Department of Energy
Albuquerque Operations Office
P.O. Box 5400
Albuquerque, New Mexico 87185-5400

February 7, 2000

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, N.W.
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

Consistent with the Department's implementation plan (98-2 Plan) for the Defense Nuclear Facilities Safety Board's (The Board) Recommendation 98-2, the following provides detail on the deliverables due during the months of December and January.

1. Deliverable 5.6.3, #2 – Approved BIO/TSR Upgrade for lightning hazards. Consistent with the Department's letter dated November 4, 1999, a copy of the Lightning JCO approval letter (November 9, 1999) is enclosed. The Lightning JCO is a temporary measure until the Lightning Basis for Interim Operations (BIO) is completed. The BIO and the Master Study are due to be completed by July 2000.
2. Deliverable 5.7.1 – Re-authorization of the existing W62 processes in accordance with the IWAP project plan. The W62 was re-authorized through the Department's memo dated January 6, 2000, the Amarillo Area Office and Pantex operating contractor. The Board staff was copied on the memo. However, an additional copy is being provided directly to the Board and is attached. The Department has completed the actions associated with commitment 5.7.1.
3. Deliverable 5.8.3, #3 – Prepare a long-term management personnel plan for the strengths, weaknesses, opportunity and threat (SWOT) analysis for the skills needed to prepare authorization basis documents. The authorization basis SWOT analysis and the compensatory measure action plan was delivered to the Board with May and June deliverables respectively. In the October 5, 1999, letter to the Board, the Department reported that the long-term management personnel plan did not adequately assess or address the MHC authorization basis personnel issues. The plan was corrected and accepted. All actions identified in the plan were completed January 2000. The Department has completed the actions within commitment 5.8.3.

4. Deliverable 5.8.4, #1 and #2 – Staff authorization basis review positions and Amarillo Area Office (AAO) and Department of Energy (DOE), Albuquerque Operations Office (AL). Complete qualification for individuals with authority to approve authorization basis documents. A complete tabletop analysis was conducted on the applicable positions to determine the necessary competencies for the Authorization Basis Staff and Manager. Great care was taken to ensure consistency of the core authorization basis competency requirements throughout the AL Complex including AAO, Los Alamos Area Office, Safety Analysis and Support Division, and the Kirtland Area Office. Site specific requirements were identified for the authorization basis reviewers for various sites. The qualification standards were completed for each site by December 1999 and issued to the affected staff members at each site. It is anticipated that the qualifications be completed one year from release of the qualification standards. The Department has completed the actions associated with Deliverable 5.8.4, #1 and #2 and proposes their closure.

5. Deliverable 6.2.1 – Quarterly Briefings and Written Report. The quarterly briefing is scheduled for February 10, 2000, during the Board's visit to Pantex. Attached is the Quarterly Progress Report for the period October 1 through December 31, 1999.

If you have any questions, please contact me, or have your staff contact Dan Glenn at 505-665-6028.

R E Glass

R. E. Glass
Manager

Attachment

cc: See Page 3

cc w/Attachment:

J. McConnell, DNFSB Staff
W. Andrews, DNFSB Staff
625 Indiana Avenue, NW
Suite 700
Washington, D.C. 20004-2901
M. Whitaker, S-3.1
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S. Goodrum, ONDP, AL
L. Kirkman, OSS, AL
J. Bernier, AAO
D. Glenn, AL/WPD
D. Pelligrino, AL/ISRD
J. Angelo, MHC

Attachment 5.6.3#2, Lightning JCO Letter

United States Government Department of Energy

memorandum

Albuquerque Operations Office
Amarillo Area Office

DATE: NOV -9 1999

REPLY TO ATTN OF: AAO:ABS:KEW

SUBJECT: Approval of the Lightning Protection Justification for Continued Operation (JCO)

TO: W.A. Weinreich, General Manager, Mason & Hanger Corporation (MHC)

Ref: 1. Evaluation of Lightning Hazards and Justification for Continued Operation of Nuclear Explosive Operations, PX-JCO-99-002, Rev 2, November 3, 1999

The attached Safety Evaluation Report (SER) documents the Amarillo Area Office (AAO) review of the Reference 1 submittal. The conclusion of the SER is that nuclear explosive operations can be conducted safely in accordance with the requirements of the JCO through April 1, 2000.

As a result, the AAO approves the JCO with the following conditions. The JCO will expire on April 1, 2000 and must be replaced by a revision to the Pantex Plant Basis for Interim Operation (MNL-00076). Within 30 days of the date of this letter, MHC must provide a schedule for timely resolution of the issues identified under the discussion of the assessment of proposed controls in paragraph V. of the SER and make the changes to the JCO specified under the conditions of approval section.

Questions in regard to this matter may be referred to Karl Waltzer of my staff at extension 3148.

FOR

John M. Bernier
Acting Area Manager

cc:
D. Brunell, ABS, 12-36
D. Schmidt, IWAP, 12-36
J. Johnson, AAMEEM, 12-36
R. Phillips, AAMWO, 12-36
D. White, AAMBMS, 12-36
D. Kelly, AAMNMO, 12-36
E. Burkholder, FRS, 12-36
S. Dolezal, FRS, 12-36
J. Tedrow, FRS, 12-36
ABS:5021.050/99-090

Safety Evaluation Report
for an
Evaluation of Lightning Hazards
and
Justification for Continued Operation (JCO)

I. Title of Document Reviewed: "Evaluation of Lightning Hazards and Justification for Continued Operation of Nuclear Explosive Operations", submitted under cover of Mason and Hanger Corporation (MHC) letter (W.A. Weinreich to J.M. Bernier) dated November 4,1999.

II. Brief Description of Change: MHC has submitted a JCO to document the hazards associated with lightning strike on nuclear explosive (NE) operations and to document the controls to prevent lightning induced electrical input to NE.

III. Portions of the Authorization Basis Affected by Proposed Change:

MNL-00076, "Basis for Interim Operation", Revision 3, Errata AF, July 27, 1999.

MNL-1101, "Critical Safety Systems Manual", Revision 3C, Errata II, September 29, 1999.

IV. Background: Currently the Basis for Interim Operations (BIO) contains only limited information related to lightning hazards. In it, lightning induced electrical insult to NE is described as an incredible event for Building 12-50 and 12-60, Bay 2 due to protection provided by "electrical isolation features, surge protectors, and the lightning protection system...". The Critical Safety Systems Manual describes lightning protection features as the lightning protection systems and, for 12-60, Bay 2, hoist isolators rated to 4 kV. The hazards from lightning to NE operations in other buildings are not discussed.

As a result, MHC prepared a JCO to evaluate the hazards from lightning initiated electrical input to NE at Pantex and to identify the controls used to protect NE from lightning hazards pending completion of a BIO upgrade that will incorporate lightning hazard evaluations and controls.

V. Approval Basis:

Existing Safety Analysis (SA): See the Background discussion.

Effect of Change on Existing SA/Assessment of Risk: MHC has concluded a lightning strike on a NE facility is an Anticipated event i.e., once in 78 years. The AAO considers this a reasonable frequency based on information provided in reference 1. Although a strike to some facilities could be more frequent e.g., in reference 1, a strike to a cell was estimated at once every 6 years, the lower frequency appears appropriate since the proposed controls are based on the magnitude of the 99.9th % lightning strike.

MHC concluded the probability of a lightning strike between now and April 1, 2000 would reduce the frequency of a strike by at least one order of magnitude making a strike to a facility an unlikely event. The AAO determined that reduction was appropriate based on the data provided in reference 2.

For Zone 4 staging operations (including loading and unloading), one engineered barrier i.e., bomb casings or metal shipping containers that are considered as Faraday cages, is present to prevent lightning induced electrical input to NE. It is noted that during infrequent inspections, individual shipping containers may be opened for a short period of time and that these inspections are prohibited during lightning warnings. For Zone 4 transportation operations (including staging in NE transport trailers) two engineered barriers are present. These barriers are the NE transport trailers and the bomb casings or metal shipping containers that are all considered as Faraday cages. As a result, no increase in risk is expected for Zone 4 operations.

During Zone 12 operations MHC uses a combination of engineered controls and Administrative Controls to reduce the likelihood of lightning induced electrical input to NE through the creation of a Faraday cage for each NE facility (with the exception of Building 12-41, the paint bay). The facilities' Faraday cage consists of the following features: the reinforcing steel in the roof, walls, and floor; the bonds on the metallic penetrations that intrude on the facility interiors; transient voltage surge suppression installed on 120/208 v and 480 v electrical circuits; clear-air isolation of the NE equal to the bonded voltage of the facility (referred to as bonded stand-off); and dielectric insulation adequate for the worst case lightning induced facility voltage. Because Administrative Controls are relied upon, lightning induced electrical input to NE cannot be prevented however, MHC has concluded the possibility is extremely unlikely (a frequency reduction of 1E-2 is given for their Administrative Controls) and that the risk of continued operations until April 1, 2000 is acceptable. Based on the MHC evaluation, the risk of Zone 12 operations is slightly higher than the risk accepted via the current authorization basis analysis. In the existing analysis, lightning induced electrical input to NE is considered incredible.

For Zone 12 transportation operations i.e., moving NE in ramps, corridors and loading docks, MHC uses Administrative Controls to reduce the likelihood of lightning induced electrical input to NE. There are no engineered barriers available at this time for all NE movements. However, engineered barriers are available some of the time (but are not credited in the MHC JCO) e.g., the transportation carts for the W56, W62 and W87 meet the criteria for a Faraday cage as does the W62 shipping container. Other shipping containers are considered to provide Faraday cage protection as described above. As with the Zone 12 operations discussed above, lightning induced electrical input to NE cannot be prevented however, MHC has concluded the possibility is extremely unlikely and the risk of continued operations until April 1, 2000 is acceptable. Based on the MHC evaluation, the risk of Zone 12 operations is slightly higher than the risk accepted via the current authorization basis analysis.

Assessment of Effect of Proposed Controls: The basic approach by MHC for protecting NE from the effects of lightning is through the use of a Faraday cage to establish a defined voltage environment and provide isolation adequate for that environment. The following is a discussion of controls in light of that lightning protection philosophy.

AAO considers reasonable, the MHC assumption regarding the protection provided by NE transport trailers, bomb casings and shipping containers. Transport trailers are metal enclosures and Safe Secure Trailers or Safeguard Trailers are currently used to transport NE nationwide under all weather conditions. Bomb casings and shipping containers are also metal enclosures and limited analysis for the W62 shipping container by SNL has verified Faraday cage properties. However, additional evaluations for trailers, casings and shipping containers is warranted to provide greater assurance regarding the protection credit afforded to these design features.

The MHC assumption regarding the Faraday cage properties of the NE facilities appear reasonable based on the information provided in reference 1. However, since the LINAC Bays (Building 12-84 Bays 1 and 10), Building 12-50 and Building 12-104 Bay 16 have not been analyzed, an analysis should be completed. In the JCO, the suitability of the unanalyzed facilities was based on comparisons to other similarly constructed facilities that have been tested and/or analyzed. Additionally, during vacuum chamber operations, the vacuum chamber is assumed to provide Faraday cage protection based on the fact that it is a metal structure. AAO agrees this is a reasonable assumption but an analysis of the vacuum chamber is warranted.

Penetration bonding has been completed for the NE facilities however, there is a lack of adequate configuration control that could compromise the required in-service-inspections. Some of these inspections will be necessary before the expiration date of the JCO.

Low-voltage circuits, such as communication lines, are not surge protected. MHC considers this condition to present a very low risk since low voltage circuits are run in conduit that is bonded and the termination point for the circuits, that could be the attachment point for lightning, are a significant distance from the NE facilities. AAO considers this assumption reasonable during the current low lightning season. The MHC plan to relocate these lines so that unbonded stand off distances can be maintained is the preferred approach for protection.

Surge supressors on 120/208v and greater circuits are relied upon as design features to help prevent lightning affecting NE. However, an inspection program to assure the design feature is maintained is not currently required.

Dielectric isolators are relied upon for purge and backfill manifold operations, separation tests (a Kevlar cable), W79 task exhaust operations (a PVC insulator in the exhaust duct), and some work stand operations (air and vacuum hoses). MHC has analyzed the isolators to show sufficient dielectric strength but tests have not been performed. Testing these isolators would provide a greater degree of assurance regarding their ability to withstand potential lightning induced voltage.

The primary Administrative Control for lightning protection is to announce lightning warnings to NE facility personnel and then rely on facility personnel to either disconnect attachments to the NE that could facilitate lightning induced electrical input, or move NE from potentially vulnerable areas (e.g., ramps) to facilities that provide Faraday cage protection. The ability of MHC to make lightning warnings is determined in part, by the reliability of the lightning warning and detection system (credited as a Safety Class system in the JCO). Although the

system is efficient at detecting lightning strikes, its reliability has not been established. MHC should complete that action.

Taken together, the proposed controls appear to be sufficient to provide a reasonable level of protection against lightning induced electrical input to NE during the time of low lightning events from now until April 1, 2000.

VI. Conclusions: The JCO adequately describes the hazards associated with lightning strike for NE operations at Pantex. All NE operations were reviewed and a reasonably complete set of accident scenarios was evaluated. The control set was derived based on the described accident scenarios and engineered controls were credited when possible. The reliance on administrative controls is not ideal but the JCO defines the planned upgrades to achieve protection through at least one engineered control. These actions must be complete by April 1, 2000 before the advent of severe lightning weather. As a result, AAO considers the risk of NE operations between now and April 1, 2000 as acceptable.

VII. Conditions of Approval: Within 30 days of approval of the JCO, MHC must provide a schedule for timely satisfaction of the issues discussed in section V., Assessment of Effect of Proposed Controls, of this SER.

Additionally, the following changes must be made to the JCO:

1. Revise paragraphs 3.3.2.4.4 and 3.3.2.4.5 to credit the W56, W62, and W87 transportation carts as a design feature to help prevent lightning insult to the NE. The current restriction on movement during lightning warnings must be maintained.

2. Revise paragraph 4.2.1.5, Required Actions A., B., & C. to specify the operability of the field mill or impact detector be re-established.

3. Revise paragraph 4.2.1.5, Required Action D.2.2 from "14 days" to "immediately."

4. Revise paragraph 4.3 to recognize the SAC magazines are defensive in depth consistent with the discussion in Chapter 3.

5. Revise paragraph 5.4.2.2 to add the following Administrative Controls: The Plant Shift Superintendent must ensure Facility Managers have been notified of lightning warnings. A time requirement should be specified consistent with the Lightning Warnings and Detection System operating descriptions in Chapters 2 and 4.

6. Revise paragraph 5.4.3 to specify the W56, W62, and W87 transport carts are a design feature. Add a note that inspection requirements are contained in the Program Specific Activity Based Control Document.

VIII. Records/References

The following documents were reviewed during the evaluation of the proposed change.

1. Pantex Lightning Protection Project Team Final Report, Revision 1, April 1999.

2. Analysis of Lightning Flash Data for Area Surrounding Pantex, John Fredlund and Jeffery Kimball, May 1998.

3. Pantex Lightning Warning and Detection System Review, John Fredlund.

4. Evaluation of Lightning Hazards and Justification for Continued Operation of Nuclear Explosive Operations, PX-JCO-99-002, Rev 2, November 3, 1999.

Prepared by: _____ Date 11/9/99
ABS Staff

Peer Review: R.T. Brook Date 11/9/99
~~ABS Staff~~ SSTA

Attachment 5.7.1: Re-Authorizatin of W62 Memo dated January 6, 2000

DOE F 1325.8
(5-81)

United States Government | Department of Energy

memorandum

Albuquerque Operations Office

DATE: JAN 06 2000

REPLY TO
ATTN OF: WPD:Mullen (505-845-5025)

SUBJECT: Authorization of W62 War Reserve (WR) Disassembly and Inspect (D&I) Operation

TO: John Bernier, Acting Area Manager, AAO
William Weinreich, General Manager, MHC

By signature on the attached change to the Master Authorization Agreement and this memorandum, I authorize commencement of W62 disassembly and inspection operations in accordance with the requirements specified in or invoked through this agreement.

In accordance with the requirements of DOE Order 452.1A, my decision to authorize these operations is based on the following conclusions:

a. The existing authorization basis established for Pantex facility operations [Basis for Interim Operations (BIO), General Information Document (GID) and the Critical Safety Systems Manual (CSSM)] analyzes hazards due to both internal and external events and establishes adequate controls to prevent or mitigate risk to W62 operations. A site-wide BIO upgrade and Technical Safety Requirement (TSR) effort is currently underway to improve the technical basis for existing controls and evaluate the need for additional controls in several areas. The W62 operations have been evaluated with respect to these known site-wide controls. The DOE approved W62 Activity Based Control Document (ABCD) contains the suite of additional controls not found in the site-wide controls which ensure an adequate level of safety. Thus, the BIO, GID, CSSM and ABCD are the complete set of controls that satisfies the requirements of paragraphs 4.j.(1)(a) and 4.j.(1)(c) of DOE O 452.1A.

b. The authorization basis includes an analysis of the specific or unique hazards posed by the W62 operations in the form of the DOE approved Hazards Analysis Report (HAR). Operational controls were derived from the HAR and are invoked through the ABCD for W62 operations. The approved HAR fulfills requirement 4.j.(1)(b) of DOE O 452.1A.

c. DOE/AL, Mason and Hanger Corporation, Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratory (SNL) completed the line management assessment of readiness for nuclear explosive operations. Those assessment reviews consisted of the Hazards and Weapons Response Evaluation (HWRE), Management Self Assessment (MSA), Contractor Readiness Assessment (CRA), and the AL led Readiness Assessment (RA). Successful completion of these reviews fulfills the requirement of paragraph 4.j.(1)(d) of DOE O 452.1A.

d. The Office of Safety and Security and the Nuclear Explosive Safety Division completed independent verification of readiness through completion of a Readiness Assessment and a Nuclear Explosive Safety (NES) Revalidation/Study. DOE has approved the NES Revalidation/Study report. These reviews fulfill the requirements of paragraph 4.j.(1)(e) and 4.j.(1)(f) of O 452.1A.

e. I certify that all nuclear explosive surety standards are met for the W62 D&I operations. This certification is based on the NES Revalidation/Study report and on AAO memorandum dated May 28, 1998, subject: DOE Order 452.1A Fourth and Fifth Nuclear Explosive Surety Standards. This certification fulfills the requirement of paragraph 4.j.(1)(g) of DOE O 452.1A.

f. I conclude that LLNL and SNL reviews and assertions provided through Project Team and HWRE team membership, and through Engineering release 990464LL dated November 17, 1999, provide adequate confidence that the level of safety for these operations is acceptable.

It is understood that the new cell hoist insulator is being evaluated through the NES Change Control process. A resolution to this evaluation must be reached, the issue acceptably resolved and closed, and installation completed prior to commencing Cell operations. Likewise, the in place test for the effectiveness of the task exhaust insulators must be complete and satisfactory before operations utilizing the task exhaust can be performed. The AAO will validate acceptable closure of these items.

