

*PANTEXISM*  
**DESCRIPTION**

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## EXECUTIVE SUMMARY

The ultimate goal of Pantex's Integrated Safety Management (ISM) program is to achieve a strong Nuclear Explosive Safety culture. This requires active implementation and effective integration of all safety, environmental, security and quality programs addressing the most hazardous operations to those involving office work.

The first step in this endeavor is to revitalize Integrated Safety Management in accordance with the Department of Energy (DOE) Implementation Plan (June 2005). This involves fully implementing<sup>1</sup> the five ISM Core Functions and seven Guiding Principles<sup>2</sup> to ensure all workers are aware of the hazards of their work and to know the controls in place to ensure safety.

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<sup>1</sup> Fully implementing implies that the ISM system at Pantex is a comprehensive system that covers all Pantex work.

<sup>2</sup> The 2005 DOE Implementation Plan includes draft principles of High Reliability Organizations. These principles have been folded into the BWXT Pantex ISM Guiding Principles.

To take Pantex's ISM Program to the next step, BWXT Pantex plans to adapt the BWXT Corporate Human Performance Initiative (HPI) into the ISM system. This path will enhance the Strong Nuclear Explosive Safety culture at Pantex.

The process to accomplish this is simple:

1. Fully implement a comprehensive BWXT Pantex ISM system<sup>3</sup>
2. Continually evaluate BWXT Pantex ISM system effectiveness
3. Use the feedback to enhance safety and to improve the BWXT Pantex ISM system

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<sup>3</sup> The extent of implementation will be explicitly evaluated and used to modify approaches to achieve success.



## INTRODUCTION

The Pantex Nuclear Weapons Plant (hereafter referred to as Pantex Plant) is located approximately 17 miles northeast of Amarillo, Texas. Within the Department of Energy (DOE), the National Nuclear Security Administration (NNSA) provides programmatic direction and funding for most nuclear weapons stockpile management, research and development, facility infrastructure activities, and Environment, Safety & Health (ES&H) program implementation at the Pantex Plant. At the site level, the NNSA Pantex Site Office (PXSO) has management responsibility for the Pantex Plant. Under contract to DOE, the Pantex Plant is managed and operated by BWXT Pantex, LLC (BWXT), which has operated the Pantex Plant since 2001.

### *The Need for an Integrated Safety Management Program at Pantex*

The primary mission of the Pantex Plant is the assembly, disassembly, testing and evaluation of nuclear weapons in support of the NNSA stockpile stewardship program. Pantex also performs research and development in conventional high explosives and serves as an interim storage site for plutonium pits removed from dismantled weapons.

To support these efforts, Pantex operations involve numerous activities that must be integrated, not only across the various programs and divisions at the Plant (see Figure 1 below), but also with the design agencies and other production plants. The results of these activities are various levels of hazards that require an integrated and phased approach to provide effective control.

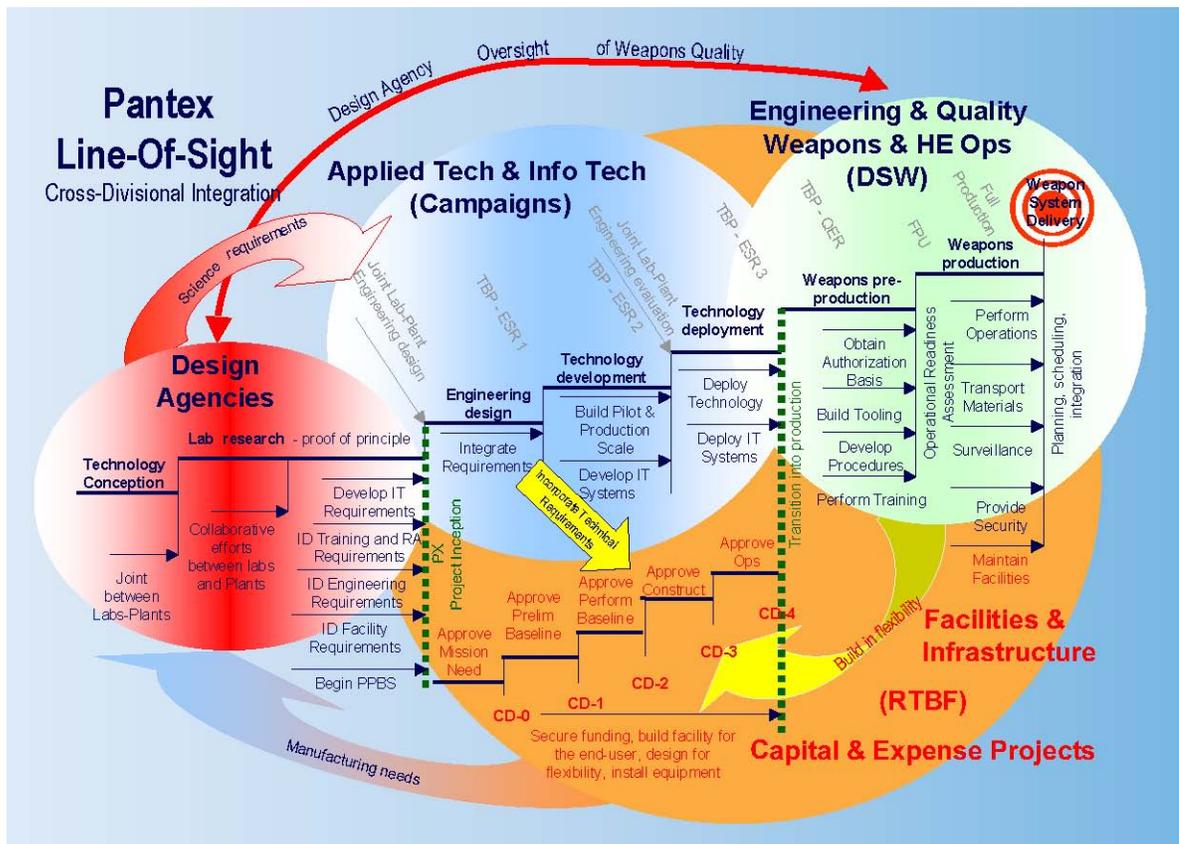


Figure 1: Pantex Line of Sight to Maintain Focus on Safety while Meeting Production

### *Maintaining Focus on Pantex Hazards*



The hazards associated with Pantex operations include a range of hazards from nuclear explosive hazards, explosive hazards, nuclear material hazards, nuclear criticality, internal and external exposures to radiation, radiological contamination, beryllium, and hazardous chemicals, to various physical hazards associated with facility operations (e.g., machine operations, high-voltage electrical equipment, pressurized systems, and noise) to office hazards.

Figure 2 shows the potential consequences of Pantex's hazardous operations in order of

severity. Around the outside of the triangle are the functional areas whose integrated efforts prevent these consequences.

While it is important to highlight and keep clearly in focus those hazards that would result in the largest consequence if not properly controlled (See Figure 2), it is also important to be aware of and control those hazards that have a higher likelihood of occurring (industrial safety hazards) which would undermine the Pantex safety posture.

**Nuclear Explosive Safety** Applies to the disassembly, evaluation, maintenance, repair and retrofit of nuclear weapons. The requirements for nuclear explosive safety are derived from DOE 452 series orders.

**Explosives Safety** Applies to the development, fabrication, testing, and storage of chemical explosives and explosive components: this applies when not covered by the definition of nuclear weapons work. This also includes activities and facilities associated with Nuclear Explosive Like Assemblies and Test Beds. Requirements associated with explosive safety are derived from the DOE Explosives Safety Manual, DOE M 440.1-1.

**Nuclear Safety** Applies to hazards associated with nuclear material packaging, handling, staging, storage, or testing operations that the definition of a non-reactor nuclear facility as defined by 10 CFR 830.3(a), and could include activities and facilities associated with Nuclear Explosive Like Assemblies and Test Beds.

Because of these inherent high consequence operations and those involving industrial and office work, BWXT Pantex commits to fully implement Integrated Safety Management (ISM), to evaluate the effectiveness of ISM and to use this feedback to continually improve the BWXT Pantex ISM system.

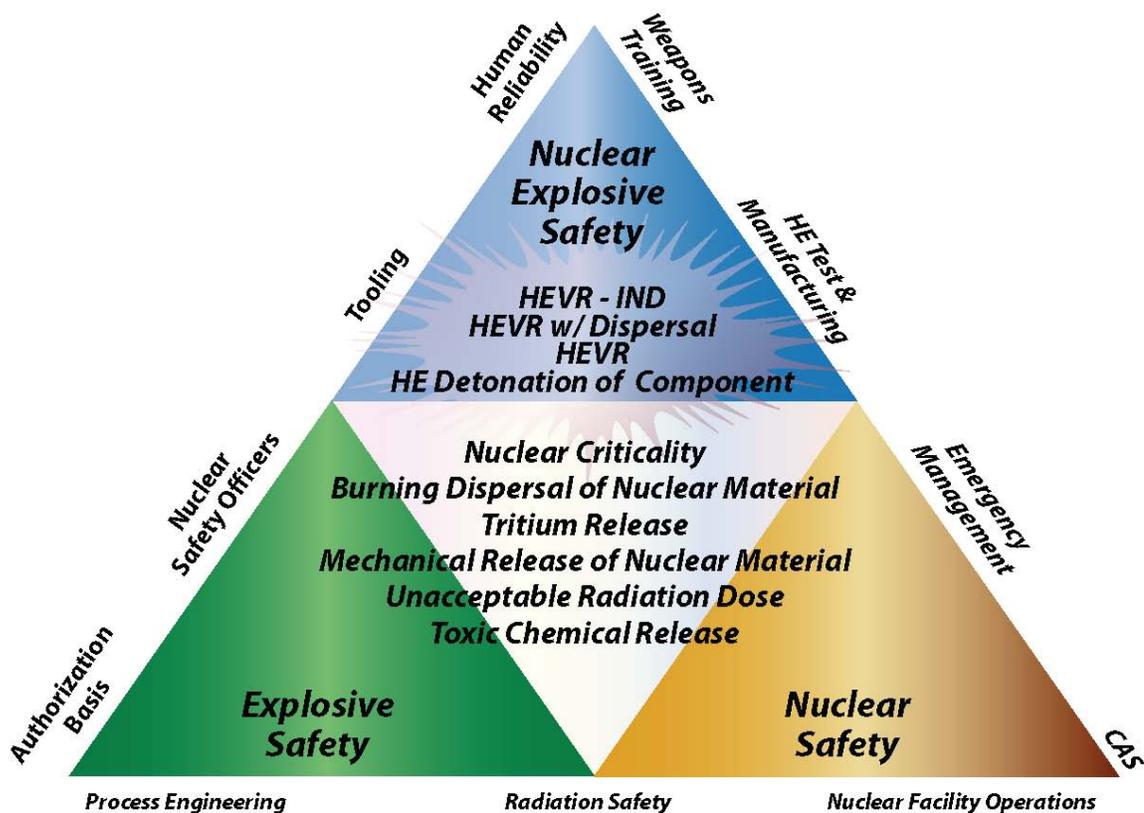


Figure 2: Maintain Focus on Pantex High Consequence Operations

### *Pantex ISM Goal and Tools to Achieve Goal*

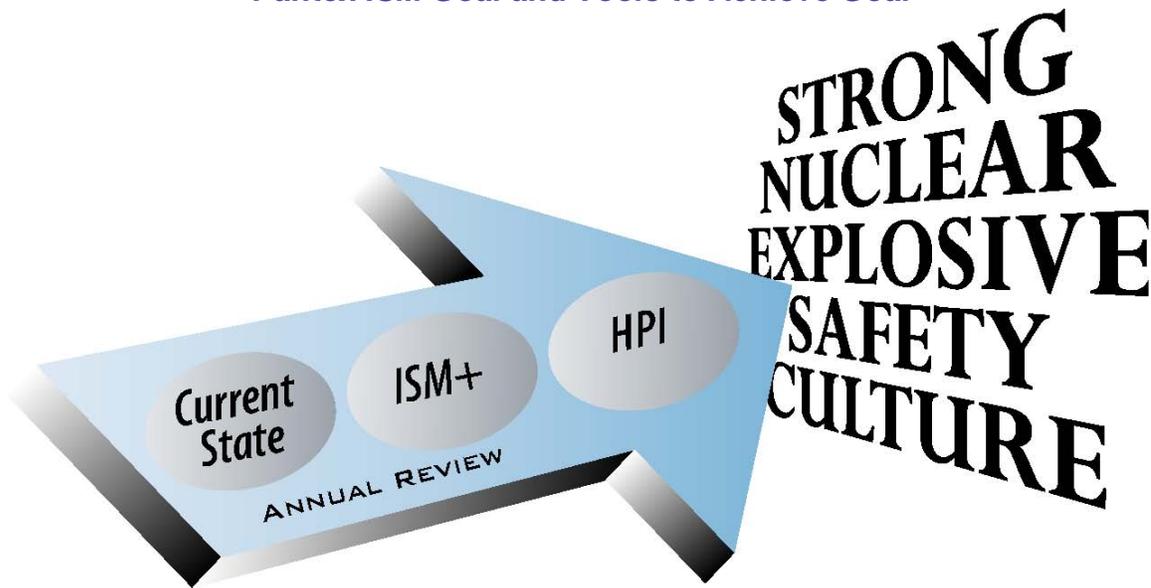


Figure 3: Pantex Goal for ISM a Strong Nuclear Explosive Safety Culture

The ultimate goal of Pantex's ISM Program is to develop a Strong Nuclear Explosive Safety Culture. This includes revitalizing ISM in accordance with the 2005 DOE Implementation Plan using the five ISM Core Functions and enhanced seven Guiding Principles, (labeled as ISM+ in Figure 3). Future steps to further enhance the ISM+ process include an adaptation of the BWXT Corporate Human Performance Initiative (HPI) on the path to a Strong Nuclear Explosive Safety Culture.

Pantex's Integrated Safety Management Description (ISMD) is one of four ISM-related documents published by BWXT Pantex. The ISMD lays the foundation for Pantex's safety management program. The four documents/chapters and their purpose are provided below:

#### **ISM Description Document**

- Describes the "as-is" state of Pantex ISM with gaps identified in FY05

#### **ISM Policy**

- Describes desired "future intermediate-state" of Pantex ISM (ISM+)
- States management expectations (5 Core

Functions, 7 Guiding Principles)

- Requires performance indicators to demonstrate ISM implementation
- Requires performance indicators to evaluate ISM effectiveness
- Establishes the expectation to use performance indicators to continually improve safety

#### **ISM Guide**

- Provides list of requirements for "evidence" of ISM Implementation
- Provides examples of performance indicators to be used by line management to demonstrate ISM implementation
- Provides examples of performance indicators to be used by line management to demonstrate ISM effectiveness

#### **A Culture of High Reliability**

- Describes the required behaviors and environment for the High Reliability Organization "future end-state" of Pantex ISM

*Pantex Comprehensive ISM System*

The ISMD describes the methods and activities BWXT Pantex employs to manage and oversee implementation of the ISM Program at Pantex. ISM applies to all work conducted at Pantex. (See Comprehensive Pantex Integrated Safety Management Process Figure 4 below.) Pantex uses the facility hazard classification process<sup>4</sup> to determine the level of formality required to address the hazards associated with each Pantex operation. Nuclear hazardous operations directed by 10 CFR 830 are covered by the Pantex Authorization Basis(AB) ISM process. High, moderate and low non-nuclear hazardous operations (to include high explosives) are covered by

Process Safety Management (PSM) as outlined in 20 CFR 1910.119. All industrial, environmental and personnel safety hazards are covered by Pantex ES&H safety programs.<sup>5</sup>

The term "safety" includes all aspects of environment, safety, health, security, and quality management, including pollution control and waste minimization. The ISMD is BWXT Pantex's description of ISM that satisfies requirements of DOE Safety Management System Policy (DOE P 450.4) and Contract No. DE-AC04-00AL66620, Clause H-40 Environment, Safety, Health.

<sup>4</sup> STD 3035 PX Facility Hazard Classification to be replaced by WI 02.01.06.01.01 How to Identify Hazardous Operations (Facility Categorization)

<sup>5</sup> Note highlighted in the figure in red are gaps in the current Pantex ISM system in ensuring seamless hand-offs between AB and ES&H industrial safety processes and PSM and ES&H industrial safety processes.

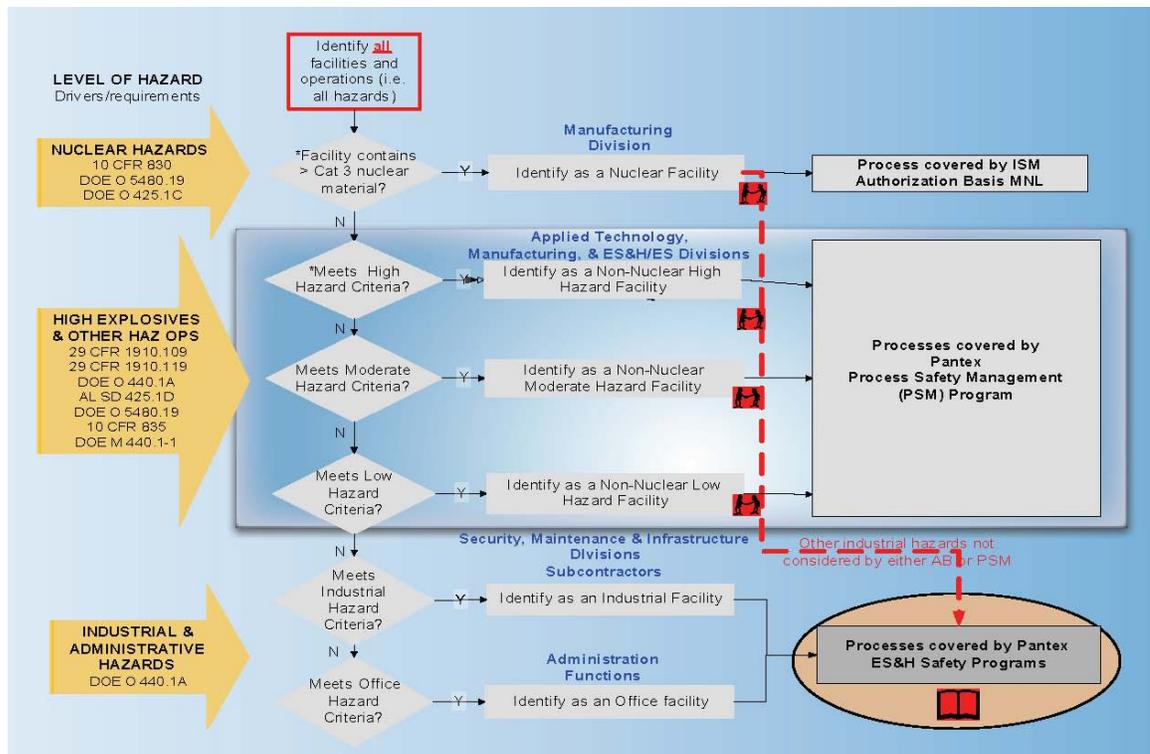


Figure 4: Pantex ISM - A Comprehensive Program With A Graded Approach

## ISM GUIDING PRINCIPLES & CORE FUNCTIONS

In light of the many diverse Pantex work hazards, BWXT Pantex commits to perform all work safely, in a manner that strives for the highest degree of protection for employees, visitors, the public and the environment, in keeping with the nature and scale of the work. In addition, BWXT Pantex seeks continuous improvement to sustain excellence in the quality of all Plant processes and products. To achieve these goals, BWXT Pantex has adopted the following ISM Principles, which are reflected in the Plant's policies and procedures. Managers and supervisors are expected to incorporate these principles into the management of their work activities. While these principles apply to all work, the exact implementation of these principles is flexible and can be tailored to the complexity of the work and the severity of the hazards and environmental risks.