Because of the large number of issues identified during reviews resulting in several procedural changes, the AAO will team with appropriate MHC personnel to continually observe D&I operations on the first two units. The focus of this activity is to be on formality and conduct of operations.

Finally, I expect diligence in completing and closing the post start issues/recommendations from the RA, NES Revalidation and the HWRE. I request submittal of post-start action plans by February 29, 2000.

I hereby authorize commencement of the W62 WR D&I operation.

R E Glass

R. E. Glass
Manager

Attachment

cc w/attachment:
John Conway, Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW
Washington, DC 20004
Mark Whitaker, Jr., S3.1, DOE/HQ
Dave Beck, DP-20, DOE/HQ
Larry Kirkman, OSS, AL
Steve Goodrum, ONDP, AL
Karen Boardman, WPD, AL
Bill Mullen, WPD, AL

Albuquerque Operations Office

&

Mason & Hanger Corporation

Master Authorization Agreement

For

Nuclear Operations

at the

Pantex Plant

Amarillo, Texas

MNL - 258600
Revision 1
Change 1
January 5, 2000

.Authorizing Signatures

Effective Date and Expiration Date

This Agreement is effective upon the latest date of signature by both parties and shall expire upon the earlier of the expiration of the Contract (Contract Exp.) or a specific termination clause incorporated in Appendix C to this Agreement.

†We, the undersigned, authorize Revision 1, Change 1 to this Agreement. Transactions to this agreement are summarized in the Issue History and Summary of Changes Log.

U. S. Department of Energy		Mason & Hanger Corporation
RE Glass 1/6/00		1/5/00
Richard E. Glass /Date Manager, AL Operations Office		W. A. Weinreich /Date General Manager, Pantex Plant

Issue History and Summary of Changes Log

Revision No.	Change No.	Submittal Date	Description of Change(s)	Affected Pages
1	0	11-30-99	Initial Issue	All
1	1	1-5-00	➢ Incorporated AA for the W62 Program and repaginated Appendix A (pages A3 & A4) ➢ Added Change Level to Header	A2, A3, A4 C18 i, ii

Program	Covered Operations
B61-11	Assembly Operations
	Disassembly Operations
	Staging Operations
	Transportation
⊥W-62	Disassembly & Inspection Operations
	Staging Operations
	Transportation
W78	Disassembly Operations
	Repair Operations
	Assembly Operations
	Staging Operations
	Transportation
W79	Disassembly Operations
	Staging Operations
	Transportation
W80	Disassembly Operations
	Reassembly Operations
	Command Disablement Test Operations
	Staging Operations
	Transportation
B83	Assembly Operations
	Disassembly Operations
	Staging Operations
	Transportation

Program	Covered Operations
W84	Assembly Operations
	Disassembly Operations
	Staging Operations
	Transportation
W87	Disassembly Operations
	Assembly Operations
	Life Extension Program (ALT-342) Reassembly Operations
	Staging Operations
	Transportation
Zone 4	Nuclear Explosive Staging in SAC Magazines
	Component (Pit & CSA) Staging in MR or SAC Magazines
	Intra-Zone and Inter-Zone Transportation (Nuclear Explosives & Components)
	On-Site and Off-Site Shipping and Receiving
Transportation & Zone 12 Staging	Pit Packaging - AL-R8 or FL Containers
	Intra-Zone and Inter-Zone Transportation (Nuclear Explosives & Components)
	Component (Pit & CSA) Staging
	Component (other than pits) Packaging
Zone 12 SNM Operations	Pit Surveillance
	Pit Requalification
	Pit and Component Packaging
	Pit Staging
	Thermal monitoring of SNM Staging and Storage
Building 12-116	Staging of Nuclear Components, to Include Receiving & Shipping

TITLE: W62 DISASSEMBLY & INSPECTION	AA-018	EFFECTIVE DATE: 1-5-00	EXPIRATION DATE:8-7-02

SCOPE OF ACTIVITIES:

This Authorization Agreement authorizes the performance of W62 Evaluation activities to include SFT/SLT Disassembly & Inspection (D&I) in accordance with the DOE W62 Program Control Document (PCD) and Quality Assurance Program Plan (QAPP). Specific operations covered are:

a) Receiving Inspection.
b) Transportation and Staging of units in Zone 4.
c) Transportation and Staging of units in Zone 12; 12-104, Bay 11.
d) W62 Disassembly and Inspection operations performed in Cell 12-96 and 12-104, Bays 5 & 9.
e) Radiography operations performed in 12-84, Bays 1 & 10.
f) Leak Test operations performed in 12-104, Bay 16.

AUTHORIZATION BASIS:

a) *Pantex Plant Disassembly & Inspection Activity Based Controls Document (ABCD)*, ABC-W62-256187, Revision 003 – January 4, 2000.
b) *Pantex Plant W62 Disassembly & Inspection Hazards Analysis Report (HAR)*, RPT-HAR-252568, Revision 1 – October15, 1999 (approved October 26, 1999).
c) See Site-wide Authorization Basis (Appendix B).

SPECIFIC REVIEWS:

a) NESSG report, *Nuclear Explosive Safety Study of W62 Disassembly Operations at the USDOE Pantex Plant*, dated May 22, 1992 (approved August 7, 1992).
b) NESSG Report, *Revalidation for the Nuclear Explosive Safety Study of W62 Disassembly and Inspection Operations at the USDOE Pantex Plant*, dated December 9, 1999 (approved on December 21, 1999).
c) *AL Readiness Assessment (RA) Final Report for the W62 Disassembly & Inspection (D&I) Process*, December 13, 1999.
d) Qualification Evaluation Release ER No. 990464LL, Revision 0, November 17, 1999.

ADDITIONAL TERMS & CONDITIONS:

a) Weapon Safety Specification, W62 SS458511.
b) Evaluation activities for the W62 shall be performed in accordance with Materials List (210163) and B-Series Drawing (BA210163).
c) MHC shall comply with Additional Terms & Conditions as stipulated in current Qualification Evaluation Releases.
d) MHC shall comply with Specific NESRs and Immediate-Action Procedures as stipulated in Item b (Specific Reviews).

Attachment 5.8.4#1 and #2: Qualification Standards for AAO and SASD

Memorandum

Albuquerque Operations Office

DATE: September 27, 1999

REPLY TO: SASD:SE (99-029)

SUBJECT: Safety Analyst Qualification

TO: SASD Division Personnel

The Safety Analysis and Support Division (SASD) Qualification Standard establishes Department of Energy/Albuquerque Operations Office (DOE/AL) competency requirements for a Safety Analyst. In order to more efficiently and consistently apply this standard, its requirements have been grouped by similar topics and translated into Performance Objectives and Criteria. Guidance has also been provided on acceptable qualification methods.

Attachment 1 contains instructions for using the performance objectives to document qualification. Documented completion of these requirements ensures that a SASD Safety Analyst possesses the minimum requisite competency to fulfill related duties and responsibilities.

These Performance Objectives and Criteria require signoff by a Subject Matter Expert (SME) to verify that qualification requirements have been adequately met. The following individuals are authorized to sign the SASD *Summary of Qualifications*:

- The SASD Director;
- A Qualified Instructor in the topic covered (for example Unreviewed Safety Question Determination Program);
- An AL or Area Office Authorization Basis Manager;
- A Senior Scientific Technical Advisor;
- AL or Area Office Safety Analysts who have already completed qualification;
- A Nationally Certified Individual in the topic covered (for example a Certified Health Physicist or a Registered Professional Engineer in Nuclear Engineering);
- Phase II Qualified Facility Representatives for a specific facility or operation;
- A Ph.D. in the topic covered (for example a Ph.D. in Chemistry); and
- Any other individual justified and authorized in writing for a given topic by the SASD Director.

Attachment 2 contains signoff instructions for SMEs. Attachment 3 describes the process that Human Resource Division (HRD) will use to set a threshold for placement of individual employees into the special competitive level of *SASD Authorization Basis Review Engineer/Scientist*. The process for movement to the special competitive level is

referred to as "designation". This model was created to protect personnel in critical technical positions in the event of a Reduction in Force (RIF).

Attachment 4 is the SASD Safety Analyst Qualification Manual which contains the newly defined objectives and criteria, acceptable learning methodologies, and the SASD Safety Analyst *Summary of Qualifications* that will be used to document completion of each qualification performance objective.

As I have said many times, the safety analysis "trade" is very much in demand and individuals possessing solid skills are invaluable to DOE. This experience and training can benefit you and the organization in any position you may hold in the future. It is my intent to give you the tools and the support to help you be successful. I know that this process has it's weaknesses and is far from perfect, and I will be responsive to changes that may become necessary in the course of working through this qualification process. I expect a dedicated effort to reach our goal of having all of SASD qualified to these requirements within 12 months from the date of this memo.

Steven C. Erhart
Director
Safety Analysis and Support Division

4 Attachments

Attachment 1: Instructions for Using SASD Safety Analysis Qualification Performance Objectives and Criteria
Attachment 2: Signoff Instructions for SMEs
Attachment 3: SASD Authorization Basis Review Engineer Scientist Competitive Level Definition and Criteria
Attachment 4: SASD Safety Analyst Qualification Manual

Cc w/attachments:
C. Steele, LAAO
D. Brunell, AAO
T. Wallace, KAO

Cc w/o Attachment 4:
L. Kirkman, OSS
V. Varela, HRD
D. Devine, QTD
C. Cruz, NSD
P. Higgins, SPD
K. Boardman, WPD

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

Amarillo Area Office

QUALIFICATION STANDARD

Assistant Area Manager, Authorization Basis
Amarillo Area Office

October 1999

Qualification Standard Reviewed By:		
Donald C. Brunell	Assistant Area Manager Authorization Basis	Signature
Printed Name	Title	Signature
Printed Name	Title	Signature

Qualification Standard Approved By:		
John Bernier	Acting Manager, AAO	Signature & Date

TABLE OF CONTENTS

1.0 INTRODUCTION

This Qualification Standard (QS) specifies the competencies and supporting knowledge and/or skill elements that must be met to successfully complete qualification as Assistant Area Manager, Authorization Basis, Amarillo Area Office.

1.1 Purpose

The QS establishes the Department of Energy/Albuquerque Operations Office (DOE/AL) competency requirements as Assistant Area Manager, Authorization Basis, Amarillo Area Office. Satisfactory and documented completion of the competency requirements and the knowledge and skill evaluation elements contained in the QS ensures that the Assistant Area Manager, Authorization Basis, Amarillo Area Office, possesses the minimum requisite competence to fulfill his/her related duties and responsibilities.

1.2 Evaluation Requirements

The competency statements and supporting knowledge and/or skill evaluation elements included in this QS define the required knowledge and/or skill that an individual must possess.

The competency statements may be completed by one of the following methods.

1. The candidate may obtain training to meet the competencies in the QS. Training will be based on the supporting knowledge and/or skill evaluation elements similar to the ones listed for each of the competency statements. The candidate should use the knowledge and/or skill evaluation elements as a basis for evaluating the content of the training courses to be used to meet the QS competency statements.

2. Challenging a specified course by taking and passing the final written examination for that course (score of 80 percent or greater). (This method can also be used to satisfy requirements for mandatory courses.)

3. Completing structured self-study, such as computer-based training or Criterion Referenced Instruction courses that contain evaluation tools.

4. Previous experience, training, education, or qualification. QS knowledge and/or skill evaluation elements may be considered satisfied when the candidate demonstrates that his/her experience and/or prior training or qualification is equivalent. The equivalency determination and accompanying documentation must be in accordance with the programmatic record requirements of the *Technical Qualification Program Manual.*

   Note: Competency Statement References (CSR) follow the knowledge and skill requirements for each competency to identify links between competencies in this QS and competencies in previous technical qualification standards.

5. Completing Self-Study. The candidate may use the knowledge requirements in the QS as a guide to study associated references to obtain the required knowledge requirements.

Supervisors and Qualifying Officials will use the evaluation process identified in the Candidate Qualification Process Procedure to determine when the candidate has acquired the competencies outlined in the QS.

When the candidate has met all the individual competencies for a section, he/she will be evaluated by the Qualifying Official assigned to that section. In the evaluation, the Qualifying Official will verify that all competencies have been signed and that the candidate has provided objective evidence, when necessary, to indicate completion of individual competencies. He/she will also conduct an interview to evaluate the candidate's overall knowledge of the specified knowledge requirements. The interview, at a minimum, will cover those competencies that the candidate has completed through self-study. Following are the types of documents that shall be produced to indicate successful completion of the QS competency statement requirements. (Endnote 1)

- Previously completed qualification
- Documented evaluation of equivalencies
- Written examination results
- Documented oral evaluation
- Documented observation of performance (initialed evaluation element and/or signed competency statement)
- Training certificates of completion
- Professional certification certificates

1.3 Implementation

1.3.1 Competency Statement Requirement Completion

When the candidate has met the knowledge and skill requirements identified in the qualification standard for a specified competency, he/she will document completion as follows.

1. Indicate the completion method in the Completion Method (CM) block of the accompanying Qualification Card (QC), using the abbreviations listed below.
   - **CR** – Classroom training or challenging a course
   - **DSS** – Documented self-study program
   - **PQ** – Previous qualification
   - **EE** – Equivalent experience, training, or education
   - **SS** – Self-Study

2. Sign and date the QC in the block provided.

1.3.2 Critical Competency Verification

1. When the candidate completes a critical competency statement requirement (listed separately in each section of the QC), he/she will present the QS, QC, and any objective evidence that supports completion to a Qualifying Official for review.

2. The Qualifying Official will review the package and conduct an interview that evaluates the candidate in the critical competency. When the Qualifying Official

is satisfied that the candidate has met all critical competency statement requirements, he/she will sign and date in the blocks provided. (EndNote 2)

1.3.3 Qualifying Official Section Review

1. When the candidate has completed all the competency statement requirements for a section, he/she will present the QS, QC, and any objective evidence that supports completion to the Qualifying Official for review.

2. The Qualifying Official will review the package and conduct an interview that, at a minimum, evaluates the candidate in competencies where self-study was the method of completion. When the Qualifying Official is satisfied that the candidate has met all competency statement requirements for a section, he/she will document those items covered in the interview on the QC and sign and date in the spaces provided. (EndNote 1)

1.3.4 Final Qualification

1. The final qualification requirements for the position are listed in the QC.

2. When all section reviews are completed, the candidate will present the completed QC, QS, and his/her qualification record to his/her supervisor for review.

3. The supervisor will review the candidate's qualification documents and interview the candidate. When he/she is satisfied that the candidate has satisfied all competency statements requirements and that the qualification record is accurate and complete, the supervisor will sign and date the QC in Section 4.1, recommending the candidate for final qualification. Based upon the final qualification requirements in the QC, the supervisor will arrange with the candidate the following:

   - The candidate must complete a **second-level supervisor interview**. The interview will consist of questions based on a representative sample of the competency statements from this qualification standard and those additional qualification standards listed in Section 1.4, Background and Experience. The second-level supervisor's signature on the QC in Section 4.2 indicates that the candidate has satisfactorily completed the interview.

4. When the second-level supervisor is satisfied that the candidate has successfully completed the final qualification requirements, he/she will sign and date the QC, indicating that the candidate is fully qualified. (EndNote 1)

1.4 Background and Experience

The minimum education and experience for Assistant Area Manager, Authorization Basis personnel is listed below.

1. Education:
   Assistant Area Manager, Authorization Basis – Bachelor of Science, Engineering, or equivalent

2. Experience:
   Minimum of 10 years nuclear facility-or weapons-related experience with at least 5 years in a management position.

This standard includes competency statements that require the candidate to complete the following additional qualification standards.

Senior Technical Safety Manager Functional Area Qualification Standard, dated 10/29/96
Safety Analyst, Safety Analysis and Support Division Qualification Standard, dated 6/99

The competency requirements contained in the above qualification standards may be completed before or concurrently with the completion of this standard.

Endnote 1: The qualification evaluation and documentation process is covered in detail in the Candidate Qualification Process Procedure. The procedure is contained in the *Technical Qualification Program Manual.*

Endnote 2: The Critical Competency verification may be conducted either as a part of the Qualifying Official Section Review or the candidate may request that it be done separately. If done separately, completion of an entire section is not required. However, all section reviews must be completed prior to final qualification review (see Section 1.3.4).

2.0 DUTIES AND TASKS

The purpose of this section is to identify the responsibilities and activities assigned to the Assistant Area Manager, Authorization Basis, Amarillo Area Office (AAO).

2.1 Duty Area 01, Non-reactor Nuclear Facility Safety Basis Review

Task 1 Provide technical guidance to AAO line management and project management teams to ensure the adequacy of hazard analysis, safety analysis and controls to include safety analysis report (SAR), basis for interim operations (BIO), justification for continued operations (JCO), unresolved safety question (USQ), and hazard analysis (HA) for new and existing nuclear operations.

Task 2 Review SAR, BIO, JCO, USQ, and HA documents for nuclear facilities to ensure all criteria established in applicable DOE Orders.

Task 3 Approve SAR, BIO, JCO, USQ, and HA documents for nuclear facilities if no new accidents are involved in the analyses.

Task 4 Review Technical Safety Requirements (TSR) documents for nuclear facilities for compliance with formats and content identified in the SAR and DOE Order 5480.22, Technical Safety Requirements.

Task 5 Approve TSR documents for nuclear facilities if no new accidents are involved in the analyses.

Task 6 Review authorization basis change control processes for nuclear facilities for changes to the baseline established in the SAR/TSR documents as specified in DOE Order 5480.21, Unreviewed Safety Questions.

Task 7 Approve authorization basis change control processes for nuclear facilities if no new accidents are involved in the analyses.

Task 8 Brief management on the results of the safety analyses for nuclear facilities.

2.2 Duty Area 02, Non-nuclear Facility Safety Basis Review and Approval

Task 1 Provide technical guidance to AAO line management and project management teams to ensure the adequacy of HA and controls for new and existing non-nuclear operations.

Task 2 Assist contractors in the development of hazard evaluation documents for non-nuclear facilities.

Task 3 Review and approve controls and analyses for non-nuclear facilities for adequacy and satisfaction of the conditions identified in the non-nuclear facility hazard evaluation documents.

Task 4 Review and approve authorization basis change control processes for non-nuclear facilities.

Task 5 Brief management on the results of non-nuclear facility safety analyses.

2.3 Duty Area 03, Assessment Support

Task 1 Serve as a subject matter expert in the areas of safety authorization basis to support environmental, safety, and health (ES&H) reviews and readiness reviews for operation and facility startup.

Task 2 Coordinate AAO nuclear program/facilities efforts in support of readiness reviews and readiness assessments.

Task 3 Lead a safety basis review team to verify that new and existing facilities and operations incorporate the health and environment parameters specified in the design, SAR, and TSR.

Task 4 Support and/or perform assessments in the area of authorization basis.