### *ISM Guiding Principles*

#### **1. Line Management\* Responsibility for Safety**

Line management is responsible for the protection of the public, the workers and the environment. More specifically, BWXT Pantex line managers are responsible for integrating ES&H into work, and for ensuring active communication up and down the management line and with the workforce.

#### **2. Clear Roles and Responsibilities**

Clear and unambiguous lines of authority and responsibility about ISM principles are established and maintained at all organizational levels within BWXT Pantex and for the work performed by its contractors. At BWXT Pantex, this principle is manifested in contract language, position descriptions, work authorization documents and other agreements about ES&H.

#### **3. Competence Commensurate with Responsibilities**

Personnel possess the experience, knowledge, skills and abilities necessary to discharge their responsibilities. BWXT Pantex management will take steps to assure that the appropriate depth and breadth of technical talent in ES&H is available, and that the Plant has in place the means for periodically

evaluating competencies. Competence includes training, experience and fitness for duty.

#### **4. Balanced Priorities**

Resources are effectively allocated to address ES&H, programmatic and operational considerations. Protecting the public, workers and the environment is a priority whenever activities are planned and performed.

#### **5. Identification of Safety Standards and Requirements**

Before work is performed, the associated hazards are evaluated and an agreed-upon set of standards and requirements are established. These standards, properly implemented, provide adequate assurance that the public, workers and the environment are protected from adverse consequences.

The level of the hazard dictate the level of formality used to analyze the hazards and to establish controls. As previously discussed (Figure 4), Pantex uses the facility hazard classification process to determine the level of formality required to address the hazards associated with each Pantex operation. Nuclear hazardous operations are covered by the Pantex Authorization Basis ISM process. High, moderate and low non-nuclear hazardous operations (to include high explosives) are covered by Process Safety Management (PSM). All industrial, personnel safety, and environmental hazards are covered by Pantex ES&H safety programs.

Safety Standards and requirements are currently flowed into the S/RIDS. Over time, the Pantex Business Requirements and Instruction Network (BRAIN) will pick up those requirements and integration of those requirements to maintain Pantex's safety systems, (shown schematically in Figure 5.) The BRAIN has a web-based interface that allows users to navigate through the business model to locate needed documents. This interface facilitates linking to supporting information, other databases, and processes such as cross referencing the respective Program Description document or work instruction with the associated ISM Core Function and ISM Guiding Principle.

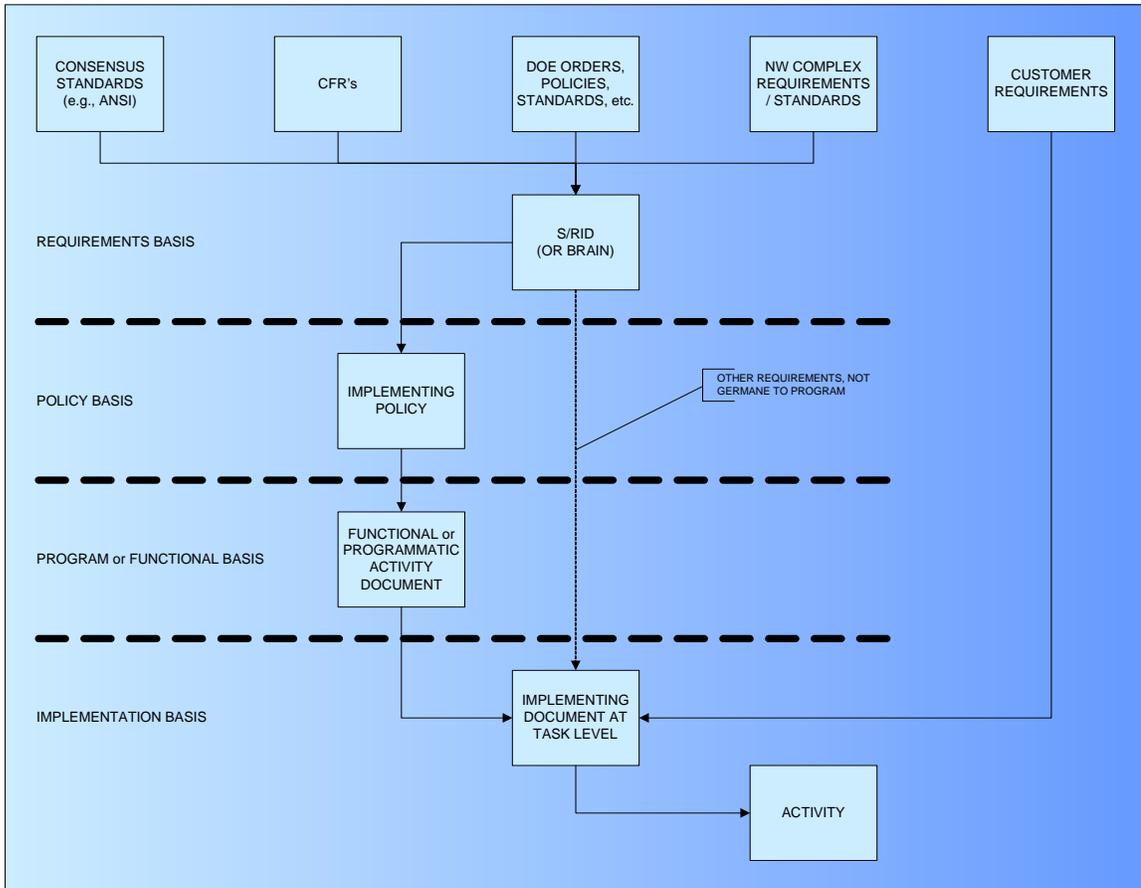


Figure 5: Flow Down of Safety Requirements

## 6. Hazard Controls Tailored to Work Being Performed

Administrative and engineering controls to prevent and mitigate hazards are tailored to the work and associated hazards being performed. BWXT Pantex recognizes that tailoring requires judgment to be exercised at the appropriate decision level.

## 7. Operations Authorization

The conditions and requirements that must be satisfied for operations to be initiated and conducted are clearly established and agreed upon. The level of formality for authorizing operations is dependent on the level of hazard and the requirements. For example, for nuclear operations (Figure 6), the start-up and authorization process is dictated by 10 CFR 830 and DOE O 452.1. Operations authorization is maintained using the change control process established to maintain the safety basis authorized by NNSA.

### \*Line Manager Definition

Managers are those individuals who are responsible for one or more employees or facilities. All managers are responsible for the safe conduct of work. This includes translating missions into work tasks, setting expectations, prioritizing tasks, identifying preliminary hazards, approving and implementing controls and developing program, project, or work plans that outline resources, priorities, schedules, and tasks balanced against risks/benefits. Safety and staff organizations support and advise management in making decisions. A "line manager," as commonly used when referring to "line management," represents a subset of managers who are in a direct chain from the General Manager to the workers who execute mission work. Within the context of the Integrated Safety Program, there is no distinction between a manager's and line manager's safety responsibilities; the only difference is the scope of work.

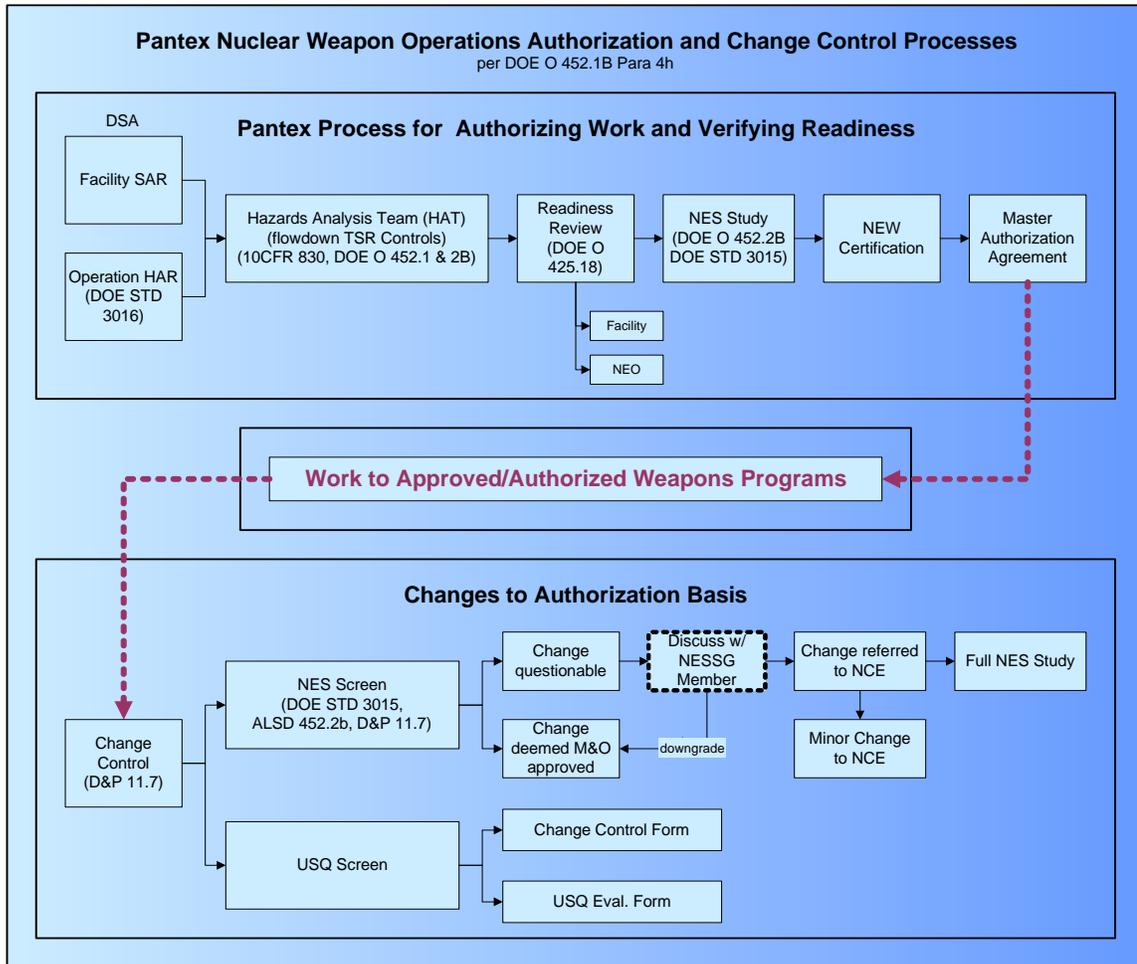


Figure 6: Example of Operations Authorization Based Upon the Level of Hazard (Pantex Nuclear Operations Authorization Process)

### ISM Core Functions

These guiding principles are implemented through the following ISM Core Functions that must become a part of every aspect of work at BWXT Pantex:

**1. Define the Scope of the Work**

Missions are translated into work, expectations are set, tasks are identified and prioritized, and resources are allocated.

**2. Identify and Analyze the Hazards**

Hazards associated with the work are identified, analyzed and categorized and made available to the workforce.

**3. Develop and Implement Hazard Controls**

Applicable standards and requirements are identified and agreed-upon, controls to

prevent/mitigate hazards are identified, the safety envelope is established, and controls are implemented.

**4. Perform Work within Controls**

Readiness is confirmed, and work is performed safely.

**5. Provide Feedback and Continuous Improvement**

Feedback information on the adequacy of controls is gathered; opportunities for improving the definition and planning of work are identified and implemented; line and independent oversight is conducted; and, if necessary, regulatory enforcement actions occur.

## ***High-Reliability Principles for Effective Safety Management System Implementation***

Based on experience and learning over the past 10 years since the inception of Integrated Safety Management, the following four supplemental high-reliability principles have been developed. BWXT Pantex has integrated these high-reliability principles into the BWXT Pantex ISM Guiding Principles, to help develop the appropriate environment for the effective implementation of Integrated Safety Management (ISM) for 2005 and beyond:

### **1. Highly-Reliable Operational Performance**

Plant organizations achieve sustained, high levels of operational performance, encompassing all DOE and contractor activities to meet mission, safety, productivity, environmental and other objectives. High-reliability is achieved through a focus on operations, quality decision-making, open communications, deference to expertise and systematic elimination of errors.

### **2. Individual Attitude and Responsibility**

Every individual accepts responsibility for safe Pantex mission performance. Individuals demonstrate a questioning attitude by challenging assumptions, investigating

anomalies, and considering potential adverse consequences of planned actions. All employees are mindful of conditions or activities that can have an undesirable effect on safety.

### **3. Performance Assurance**

Competent, robust, periodic and independent oversight is an essential source of feedback that verifies expectations are being met and identifies opportunities for improvement. Performance assurance activities verify whether standards and requirements are being met. Performance assurance through conscious, directed, independent reviews at all levels brings fresh insights and observations to be considered for safety and performance improvement.

### **4. Organizational Performance Improvement**

The organization demonstrates excellence in performance monitoring, problem analysis, solution planning and solution implementation. The organization encourages openness and trust, and cultivates a continuous learning environment.

## ***Integration of Core Functions and Principles at Each Level of Work***

The ISM Core Functions provide the mechanisms of Pantex's Integrated Safety Management System. The Core Functions define how Pantex's safety management functions are performed. The Guiding Principles and HRO Principles are the fundamental policies that guide Pantex actions from the development of safety directives to performance of work. The Principles are integrated in the respective Core Function.

The ISM Core Functions, ISM Guiding Principles, and the HRO Principles apply at all levels of the Plant: at the Plant level, the division or department level, and at the project, task or work planning control level (Figure 7). Each level must have a defined process that is integrated with the other levels. This ensures safety and provides feedback about the effectiveness of the

overall Plant ISM system.

**Plant Level** represents the work of operating Pantex and is authorized by the prime Contract between BWXT Pantex and DOE/NNSA.

**Division/Department Level** represents the work of providing and maintaining facilities and equipment to support the missions of Pantex: Nuclear Weapons, Explosives and Nuclear Material operations.

**Project, Task, Work Planning or Subcontract Level** represents work/activities on individual mission projects.

In addition to integrating ISM at each level of the Plant, Quality Assurance, Integrated Safeguards & Security Management and Environmental Management must be integrated into Pantex's ISM system.

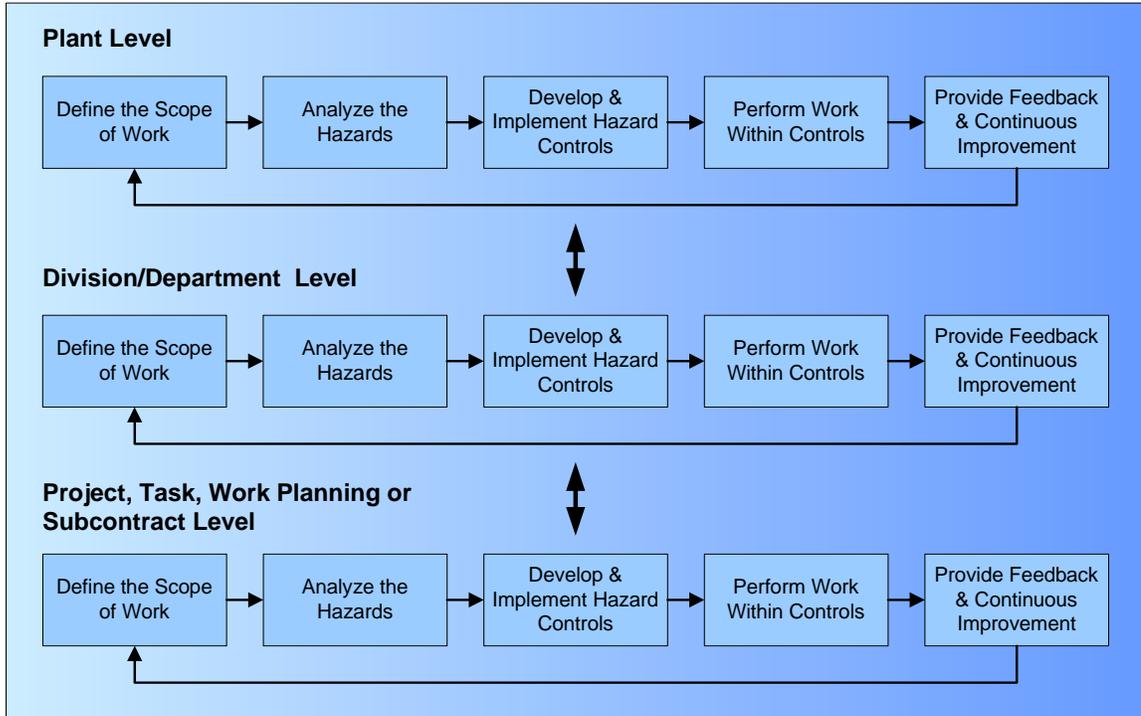


Figure 7: Pantex Uses the ISM Core Functions at Each Level

The Pantex ISMD describes how these Core Functions and Principles are addressed at the three levels and how activities involving BWXT Pantex contractors are managed for ES&H concerns. The Plant level description will be presented as part of the ISMD.

Specific Division and Task Level ISM processes and measures of effectiveness, highlighted in the ISMD, are to be developed and maintained by each respective division based upon the level of hazard.



### Steps to Achieve Pantex ISM Goal

Because of Pantex hazards, BWXT Pantex commits to:

- 1) Fully implement ISM
- 2) Continually evaluate BWXT Pantex ISM effectiveness by evaluating the performance at each level of the ISM System and using this feedback to
- 3) Continually improve the BWXT Pantex ISM system.

BWXT Pantex defines an effective ISM framework as:

- 1) A strong safety culture with positive worker attitudes and effective supervision
- 2) Clear and concise requirements with defined and documented processes to execute those requirements with defined measures to determine the effectiveness of the implementation/execution
- 3) Documented evidence of effectiveness with appropriate tracking, trending and data interpretation (in all four levels shown inside the pyramid in Fig 8)

4) Documented continuous improvement based upon effectiveness feedback.