Task 5 Brief management on the results of the authorization basis area evaluation.

2.4 Duty Area 04, General Management

Task 1 Review codes, standards, and regulations related to authorization basis activities to determine their applicability to AAO facilities and operations.

Task 2 Serve as the principal AAO representative for authorization basis interactions with management and operating contractors, DOE/AL, DOE/Headquarters and external oversight entities, such as ES&H Site representatives and the Defense Nuclear Facilities Safety Board (DNFSB).

Task 3 Provide expert technical advice to the Area Manager on matters relating to DNFSB issues, as well as, operations at all nuclear and non-nuclear facilities.

Task 4 Provide input to the Area Manager for establishment and evaluation of Mason & Hanger performance measures and goals as they relate to the DOE strategic mission with regard to the nuclear program.

Task 5 Monitor long-range program status and objectives and report on nuclear program accomplishments to higher level management to support program/facility changes.

Task 6 Brief senior level executives, local government officials, members of Congress and industry groups on Mason & Hanger issues regarding nuclear program matters.

Task 7 Lead nuclear related committees to make or change policy or law.

Task 8 Develop and coordinate safety authorization basis agreements for all Mason & Hanger facilities.

Task 9 Direct adherence to configuration management policy for physical arrangement and documentation control.

Task 10 Analyze and validate Performance Indicator Data on yearly indicators for the Mason & Hanger contract.

Task 11 Instruct (or mentor) Facility Representatives and safety authorization basis teams on safety authorization basis documentation procedures.

Note: Duty and Task References (DTR) are provided following the knowledge and skill requirements for each competency to assist in identifying links between competencies in this standard and the associated duties and tasks. The numbers are shown as Dxx-Tyy, where "xx" indicates the Duty number and "yy" indicates the Task number.

3.0 COMPETENCIES

3.1 Weapons Technology

3.1.1 The candidate must have knowledge of and/or experience with the internal design of nuclear explosive/weapon systems, components and mechanisms. The candidate shall be able to:

A. Discuss the function, purpose, and design of the following systems and components:

- Arming
- Fusing
- Firing
- High explosives
- Fusionable material
- Fissile material - primary and secondary
- Detonators
- Boosting device
- Neutron generators (zippers)
- Ancillary hazardous systems

B. Describe the nuclear explosive/weapon command and control features with respect to the following:

- Personnel
- Electronics
- Mechanics/required signals - permissive action link

C. Discuss the principles of nuclear weapon design specific to the following:

- Stockpile-to-Target Sequence
- Military Characteristics

D. Discuss nuclear detonation safety design principles and describe nuclear explosive components/features that have been employed to provide isolation, inoperability, and incompatibility, including:

- Barriers
- Weak links
- Strong links
- Unique signals

E. Discuss the role of independence and first principles in the implementation of the nuclear detonation safety design principles (safety theme).

F. Describe nuclear explosive design features that have been employed to prevent/mitigate fissile material dispersal, including:

- Insensitive high explosives
- Fire-resistant pits

References
DTR: D01-T01
CSR: New

3.1.2 The candidate must have knowledge of the radiological, equipment, and personnel hazards associated with nuclear explosives/weapons. The candidate shall be able to:

A. Discuss the radiological characteristics, and related hazards to personnel and equipment from the following materials used in nuclear explosives/weapons:

- Uranium
- Plutonium
- Tritium

B. Discuss the general quantity and configuration of the materials used in nuclear explosives/weapons that present a potential radiological hazard to personnel and equipment.

C. Describe how as-low-as-reasonably-achievable considerations are incorporated into the procedures for the handling and storage of nuclear explosives/weapons.

D. Identify the hazards to personnel and equipment from each of the following features of nuclear explosive/weapon design:

- Spin rockets
- Retarding devices
- Pre-flight controllers
- Boosting device

E. Describe toxic materials typically found in nuclear explosives and weapons, the hazards associated with them, and the safety precautions that should be taken.

F. Describe the physical effects of a high explosive detonation and a nuclear detonation in terms of:

- Blast
- Radiation
- Thermal

References
DTR: D01-T01
CSR: New

3.1.3 The candidate must have knowledge of high explosives and their applicability in nuclear explosives/weapons. The candidate shall be able to:

A. Discuss the difference between insensitive high explosives and conventional high explosives used in nuclear explosives/weapons.

B. Describe the function of primary and secondary explosives in nuclear explosive/weapon design.

C. Describe the response of high explosives used in nuclear explosive/weapon design to the following external stimuli:

- Mechanical
- Electrical
- Thermal

D. Discuss the effects of aging on the high explosive materials used in nuclear explosive/ weapon design.

E. Discuss the toxic properties of the high explosive materials used in nuclear explosive/ weapon design.

References
DTR: D01-T01
CSR: New

3.1.4 The candidate must have knowledge of the policy, procedures, authorities, and responsibilities established to ensure safe conduct of nuclear explosive activities as described in:

- **DOE O452.2A, Safety of Nuclear Explosive Operations**
- **AL Supplemental Directive 452.2A, Safety of Nuclear Explosive Operations**
- **DOE G452.2A-1A, Implementation Guide for DOE O452.2A, Safety of Nuclear Explosive Operations**

The candidate shall be able to:

A. Discuss the purpose, scope and applicability of each of the listed documents.

B. Explain the two-person concept for operations involving nuclear explosives.

C. Explain why the following are needed to ensure the safe conduct of nuclear explosive operations and associated activities:

- Nuclear explosive-like assembly requirements
- Permanent Marking Instructions
- Control of Electrical Testers/Equipment

D. State who approves weapons operations prior to achieving Hazard Analysis Report (HAR) upgrade approval.

E. Describe the relationship between the SAR, the HAR, and the Nuclear Explosive Hazard Assessment.

F. Discuss the following in relation to the safety/hazard analysis reports:

- Operational Safety Controls
- Nuclear Explosive Safety Rules
- TSRs
- Safety structures, systems, and components

G. Discuss the nuclear explosive safety study process as described in DOE O452.2A, Safety of Nuclear Explosive Operations and detailed in DOE-STD-3015-97.

H. Describe the organization requirements for a Nuclear Explosive Safety Study Group (NESSG).

I. Describe the scope of the NESSG responsibilities.

J. Discuss DOE O452.2A, Safety of Nuclear Explosive Operations requirements for conducting a NES Study and NES Survey.

K. Explain the functions of an NES Study, an NES Survey, and an NES Review.

L. Explain how changes in each of the following types of planned operations could require a new NES Study and NES Survey:

- Dismantlement schedule
- Nuclear testing schedule
- Testing schedule
- New build and rebuild schedule
- Transportation schedule
- Revised programmatic/safety priorities
- Weapon custody

M. Describe the approval level requirements for an NES Study, an NES Survey, and an NES Review.

N. Explain the relationship between a Master Study and a specific study.

O. Given a set of conditions from which the need to perform an NES Study, an NES Survey, or an NES Review has been determined:

- Identify the scope of nuclear explosive safety operations, facilities, and equipment to be studied or surveyed
- Describe the study group membership
- Discuss how to communicate DOE expectations of the conduct of the Nuclear Explosive Safety Study to all those who will participate in the study
- Discuss how to prepare a comprehensive draft report for the study
- Discuss how to coordinate the participation of contractors in the compilation, analysis, and evaluation of data during the planning and performance of an NES Study, an NES Survey, or an NES Review
- Discuss how to evaluate the need for special briefings to provide supplemental information to study participants during the planning and performance of an NES Study, an NES Survey, or an NES Review

P. Define the following terms and describe the approval requirements for each:

- Variance
- Waiver
- Exception

Q. Describe the specific elements of information to be included with each request for a variance, waiver, or exception.

R. Describe the use of alternate or equivalent means to meet a specific requirement of DOE O452.2A, Safety of Nuclear Explosive Operations.

S. Using an actual or hypothetical request for a variance, waiver, or exception, evaluate the request for adequacy, completeness, and compliance with DOE O452.2A, Safety of Nuclear Explosive Operations.

References

DTR: D01-T01
CSR: New

3.2 Safety Analysis

3.2.1 The candidate must have knowledge of safety analysis. The candidate shall be able to:

A. Complete all the requirements included in Safety Analyst, Safety Analysis and Support Division Qualification Standard (core).

References
DTR: D01-T01-08; D02-T01-05; D03-T01-05; D04-T01-11
CSR: New

3.2.2 The candidate must have knowledge of the safety documentation system at the Pantex Plant. The candidate shall be able to:

A. Discuss the scope of Pantex contractor's authorization agreements procedure and identify the three occurrences which can change an Authorization Agreement.

B. Define authorization basis and identify where the authorization basis is documented.

C. Identify how often the BIO and SARs must be updated and what must, as a minimum, be included in the updates.

D. Discuss the relationships between the safety documents for the Pantex Plant.

E. Discuss the scope of Pantex Contractor USQ process.

F. Given the Pantex contractor USQ procedure, discuss:

- When to screen issues
- Steps taken by the Originator to complete a USQ process
- Questions addressed from Section 10.c of DOE Order 5480.21
- Potentially Inadequate Safety Analysis or reductions in the margin of safety
- JCO

G. Discuss AAO procedures for USQ evaluations and establishing a USQ point of contact.

H. Discuss the JCO process and those circumstances that will invalidate a JCO.

References
DTR: D01-T01
CSR: New

3.2.3 The candidate must have knowledge of how the Safety Envelope at the Pantex Plant is defined. The candidate shall be able to:

A. Describe the purpose and use of Pantex Site-Wide TSRs.

B. Describe the relationship between the Pantex Site-Wide TSRs with other Pantex authorization basis documentation (BIO Modules, NES Master Studies, SARs, HARs, Activity Based Control Documents).

References
DTR: D01-T01-05; D02-T01-04; D03-T03
CSR: New

3.3 General Management

3.3.1 The candidate must have knowledge of the Senior Technical Safety Manager Functional Area Qualification Standard. The candidate shall be able to:

A. Demonstrate completion of the Senior Technical Safety Manager Functional Area Qualification Standard.

References
DTR: D04-T01,02,04-10
CSR: Senior Technical Safety Manager FA, 10/29/96 – CS - All

3.3.2 The candidate must have knowledge of management organization and responsibilities. The candidate shall be able to:

A. State the objective of Mason & Hanger ISM program plan.

B. For the Management, Integration, and Controls Standards/Requirements Identification Document:

- Describe the seven core safety functions (sections)
- Discuss the four categories addressed in each of the core safety functions
- Discuss the flowdown of standards and requirements (S/R) to implementing plant standards
- Discuss the S/R change evaluation process
- Identify Mason & Hanger's efforts used to develop policies, procedures, and documents to implement safety management

C. State the purpose and scope of Pantex Policy DIR-0001.

D. Briefly describe the following processes in Pantex Policy DIR-0001:

- Hazard analysis
- Identification of controls
- Implementation of controls
- Readiness confirmation

References
DTR: D01-T01
CSR: New

U.S. DEPARTMENT OF ENERGY
ALBUQUERQUE OPERATIONS OFFICE

SAFETY ANALYSIS AND SUPPORT DIVISION

QUALIFICATION STANDARD

Safety Analyst
Safety Analysis and Support Division

June 1999

Qualification Standard Reviewed By:	
S. Payne, LANL, Acting Team Lead	Date
T. McEvoy, Pantex, Team Lead	Date
R. Baca, SNL/NM, Acting Team Lead	Date
S. Erhart, SASD, Director	Date

Qualification Standard Approved By:	
L. Kirkman, OSS, Assistant Manager	Date

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1.0 INTRODUCTION

This Qualification Standard (QS) specifies the competencies and supporting knowledge and/or skill elements that must be met to successfully complete qualification for a Safety Analyst, Safety Analysis and Support Division (SASD), as applicable to the review of contractor development, review, approval, and implementation of safety basis documents.

1.1 Purpose

The QS establishes the Department of Energy/Albuquerque Operations Office (DOE/AL) competency requirements for a Safety Analyst, SASD. Satisfactory and documented completion of the competency requirements and the knowledge and skill evaluation elements contained in the QS ensures that a Safety Analyst, SASD, possesses the minimum requisite competence to fulfill related duties and responsibilities.

Competencies in Sections 3.1-3.4 are mandatory for Safety Analysts, SASD. Candidates are only required to fulfill one additional section to meet site specific requirements (Section 3.5, 3.6, or 3.7).

1.2 Evaluation Requirements

The competency statements and supporting knowledge and/or skill evaluation elements included in the QS define the required knowledge and/or skill that an individual must possess.

The competency statements may be completed by one of the following methods.

1. The designated employee may obtain training to meet the competencies in the QS. Training will be based on the supporting knowledge and/or skill evaluation elements similar to the ones listed for each of the competency statements. The employee should use the knowledge and/or skill evaluation elements as a basis for evaluating the content of the training courses to be used to meet the QS competency statements.

2. Challenging a specified course by taking and passing the final written examination for that course (score of 80 percent or greater). (This method can also be used to satisfy requirements for mandatory courses.)

3. Completing structured self-study, such as computer-based training or Criterion Referenced Instruction courses that contain evaluation tools.

4. Previous experience, training, education, or qualification. QS knowledge and/or skill evaluation elements may be considered satisfied when the candidate demonstrates that his/her experience and/or prior training or qualification is equivalent. The equivalency determination and accompanying documentation must be in accordance with the programmatic record requirements of the *Technical Qualification Program Manual.*

Note: Competency Statement References (CSR) follow the knowledge and skill requirements for each competency to identify links between competencies in this QS and competencies in previous technical qualification standards.

5. Completing Self-Study. The candidate may use the knowledge requirements in the QS as a guide to study associated references to obtain the required knowledge requirements.

The evaluation process identified in the Candidate Qualification Process Procedure provides supervisors and Qualifying Officials with instructions to determine when the candidate has acquired the competencies outlined in the QS. When the candidate has met all the individual competencies for a section, the Qualifying Official will evaluate the candidate for that section. The evaluation will consist of a review of the QS section to verify that all competencies have been signed, a review of the objective evidence that the candidate has provided that documents completion of individual competencies, and an interview to evaluate the candidate's overall knowledge of the specified knowledge requirements. The interview, at a minimum, will cover those competencies that the candidate has completed through self-study. Following are the types of documents that shall be produced to indicate successful completion of the QS competency statement requirements. (Endnote 1)

- Previously completed qualification
- Documented evaluation of equivalencies
- Written examination results
- Documented oral evaluation
- Documented observation of performance (initialed evaluation element and/or signed competency statement)
- Training certificates of completion
- Professional certification certificates

1.3 Implementation

1.3.1 Competency Statement Requirement Completion

When a candidate has met the knowledge and skill requirements identified in the qualification standard for a specified competency, he/she will document completion as follows:

1. Indicate the completion method in the Completion Method (CM) block of the accompanying Qualification Card (QC), using the abbreviations listed below.

   - **CR** – Classroom training or challenging a course
   - **DSS** – Documented self-study program
   - **PQ** – Previous qualification
   - **EE** – Equivalent experience, training, or education
   - **SS** – Self-Study

2. Sign and date the QC in the block provided.

1.3.2 Critical Competency Verification

1. When the candidate completes a critical competency statement requirement (listed separately in each section of the QC), he/she will present the QS, QC, and any objective evidence that supports completion to a Qualifying Official for review.

2. The Qualifying Official will review the package and conduct an interview that evaluates the candidate in the critical competency. When the Qualifying Official is satisfied that the candidate has met all critical competency statement requirements, he/she will sign and date in the blocks provided. (EndNote 1)

1.3.3 Qualifying Official Section Review

1. When the candidate has completed all the competency statement requirements for a section, he/she will present the QS, QC, and any objective evidence that supports completion to the Qualifying Official for review.

2. The Qualifying Official will review the package and conduct an interview that, at a minimum, evaluates the candidate in competencies where self-study was the method of completion. When the Qualifying Official is satisfied that the candidate has met all competency statement requirements for a section, he/she will document those items covered in the interview on the QC and sign and date in the spaces provided. (EndNote 1)

1.3.4 Final Qualification

1. When all section reviews are completed the candidate will present the completed QC and QS and all objective evidence to support completion to his/her supervisor for review. The supervisor will review the package and when he/she is satisfied that the package is complete and that the candidate has met all requirements for final qualification, he/she will submit the package to the second-level supervisor and arrange a final qualification interview.

2. The second-level supervisor will review the package and interview the candidate. When the second-level supervisor is satisfied that the candidate has met all QS requirements, he/she will sign and date the qualification card indicating that the candidate is fully qualified. (EndNote 2)

1.4 Background And Experience

The minimum education and experience for the Safety Analyst personnel is listed below.

1. Education.

   Senior Project Engineer – Bachelor of Science degree in engineering or physical science.

   It is preferred that the candidate will have completed coursework or equivalencies sufficient to understand and apply the BASICS of the following: (EndNote 3)

   - Mathematics (DOE-HDBK-1014/1&2-92 or EQUIVALENT)
   - Chemistry (DOE-HDBK-1015/1&2-92 or EQUIVALENT)
   - Classical Physics (DOE-HDBK-1010-92 or EQUIVALENT)
   - Electrical Science (DOE-HDBK-1011/1&2&3&4-92 or EQUIVALENT)
   - Mechanical Science (DOE-HDBK-1018/1&2-93 or EQUIVALENT)
   - Thermodynamics, Heat Transfer, and Fluid Flow (DOE-HDBK-1016/1&2-93 or EQUIVALENT)

- Material Science (DOE-HDBK-1017/1&2-93 or EQUIVALENT)
- Instrumentation and Controls (DOE-HDBK-1013/1&2-92 or EQUIVALENT)
- Engineering Symbology, Prints, and Drawings (DOE-HDBK-1016/1&2-93 or EQUIVALENT)
- Nuclear Physics (DOE-HDBK-1019/1&2-93 or EQUIVALENT)

The candidate will identify any known deficiency in the BASICS of each area and will demonstrate understanding of the BASICS of each area using the specified handbook or equivalent coursework.

2. Experience.

- Applying the principles, theories, and practices of engineering or physical science to nuclear and non-nuclear facilities
- Managing a team of individuals with technically diverse disciplines to complete an assessment on nuclear and non-nuclear facilities
- Assessing contractor performance in the execution of project and contract management deliverables for nuclear and non-nuclear facilities
- Interacting with all levels of DOE management, DOE contractors, and other federal agencies on nuclear and non-nuclear facilities

It is preferred that the candidate have an understanding of the following DOE safety policies and programs BASICS sufficient to identify significant deficiencies in relation to reviewing authorization basis documentation and when needed, request assistance from other subject matter experts:

- Nuclear and Explosive Facility Design
- Fire Protection
- Natural Phenomenon Hazards Mitigation
- Criticality Safety
- Radiation Protection
- Hazardous Material Protection
- Radioactive and Hazardous Waste Management
- Maintenance Management
- Conduct of Operations
- Human Factors
- Quality Assurance
- Emergency Management

The candidate will identify any known deficiency in the BASICS of each area and will demonstrate understanding of the BASICS of each area as required by their supervisor.