Each level of organization at BWXT Pantex will be evaluated (Figure 8) to determine:

- 1) How well the ISM is being implemented<sup>6</sup>
- 2) How effective their ISM processes are<sup>7</sup> and
- 3) How safety is increased and how improvements in the Pantex ISM system are developed and implemented based upon this feedback.

<sup>6</sup> Using DOE Requisites Environment for Effective Implementation of Integrated Safety Management (ISM) Systems June 2005. Refer to ISM Guide.

<sup>7</sup> Using Indicators of Changing Performance Institute of Nuclear Power Operations, December 2001, INPO 01-005 as a guide. Refer to ISM Guide.

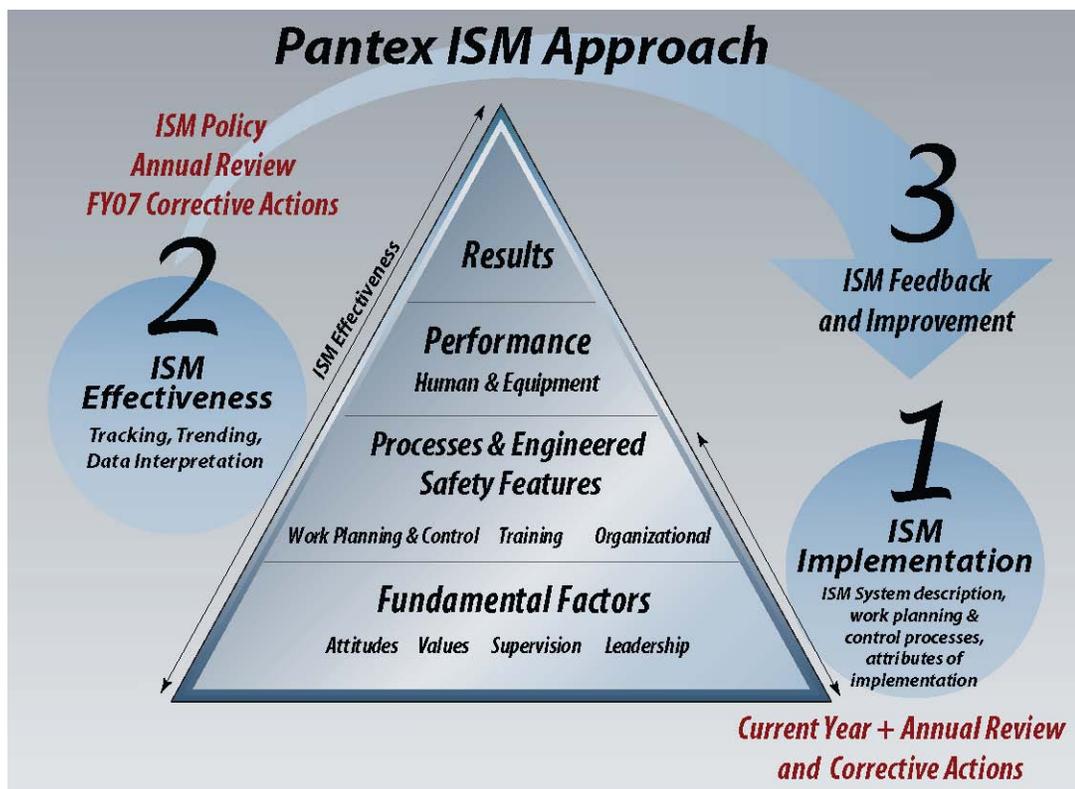


Figure 8: Steps to Achieve Pantex ISM Goal



Using the Pantex ISM Guide, "Measures To Evaluate ISM Implementation and ISM Effectiveness," BWXT Pantex will perform an annual self-assessment review of the effectiveness of ISM and evaluate the level of continuous improvements.

Based upon a measure of success, BWXT Pantex will annually declare that ISM is effectively implemented. Annual ISM declarations will be provided to PXSO.

Annual ISM declarations will provide a detailed basis that includes:

- Annual management meetings with workers to emphasize the importance of safety and to obtain direct feedback on BWXT Pantex ISM effectiveness

- An ISM review
- Task-level ISM reviews, and
- Pertinent feedback data from a variety of mechanisms to include performance indicators and corrective actions.

BWXT Pantex annually reviews the upcoming year's safety performance objectives, performance measures, and commitments using the Pantex ISM Guide, "Measures To Evaluate ISM Implementation and ISM Effectiveness."

## ISM CORE FUNCTIONS AT THE PLANT LEVEL

At the plant level, the ISM core functions are addressed through Plant-wide policies and procedures. The most significant publications in this context are:

- DIR-0001, Roles & Responsibilities;
- BRAIN, ES&H Requirements Flow Down into Plant Program Documents and Work Instructions;
- CD-00079, the Pantex Quality Assurance Program Description (QAPD);
- CD-0001, Pantex Plant's Environmental Management System Description (EMSD);
- PD-02.02.02.06, What is Pantex Integrated Safeguard and Security Management Policy (ISSM);
- CAS, the Pantex Contractor Assurance System Plan;
- MNL-RS-0001, the Pantex Radiological Control Manual.

### Define the Scope of Work

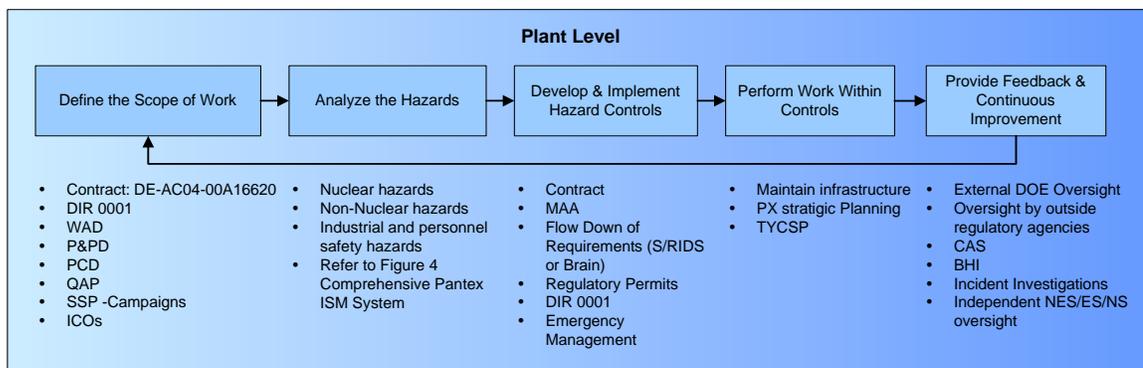
The scope of work at Pantex comes through the respective program (e.g. DSW, RTBF, EM, or Campaigns). As an example, for DSW, defining the scope of work for the nuclear weapons mission begins with the submittal of the Nuclear Weapons Stockpile Memorandum by the Secretaries of Defense and Energy to the President through the National Security Council. Once signed, the

Memorandum becomes the Nuclear Weapons Stockpile Plan.

The plan is then returned to the Security Council for assignment of a Presidential Decision Directive number, and distribution back to the Secretaries. Upon receipt, the Secretary of Energy forwards the plan to the Assistant Secretary for Defense Programs.

It is the Secretary's responsibility to convert the plan to the Production & Planning Directive (P&PD), which is then forwarded to the DOE/NNSA as the primary document defining the nuclear weapons complex workload. The P&PD is converted by DOE/NNSA into Program Control Documents (PCD) for each weapons program. Control Documents for each weapon program are combined with the Quality Assurance Production Plan (QAP) and any special letters from DOE/NNSA to become the "directed workload."

The scope of work for Pantex is established at the corporate level by the operating Contract between BWXT Pantex and DOE/NNSA (DE-AC04-00AL66620). The Contract defines Pantex, as an entity, and the operating boundaries and requirements of the work BWXT Pantex performs for its clients. As such, the operating Contract is the site-level authorization agreement. Similar processes are followed for the RTBF, EM, and Campaign programs.



Following DOE's authorization of Pantex missions, the General Manager establishes mission performance objectives, resource targets and charters for BWXT Pantex organizations. Program Directors and Division Managers determine the specific work to be accomplished in order to meet those missions. Program Managers assure that specific work activities are executed as planned and scheduled. DOE expectations, BWXT Pantex's capabilities, safety priorities and available resources should be explicitly considered in defining the scope of work to be performed. Activities are prioritized to assure that resources are most effectively applied while safety is being maintained. Management leadership roles and responsibilities for Program Directors, Division Managers and Program Managers are defined in Policy Directive DIR-0001, "Roles and Responsibilities for the Management and Operation of the Pantex Plant."

### ***Identify and Analyze Hazards***

It is BWXT Pantex's policy that safety take top priority, and that the workplace be free of recognized hazards that might endanger the health and safety of employees, the public and the environment. Employees are encouraged to report and discuss safety concerns noted during safety meetings and pre-job briefings. Additionally, employees are charged with the responsibility to report any/all hazards, and unsafe acts and conditions immediately to the appropriate supervisor or the Safety Hotline (ext. 4441).

As such, ISM applies to all work conducted at Pantex (Figure 4). Pantex uses the facility hazard classification process<sup>8</sup> to determine the level of formality required to address the hazards associated with each Pantex operation.

### ***Nuclear Operations***

Nuclear hazardous operations directed by 10 CFR 830 are covered by the Pantex AB ISM process. The Pantex Plant Integrated Safety Management Authorization Basis Manual applies to all projects, programs and activities

across the Plant specifically requiring an Authorization Basis (Hazard Category 2 nuclear operations; facilities, nuclear materials, and nuclear explosive operations) by the DOE/NNSA/PXSO.

The AB Process is structured according to the core safety management functions of ISM as they are applied to the development, implementation and maintenance of AB documents.

Hazard analysis results and the associated controls that are derived from those analyses for the Site, Facility and Nuclear Explosive Programs are documented and approved by DOE/NNSA/PXSO. These documents constitute the Authorization Basis for conducting Nuclear Explosive Operations and Nuclear Material Operations. Authorization Basis documents contains the results of the hazard identification/evaluation and control selection for Site, Facility and Nuclear Explosive Programs.

### ***Non-Nuclear Hazardous Operations***

High, moderate and low non-nuclear hazardous operations (to include high explosives) are identified in the facility hazard classification process and reported in RPT MIS 302305, Pantex Facility Hazard Classification (Plant Standard STD-3035). Process Safety Management (PSM), as outlined in 20 CFR 1910.119, covers these non-nuclear operations.

The PSM approach incorporates Process Hazard Analyses (PHAs) to analyze the hazards associated with the process (and facility). This enables a thorough review to establish a safety umbrella that imparts the necessary degree of assurance that the process is being operated safely. PSM institutes controls at a level low enough to assure a high degree of worker, as well as facility and equipment protection. Employees from all levels are involved in the development of PHAs. The PSM approach examines the administrative and engineered controls that are major contributors to process and facility safety, which provide defense toward prevention and mitigation of potential accidents.

<sup>8</sup> STD 3035 PX Facility Hazard Classification to be replaced by WI 02.01.06.01 How to Identify Hazardous Operations (Facility Categorization)

### ***Industrial and Personnel Safety***

Industrial, personnel safety, and environmental hazards are covered by Pantex ES&H safety programs. Job Safety & Health Analyses (JSHAs) are an accident prevention tool used to review job methods. JSHAs identify hazards associated with the layout of Plant facilities and the design and operation of machinery, equipment, tools, workstations, tasks or processes. JSHAs are performed by supervisors and involved employees working together. The appropriate ES&H discipline provides assistance as needed. The supervisor discusses the job hazards and hazard control methods with all personnel involved in that job after JSHAs are completed. Employees are given the opportunity to provide comments on the JSHA if they think hazards have not been appropriately addressed.

### ***Develop and Implement Controls***

Division Managers coordinate with Program Directors and Program Managers to exercise the following responsibilities in the implementation of controls:

- Coordinate overall training activities to assure consistency, uniformity and scheduling to meet the overall training needs of the plant.
- Assure that design and administrative hazard control requirements are translated into procurement, construction, operation, maintenance, and acceptance testing specifications, instructions, documents, drawings or procedures.
- Assure roles, responsibilities and authorities for integrated safety management functions are clearly defined, documented, and implemented through technical and administrative procedures.

Using information available from process-specific hazard analyses, and other controls specified by facility or site-level requirements, line managers work with facility managers to establish the controls necessary for performing the work safely. The line manager identifies the facility (or facilities) in which project work will be performed. The line manager, in coordination with the program manager, is responsible for assuring ES&H hazards associated with the proposed work

are within the limits of the Authorization Agreement authorization basis. The line manager uses the building standard (AB) or facility procedure to verify that work to be performed is within the operating boundary of the facility. Potential for accidents and emergency situations are identified and analyzed.

For projects that introduce new hazards into the facility, the line manager involves facility management, technical managers (e.g., environmental, engineering) and ES&H/ES staff to assist in identifying any special considerations that might affect the safety of conducting the work in the given facility. When new controls are necessary to safely execute a project, they are identified and costed as part of the project. These new controls may require modifying the authorization basis (Plant Standard STD-3071).

After the AB is developed, it is included in an Authorization Agreement between DOE/NNSA/PXSO and BWXT Pantex. The Master Authorization Agreement defines and establishes the relationship between the Safety Basis, Authorization Basis, Plant programs, and Authorization Agreements for facilities and nuclear explosive operations. Authorization Agreements document key terms and conditions (controls and commitments) between DOE/NNSA/PXSO and BWXT Pantex under which work on Hazard Category 2 nuclear explosive programs and nuclear material operations are authorized. This agreement provides DOE reasonable assurance regarding the adequacy and effectiveness of the overall system of safety management at Pantex.

The facility authorization basis identifies the operating boundary or envelope for facilities. This envelope serves to limit quantities and types of materials and hazards that may be brought into a facility. The envelope is designed to assure that: 1) facility ES&H systems are able to appropriately control or mitigate identified hazards; 2) the facility meets defined environmental permit conditions; and 3) the public, the environment and workers are protected.

To operate within contractual authorization agreements, Pantex has developed a set of management systems that establish and maintain an agreed upon standards and requirements base and a set of clearly delineated operational practices for all work.

Each management system provides appropriate standards and, if necessary, more detailed site-level requirements, procedures, guidance and training needed to implement each management system. The list of contractually binding standards and requirements, which establishes the technical basis for the site's authorization agreement, is contained in the operating Contract.

### **Facility Controls**

Building standards or facility procedures include identification of facility controls and personnel roles and responsibilities for maintaining the integrity of the facility-operating boundary. This enables oversight of facility and administrative controls for mitigating ES&H hazards. These standards typically supplement a General Safety Requirements Standard depending on the type or hazard category of the facility (e.g., 7-5000, 6-5000).

Facility work consists largely of facility management, operations, maintenance and strategic facility investments. Facility and building managers are central to integrating, coordinating and controlling the various aspects of facility-related work. Procedures and administrative and operational limits encompass the requirements that personnel must meet for an activity to proceed safely, with a high degree of confidence of success. The scope of strategic facility investment activities is defined in a formal project request through Plant Standard STD-9027, "Facility Project Requests." The basic elements of the facility operational, maintenance, and strategic facility investment work definition processes are specified in DOE Order 413.3 Project Management Implementing Plan (PMIP) Manual (MNL-293000) and Plant Standard STD-5016, "Maintenance Work Control System."

Building Standards or Facility Procedures (Plant Standard STD-0143) define the scope of work at the facility level. These standards/procedures define operating boundaries and requirements (including roles and responsibilities) for each facility, which are used to assure that facility operating boundaries fall within the boundaries as defined by the operating Contract and its safety basis. The facility authorization basis (Plant Standard STD-3071) identifies the requirements and controls necessary to safely operate a nuclear facility, and protect the workers, the public, and the environment.

The facility authorization basis is the collective set of documents, directed or approved by the DOE/NNSA/PXSO, relating to the control of hazards at a facility (including design, engineering analyses and administrative controls), relied upon to conclude that activities at a facility can be conducted safely. In accordance with the operating contract, DOE/NNSA/PXSO approval of the authorization basis is required prior to performing work in a nuclear facility.

### **Document Management Controls**

A formalized document control system provides for development, approval, maintenance and controlled distribution of management control documents. The system is designed to assure that only current approved documents are available for use.

The Management and Operating Contract is a safety flow down requirement (Figure 5) for federal and state laws, industry codes and standards, and DOE Orders and related documents, which establish the basis for control. As requirements are directed or authorized by DOE, they are flowed to lower tiers of the hierarchy for implementation through process documents, work instructions, plant standards, manuals or other management controlled documents, which are then cross-referenced with S/RIDs and/or BRAIN, as appropriate.

Subsequent tiers include Policy Directive DIR-0001, which establishes the roles and responsibilities and identifies the scope of work of each Program Director and Division Manager at the Pantex Plant; Process Documents, which describe the process flow steps; and Work Instructions.

### **Training**

The basic premise of Pantex safety and health training is "Safety first." Employees are responsible for the safety of the public, their fellow workers, themselves and the environment.

New employees receive formal safety and health orientation and training. In addition to presentations on plant security, employee benefits and business ethics issues, employees receive 24 hours of initial General Employee Training (GET). During this training, employees are instructed on safety, environmental compliance, and health topics (e.g., Integrated Safety Management, hazard

communication, industrial safety, quality, radiation safety, fire protection, explosive safety and emergency procedures). They also receive instruction on the importance of Conduct of Operations and adherence to written procedures. Emphasis is placed on identifying, reporting and reducing workplace hazards. Subcontractors and visitors who will work at Pantex for more than 10 days are required to attend initial GET before being allowed unescorted access to plant facilities.

Prior to obtaining a security clearance, new employees are required to tour their work area with their supervisors, following initial GET. If their work area is inside the Protected Area (PA) or the Material Access Area (MAA), this tour will be conducted following receipt of security clearance. Supervisors use a "Safety Orientation and Training" worksheet as a guide to point out safety features and potential hazards of the work area.

Job specific training begins after new employees complete their initial orientation and training. Qualified instructors train and evaluate personnel performance in the work areas. Pantex offers a variety of training including training seminars, formal classroom instruction, performance based training, and on-the-job training and courses at Amarillo College.

In addition to attending initial and continuing GET, supervisors attend general and job-specific training such as formality of operations and accident reduction techniques.

### ***Perform Work Within Controls***

Work on individual project tasks involving identified hazards/risks is authorized when: 1) the DOE/NNSA/PXSO approves the expenditure of funds by approving the WAD, and 2) the Startup/Restart Approval Authority, as determined by Plant Standard STD-7301, authorizes the conduct of work. The startup and restart requirements apply to initial startup, modification or restart of any nuclear, nuclear explosive or hazardous non-nuclear facility or operation. The BWXT Pantex process for startup and restart of activities encompasses the:

- Declaration of readiness by the appropriate Division Manager and,
- Conduct of independent BWXT Pantex Readiness Reviews (Operational Readiness Reviews and Readiness Assessments).