Endnote 1: The qualification evaluation and documentation process is covered in detail in procedure TQP-0502, Candidate Qualification Process Procedure. The procedure is contained in the *TQP Manual*.

Endnote 2: The Critical Competency verification may be conducted either as a part of the Qualifying Official Section Review or the candidate may request that it be done separately. If done separately, completion of an entire section is not required. However, all section reviews must be completed prior to final qualification review (see Section 1.3.4).

Endnote 3: The term BASICS is defined as understanding of fundamental mathematical and physical laws and DOE policies and programs sufficient to address deficiencies by finding and using the appropriate references or identifying known subject matter experts.

2.0 DUTIES AND TASKS

The purpose of this section is to identify the responsibilities and activities assigned to the Safety Analyst, SASD.

2.1 Duty Area 01 – Nuclear and Non-Nuclear Facility Authorization Basis Review

Task 01 Verify that the safety analysis document complies with the applicable requirements using technical judgement and interpretation of directives and requirements sufficient to communicate and resolve issues with contractor and other DOE personnel. This includes providing technical reviews and supporting analysis of new facilities or modifications of existing facilities involving conceptual design, preliminary design, final design, and construction phases of a project.

Task 02 Validate that the site is adequately characterized in the safety analysis document.

Task 03 Validate that the facility is adequately described in the safety analysis document.

Task 04 Validate that the analyses have adequately identified and evaluated the hazards and accidents.

Task 05 Validate that the facility structures, systems and components have been identified as necessary to meet evaluation guidelines, provide defense-in-depth, or contribute to worker safety in the safety analysis document. This includes directing and performing risk management analysis sufficient to foresee vulnerabilities of operations involving energetic materials and the potential effects of violent energy releases on structures, systems and components and providing authoritative recommendation to management concerning appropriate guidance for the authorizing official.

Task 06 Validate the derivation of controls and their operability, reliability, and maintainability in the safety analysis document and controls document.

Task 07 Verify that the safety program elements selected to support safety analysis assumptions is adequate.

Task 08 Validate the conclusions of the safety analysis document and the rationale for the conclusions.

Task 09 Validate that the controls document complies with the applicable requirements and is consistent with the safety analysis document using technical judgement and interpretation of directives and requirements sufficient to communicate and resolve issues with contractor and other DOE personnel.

Task 10 Validate that the change control document complies with the applicable requirements document using technical judgement and interpretation of directives and requirements sufficient to communicate and resolve issues with contractor and other DOE personnel.

Task 11 Verify the potential impacts of changes to the authorization basis, the conclusions made by the change control document, and the rationale for the conclusions.

Task 12 Lead and/or participate in a team of subject matter experts to develop a report on the adequacy of the authorization basis documents assembling the technical disciplines to review these documents and technical support documents. This includes coordinating review comments, conducting supporting analysis, and preparing transmittal memoranda to the approving official.

Task 13 Brief management, contract personnel and other agencies on the results of the authorization basis review.

2.2 Duty Area 02 – Nuclear and Non-Nuclear Facility Authorization Basis Document Implementation

Task 01 Lead and/or participate in a team of subject matter experts in technical and management reviews of authorization basis implementation. This includes providing authoritative recommendations concerning the interpretation and implementation of codes, standards, and orders. Where existing applicable codes, standards, or regulations do not exist, or not applicable, develop and recommend appropriate guidance for the authorizing official.

Task 02 Lead and/or participate in a team of subject matter experts to develop a report on the adequacy of the authorization basis document implementation for on-site operations. This includes coordinating review comments, conducting supporting analysis, and preparing transmittal memoranda to the approving official.

Task 03 Brief management, contract personnel and other agencies on the results of the authorization basis implementation review of on-site operations.

2.3 Duty Area 03 – Contractor Performance Reviews

Task 01 Uses technical expertise and knowledge of DOE facilities to serve as a subject matter expert during independent assessments and prioritization of the annual AL budgets involving identifying needs, evaluating alternatives, and prioritizing projects on a cost-benefit, risk management basis.

Task 02 Review contractor performance evaluations for achievement of contract performance goals through coordination with other DOE personnel and contractor personnel.

Task 03 Lead and/or participate in a team of subject matter experts to verify and evaluate contractor achievement of milestones for safety basis projects and quality of work performed.

Task 04 Lead and/or participate in a team of subject matter experts to develop a report on the adequacy of contractor achievement of milestones for safety basis projects and quality of work performed. This includes preparing transmittal memoranda to the approving official.

Task 05 Brief management, contract personnel and other agencies on the results of the contractor performance review.

3.0 COMPETENCIES

3.1 Safety Analysis

3.1.1 The candidate must have knowledge of and/or experience using safety analysis terminology and requirements sufficient to verify that a safety analysis document complies with the applicable requirements.

Knowledge/Skill Statements

3.1.1-1 Differentiate between the following types of facilities:

- Nuclear facility
- Non-nuclear facility

3.1.1-2 Discuss the following standards and requirements and their application as they relate to safety analysis:

- Secretary of Energy Notice (SEN), SEN-35-91, Nuclear Safety Policy
- DOE Order 5480.23, Nuclear Safety Analysis Report
- DOE Order 5481.1B, Safety Analysis and Review System
- AL Supplemental Directive 5481.1B, Safety Analysis and Review System
- 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals
- DOE-EM-STD-5502-94, Hazard Baseline Documentation
- DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports
- DOE-STD-3009-94, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports
- DOE-STD-3011-94, Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans

3.1.1-3 Given a DOE facility, determine the requirements needed to assess its safety analysis document.

3.1.1-4 Given a simple facility with material type, quantity, form, and dispersibility, determine facility hazard categorization using DOE-STD-1027-92.

3.1.1-5 Discuss basic purposes and objectives of a safety analysis document.

3.1.1-6 Describe the responsibilities of contractors authorized to operate nuclear and non-nuclear facilities for the development and maintenance of safety analysis documents.

3.1.1-7 Describe the requirements for the scope and content of a Nuclear Safety Analysis Report and discuss the general content of each of the required sections of the Report.

3.1.1-8 Discuss the approval requirements for safety analysis documents for facilities and subsequent changes to the documents.

3.1.1-9 Discuss the uses that contractor management makes of safety analysis documents.

3.1.1-10 Define who approves facility operations prior to achieving safety analysis document upgrade approval.

3.1.1-11 Discuss the provisions for temporary and permanent exemptions from the requirements of DOE Order 5480.23, Safety Analysis Reports.

3.1.1-12 Discuss the requirements for the contractor to maintain the safety analysis document current.

3.1.1-13 Discuss how to evaluate contractor preparation of and review of safety analyses, including nuclear criticality, hazards classification, and safety evaluations.

3.1.1-14 Discuss the relationship between authorization agreements and a facility safety basis.

References: Duty 01, Tasks 01-09

3.1.2 The candidate must have knowledge and/or experience sufficient to validate that the site is adequately characterized.

Knowledge/Skill Statements

3.1.2-1 Given a DOE facility, identify typical site characteristics required to understand the facility environs important to the safety basis.

3.1.2-2 Describe the importance of the following site characteristics as they relate to the safety basis:

- Location of the site
- Location of the facility within the site
- Proximity of the site/facility to the public and other facilities
- Identification of the point where Evaluation Guidelines are applied
- Specification of population sheltering
- Specification of population location and density
- Historical basis for natural phenomena
- Identification of design basis natural phenomena
- Identification of sources of external accidents
- Identification of nearby facilities impacting or impacted by
- Consistency with site environmental analyses and impact statements

References: Duty 01, Tasks 01, 02

3.1.3 The candidate must have knowledge and/or experience sufficient to validate that the facility is adequately described.

Knowledge/Skill Statements

3.1.3-1 Given a DOE facility, identify major facility features required to understand the hazard analysis and accident analysis.

3.1.3-2 Describe the importance of the following facility features as they relate to the hazard analysis and accident analysis:

- Mission, operations and history
- Structure and design basis
- Process systems and constituent components
- Instrumentation
- Controls
- Operating parameters
- Structures, systems and components relationships
- Confinement systems
- Safety support systems
- Utilities
- Auxiliary systems and support facilities

References: Duty 01, Tasks 01, 03

3.1.4 The candidate must have sufficient knowledge and/or experience to validate that the analyses have adequately identified and evaluated the hazards and accidents.

Knowledge/Skill Statements

3.1.4-1 Given a DOE facility hazards and accident analyses, identify the elements of these analyses used to conduct a thorough evaluation.

3.1.4-2 Discuss the importance of the following elements of a hazards and accident analyses:

- Methodology for and approach to hazard and accident analyses
- Identification of hazardous material and energy sources present by type, quantity, form and location
- Identification of hazard analysis of the spectrum of potential accidents at the facility in terms of qualitative consequences and frequency estimates including:
  - Identification of planned design and operational safety improvements
  - Defense in Depth Controls and safety structures, systems and components
  - Design and operational features that reduce the potential for large material releases to the environment
- Identification of the limited set of unique and representative accidents

- Identification of accident analysis of design basis accidents including:
  - Estimation of source term and consequence
  - Rationale for binning frequency of occurrence in a broad range in hazard analysis
  - Accident assumptions and identification of safety structures, systems, and components based on evaluation guidelines

3.1.4-3 Differentiate between elements of the safety analysis process and discuss their application in the facility safety basis.

3.1.4-4 Define the following terms and discuss their importance relative to a facility safety basis:

- Design Basis
- Engineered Safety Features
- Evaluation Guidelines
- Hazard
- Hazard Classification
- Hazard Category 1
- Hazard Category 2
- Hazard Category 3
- Hazardous Material
- Limiting conditions for operations
- Limiting control settings
- Risk
- Safety analysis
- Safety limits

3.1.4-5 Identify and compare industry standard processes for identifying and categorizing hazards.

3.1.4-6 Define and explain the use of standard industrial hazards in the hazard identification process.

3.1.4-7 Discuss the contribution that each of the following makes to the facility final hazard analysis:

- Hazardous material inventory
- Energy sources and initiating events
- Preventive features
- Mitigative features

3.1.4-8 Differentiate between the plant/facility features which have the following designations:

- Mitigating features
- Preventive features

3.1.4-9 Discuss the methodology and graded approach used to determine facility hazard classification.

3.1.4-10 Discuss the graded approach for the level of analysis and documentation for hazards included in a hazards analysis document.

3.1.4-11 Discuss the classification categories for the consequences of unmitigated releases of radioactive and/or hazardous material.

3.1.4-12 Discuss each of the following safety analysis methods and their use in the preparation of Safety Analysis Reports:

- Risk Assessment
- Severe Accident Analysis

3.1.4-13 Differentiate between the function of structures, systems, and components in the following classifications:

- Safety-class structures, systems, and components
- Safety-significant structures, systems and components

3.1.4-14 Given a safety analysis document, identify its strengths and weaknesses and provide a recommendation on its adequacy.

References: Duty 01, Tasks 01-09

3.1.5 The candidate must have knowledge of and/or experience using hazards evaluation techniques and modeling codes sufficient to verify that a safety analysis document used accepted and applicable methodologies and codes.

Knowledge/Skill Statements

3.1.5-1 Discuss the advantages and limitations of two (2) of the following hazards evaluation techniques:

- Safety Review
- Checklist Analysis
- Relative Ranking
- Preliminary Hazard Analysis
- What-If Analysis
- What-If/Checklist Analysis
- Hazard and Operability Analysis
- Failure Modes and Effects Analysis
- Fault Tree Analysis
- Event Tree Analysis
- Cause Consequence Analysis
- Human Reliability Analysis

3.1.5-2 Describe the bases upon which to judge the adequacy of a hazard evaluation including:

- Thoroughness of hazard identification
- Rigor of analysis versus complexity of operation and potential consequences of accidents

- Conservatism of assumptions
- Applicability of data
- Consistency and control of expert elicitation process
- Validity and conservatism of scenario screening criteria
- Reflection of lack of knowledge in uncertainty estimates

3.1.5-3 Given a simple process, apply a hazard evaluation technique and explain the results.

3.1.5-4 Discuss the advantages and limitations of one (1) of the following hazards evaluation modeling codes:

- Fault Tree Analysis (FTD, SEATree, ARRTREE, SAPHIRE, ARRAMIS, SABLE, SEQUENCE)
- Event Tree Analysis (GATER, SANET, SETAC, SEQUENCE)

3.1.5-5 Given a simple process, use a hazard evaluation modeling code and explain the results.

References: Duty 01, Tasks 01, 04

3.1.6 The candidate must have knowledge of and/or experience using accident evaluation techniques and modeling codes sufficient to verify that a safety analysis document used accepted and applicable methodologies and codes.

Knowledge/Skill Statements

3.1.6-1 Given a building source term of radionuclide/hazardous chemical release, discuss the appropriate model for off-site transport and deposition.

3.1.6-2 Discuss the differences in plume travel model and parameters between site specific models and standard models (gaussian).

3.1.6-3 Discuss the differences in parameter input and effects between site specific models and standard models.

3.1.6-4 Discuss meteorology input and its effects.

3.1.6-5 Discuss the following terms:

- Chi/Q
- Dose conversion factor
- Breathing Rate
- Aerodynamic equivalent diameter
- Solubility class
- Population dose

3.1.6-6 Given a source term, determine dose consequences applying X/Q, dose conversion factor, breathing rate, and specific activity as applicable.

3.1.6-7 Discuss the advantages and limitations of two of the following accident modeling codes:

- Radiological Consequence Codes (MACCS2, GENII, RadCalc, RSAC-6)
- Fire Analysis Codes (FAST or CFAST)
- Chemical Consequence Codes (ALOHA, EPICODE)
- Leak Path Codes (MELCOR, CONTAINS)
- Explosion Analysis Codes (BlastX)

3.1.6-8 Given a simple accident scenario, demonstrate knowledge by constructing a simple neutral gas dispersion and heavy gas dispersion. Estimate consequences using an accident modeling code including hand calculations and explain the assumptions, inputs, and results.

3.1.6-9 Discuss the process for evaluating assumptions made for scenarios being modeled.

3.1.6-10 Given an accident scenario computer model analysis, interpret the inputting information and its results.

3.1.6-11 Discuss the methods used in the calculation of criticality safety, source term, environmental transport, and dose assessment activities.

3.1.6-12 Define the following accident related terms:

- Accident
- Authorization basis
- Beyond design basis accident
- Design basis
- Design basis accidents
- Evaluation guidelines
- External Event
- Internal Event

3.1.6-13 Differentiate between the following categories of individuals who may be affected by an accident at a DOE facility:

- Off-site individual
- On-site individual
- Public
- Worker

3.1.6-14 Given an accident scenario, determine the correct airborne release fraction (ARF) and respirable fraction (RF), material at risk (MAR), and damage ratio (DR) to use for a bounding and realistic estimate of the product (MAR x ARF x RF x DR).

References: Duty 01, Tasks 01, 04

3.1.7 The candidate must have knowledge and/or experience to validate that the facility structures, systems and components have been identified as necessary to meet evaluation guidelines, provide defense-in-depth, or contribute to worker safety.

Knowledge/Skill Statements

3.1.7-1 Identify attributes required to support safety functions identified in the hazard and accident analyses.

3.1.7-2 Discuss the importance of the following attributes required to validate safety functions:

- Descriptions of safety functions of safety structures, systems, and components
- Identification of safety structures, systems, and components support systems
- Identification of functional requirements necessary for the safety structures, systems, and components to perform their safety functions
- Identification of general conditions caused by postulated accident under which the safety structures, systems, and components must operate
- Identification of the performance criteria necessary to provide reasonable assurance that the functional requirements will be met
- Identification of the controls required for the safety structures, systems, and components to perform their safety functions

References: Duty 01, Tasks 01, 04, 05

3.1.8 The candidate must have knowledge and/or experience sufficient to validate the derivation of controls and their operability, reliability, and maintainability.

Knowledge/Skill Statements

3.1.8-1 Discuss the purpose of design and administrative features.

3.1.8-2 For nuclear facilities, describe the reason a sufficient basis is required to derive Technical Safety Requirements.

3.1.8-3 Given a DOE facility, identify passive design features important to the authorization basis.

3.1.8-4 Discuss the use of passive design features.

3.1.8-5 Identify evaluation processes for ensuring the controls are effective in reducing the risks associated with a postulated accident scenario.

3.1.8-6 Identify processes to ensure that controls are operable, reliable, and maintainable.

3.1.8-7 Given a DOE facility, evaluate the types of processes used to ensure operability, reliability, and maintainability of controls required by the facility safety basis.

3.1.8-8 Define and discuss the following criteria as they are applied in the selection of controls:

- Preventive features
- Mitigative features
- Passive features
- Active features
- Minimization of active features
- Reduction of risk
- Impacts on other accidents
- Independent mechanisms
- Coverage of release pathways
- Minimization of the use of support systems
- Redundancy features
- Functional diversity features
- Maintainability features
- Minimization of surveillance activities
- Minimization of economic impact in respect to implementation

References: Duty 01, Tasks 01, 04-06

3.1.9 The candidate must have knowledge and/or experience sufficient to verify that the safety program elements selected to support the safety analysis assumptions are adequate.

Knowledge/Skill Statements

3.1.9-1 Discuss the following standards and requirements and their application to safety program elements selected to support the hazards analysis assumptions:

Regulations
10 CFR 830.120, Quality Assurance
10 CFR 835, Occupational Radiation Protection

Policy
DOE Policy 450.4, Safety Management System Policy
Orders
DOE Order 151.1, Emergency Management Program
DOE Order 430.1, Life Cycle Asset Management
DOE Order 414.1, Quality Assurance
DOE Order 420.1, Facility Safety
DOE Order 440.1, Worker Protection Management for DOE Federal and Contractor Employees
DOE Order 5480.19, Conduct of Operations
DOE Order 5820.2A, Radioactive Waste Management

3.1.9-2 Identify and describe the Integrated Safety Management System elements of DOE Policy 450.4 and its importance to the facility safety basis.

3.1.9-3 Interpret the policy and objectives of the Nuclear and Explosive Design Criteria portion of DOE Order 420.1 with respect to safety structures, systems, and components.

3.1.9-4 Interpret the policy and objectives of the Fire Protection portion of DOE Order 420.1 with respect to engineering and administrative controls important to the facility safety basis.

3.1.9-5 Discuss the importance of the following fire protection elements to the facility safety basis:

- Facility fire protection systems design
- Combustible loading restrictions
- Fire fighting response capability and readiness

3.1.9-6 Interpret the policy and objectives of the Natural Phenomena Hazards (NPH) Mitigation portion of DOE Order 420.1 with respect to engineering and administrative controls important to the facility safety basis.

3.1.9-7 Discuss the potential impact on safety systems at DOE facilities from the following natural hazards and the safety measure and design features commonly used as safeguards against these natural hazards:

- Flooding
- Wind
- Tornado
- Earthquake and/or other seismic events
- Lightning

3.1.9-8 Discuss the following NPH terms and their effect on the facility safety basis:

- Performance Category 1
- Performance Category 2
- Performance Category 3
- Performance Category 4

3.1.9-9 Discuss the methodology used to determine the NPH performance category of a facility or SSC.

3.1.9-10 Interpret the policy and objectives of the Nuclear Criticality Safety portion of DOE Order 420.1 with respect to engineering and administrative controls and the application of the double contingency principle important to the facility safety basis.

3.1.9-11 Discuss the role of Department authorization basis personnel with respect to the requirements of the Price-Anderson Amendment Act.

3.1.9-12 Discuss the purpose and importance of the key features of the 10 criteria of the Quality Assurance Program with respect to the facility safety basis.

3.1.9-13 Explain the importance of maintaining an acceptable software quality assurance program with respect to the facility safety basis.

3.1.9-14 Discuss the purpose and importance of the key features of a radiation protection program with respect to engineering and administrative controls and the application of ALARA important to the facility safety basis.

3.1.9-15 Discuss the purpose and importance of the key features of a hazardous material protection program with respect to engineering and administrative controls and the application of ALARA important to the facility safety basis.

3.1.9-16 Discuss the purpose and importance of the key features of a radioactive and hazardous material waste management program with respect to engineering and administrative controls and the application of ALARA important to the facility safety basis.

3.1.9-17 Discuss the purpose and importance of facility initial testing, in-service surveillance, and maintenance programs to the facility safety basis.

3.1.9-18 Identify and describe key elements of a conduct of operations program and its importance to the facility safety basis.

3.1.9-19 Discuss the importance of human factors to the facility safety basis.

3.1.9-20 Describe the elements of an emergency preparedness program and its relationship and importance to the facility safety basis.

3.1.9-21 Discuss the importance of having adequately defined functions, responsibilities, and authorities and a sufficient allocation of resources to support the facility safety basis.

References: Duty 01, Tasks 01-09

3.2 Controls

3.2.1 The candidate must have knowledge and/or experience sufficient to validate that the controls document complies with the applicable requirements.

Knowledge/Skill Statements

3.2.1-1 Discuss the following standards and requirements and their application as they relate to controls:

- DOE Order 5480.23, Nuclear Safety Analysis Report
- DOE Order 5480.22, Technical Safety Requirements
- DOE Order 5481.1B, Safety Analysis and Review System
- AL Supplemental Directive 5481.1B, Safety Analysis and Review System
- 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals
- DOE-EM-STD-5502-94, Hazard Baseline Documentation
- DOE-STD-3009-94, Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis Reports
- DOE-STD-3011-94, Guidance for Preparation of DOE 5480.22 (TSR) and DOE 5480.23 (SAR) Implementation Plans

3.2.1-2 Discuss the purpose of nuclear and non-nuclear facility controls.

3.2.1-3 Describe the responsibilities of contractors authorized to operate DOE facilities in ensuring the implementation of controls.

3.2.1-4 Define the following terms and discuss the purpose of each:

- Technical Safety Requirements
- Safety Limit
- Limiting Control Settings
- Limiting Conditions for Operation
- Surveillance Requirements

3.2.1-5 Describe the general content of each of the following sections of the Technical Safety Requirements:

- Use and Application
- Safety Limits
- Operating Limits
- Surveillance Requirements
- Administrative Controls
- Basis
- Design Features

3.2.1-6 Compare and contrast the approval requirements for controls and subsequent changes to those controls for nuclear and non-nuclear facilities.

3.2.1-7 Discuss the definition and implementation principles for the term OPERABILITY as used in a Technical Safety Requirement.

3.2.1-8 Discuss the conditions that constitute a violation of the a control and state the reporting requirements should a violation occur.

3.2.1-9 Review a contractor's controls document and observe on-site activities to evaluate proper adherence to the requirements of the controls.

3.2.1-10 Review and evaluate a contractor's report of exceeding a Limiting Condition of Operation (LCO).

3.2.1-11 Review and evaluate a contractor's report of exceeding a Limiting Control Setting (LCS).

3.2.1-12 Compare and contrast administrative and engineering controls.

3.2.1-13 Discuss the possible technical support documents that may be used in developing controls.

3.2.1-14 Discuss the Responsibilities and Authorities section of DOE Order 5480.22 with respect to implementation.

3.2.1-15 Evaluate a contractor's preparation of a facility's controls document.

3.2.1-16 Review and evaluate a contractor's report of exceeding a Safety Limit (SL), including an evaluation of the basis for any corrective actions taken to preclude reoccurrence.

3.2.1-17 Review a contractor's request to resume operations following an incident involving a Safety Limit being exceeded, and recommend approval or disapproval.

3.2.1-18 Review and evaluate a contractor's surveillance program.

3.2.1-19 Review and evaluate proposed revisions to controls and recommend approval or disapproval.

3.2.1-20 Discuss the requirements for emergency actions that depart from the approved Technical Safety Requirements.

3.2.1-21 Discuss the appropriate source that may be used by a contractor in the initial development of the controls or in proposed changes to the controls.

References: Duty 01, Tasks 01, 04-06, 08, 09

3.3 Change Control

3.3.1 The candidate must have knowledge and/or experience sufficient to validate that the change control document complies with the applicable requirements and verify the potential impacts of changes to the authorization basis.

Knowledge/Skill Statements

3.3.1-1 Discuss the following standards and requirements and their application as they relate to authorization basis change control:

- DOE Order 5480.21, Unreviewed Safety Questions
- DOE Order 5481.1B, Safety Analysis and Review System
- AL Supplemental Directive 5481.1B, Safety Analysis and Review System
- 29 CFR 1910.119, Process Safety Management of Highly Hazardous Chemicals
- DOE-EM-STD-5502-94, Hazard Baseline Documentation

3.3.1-2 Discuss the reasons for performing an Unreviewed Safety Question determination.

3.3.1-3 Explain the purpose of a safety evaluation.

3.3.1-4 Describe the situations for which a safety evaluation is required to be performed.

3.3.1-5 Define the conditions for an Unreviewed Safety Question.

3.3.1-6 Describe the responsibilities of contractors authorized to operate nuclear and non-nuclear facilities for the performance of safety evaluations.

3.3.1-7 Describe the actions to be taken by a contractor upon identifying information that indicates a potential inadequacy of previous safety analyses or, a possible reduction in the margin of safety as defined in a controls document.

3.3.1-8 Discuss the qualification and training requirements for personnel who perform safety evaluations.

3.3.1-9 Discuss the actions to be taken if it is determined that an Unreviewed Safety Question is involved.

3.3.1-10 Discuss the following terms as they apply to Unreviewed Safety Questions:

- Categorical exclusions
- Prior Unreviewed Safety Question safety evaluations
- Inconsequential changes
- Margin of Safety

- Design Basis Accidents
- Important to Safety
- Authorization Basis

3.3.1-11 Discuss those conditions that can lead to determination of an inadequate Safety Analysis.

3.3.1-12 If an inadequate Safety Analysis is determined, discuss how to identify required actions.

References: Duty 01, Tasks 01-11

3.4 Assessment

3.4.1 The candidate must have knowledge and/or experience sufficient to develop a report on the adequacy of the authorization basis documentation and/or its implementation and brief the report to management and other agencies.

Knowledge/Skill Statements

3.4.1-1 Discuss how to prepare a Safety Evaluation Report or DOE report that documents the bases upon which approval of a contractor's Safety Analysis Report or safety analysis document has been made.

3.4.1-2 Based upon an authorization basis document, prepare a safety basis review plan and discuss key attributes of this plan.

3.4.1-3 Identify key elements of a report on the adequacy of an authorization basis document and their importance in the approval process.

3.4.1-4 Given a safety analysis document, describe the process for assessing the adequacy of the conclusions of the analysis and reporting to management on this assessment.

3.4.1-5 Describe the role of authorization basis personnel in the assessment of Government Owned Contractor Operated (GOCO) facilities.

3.4.1-6 Describe the assessment requirements and limitations associated with the interface with contractor employees.

3.4.1-7 Discuss the essential elements of a performance-based assessment including:

- Investigation
- Fact finding
- Exit interview
- Reporting
- Follow-up
- Closure

3.4.1-8 Describe the following assessment methods and the advantages or limitations of each method:

- Document review
- Observation
- Interview

3.4.1-9 Describe the action to be taken if the contractor challenges the assessment findings and explain how such challenges can be avoided.

3.4.1-10 Conduct a performance-based assessment and explain the results in terms of planning, executing, and reporting processes.

3.4.1-11 Using ORPS, track, trend, and analyze authorization basis occurrences to assist in conducting performance-based assessments.

3.4.1-12 Given an occurrence report involving an authorization basis issue, discuss the following:

- That causes were appropriately defined
- That corrective actions addressed causes
- That the lessons learned were appropriate
- That corrective actions have been completed

3.4.1-13 Discuss the content of the requirements section of DOE Order 425.1 and AL Supplemental Directive 425.1, Start-up and Restart of Nuclear Facilities as they apply to authorization basis implementation.

3.4.1-14 Define the following terms as they relate to DOE Order 425.1 and AL Supplemental Directive 425.1, Start-up and Restart of Nuclear Facilities, and authorization basis:

- Facility shutdown
- Operational readiness review
- Operational readiness review breadth
- Operational readiness review depth
- Operational readiness review implementation plan
- Operational readiness review scope
- Plan-of-action
- Prestart finding
- Readiness assessment
- Unplanned shutdown

References: Duty 01, Tasks 12-13
Duty 02, Tasks 01-03
Duty 03, Tasks 04-05

3.4.2 The candidate must have knowledge and/or experience sufficient to assess contractor authorization basis performance in achieving contract performance goals.

Knowledge/Skill Statements

3.4.2-1 Explain the purpose of project management within the Department, and describe the life cycle of a typical project.

3.4.2-2 Describe typical documents and data sources utilized in project management.

3.4.2-3 Identify and explain the major elements of a project, and discuss their relationship.

3.4.2-4 Explain the purpose and use of a project management plan and a project execution plan.

3.4.2-5 Discuss the role of configuration management as it relates to project management.

3.4.2-6 Discuss the role of quality assurance as it relates to project management.

3.4.2-7 Discuss the relationship between work breakdown structure (WBS) and cost and schedule.

3.4.2-8 Describe the purpose and use of work packages and/or planning packages.

3.4.2-9 Describe the purpose of schedules, and discuss the use of milestones and activities.

3.4.2-10 Describe the critical path method of scheduling.

3.4.2-11 Explain the concept of a project management baseline and describe the four baselines used in project management.

3.4.2-12 Describe the process for preparing cost estimates and budgets.

3.4.2-13 Describe and contrast direct and indirect costs. List ways to reduce indirect costs.

3.4.2-14 Describe the types of data required to forecast cost and schedule performance.

3.4.2-15 Using existing program data, explain what planning and scheduling was performed to ensure that program requirements are achievable.

3.4.2-16 Using data from two authorization basis-related programs, discuss each program's budget and its impact on program compliance.

3.4.2-17 Explain the contractual process of establishing performance goals.

3.4.2-18 Discuss the relationship between the contracting officer and the administrative contracting officer.

3.4.2-19 Using an existing contract, explain the contracting officer technical representative responsibilities and authorities.

3.4.2-20 Describe the relationship between funding appropriations and contractor performance goals.

3.4.2-21 Explain the concept of performance based contracting.

References: Duty 03, Tasks 01-03

3.5 Option 1 – Los Alamos National Laboratory

3.5.1 The candidate must have knowledge of and/or experience with DOE Order 420.2, Safety of Accelerator Facilities sufficient to validate Safety Assessment Document.

Knowledge/Skill Statements

3.5.1-1 State the purpose of DOE Order 420.2, Safety of Accelerator Facilities.

3.5.1-2 State the scope of DOE Order 420.2, Safety of Accelerator Facilities.

3.5.1-3 Define the following:

- Accelerator
- Accelerator Facility
- Accelerator Safety Envelope
- Experimenters
- Routine Operation

3.5.1-4 Draw a basic physics diagram of a simplified accelerator and explain how it works.

References: All Duties and Tasks

3.5.2 The candidate must have knowledge of and/or experience with an accelerator Safety Assessment Document sufficient to determine the adequacy of the safety analysis.

Knowledge/Skill Statements

3.5.2-1 Identify major topics covered in the SAD.

3.5.2-2 Discuss how the design and construction criteria comply with DOE design criteria.

3.5.2-3 Define "modes of operation."

3.5.2-4 Discuss beam delivery envelopes.

3.5.2-5 Discuss the experiments safety envelope.

3.5.2-6 Discuss the special experimental facilities safety envelopes.

3.5.2-7 Define and discuss safety equipment function.

3.5.2-8 Explain the operation of a linear accelerator and a synchrotron.

3.5.2-9 Explain the operation of a radiation safety system at an accelerator.

3.5.2-10 Define the following hazard-related terms:

- Accelerator safety envelope
- Design basis accident
- Routinely accepted hazard
- Low hazard facility
- Medium hazard facility
- High hazard facility

3.5.2-11 Differentiate between the following types of facilities:

- Nuclear facility
- Non-reactor nuclear facility and its categories
- Accelerator facility

3.5.2-12 Differentiate between the function and contents of the following documents:

- SAD
- SAR

References: All Duties and Tasks

3.5.3 The candidate must have knowledge of instrumentation and control systems.

Knowledge/Skill Statements

3.5.3-1 Explain the types of instrumentation used to measure charged particle fluxes in an accelerator.

3.5.3-2 Explain the instrumentation used to measure beam positions and beam profiles in accelerators and beam transport lines.

3.5.3-3 Identify parameters needing control in an accelerator.

3.5.3-4 Explain compensation for off-normal events by the control systems in an accelerator.

3.5.3-5 Explain the instrumentation and control operation of a linear accelerator.

References: All Duties and Tasks

3.5.4 The candidate must have knowledge of reactor theory.

Knowledge/Skill Statements

3.5.4-1 Describe the basic sources of neutrons in a shutdown reactor, including:

- Intrinsic neutron sources
- Installed neutron sources

3.5.4-2 List three nuclear properties that a material should have to be considered an ideal neutron moderator.

3.5.4-3 Describe the process by which a neutron transitions from a fast energy to thermal energy.

3.5.4-4 Describe the neutron absorption reaction.

3.5.4-5 Define the following terms:

- Prompt critical
- Delayed critical
- Neutron Multiplication Factor (K_{eff})

3.5.4-6 Describe the change in neutron population from one generation to another generation using the four factor formula.

3.5.4-7 Explain the significance of the following:

- $K_{eff} = 1$
- $K_{eff} < 1$
- $K_{eff} > 1$

3.5.4-8 Define each of the following terms of the six-factorformula:\

- Fast Fission Factor (E)
- Fast Neutron Non-Leakage Probability (L_f)
- Resonance Escape Probability (p)
- Thermal Utilization Factor (f)
- Thermal Neutron Non-Leakage Probability (L_{th})
- Reproduction Factor (N)

3.5.4-9 Explain how the change in the following factors affects neutron leakage:

- Temperature
- Pressure
- Gas Bubble

3.5.4-10 Explain the formula, $N_n = N_o(K_{eff})^n$, calculate the number of neutrons after n number of generations, assuming a value of K_{eff} @ 0.8.

3.5.4-11 Briefly describe how fission product poison can affect core reactivity.

3.5.4-12 Define the term "reactivity" and explain how the following factors can influence the reactivity of a nuclear reactor:

- Fuel depletion
- Temperature
- Pressure
- Poisons
- Gases

3.5.4-13 Describe, in basic terms, the following two types of control rods used in critical assemblies:

- Regulating rods
- Safety rods

3.5.4-14 Explain the basic considerations used to determine minimum and maximum control rod speed.

3.5.4-15 Discuss the following Reactor Kinetics areas:

- Reactor period
- Reactor power versus reactor period in mathematical terms
- Delayed neutron fraction
- Effective delayed neutron fraction
- Delayed neutrons during transient reactor operation
- Prompt critical
- Prompt jump
- Prompt drop

3.5.4-16 Explain how the "shutdown margin" of a critical assembly or reactor is maintained.

3.5.4-17 Explain how decay heat is generated within a critical assembly or reactor and three methods by which decay heat may be removed.

References: All Duties and Tasks

3.5.5 The candidate must have knowledge of high explosives and the application of DOE M 440.1-1, DOE Explosives Safety Manual at LANL.

Knowledge/Skill Statements

3.5.5-1 Using any applicable references, define the following terms:

- Conventional high explosive (CHE)
- Insensitive high explosive (IHE)
- One point detonation

3.5.5-2 Discuss the difference between IHE and CHE.

3.5.5-3 Define and compare the effects of the following interrelated high explosive terms:

- Detonations
- Violent reactions
- Deflagration
- Combustion

3.5.5-4 Describe the response of high explosives to the following external stimuli:

- Mechanical
- Electrical
- Thermal

3.5.5-5 Discuss the effects of aging on high explosive materials.

3.5.5-6 Discuss the toxic properties of high explosive materials.

3.5.5-7 List seven abnormal stimuli or environments from which explosives should be protected.

3.5.5-8 State the hazards associated with 1.1, 1.2, 1.3, 1.4, 1.5, & 1.6 explosives.

3.5.5-9 Describe the four hazard classes and corresponding required levels of protection.

3.5.5-10 Describe, in general terms, quantity-distance determination requirements.

References: All Duties and Tasks

3.5.6 The candidate must have knowledge of LANL AR 13-2, Cranes, Hoists, Lifting Devices, and Rigging.

Knowledge/Skill Statements

3.5.6-1 Define the following:

- High-consequence lift (critical lift)
- Incidental crane operator
- Ordinary lift

3.5.6-2 Identify the procedural requirements for high-consequence lifts, including approvals.

3.5.6-3 Identify the inspection requirements for overhead cranes, mobile cranes (including wire ropes), and rigging equipment.

References: All Duties and Tasks

3.5.7 The candidate must have knowledge of radiation detection and measurement principles.

Knowledge/Skill Statements

3.5.7-1 Define the following terms:

- Ionization
- Range (charged particle)
- Bremsstrahlung
- Backscatter
- Absorption
- Attenuation
- Moderation
- Absorbed dose
- Dose equivalent
- Exposure
- Quality factor
- Committed effective dose equivalent (CEDE)
- Total effective dose equivalent (TEDE)

3.5.7-2 Describe the process of elastic scattering of neutrons with hydrogen in the body and its biological importance.

3.5.7-3 Identify the materials commonly used as neutron moderators and discuss their qualitative abilities.

3.5.7-4 Calculate radiation dose or dose rates using the inverse square law:

$$I_1 \, d_1^2 = I_2 \, d_2^2 \quad \text{or} \quad DR_1 \, r_1^2 = DR_2 \, r_2^2$$

3.5.7-5 Define the units used to measure the following:

- Absorbed dose
- Dose equivalent

3.5.7-6 Calculate the dose equivalent given the absorbed dose and quality factor (e.g. roentgen, Rad, and rem).