Readiness Preparation and Review, Standard STD-7301, applies to all organizations and to all nuclear, hazardous non-nuclear activities, including explosives facilities/activities, and nuclear explosive operations for which BWXT Pantex has environment, safety, and health responsibility. These activities are evaluated as to the need for performing a readiness review in accordance with the requirements defined in the standard.

The Project/Facility Manager assigned responsibility for management of the startup/restart prepares the activity for safe operations. As a part of the readiness preparation process a Readiness Verification Program (RVP) review of the elements of the activity is conducted, in accordance with Plant Standard 7301, to confirm the project has achieved readiness. When the RVP is complete, the Team Leader recommends to the responsible Division Manager to declare readiness for the Contractor Readiness Review.

The Readiness Review and Assessment Group, using trained and qualified personnel, independent from the activity being reviewed, conducts a Readiness Review to confirm that the hazardous operation or facility can be started or restarted safely. This formal review is conducted in accordance with STD-7301.

If the Startup/Restart Approval Authority as specified in STD-7301 is accepted by DOE/NNSA/PXSO, a subsequent readiness review will be conducted by DOE/NNSA/PXSO following the requirements of DOE 425 series orders and DOE-STD-3006-2000. For nuclear explosive work, an approved Nuclear Explosive Safety Study and Design Agency approval (Engineering Release) are also required (Figure 6).

Once the Startup/Restart Approval Authority review has been satisfactorily completed, authority to commence work will be granted.

Site level work consists of maintaining the institutional infrastructure (management systems and organization structures) needed to support Pantex. The Pantex mission is documented in the Pantex Ten Year Comprehensive Site Plan and is comprised of three core areas: Nuclear Weapons, Explosives and Nuclear Material Management.

Administrative procedures describe policies, roles, responsibilities, accountabilities, employee empowerment, work standards for the conduct of mission operations, and

organizational interfaces and working relationships needed to implement effective programs that extend to all facilities, contractor and subcontractor personnel.

Mission work is only authorized/conducted according to approved and issued procedures. Strict compliance with procedures is mandatory, without exception.

Employees have the authority to suspend any operation or activity that has actual or potential unsafe working conditions, actual or potential violation of standards or regulations, causes or has potential to cause environmental damage, or produces a deficiency in the quality of production. In the event that operations are suspended, employees are instructed to notify their supervisor, Facility Representative and/or the Operations Center. The suspension is investigated to determine what corrective actions need to be implemented before reinstatement of the suspended operation/activity is approved.

Work permits are used as management controls for performing work safely in hazardous environments. Permits are predefined to control work in radiological areas, nuclear and explosive areas, construction areas, confined spaces, excavations and where hot work is conducted in the presence of combustibles (e.g., Radiation Work Permit, Confined Space Permit).

### ***Maintenance***

A comprehensive maintenance program preserves and restores facility systems, equipment and components to assure Structures, Systems and Components (SSCs) important to safe and reliable plant operations are capable of fulfilling their design and safety functions. The work control system is designed to assure that maintenance activities are performed safely, correctly and in a timely manner; that activities are properly verified and adequate facilities, equipment, tools, parts and materials are available when needed. Processes are provided to monitor and assess performance; identify and resolve deficiencies; and evaluate adverse events. Post-maintenance testing assures components and systems are functional prior to returning to service. Maintenance activities comply with technical bases and safety requirements communicated by engineering and various safety and environmental

functional areas.

### ***Provide Feedback And Continuous Improvement***

An integrated assessment approach to management assessment relies on the application of self-assessments, audits, performance indicators, trend analysis, and external oversight to critically review performance. Assessment activities include staff identifying unsafe work concerns, line self-assessment of compliance with requirements, lessons-learned from abnormal operating experiences, Environment, Safety & Health program self-assessments, and comprehensive independent assessments and audits of performance, controls, and management systems.

Findings, conclusions and recommendations identified as a result of assessments and reviews are documented and necessary corrective and preventive actions identified and undertaken. Management assures these actions have been implemented and that there is systematic follow-up to assure effectiveness.

The Quality and Performance Assurance Division has formalized the analysis and evaluation of operational performance data, occurrence reports, non-conformance reports, safety indicators and business indicators to detect trends in internal and external assessments. Self-assessment results at the facility and activity level are included in the analysis. The results of this effort establish an integrated site-wide approach to the identification of precursors and ISM trends throughout all mission critical operations.

Records relating to ES&H/ES documentation are identified, collected, stored and maintained to provide objective evidence of conformance to legal and other requirements (Plant Standards 1950, 2055, and 3400). These include training records, audit and inspection results, radiation dosimetry results, accident and injury statistics, exposure monitoring results, management records review, environmental monitoring and measurements results, and results of assessments and actions taken environmental monitoring and measurements, and results of assessments and actions taken.

Routine hazard analysis of jobs and processes (e.g., ergonomic surveys, industrial hygiene surveys, job safety and health

analysis, process hazards analysis) are conducted.

The Industrial Hygiene and Industrial Safety Departments conduct periodic surveys of facilities to identify potential hazards (e.g., chemical, ventilation, noise, heat, laser hazards, etc.). These surveys look for hazards related to the physical condition of facilities and work operations. Historical information related to the facility and its operations is considered during the surveys.

The following are examples of methods used to provide feedback and effect continuous improvement in mission operations:

### ***Business Health Indicators***

BWXT Pantex has implemented a set of performance metrics to monitor the health of business processes, gauge the success of process improvement efforts and drive performance enhancements. The measures cover all aspects of plant performance from financial to safety and from personnel utilization to customer commitments.

The focus of the metric process is continuous business improvement through resolution of the questions: 1) how are we performing relative to strategic goals; 2) what are the causes of the delta between our targets and our performance; 3) what are the specific business issues derived from these causes; and 4) how do we resolve these issues to improve performance. Managers are engaged in this data analysis and improvement activity on an on-going basis, including a mandatory monthly Senior Management discussion of the status of all plant business health indicators.

The metric process, as well as selected individual indicators, is modified as baselines are established, issues are more fully understood, process enhancements are implemented, goals are refined and the measurement process matures.

### ***Injury and Illness Trending***

The Industrial Safety Department tracks and trends employee injury and illness cases. The Manager of ES&H/ES briefs Senior Management on injury and illness trends, as well as traffic and construction incidents. Specifics of cases/incidents are discussed and recommendations made.

### ***Radiological Exposure Data***

Radiological Exposure Data are tracked and trended by Radiation Safety and promulgated by a monthly As Low As Reasonably Achievable (ALARA) report and Radiation Exposure report. The report provides goals and cumulative doses by areas and programs, and trends in cumulative deep dose, shallow dose and neutron dose by functional area and program.

### ***Executive Safety Committee***

On a monthly basis, the Executive Safety Council is briefed on injuries and illnesses resulting in OSHA Recordable Cases and OSHA Lost Workday Cases. The objectives of the committee are to encourage awareness, highlight problem areas and bring solutions to the table. Additional safety and health trending is performed at the department level throughout the Plant.

### ***Lessons Learned***

A Lessons Learned Coordinator reviews and analyzes operational management experiences documented in Occurrence Reports, Weapons Quality Surveys, Pantex Root Cause Evaluations, ES&H/ES Industrial Safety Observer Reports, Pantex Industrial Safety Reports, DOE/NNSA/PXSO facility Lessons Learned Program reports, DOE/NNSA/PXSO Occurrence Reporting Process System and DOE Nuclear Safety Reports. These data are trended for application at Pantex to improve operations, and provided to employees for learning purposes.

### ***Incident Investigations***

Employees are encouraged to immediately report incidents and events related to occupational injuries and illnesses, property damage, vehicle damage and near misses to their supervisor and/or the Pantex Operations Center.

Management of an incident begins immediately when an employee reports an incident or an employee reports to the Occupational Medical Department for evaluation and treatment.

Necessary information is obtained from affected individuals, witnesses, their supervisor and the incident scene as

appropriate. Safety professionals evaluate this information and an investigation is conducted as warranted. The rigor and detail of the investigation is determined by the significance of the incident.

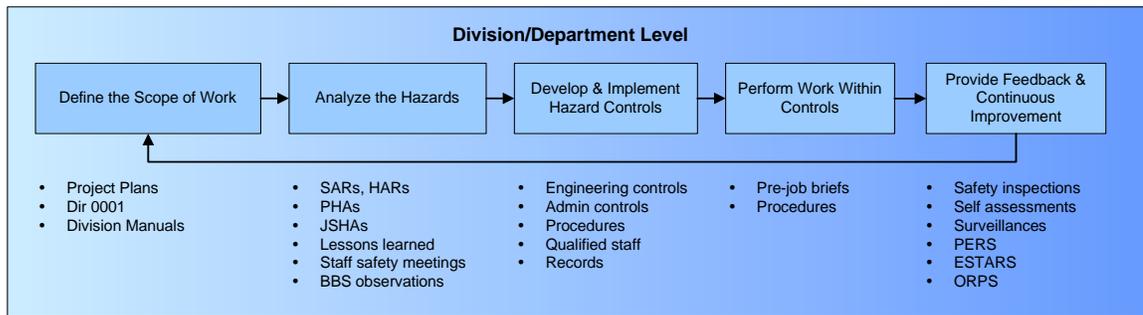
When an investigation is warranted, a safety professional assists with the investigation, analyzes investigation data, and writes a report identifying the root cause of the accident and recommends corrective actions designed to prevent recurrence. Corrective actions are tracked to completion.