References: All Duties and Tasks

3.5.8 The candidate must have knowledge of the engineered radiological controls and design criteria. The candidate shall be able to:

Knowledge/Skill Statements

3.5.8-1 Discuss radiological protection considerations in layout design for nuclear reactor facilities.

3.5.8-2 Discuss the radiological protection considerations in the design and selection of components for nuclear reactor facilities.

3.5.8-3 Discuss the concerns associated with the selection of materials and the associated finishes for components used in radiological control areas.

3.5.8-4 Discuss the differences and associated applications between permanent and temporary engineered radiological controls.

References: All Duties and Tasks

3.5.9 The candidate must have knowledge of the LANL Radiological Control Manual.

Knowledge/Skill Statements

3.5.9-1.1 Describe LANL's Marginal Radiological Control Performance Policy.

3.5.9-2 Discuss the limitations for use of laboratory coats as radiological protective clothing.

3.5.9-2.1 State who has the authority to authorize resumption of radiological work that has been stopped.

3.5.9-3 Describe a hot particle and the requirements for controlling them.

3.5.9-4 Discuss under what conditions a Post-Job Review should be held and list the information that should be documented.

3.5.9-5 List actions that should be considered during inclement weather or other environmental conditions that disrupt radiological controls.

3.5.9-6 List hazards to consider when radiological controls are implemented to ensure protection from all work place hazards.

3.5.9-7 Define radioactive material according to LANL's Radiological Control Manual.

3.5.9-8 State the types of radioactive material that need to be labeled.

3.5.9-9 State what type of material in contamination areas are considered contaminated and list the requirements for equipment that needs to be removed from the contamination area.

3.5.9-10 Describe labeling requirements for radioactive material located within a Contaminated, High Contaminated or Airborne Radioactivity Area.

References: All Duties and Tasks

3.5.10 The candidate must demonstrate knowledge of LANL LIRs, LPRs, and LIGs pertaining to the Safety Analysis and Review System.

Knowledge/Skill Statements

3.5.10-1 Discuss the purpose and scope LANL LIRs, LPRs, and LIGs pertaining to the Safety Analysis and Review System.

3.5.10-2 Describe the actions requiring a safety analysis report.

3.5.10-3 Discuss the steps involved in the SAR process as identified LANL LIRs, LPRs, and LIGs pertaining to the Safety Analysis and Review System.

3.5.10-4 Discuss the LANL SAR review and approval process.

References: Duty 01, Tasks 01-09

3.5.11 The candidate must demonstrate knowledge of the following LANL documents:

- **PED 114-05.0, Technical Safety Requirements**
- **LS 114-02.0, Technical Safety Requirements Implementing Document**
- **LS 114-03.0, Technical Safety Requirements Implementing Guidance Document**

Knowledge/Skill Statements

3.5.11-1 Discuss the purpose, scope and relationship of each document to DOE Order 5480.22, Technical Safety Requirements.

3.5.11-2 Discuss how TSR effectiveness is evaluated by measures of performance.

3.5.11-3 Discuss how variances and conditions are addressed in TSR development.

3.5.11-4 Discuss how violations to TSR procedures are addressed.

3.5.11-5 Discuss the modification and revision process of TSRs.

References: Duty 01, Tasks 01, 04-06, 08, 09

3.5.12 The candidate must demonstrate knowledge of LANL LS 114-01.0, Unreviewed Safety Question Determination (USQD).

Knowledge/Skill Statements

3.5.12-1 Discuss the purpose and scope of LANL LS 114-01.0, Unreviewed Safety Question Determination.

3.5.12-2 Discuss the three purposes of USQD.

3.5.12-3 Describe the conditions that require a USQD to be performed.

3.5.12-4 Discuss the seven questions a USQD must answer.

References: Duty 01, Tasks 01-11

3.5.13 The candidate must demonstrate knowledge of LAAO procedures on safety analysis and review systems. The candidate shall be able to:

Knowledge/Skill Statements

3.5.13-1 Discuss LAAO process on reviewing Justification for Continued Operations.

3.5.13-2 Discuss LAAO process on reviewing safety analysis documents.

3.5.13-3 Discuss LAAO process on reviewing control documents.

3.5.13-4 Discuss LAAO procedure on reviewing USQs.

References: Duty 01, Tasks 01-11

3.6 Option 2 – Pantex

3.6.1 The candidate must have knowledge and/or experience with requirements sufficient to evaluate the adequacy of a hazards analysis report.

Knowledge/Skill Statements

3.6.1-1 Using AL Appendix 56XB, Development and Production Manual, Chapter 11.4, discuss the objective of a hazards analysis report (HAR) and its goals.

3.6.1-2 Using AL Appendix 56XB, Development and Production Manual, Chapter 11.6, discuss the role and responsibilities of a safety basis review team.

3.6.1-3 Given a HAR, provide an analysis of its strengths and weaknesses and a recommendation on its acceptability by the authorization official.

3.6.1-4 Given a SER, discuss its content and conclusions regarding a HAR.

References: Duty 01, Tasks 01-09

3.6.2 The candidate must have knowledge of and/or experience with the internal design of nuclear explosive/weapon systems, components and mechanisms.

Knowledge/Skill Statements

3.6.2-1 Discuss the function, purpose, and design of the following systems and components:

- Arming
- Fusing
- Firing
- High explosives
- Fusionable material
- Fissile material - primary and secondary
- Detonators
- Boosting device
- Neutron generators (zippers)
- Ancillary hazardous systems

3.6.2-2 Describe the nuclear explosive/weapon command and control features with respect to the following:

- Personnel
- Electronics
- Mechanics/required signals - permissive action link (PAL)

3.6.2-3 Discuss the principles of nuclear weapon design specific to the following:

- Stockpile-to-Target Sequence
- Military Characteristics

3.6.2-4 Discuss nuclear detonation safety design principles and describe nuclear explosive components/features that have been employed to provide isolation, inoperability, and incompatibility, including:

- Barriers
- Weak links
- Strong links
- Unique signals

3.6.2-5 Discuss the role of independence and first principles in the implementation of the nuclear detonation safety design principles (safety theme).

3.6.2-6 Describe nuclear explosive design features that have been employed to prevent/mitigate fissile material dispersal including:

- Insensitive high explosives
- Fire-resistant pits

References: All Duties and Tasks

3.6.3 The candidate must have knowledge of the radiological, equipment, and personnel hazards associated with nuclear explosives/weapons.

Knowledge/Skill Statements

3.6.3-1 Discuss the radiological characteristics, and related hazards to personnel and equipment from the following materials used in nuclear explosives/weapons:

- Uranium
- Plutonium
- Tritium

3.6.3-2 Discuss the general quantity and configuration of the materials used in nuclear explosives/weapons that present a potential radiological hazard to personnel and equipment.

3.6.3-3 Describe how as-low-as-reasonably-achievable (ALARA) considerations are incorporated into the procedures for the handling and storage of nuclear explosives/weapons.

3.6.3-4 Identify the hazards to personnel and equipment from each of the following features of nuclear explosive/weapon design:

- Spin rockets
- Retarding devices
- Pre-flight controllers
- Boosting device

3.6.3-5 Describe toxic materials typically found in nuclear explosives and weapons, the hazards associated with them, and the safety precautions that should be taken.

3.6.3-6 Describe the physical effects of a high explosive detonation and a nuclear detonation in terms of:

- Blast
- Radiation
- Thermal

References: All Duties and Tasks

3.6.4 The candidate must have knowledge of high explosives and their applicability in nuclear explosives/weapons.

Knowledge/Skill Statements

3.6.4-1 Define the following terms:

- Conventional high explosives (CHE)
- Insensitive high explosive (IHE)
- One point detonation

3.6.4-2 Discuss the difference between IHE and CHE used in nuclear explosives/weapons.

3.6.4-3 Describe the function of primary and secondary explosives in nuclear explosive/weapon design.

3.6.4-4 Define and compare the effects of the following interrelated high explosive terms that apply to nuclear explosive/weapon design:

- Detonations
- Violent reactions
- Deflagration
- Combustion

3.6.4-5 Describe the response of high explosives used in nuclear explosive/weapon design to the following external stimuli:

- Mechanical
- Electrical
- Thermal

3.6.4-6 Discuss the effects of aging on the high explosive materials used in nuclear explosive/weapon design.

3.6.4-7 Discuss the toxic properties of the high explosive materials used in nuclear explosive/weapon design.

References: All Duties and Tasks

3.6.5 The candidate must have knowledge of tooling, testers, rigging, and hoisting equipment used for handling nuclear explosives/weapons.

Knowledge/Skill Statements

3.6.5-1 Explain how the design of each of the following is important in minimizing or eliminating the potential for mishandling nuclear explosives/weapons and preventing accidents.

- Tooling
- Testers
- Rigging equipment
- Hoisting equipment

3.6.5-2 Discuss the reasons for requiring the use of approved procedures when using tooling equipment used for handling nuclear explosive/weapons, including the consequences of the improper use of such equipment.

3.6.5-3 Read and interpret design drawings and technical specifications for the tooling, testers, rigging, and hoisting equipment used in handling nuclear explosives/weapons.

3.6.5-4 Explain the importance of proper certification of slings and hoisting equipment used in handling nuclear explosives/weapons.

3.6.5-5 Explain the importance of proper certification of testers used in nuclear explosives/weapons operations.

References: All Duties and Tasks

3.6.6 The candidate must have knowledge of facility system interfaces and their potential effects on nuclear explosives.

Knowledge/Skill Statements

3.6.6-1 Identify the potential hazards that pneumatic and hydraulic systems present to the safety of nuclear explosive operations and associated activities.

3.6.6-2 State the purpose and significant features of heating, ventilation, and air-conditioning systems that service nuclear explosive areas and discuss the effects of these systems in normal and abnormal environments.

3.6.6-3 Describe the hazards presented to the safety of nuclear explosive operations and associated activities by the introduction of alternating current (AC) and direct current (DC) electrical energy sources, or equipment using any electrical source, into a nuclear explosive area.

3.6.6-4 Describe the controls and design measures to prevent or limit the introduction of electrical energy into a nuclear explosive area.

References: All Duties and Tasks

3.6.7 The candidate must have knowledge of fire protection systems and their effects on nuclear explosive/weapon safety.

Knowledge/Skill Statements

3.6.7-1 List the various types of fire protection systems that service nuclear explosive areas and describe the effects of their use on nuclear explosive safety.

3.6.7-2 For each of the following, describe the actions that mitigate the hazards associated with each of the fire protection systems that service nuclear explosive areas:

- Criticality
- Containment of radioactive effluent
- Contamination due to partially burned high explosive

3.6.7-3 Discuss the provisions contained in joint DOE/Department of Defense (DoD) Technical Publication 20-11, General Fire Fighting Guidance, and apply each to a fire situation involving nuclear explosives/weapons.

References: All Duties and Tasks

3.6.8 The candidate must have knowledge of the criticality process and its application to nuclear explosive/weapon design and operations.

Knowledge/Skill Statements

3.6.8-1 Discuss the following processes and their application in nuclear explosive/weapon design:

- Nuclear fission
- Nuclear fusion

3.6.8-2 Define the term "fissile materials" and give examples applicable to nuclear explosive/weapon design.

3.6.8-3 Describe the methods used during the assembly, disassembly, transportation and storage of nuclear explosives/weapons to prevent criticality.

3.6.8-4 Describe the criticality effects and criticality hazards associated with nuclear explosives/weapons in terms of personnel radiation exposure.

3.6.8-5 Describe how each of the following categories of neutron interacting materials is used in, or may affect, the safe packaging, stacking, and storage of nuclear explosives/weapons. Give examples of materials and/or components within each category.

- Reflectors
- Absorbers
- Moderators

References: All Duties and Tasks

3.6.9 The candidate must have knowledge of the effects of abnormal environments on nuclear explosives/weapons.

Knowledge/Skill Statements

3.6.9-1 Define the term "abnormal environment."

3.6.9-2 List the categories of abnormal environments specific to nuclear explosive/weapon operations and storage, and describe the characteristics of each.

3.6.9-3 Given a set of conditions that make up an abnormal environment for a nuclear explosive/weapon, assess and evaluate a single abnormal environment including the credibility of multiple abnormal environments. Include the following in the evaluation:

- Identifying hazards
- Identifying the effects on the nuclear explosive
- Identifying mitigating measures to be taken

References: All Duties and Tasks

3.6.10 The candidate must have knowledge of facility design at the Pantex Plant.

Knowledge/Skill Statements

3.6.10-1 Define/explain the following types of explosive activities and describe the level of protection the facility housing the explosive activity shall provide:

- Class I
- Class II
- Class III
- Class IV

3.6.10-2 Discuss the following for Bays/Cells:

- Operations performed
- Basic aspects of their construction, including:
  - Roof
  - Walls
  - Blast Doors
  - Blast Door Interlocks
  - Fire Dampers
  - Contaminated Waste Isolation Valves (assembly cells only)
  - Missile Shields or Door Catchers (assembly bays only)
  - Lightning Protection
  - Overburden
  - Mechanism for gas venting in the event of an explosion
- Natural Phenomena Design Basis Accidents
- Explosive Design Basis Accidents and Methods of Mitigation

3.6.10-3 Discuss the following for Modified Richmond and Steel Arch Construction Magazines at the Pantex Plant:

- Operations performed
- Basic aspects of their construction, including:
  - Roof
  - Walls
  - Blast Doors
  - Blast Shields
  - Lightning Protection
  - Overburden
- Natural Phenomena Design Basis Accidents
- Other Design Basis Accidents and Methods of Mitigation

References: All Duties and Tasks

3.6.11 The candidate must have knowledge of the Radiation Alarm Monitoring System (RAMS).

Knowledge/Skill Statements

3.6.11-1 State the purpose, operation, location and associated setpoints (as applicable) of the following RAMS components:

- Alpha Continuous Air Monitor
- Tritium Continuous Air Monitor
- Sensor Drop Box
- Local Alarm Relay Box (LARB)
- Microcomputers
- Minicomputer
- Remote Video Units
- Contaminated Vacuum System

3.6.11-2 Describe the operation of RAMS in a degraded mode upon loss of any of the following components or combination of the loss of any of the following components:

- Microcomputer
- Minicomputer

3.6.11-3 Describe the interrelationships between the Blast Door Interlocks, Heating, Ventilation, and Air Conditioning (HVAC) system and RAMS.

References: All Duties and Tasks

3.6.12 The candidate must have knowledge of a typical HVAC system at the Pantex Plant.

Knowledge/Skill Statements

3.6.12-1 Describe/explain the interrelationships between the HVAC system and the RAMS and Fire Protection systems.

3.6.12-2 For a typical bay or cell, describe the response of the HVAC system for the following alarm conditions:

- Fire alarm
- Beta alarm
- Alpha alarm

References: All Duties and Tasks

3.6.13 The candidate must have knowledge of the high explosive support systems at the Pantex Plant.

Knowledge/Skill Statements

3.6.13-1 State the purpose of an interlock warning system for remote (Class I) operations.

3.6.13-2 State the purpose fail-safe over-temperature controllers.

3.6.13-3 State the purpose of explosive duct exhaust ventilation and collection systems.

3.6.13-4 State the purpose of the interlock associated with the vacuum holding fixtures.

3.6.13-5 State the purpose of the ENMET Hazardous Gas Monitor/Alarm System.

3.6.13-6 Describe the influence the following parameters have on the results of a radiological consequence analysis:

- For high explosive violent reaction, high explosive charge mass and pit fissile material mass
- High explosive burn versus violent reaction
- Plutonium versus enriched uranium
- Wind speed and direction
- Atmosphere stability

References: All Duties and Tasks

3.6.14 The candidate must have knowledge of the policy, procedures, authorities, and responsibilities established to ensure safe conduct of nuclear explosive activities as described in DOE Order 452.1A, Nuclear Explosive and Weapon Surety Program.

Knowledge/Skill Statements

3.6.14-1 Discuss the purpose, scope and applicability of DOE Order 452.1A, Nuclear Explosive and Weapon Surety Program.

3.6.14-2 Define the following terms that are used in DOE Order 452.1A, Nuclear Explosive and Weapon Surety Program:

- Abnormal environment
- Environment, Safety, and Health (ES&H)
- Normal environment
- Nuclear explosive
- Nuclear weapon
- Nuclear explosive operation
- Nuclear explosive operation associated activities
- Nuclear Explosive Safety (NES)
- Positive measures

3.6.14-3 Explain the line management responsibilities within the Nuclear Explosive and Weapons Surety Program.

References: All Duties and Tasks

3.6.15 The candidate must have knowledge of the policy, procedures, authorities, and responsibilities established to ensure safe conduct of nuclear explosive activities as described in:

- **DOE Order 452.2A, Safety of Nuclear Explosive Operations**
- **AL Supplemental Directive 452.2A, Safety of Nuclear Explosive Operations**
- **DOE Guide 452.2A-1A, Implementation Guide for DOE Order 452.2A, Safety of Nuclear Explosive Operations**

Knowledge/Skill Statements

3.6.15-1 Discuss the purpose, scope and applicability of each of the documents listed above.

3.6.15-2 Define the following terms used in DOE Order 452.2A, Safety of Nuclear Explosive Operations:

- High explosive deflagration
- High explosive detonation
- Live pit
- Main charge
- Mock high explosive
- Nuclear detonation
- Nuclear explosive area
- Nuclear explosive like assembly (NELA)
- One point safe nuclear explosive
- Safe secure railcar (SSR)
- Safe secure trailer (SST)

3.6.15-3 Explain the two-person concept for operations involving nuclear explosives.

3.6.15-4 Explain why the following are needed to ensure the safe conduct of nuclear explosive operations and associated activities:

- NELA requirements
- Permanent Marking Instructions
- Control of Electrical Testers/Equipment

3.6.15-5 State who approves weapons operations prior to achieving Hazard Analysis Report upgrade approval.

3.6.15-6 Describe the relationship between the SAR, the HAR, and the Nuclear Explosive Hazard Assessment (NEHA).

3.6.15-7 Discuss the following in relation to the safety/hazard analysis reports:

- Operational Safety Controls (OSCs)
- Nuclear Explosive Safety Rules (NESRs)

- TSRs
- Safety structures, systems, and components (SSCs)

3.6.15-8 Discuss the nuclear explosive safety study process as described in DOE Order 452.2A and detailed in DOE-STD-3015-97.

3.6.15-9 Describe the organization requirements for a Nuclear Explosive Safety Study Group (NESSG).

3.6.15-10 Describe the scope of the NESSG responsibilities.

3.6.15-11 Discuss DOE Order 452.2A, Safety of Nuclear Explosive Operations requirements for conducting a NES Study and NES Survey.

3.6.15-12 Explain the functions of an NES Study, an NES Survey, and an NES Review.

3.6.15-13 Explain how changes in each of the following types of planned operations could require a new NES Study and NES Survey:

- Dismantlement schedule
- Nuclear testing schedule
- Testing schedule
- New build and rebuild schedule
- Transportation schedule
- Revised programmatic/safety priorities
- Weapon custody

3.6.15-14 Describe the approval level requirements for an NES Study, an NES Survey, and an NES Review.

3.6.15-15 Explain the relationship between a Master Study and a specific study.

3.6.15-16 Given a set of conditions from which the need to perform an NES Study, an NES Survey, or an NES Review has been determined:

- Identify the scope of nuclear explosive safety operations, facilities, and equipment to be studied or surveyed.
- Describe the study group membership.
- Discuss how to communicate DOE expectations of the conduct of the Nuclear Explosive Safety Study to all those who will participate in the study.
- Discuss how to prepare a comprehensive draft report for the study.
- Discuss how to coordinate the participation of contractors in the compilation, analysis, and evaluation of data during the planning and performance of an NES Study, an NES Survey, or an NES Review.
- Discuss how to evaluate the need for special briefings to provide supplemental information to study participants during the planning and performance of an NES Study, an NES Survey, or an NES Review.

3.6.15-17 Define the following terms and describe the approval requirements for each:

- Variance
- Waiver
- Exception

3.6.15-18 Describe the specific elements of information to be included with each request for a variance, waiver, or exception.

3.6.15-19 Describe the use of alternate or equivalent means to meet a specific requirement of DOE Order 452.2A, Safety of Nuclear Explosive Operations.

3.6.15-20 Using an actual or hypothetical request for a variance, waiver, or exception, evaluate the request for adequacy, completeness, and compliance with DOE Order 452.2A, Safety of Nuclear Explosive Operations.

References: All Duties and Tasks

3.6.16 The candidate must have knowledge of nuclear component special packaging operations at the Pantex Plant.

Knowledge/Skill Statements

3.6.16-1 Discuss 10 CFR 71, Packaging and Transportation of Radioactive Material, with emphasis on applicability to Pantex Plant operations.

3.6.16-2 Describe the types of packaging operations at the Pantex Plant, as applicable, to include the loading/reloading of plutonium, tritium, and uranium containers and explosive assemblies.

3.6.16-3 Describe the content of the Pantex Plant's "On-Site Packaging Transportation Manual."

3.6.16-4 Describe the procurement process of Type B packages.

References: All Duties and Tasks

3.6.17 The candidate must have knowledge of management organization and responsibilities.

Knowledge/Skill Statements

3.6.17-1 State the objective of Mason & Hanger Corporation's (MHC) Integrated Safety Management (ISM) program plan.

3.6.17-2 For the Management, Integration, and Controls Standards/Requirements Identification Document (MIC S/RID):

- Describe the seven core safety functions (sections).
- Discuss the four categories addressed in each of the core safety functions.
- Discuss the flowdown of standards and requirements (S/R) to implementing plant standards.
- Discuss the S/R change evaluation process.
- Identify MHC efforts used to develop policies, procedures, and documents to implement safety management.

3.6.17-3 State the purpose and scope of Pantex Policy DIR-0001.

3.6.17-4 Briefly describe the following processes in Pantex Policy DIR-0001:

- Hazard analysis
- Identification of controls
- Implementation of controls
- Readiness confirmation

References: All Duties and Tasks

3.6.18 The candidate must have knowledge of the safety documentation system at the Pantex Plant.

Knowledge/Skill Statements

3.6.18-1 Discuss the scope of Pantex contractor's authorization agreements procedure and identify the three occurrences which can change an Authorization Agreement.

3.6.18-2 Define authorization basis and identify where the authorization basis is documented.

3.6.18-3 Identify how often the basis for interim operation (BIO) and SARs must be updated and what must, as a minimum, be included in the updates.

3.6.18-4 Discuss the relationships between the safety documents for the Pantex Plant.

3.6.18-5 Discuss the scope of Pantex Contractor Unreviewed Safety Question (USQ) process.

3.6.18-6 Given the Pantex contractor USQ procedure, discuss:

- When to screen issues
- Steps taken by the Originator to complete a USQ process
- Questions addressed from Section 10.c of DOE Order 5480.21
- Potentially inadequate Safety Analysis (PISA) or reductions in the margin of safety
- Justification for Continued Operations (JCO)

3.6.18-7 Discuss Amarillo Area Office (AAO) procedures for unreviewed safety question (USQ) evaluations and establishing a USQ point of contact.

3.6.18-8 Discuss the JCO process and those circumstances that will invalidate a JCO.

References: All Duties and Tasks

3.6.19 The candidate must have knowledge of Nuclear Criticality Safety at the Pantex Plant.

Knowledge/Skill Statements

3.6.19-1 Discuss the purpose, scope, responsibilities, and actions related to the DOE AAO Nuclear Criticality Safety procedure.

3.6.19-2 Describe the purpose and scope of the Pantex Nuclear Criticality Safety (NCS) Program.

3.6.19-3 List the common controls required to assure subcriticality under all normal and credible abnormal conditions.

References: All Duties and Tasks

3.6.20 The candidate must have knowledge of Nuclear Explosive Safety at the Pantex Plant.

Knowledge/Skill Statements

3.6.20-1 State the purpose and scope of DOE-AAO Procedure on nuclear explosive safety.

3.6.20-2 Describe the DOE-AAO Personnel Assurance Program requirements including:

- Certification/recertification
- Medical evaluation
- Training and qualification

3.6.20-3 Discuss DOE-AAO staff responsibilities/authorities related to the DOE-AAO Nuclear Explosive Safety Program.

3.6.20-4 Discuss the purpose and scope of the Pantex contractor nuclear safety program (NSP) procedure.

3.6.20-5 Discuss the NSP structure and interrelationships with other safety disciplines.

3.6.20-6 State the three nuclear explosive safety standards.

3.6.20-7 Discuss the contents and applicability of the DOE General Nuclear Explosive Safety Rules.

3.6.20-8 Describe the process for review and approval of fissile material and personnel limits including temporary and emergency limits.

3.6.20-9 State the zone coverage requirements which must be present whenever a nuclear explosive area is unprotected by the facility's dual-lock system.

3.6.20-10 State the conditions in which person-to-person coverage requirements apply.

3.6.20-11 State the personnel requirements for the two persons involved in person-to-person coverage.

3.6.20-12 Describe how Reader-Worker Routines and Check-Off Lists are used when person-to-person coverage is required.

3.6.20-13 Identify the conditions which must be met for a Nuclear Explosive Safety Study or Nuclear Explosive Safety Survey to be valid.

3.6.20-14 Describe the condition(s) in which a Nuclear Explosive Safety Survey can be used in lieu of a Nuclear Explosive Safety Study.

3.6.20-15 State the purpose of Technical Business Practice (TBP) 901/A and its relationship with the nuclear weapon safety basis.

3.6.20-16 Identify the scope of Seamless Safety for the 21st century (SS-21) at the Pantex Plant.

3.6.20-17 Discuss Pantex contractor use and operation of Fire Department electrical equipment in critical assembly areas including the following:

- The dangers associated with operating electrical/electronic equipment (including cellular telephones) in operating bays or cells, firing sites, and Sandia areas.
- The policy on operating cellular or portable telephones in these areas.
- The policy on using Cardiac Monitors/Defibrillators in these areas.

References: All Duties and Tasks

3.6.21 The candidate must have knowledge of the policy, procedures, and responsibilities established in AL Appendix 56XB, Development and Production Manual, Chapters 11.4 and 11.5, concerning Activity Based Control Documents (ABCDs) sufficient to validate that the controls document is in compliance.

Knowledge/Skill Statements

3.6.21-1 Discuss the purpose, scope and applicability of ABCDs.

3.6.21-2 Discuss how the ABCD documents mitigating controls for the accident scenarios described in the HAR for a specific nuclear explosive operation.

3.6.21-3 Describe the purpose and use of Target Level of Controls and its relationship with an ABCD document.

3.6.21-4 Discuss the relationship between the TSR and the ABCD.

References: Duty 01, Tasks 01, 04-06, 08, 09

3.6.22 The candidate must have knowledge of and/or experience with the application of DOE M 440.1-1, DOE Explosives Safety Manual at Pantex.

Knowledge/Skill Statements

3.6.22-1 List seven abnormal stimuli or environments from which explosives should be protected.

3.6.22-2 List six checks that explosives processing and test equipment should be subjected to prior to use.

3.6.22-3 Using Tables II-4 and II-5, determine allowed storage compatibility of explosives from various compatibility groups.

3.6.22-4 State the hazards associated with 1.1, 1.2, 1.3, 1.4, 1.5, & 1.6 explosives.

3.6.22-5 Describe the four hazard classes and corresponding required levels of protection.

3.6.22-6 Describe, in general terms, quantity-distance determination requirements.

3.6.22-7 State the relationship between the distance requirements and net explosive weight (NEW).

3.6.22-8 State the quantity of explosives which requires review and determination for explosive compatibility groups.

3.6.22-9 State the primary consideration for establishing a safe explosives storage interval.

3.6.22-10 Discuss the process of evaluating and assigning storage compatibility groupings for explosives.

3.6.22-11 Discuss the explosives characteristics to be considered in establishing permanent storage compatibility groups.

References: All Duties and Tasks

3.6.23 The candidate must have knowledge and/or experience sufficient to validate that the change control document for nuclear explosive operations complies with AL Appendix 56XB, Development and Production Manual, Chapter 11.7, Change Control and verify the potential impacts of changes to the authorization basis.

3.6.23-1 Discuss the responsibilities of each agency (Pantex Contractor, Amarillo Area Office, and Albuquerque Operations Office) in reviewing and assessing a nuclear explosive operations change.

3.6.23-2 Explain the relationship between line management and the NESS community on changes to a nuclear explosive operation.

3.6.23-3 Discuss the following terms and how they relate to a change to a nuclear explosive operation:

- Minor
- Significant
- Trivial
- Non-trivial

3.6.23-4 Explain the process of determining the review and approval of a change to a nuclear explosive operation.

References: Duty 01, Tasks 01-11

3.6.24 The candidate must have knowledge of how the Safety Envelope at the Pantex Plant is defined.

Knowledge/Skill Statements

3.6.24-1 Describe the purpose and use of Pantex Site-Wide Technical Safety Requirements (TSRs).

3.6.24-2 Demonstrate the use of the Pantex Site-Wide TSRs to identify critical and important systems, Occurrence Reporting categories, Action Statements, Bases, and Surveillance Requirements.

3.6.24-3 Describe the relationship between the Pantex Site-Wide TSRs with other Pantex authorization basis documentation (BIO Modules, NES Master Studies, SARs, HARs, ABCDs).

References: All Duties and Tasks

3.6.25 The candidate must have knowledge of the requirements in AAO procedural requirements for review and approval of authorization basis documentation (SARs, TSRs, Unreviewed Safety Questions (USQ) and Justifications for Continued Operations (JCO)).

Knowledge/Skill Statements

3.6.25-1 Describe the AAO process for reviewing and approving SARs and TSRs.

3.6.25-2 Define the following USQ/JCO terms:

- Changes in process or campaigns
- Design basis
- Design basis accidents
- DOE safety chain of command for unreviewed safety analysis reports
- Justification for Continued Operation
- Nonreactor nuclear facility
- Nuclear facility
- Notification
- Routine maintenance
- Safety analyses
- Safety evaluation screen

3.6.25-3 Discuss the USQ and JCO requirements. Include in the discussion the following elements:

- Establishment of the USQ point of contact
- USQ procedures
- USQ evaluations
- USQ reviews
- Procurement issues

References: All Duties and Tasks

3.7 Option 3 – Sandia National Laboratories

3.7.1 The candidate must have knowledge of Pulse Power theory.

Knowledge/Skill Statements

3.7.1-1 Using a diagram of a pulse accelerator, explain the function and principles of operation of each component part in the generation of a high power pulse.

3.7.1-2 Define the following terms and any effects they may have on accelerator performance:

- A-K gap
- Arc length
- Bremsstrahlung
- Bias or biasing
- Capacitor
- Capacitance (C)
- Calorie
- Charge (Q)
- Coaxial line
- Dielectric
- Diode
- Droop
- Electric force (E)
- Electromagnetic pulse (EMP)
- Electron
- Farad (f)
- Field strength
- Flashover field
- Electrical field & enhancement
- Gain
- Impedance (Z)
- Inductance (L)
- Inductor
- Insulator (electrical)
- Insulator angle
- Ion beam
- Jitter
- Arc
- Beam
- Joule (J)
- Magnetic force (gauss or tesla)
- Parallel circuit
- Period (t)
- Power (w)
- Power Flow
- Pulse
- Pulse compression
- Oil field resistor
- R-C circuit
- R-L circuit
- R-L-C circuit
- Resistor
- Resistivity (ρ)
- Resistance (W)
- Rise time
- Ringing rise time
- Safety gap
- Series circuit
- Streamer (formation)
- Stripline
- T-line
- Water storage resistor
- Wave form
- Variac

3.7.1-3 Describe the effect of geometry on inductance.

3.7.1-4 Discuss the relationship between pulse compression and intermediate storage.

3.7.1-5 Briefly discuss the traits associated with dielectrics.

3.7.1-6 Discuss the advantage of using insulating gases.

3.7.1-7 Discuss the purpose of using a vacuum in the diode section of the accelerator.

References: All Duties and Tasks

3.7.2 The candidate must have knowledge of DOE Order 420.2, Safety of Accelerator Facilities.

Knowledge/Skill Statements

3.7.2-1 Discuss the responsibilities and authorities of DOE Field Offices of this order.

3.7.2-2 Discuss the elements that must be identified in a SAD to include:

- Hazard and risk identification and impact
- Engineering controls
- Administrative measures
- Facility function, location and management organization

3.7.2-3 Discuss the reason for keeping SADs current and consistent with the administrative control measures and physical configuration of a facility and major safety equipment.

3.7.2-4 Discuss the purpose of the ASE.

3.7.2-5 Discuss the conditions that generate and purpose of USIs.

3.7.2-6 Discuss the basis for approval to commence routine operations.

3.7.2-7 Describe how DOE Order 420.2, Safety of Accelerator Facilities, is implemented, including the use of any site- or facility-specific procedures.

References: All Duties and Tasks

3.7.3 The candidate must have knowledge of basic reactor physics.

Knowledge/Skill Statements

3.7.3-1 Define the following terms as they apply to nuclear force:

- Binding energy (BE)
- Excitation energy (Ee)
- Critical energy (Ec)

3.7.1-2 Describe the principles of the following types of neutron absorption reactions:

- Radioactive capture
- Particle ejection

3.7.3-3 Using a Chart of the Nuclides, explain the principles of radioactive decay demonstrated through the following mechanisms:

- Electron capture
- Gamma emission
- Neutron emission
- Alpha emission

3.7.3-4 Describe the basic sources of neutrons in a shutdown reactor, including the following:

- Intrinsic neutrons sources
- Installed neutron sources

3.7.3-5 List the three nuclear properties that a material should have to be considered an ideal neutron moderator.

3.7.3-6 Define the following terms:

- Prompt critical
- Delayed critical
- Neutron Multiplication Factor (K_{eff})

3.7.3-7 Describe the change in neutron population from one generation to another generation using the four-factor formula.

3.7.3-8 Explain the significance of the following:

- $K_{eff} = 1$
- $K_{eff} < 1$
- $K_{eff} > 1$

3.7.3-9 Define each of the following terms of the six-factor formula:

- Fast Fission Factor (E)
- Fast Neutron Non-Leakage Probability (Lf)
- Resonance Escape Probability (p)
- Thermal Utilization Factor (f)
- Thermal Neutron Non-Leakage Probability (Lth)
- Reproduction Factor (N)

3.7.3-10 Explain the formula, $Nn = No\ (K_{eff})n$, calculate the number of neutrons after n number of generations, assuming a value of K_{eff} @ 0.8.

3.7.3-11 Describe "water hole" peaking.

3.7.3-12 Describe the effects on radial flux caused by either the presence or absence of targets in a core.

3.7.3-13 Define the term reactivity and explain how the following factors can influence the reactivity of a nuclear reactor:

- Fuel depletion
- Temperature
- Pressure or voids
- Poisons
- Gases
- Moderator
- Reflectors

3.7.3-14 Explain the basic considerations used to determine minimum and maximum control rod speed.

3.7.3-15 Discuss the following Reactor Kinetics areas:

- Define the term, Reactor Period, (T)
- Describe the relationship between reactor power and reactor period
- Define the term, Delayed Neutron Fraction
- Define the term, Effective Delayed Neutron Fraction
- Describe the importance of delayed neutrons during transient reactor operation
- Define the term, Prompt Critical
- Describe how reactor power is affected by a large insertion of positive reactivity (e.g. pulsing the reactor)
- Describe how reactor power is affected by a large insertion of negative reactivity such as inserting all reactor-regulating rods

3.7.3-16 Explain how the "Shutdown Margin" of a critical assembly or reactor is maintained.

3.7.3-17 Explain the following heat transfer concepts:

- Nucleate boiling
- Film boiling
- Partial film boiling
- Bulk boiling
- Departure from Nucleate Boiling
- Critical Heat Flux

References: All Duties and Tasks

3.7.4 The candidate must have knowledge of radiation detection and measurement principles.

Knowledge/Skill Statements

3.7.4-1 Define the following terms:

- Nuclear transformation
- Atomic mass unit
- Specific activity
- Radioactive half-life
- Transformation constant (decay constant)
- Ion
- Ion pair
- Ionization
- Range (charged particle)
- Bremsstrahlung
- Backscatter
- Cerenkov radiation
- Annihilation radiation
- Photon
- Absorption
- Attenuation
- Linear attenuation coefficient, μ
- Mass attenuation coefficient, μ/ρ
- Thermal neutron
- Fast neutron
- Moderation
- Cross-section
- Absorbed dose
- Dose equivalent
- Exposure
- Quality factor
- Committed effective dose equivalent
- Total effective dose equivalent

3.7.4-2 Describe a typical beta particle energy spectrum.

3.7.4-3 Using a chart of the nuclides, identify the primary modes of decay and the resultant nuclear isotopes for each of the following:

- Ar^{41}
- Cs^{137}
- Po^{210}
- Xe^{135}
- Kr^{85}

3.7.4-4 Describe the process of elastic scattering of neutrons with hydrogen in the body and its biological importance.

3.7.4-5 Identify the materials commonly used as neutron moderators and discuss their qualitative abilities.

3.7.4-6 Calculate radiation dose or dose rates using the *inverse square law.*

$$I_1 d_1^2 = I_2 d_2^2$$

or

$$DR_1 r_1^2 = DR_2 r_2^2$$

3.7.4-7 Define the units used to measure the following:

- Absorbed dose
- Dose equivalent

3.7.4-8 Calculate the dose equivalent given the absorbed dose and quality factor (e.g. roentgen, Rad, and rem).