### ***Environmental Objectives and Targets***

Senior managers establish environmental objectives and specific targets each fiscal year based upon the significant environmental aspects associated with Pantex activities, services and products. These objectives seek to improve the significant environmental impacts resulting from work conducted within the boundaries of the Plant. The objectives are selected considering the environmental policy, regulatory compliance, pollution prevention and other relevant factors. The EMS Coordinator tracks the objectives and reports to senior management on a quarterly basis, allowing continuous improvement in the EMS.



## ISM CORE FUNCTIONS AT THE DIVISION/DEPARTMENT LEVEL



Given the wide variety and degree of activities and hazards, and the great differences in how the divisions and departments are managed, a single ISM process at the division or project level is inappropriate. Therefore, each division or department has been requested to develop a division specific ISM plan (see ISM Guide). The Division ISM plan establishes clear expectations that BWXT Pantex managers are to take the initiative in following locally applicable ES&H rules. This provides assurance to the BWXT Pantex Plant Manager that ES&H issues are being addressed appropriately. The information below provides the framework for the Division specific ISM Plans (see Appendix A for a template of Division Integrated Safety Management Plans in the ISM Guide).

### ***Define Scope of Work***

The minimum requirements for work planning and documentation of work planning for each division are the explicit identification of hazards and controls consistent with this ISMD. Work planning at this level is rolled up to the Plant and becomes part of the BWXT Pantex Strategic Plan.

### ***Identify and Analyze Hazards***

Site and process specific hazards are identified through SARs, HARs, PHAs and JSHAs depending on the level of hazard associated with the specific operation. Potential environmental hazards are identified through NEPA EISs, EAs, and project environmental checklists for planned projects. Other environmental hazards may be identified through the JSHA process.

### ***Develop and Implement Hazard Controls***

Appropriate controls for activities at BWXT Pantex are provided for each hazard. Division ISM plans specifically address how work is reviewed at the activity or project level to determine and assure line management, supervisory and employee responsibilities. They also address qualifications and training, as well as engineering and procedural requirements. Departments that perform work potentially causing significant environmental impacts must establish, document and maintain appropriate controls prior to work initiation.

### ***Perform Work within Controls***

Formally developed, reviewed, and approved procedures, processes, and controls establish a basis by which work can be carried out under controlled conditions. Controlled conditions may include engineered controls, administrative controls (e.g., documented procedures containing operating criteria) and personal protective equipment. Findings from activity level self-assessments are included in the trend analysis program and in the risk model used to plan BWXT Pantex independent assessments each year.

### ***Provide Feedback and Continuous Improvement***

Nuclear and high hazard facilities rely upon pre-surveillance checks to determine the operability of critical systems (administrative and engineered) prior to performing work in a facility (MNL-00040).

### ***System to Conduct Routine Inspections***

Many organizations conduct inspections at Pantex, including ES&H/ES, Fire Department, Facility Managers, Metal Trades Council Safety Officers and managers.

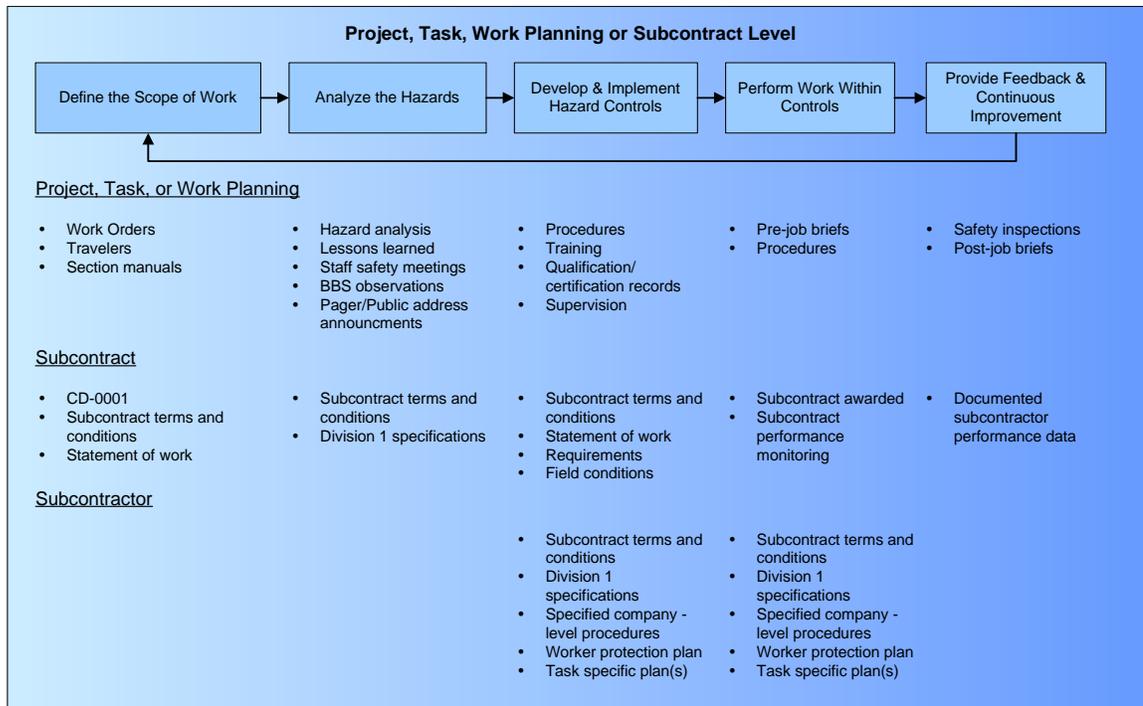
Industrial Safety, Industrial Hygiene, Nuclear Explosives Safety, Radiation Safety, Occupational Medicine and the Fire Department conduct routine safety and health inspections and surveillances. Management also performs walk-throughs, which include safety and health observations. Safety and health professionals and subject-matter experts conduct these inspections, except management walk-throughs. Personnel conducting management walk-throughs have received general OSHA and other safety and health training.

### ***Self-Assessments***

Self-assessment activities for facility-related work are performed under the framework provided by the Pantex Management Assessment program (Plant Standard STD-0107). Management strives, through self-assessment and the CAS program, to continually improve processes and activities with the objective of improving the effectiveness and efficiency of overall ES&H performance. The ES&H/ES organization supports self-assessment activities conducted by facility operations, management and staff performing the work. Change control mechanisms, integrated with the Nuclear Explosive Safety change control process, assure configuration is maintained for facilities and nuclear explosive processes (Plant Standard STD-3014 and STD-3366). Findings from Management Assessments are included in the trend analysis process and are included in the risk model used to plan BWXT Pantex independent assessments each year.



## ISM CORE FUNCTIONS AT THE PROJECT, TASK, WORK PLANNING OR SUBCONTRACT LEVEL



### ***Define Scope of Work***

A project is the basic unit for conducting mission activities. Within a mission project, there is a specific set of activities conducted for a specific customer (typically external, e.g., DOE/NNSA) under the terms of a defined scope, schedule and budget based on discussions with the Program Directors. The basic work definition elements for projects are defined in annual guidance by management during budget preparation and submittal. This includes developing the scope of work, completing negotiations, finalizing the baseline, documenting the project management plan, performing work, communicating project information, assessing project performance, managing change and closing out the project.

### ***Identify and Analyze Hazards***

Pre-job briefings are conducted to discuss safety aspects of the job, and applicable JSHAs are reviewed during these briefings, as well as, procedural controls and permit requirements. Pre-job safety meetings ensure hazards are made known to workers and

controls identified and to enable concerns to be resolved before work begins.

### ***Develop and Implement Hazard Controls***

Personnel perform work in accordance with established requirements including environmental permit conditions. They adhere to Building Standard or Facility Procedure requirements, plant standards, test plans or technical procedures (Plant Standard STD-0150) as applicable, and document activities as appropriate.

Subcontract personnel perform work in accordance with subcontract, regulatory requirements and company level procedures.

### ***Perform Work Within Controls***

At the activity level, specific work controls and facility controls that interface with the work scope are included in activity planning, to assure that work within a facility is conducted in a manner consistent with the authorization basis and building standard or facility procedure. The operations managers of the

staff who perform work are responsible for assuring that work performed within a facility complies with documented facility controls.

Subcontract personnel, at the activity level, perform work in accordance with an approved ISM Plan.

***Imminent Danger***

In the event of imminent danger, employees are instructed to immediately suspend operations/activities in the area and evacuate the location, as appropriate. The supervisor, Facility Manager and the Operations Center are notified. Employees and supervisors (or their designees) restrict access to the dangerous area. The Operations Center makes appropriate notifications. The incident is investigated and recommendations for corrective actions are implemented as necessary. The incident is investigated once appropriate measures have been taken to protect personnel and the environment.

***Provide Continuous Feedback and Improvement***

Self-assessments of project work are primarily performed on an organizational basis as part of the Management Assessment program (Plant Standard STD-0107). The organizational self-assessment processes may include customer satisfaction surveys, peer reviews and periodic operational assessments to ensure they comply with project work requirements. BWXT Pantex management strives to continually improve organizational processes to strengthen the ability to identify ES&H hazards and controls, with the objective of improving overall ES&H performance. Trained professionals within the ES&H/ES organization support the BWXT Pantex self-assessment activities of line employees and staff personnel, who perform the work.