3.7.4-9 Describe the types of radiation that various designs of proportional counters can detect.

3.7.4-10 Describe the principles of operation of an ionization chamber.

3.7.4-11 Describe the principles of operation of a Continuous Air Monitor (CAM).

References: All Duties and Tasks

3.7.5 The candidate must have knowledge of the engineered radiological controls and design criteria.

Knowledge/Skill Statements

3.7.5-1 Discuss radiological protection considerations in layout design for nuclear reactor facilities.

3.7.5-2 Discuss the radiological protection considerations in the design and selection of components for nuclear reactor facilities.

3.7.5-3 Discuss the concerns associated with the selection of materials and the associated finishes for components used in radiological control areas.

3.7.5-4 Discuss the differences and associated applications between permanent and temporary engineered radiological controls.

3.7.5-5 Describe the purpose, scope, and application of Sandia National Laboratories Radiological Control Manual, with respect to worker safety and health in explosive operations and associated activities and facilities.

References: All Duties and Tasks

3.7.6 The candidate must have knowledge of GN470089, Risk Management Requirements for Moderate-and High-Hazard Nonnuclear, Accelerator, and Nuclear Facilities.

Knowledge/Skill Statements

3.7.6-1 Using the document as a reference, discuss the requirements relating to the establishment of a safety envelope.

3.7.6-2 Discuss the Sandia National Laboratories guidance for determining when formal operational readiness reviews are necessary and the requirements for how they are conducted.

3.7.6-3 Discuss the relationship between DOE-DP-STD-3023-98, Guidelines for Risk-Based Prioritization of DOE Activities, and GN470089.

References: All Duties and Tasks

3.7.7 The candidate must have knowledge of SNL's Formality of Operations Manual.

Knowledge/Skill Statements

3.7.7-1 Using the manual as a reference, discuss SNL's formality of operations policy as outlined in the SNL's Formality of Operations Manual.

3.7.7-2 Using the manual as a reference, discuss the ten fundamental management standards that are SNL's minimum expectations regarding formality of operations.

3.7.7-3 Discuss the relationship between the Formality of Operations Manual and SNL's Integrated Safety Management System (ISMS).

References: All Duties and Tasks

3.7.8 The candidate must have knowledge of SNL's Integrated Safety Management System (ISMS).

Knowledge/Skill Statements

3.7.8-1 Discuss the purpose and scope of the SNL ISMS.

3.7.8-2 Discuss how the ISMS connects each of the following fundamental elements:

- Laboratory mission
- Strategic objectives
- Corporate values, ethics and code of conduct
- Laboratory policy

3.7.8-3 Discuss the Five-Step ISMS Management Process and it applicability to operations.

References: All Duties and Tasks

Attachment 5.8.3#3: Long-term Authorization Basis Action Plan from MHC

since 1827
MASON & HANGER CORPORATION

SEP 2 2 1999

Mr. J.M. Bernier, Acting Area Manager
Amarillo Area Office
U.S. Department of Energy
Amarillo, Texas 79177

Re: 98-2 Deliverable, Task 5.8.3.C, "Prepare a Long-Term Project Plan for Authorization Basis Personnel"

Dear Mr. Bernier:

The Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis for Authorization Basis (AB) Personnel was performed and submitted on May 27, 1999 to fulfill Task 5.8.3.A in the 98-2 deliverables and milestones. Compensatory Measures were then submitted on June 21, 1999 to fulfill Task 5.8.3.B in the 98-2 deliverables and milestones.

Attached is a Corrective Action Plan for AB Personnel SWOT Analysis. This submittal serves as both the draft and final action plan and thus fulfills Task 5.8.3.C in the 98-2 deliverables and milestones.

If you have any questions, please contact Jeff Yarbrough at extension 3281.

Very truly yours,

W.A. Weinreich
General Manager

dlc

Attachment: As Stated

cc: J.W. Angelo, MPD, 12-69
R.T. Rowe, Human Resources, 16-12
J.C. Yarbrough, Engineering & Design, 12-6
S.L. Young, Risk Management, 12-127
J.D. Ely, Risk Management, 12-127
R.A. Leffel, Risk Management, 12-127
P.K. Howard, Risk Management, 12-127
File Copy

GM99-00691-985

Corrective Action Plan for AB Personnel
SWOT Analysis

September 16, 1999

APPROVALS:

Originator Kelly Howard Date: 9-16-99

Department Manager [signature] Date: 9/17/99

Originating Division Manager [signature] Date: 9/20/99

Human Resources Division Manager [signature] Date: 9/22/99

MPD Division Manager [signature] Date: 9/20/99

PA - Need HR input + would like copies

INTRODUCTION:

This plan was written from the AB development perspective to address weaknesses identified in the AB personnel SWOT. It addresses concerns and corrective actions that involve Plant-wide programs, but may only need to address how they are instituted for AB personnel. Many Plant programs and procedures are applied to all personnel, when in reality there is a tremendous diversity of skill, qualification, education, and specialty in the Pantex work force. Corrective actions should be undertaken with AB skills and qualifications in mind.

Corrective actions were to be developed prior to compensatory measures; however, the weaknesses identified in the SWOT are complex and have no short-term solutions. Thus the compensatory measures and corrective actions were identical. Therefore, this document contains corrective actions which encompass long-term solutions.

STATEMENT OF CONCERN:

On November 20, 1998, the Department of Energy (DOE) accepted Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 98-2, which addressed the need to improve the safety management of nuclear explosive operations conducted at the Pantex Plant. Since that time, DOE has published several versions of an implementation plan entitled U. S. Department of Energy Implementation Plan for Improving Safety Management at Pantex Plant (Board Recommendation 98-2). Corrective actions were then derived from this implementation plan and assigned to various Mason & Hanger division managers. Specific actions to address Authorization Basis personnel were identified as follows:

1) 5.8.3.a Complete Strengths, Weaknesses, Opportunity, and Threats (SWOT) analysis for personnel preparing Authorization Basis document.

2) 5.8.3.b Prepare a compensatory measures action plan based on the SWOT analysis.

3) 5.8.3.c Prepare a long-term project plan for authorization basis personnel.

On May 28, 1999 a SWOT analysis which addresses corrective action 5.8.3.a was submitted to DOE/AAO. Corrective actions 5.8.3.b and 5.8.3.c will be addressed in this document.

STATEMENT OF ACCEPTANCE:

"Authorization Basis (AB) personnel" was defined in the SWOT. AB personnel consist of those Risk Management Department (RMD) employees who develop Basis for Interim Operation (BIO) documentation, Hazard Analysis Reports (HARs), and Activity Based Controls Documents (ABCDs). Also included are those RMD employees who provide change control capability in the form of Unreviewed Safety Questions (USQs), BIO maintenance, and Technical Safety

Requirements (TSRs) maintenance. RMD also employs support personnel that provide direct technical and clerical support on AB work; therefore, they also are considered AB personnel.

This corrective action will address the weaknesses identified in the SWOT, which was signed by the MHC General Manager and formally submitted to DOE/AAO on May 28, 1999; therefore, they are accepted.

CAUSE ANALYSIS:

The weaknesses identified in the SWOT are primarily due to a combination of several conditions in RMD. These are discussed below

The MHC merit system is funded by DOE. In 1994, DOE froze salaries for that year and established guidelines that precluded keeping salaries up to industry standards for five years. Currently Pantex salaries are 13% - 15% below market averages.

The Chiles Commission has recognized the need for DOE to change its methods of funding contractor salaries and benefits to retain skilled contractor employees. In Report of the Commission on Maintaining United States Nuclear Weapons Expertise the following statement is made:

> "We recommend that DOE, working with its contractors, change the personnel appendix of facilities contracts (Appendix A to each of those contracts) so that contractors can offer genuinely competitive salaries and benefits packages to recruit and retain scarce and highly sought talent. To be competitive in the war for talent, DOE must accept significant departures from its past practices. Contractors should be authorized and encouraged to make salary and benefits adjustment decisions for employees without having to refer individual cases to DOE for concurrence, particularly for personnel in critical skill areas.
>
> In keeping with the DOE's general duty to eliminate excessive oversight and micro management of its laboratories and contractors, a matter well documented in the Galvin Commission Report and other external reviews, the Department must make greater progress in providing the latitude and flexibility necessary for attracting and retaining personnel."

RMD, which contains the largest number of AB employees, has been identified as one of the "critical skill areas" mentioned in the above recommendation. Due to salaries that are below industry standards and large salary discrepancies, combined with the stress of AB work, RMD has had a particularly high turn-over rate. As a result, RMD has experienced difficulty in maintaining experienced employees. Furthermore, due to staffing ceilings, Pantex has not replaced personnel that have left RMD for several years, effectively preventing RMD from maintaining the experience level necessary for AB work. Finally, while RMD's staff was reducing, customer expectations were increasing.

GENERIC IMPLICATIONS:

The generic implications of this corrective action plan are widespread throughout the Plant. Many of the corrective actions require that upper management resolve identified issues. As an aid to identify those affected by this action plan, the table of corrective actions provided below includes the name of responsible managers who should perform specific actions.

TECHNICAL RATIONALE FOR CORRECTIVE ACTION:

This plan was written from the AB development perspective to address weaknesses identified in the AB personnel SWOT. It addresses concerns and corrective actions that involve Plant-wide programs, but may only need to address how they are instituted for AB personnel. Many Plant programs and procedures are applied to all personnel, when in reality there is a tremendous diversity of skill, qualification, education, and specialty in the Pantex work force. Corrective actions should be undertaken with AB skills and qualifications in mind. The rationale behind the listed corrective actions is evident from reading the text in the cause analysis provided earlier in this document.

CORRECTIVE ACTIONS:

The corrective actions are presented in the following table. Each corrective action is listed with the SWOT weaknesses that they address

Number	Associated Weaknesses	Corrective Action	Completion Date	Responsible Individual	Completion Criteria
1	W.1, W.2, W.4, W.13	Establish a Plant commitment to staff and fund RMD based on work requirements. This includes: 1) Develop a skill mix for the identified staffing level for FY00. 2) Submit hiring requisitions based on the skill mix.	11-15-99	Jeff Yarbrough E&DD	Division approval of hiring requisition based on projected work or identification of work that will not be done
2	W.5, W.13	Establish a Plant commitment to fund travel, training, and professional development for AB personnel.	11-15-99	Jeff Yarbrough E&DD	Necessary budget established
3	W.7	Develop an internal, working plan to establish a project management team in RMD consisting of dedicated project managers and schedulers.	11-15-99	Jeff Yarbrough E&DD	Internal, working plan developed.
4	W.9, W.7, W.12	Instill in the Plant population the importance of AB and the belief that AB is owned by the Plant, not RMD.	12-1-99	Steve Young RMD	Training completed for the implementation of the TSRs
5	W.10	Acquire a commitment from the national laboratories to support Pantex AB work.	11-15-99	Steve Young RMD	MHC request for lab support forwarded through DOE/AAO for submission to labs
6	W.11	Write form and content guides for AB documentation.	Deferred to AB Task Force Action Plan		

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Number	Associated Weaknesses	Corrective Action	Completion Date	Responsible Individual	Completion Criteria
7	W.1, W.6, W.7, W.8, W.12, W.13	Institute and adhere to project management concepts for Plant projects. This includes: 1) Require all DOE taskings be in writing and routed through a central Plant business office. 2) Institute a policy that no work starts until funding is attained. 3) Develop a flexible budget system that will allow functional managers to budget, plan, and manage to the priorities with emphasis on critical path. 4) Require project managers to fund all expenses associated with their projects, including travel, training, professional development, supplies, and equipment. 5) Institute a policy that will allow functional managers to develop their own project plans and set due dates after the completion of those plans. 6) Require the issuance of a priority list that consists of a single list of priorities for the Plant.	1-14-00	Jim Angelo MPD	Establish a Plant policy that governs project management which adheres to project management concepts
8	W.1, W.3, W.13, W.14	Address the issues identified concerning salaries, benefits, and the merit system.	Deferred to on-going initiatives and negotiations between DOE and MHC Human Resources		

COMPLETION CRITERIA:

The completion criteria for each listed corrective action is presented below:

CA #1: Division approval of hiring requisition based on projected work or identification of work that will not be done

The completion criteria for this corrective action is division approval of hiring requisitions to bring RMD staffing up to the level necessary to successfully complete the work projected for FY00 or a division-level decision on what projected FY00 work will not be done. Any hiring will be based on the proper skill mix and will include technical writers and clerks.

CA #2: Necessary budget established

The completion criteria for this corrective action is the establishment of a budget to support travel, training, and professional development for AB personnel in RMD.

CA #3: Internal, working plan developed.

Develop an internal, working plan to establish a project management team in RMD consisting of dedicated project managers and schedulers. This includes training and software necessary to perform project management. This plan is not required to be formal or gain approval from organizations outside E&DD, but rather is only for E&DD's use to establish the team.

CA #4: Training completed for the implementation of the TSRs

The completion criteria for this corrective action is the completion of training for the implementation of the TSRs which will instill in the Plant population the importance of AB and the belief that AB is owned by the Plant, not RMD.

CA #5: MHC request for lab support forwarded through DOE/AAO for submission to labs

The completion criteria for this corrective action is the completion of an MHC request for lab support and the submission of the request through DOE/AAO for proposal to the laboratories.

CA #6: ***Deferred to AB Task Force Action Plan***

CA #7: Establish a Plant policy that governs project management which adheres to project management concepts

The completion criteria for this corrective action is the establishment of a Plant policy that governs Plant project management which addresses the following concepts:

1) Require all DOE taskings be in writing and routed through a central Plant business office.

2) Institute a policy that no work starts until funding is attained.

3) Develop a flexible budget system that will allow functional managers to budget, plan, and manage to the priorities with emphasis on critical path.

4) Require project managers to fund all expenses associated with their projects, including travel, training, professional development, supplies, and equipment.

5) Institute a policy that due dates are set only after the completion of a project plan and after direct concurrence from the AB personnel that will do the work.

6) Require the issuance of a priority list that consists of a single list of priorities for the Plant.

CA #8: Deferred to on-going initiatives and negotiations between DOE and MHC Human Resources

REFERENCES:

1) "Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis for Authorization Basis Personnel", Howard, Kelly and Leffel, Rick, Mason & Hanger Corporation, Pantex Plant, Amarillo, Texas, May 27, 1999.

2) "Listing of Plant Priorities (11/10/98)", Mason & Hanger Corporation, Pantex Plant, Amarillo, Texas, 11/10/98.

3) "Report of the Commission on Maintaining United States Nuclear Weapons Expertise", Report to the Congress and Secretary of Energy, March 1, 1999. (Chiles Commission)

Attachment 6.2.1: Quarterly Report

Quarterly Report For the Implementation Plan

Defense Nuclear Facilities Safety Board Recommendation 98-2

Accelerating Safety Management Improvements at the Pantex Plant

October 1 through December 31, 1999

Albuquerque Operations Office
U.S. Department of Energy

1.0 Introduction

The Department of Energy (DOE) issued the Implementation Plan for Defense Nuclear Facilities Safety Board (DNFSB) Recommendation 98-2, *Accelerating Safety Management Improvements at the Pantex Plant,* in April 1999. On June 16, 1999, the Department received a letter from the DNFSB accepting the Implementation Plan.

This quarterly report for the period October 1 through December 31, 1999 focuses on progress made towards completing the deliverables outlined in the 98-2 Implementation Plan Commitments.

2.0 General Progress

The 98-2 implementation plan is approaching its one-year anniversary. During this time the Department has been reporting the status of individual actions. As a result, the Department and the DNFSB staff have identified several opportunities to enhance the focus and usefulness of this document.

A revision to this implementation plan would provide the mechanism to (1) apply lessons learned, (2) remove redundancies, and (3) better target the actions that are most essential to SS-21 implementation. Therefore, during the next quarter we intend on working closely with your staff to develop a revision to this implementation plan.

During this reporting period the following occurred:

- Correction to reporting commitments 5.1.3 and 5.2.1 as complete. These required issuing Technical Business Practice (TBP) 901. However, the TBP has not been published through the Sandia National Laboratory system. Therefore, these commitments are not complete.
- Deliverables 5.1.4, 5.2.3-#2, 5.3.1-#3, 5.6.1-#2, 5.6.3-#1, 5.6.4-#1, 5.8.2-#2 and 5.8.3-#3 due during the April 1 through September 30, 1999, remain incomplete.

Discussion regarding incomplete deliverables is provided within the Task Area Status section of this report

During the period beginning April 1 through December 31, 1999, a total of 25 out of 45 actions were delivered to the Board.

3.0 Task Area Status

The following provides a status corresponding to the task areas defined within the 98-2 Implementation Plan for those deliverables due within the October 1, 1999 to December 31, 1999 reporting period and any outstanding deliverables from previous reporting periods. A summary of the commitments and their associated deliverables for 98-2 is provided as Attachment A to this report.

98-2 Commitments and Deliverables

5.1 Implementation of Effective Management Structure

Commitment 5.1.3—Replace EP40110 with Technical Business Practice (TBP) 901 to define roles of design agency project team members and eliminate mandated sub-teams.

> Deliverable to issue TBP 901 was delivered for publication on August 27, 1999. A copy of the document was mailed to the Board on September 7, 1999. However, TBP-901 has not been published through the SNL system and remains open.

Commitment 5.1.4—Issue project plans with improved project definitions for each weapon program and BIO improvement initiative. Resolve scope and resource conflicts. Issue schedule for Pantex operational improvement initiatives:

> Deliverable to provide the project plans and schedules remain incomplete. The integrated weapons activity plan (IWAP) Issue F has been submitted for approval. Issue F identifies fiscal year 2000 weapon deliverables and milestones, includes B61 deliverables to enhance safety, includes CHE Step 1 revisions for the W76, W88, and W78, and identifies high level Basis for Interim Operations (BIO) deliverables. IWAP Issue G will include fully integrated BIO project plans, W76 Rebuild, and the IHE B83 SS-21 project plans. IWAP Issue G is expected to be released within the next 90 days.

5.2 Streamline Process and Tooling Development, and Improve Transfer of Safety Improvements

Commitment 5.2.1—Issue updated definition of DOE expectations for SS-21 and laboratory/contractor implementation guidance.

> Deliverable #2 to issue TBP 901 was mailed to the Board on September 7, 1999. See commitment 5.1.3

Commitment 5.2.3—Complete an assessment of Pantex practices for tooling design, tooling procurement, and procedure development. Issue a report with recommendations and implement adopted actions.

Deliverable #2 to implement the process improvements as a result of the tooling recommendation report issued May 1999. The operating contractor is reporting that one correction action plan remains from the four identified in the long-term corrective action plan submitted to the Board in through the Department's letter dated September 7, 1999. The estimated completion date for all corrective actions is June 2000.

5.3 Improve Authorization Basis Structure and Approval Process

Commitment 5.3.1—Complete Task Force and Management Action Plan.

Deliverable #3 to complete the actions defined within the May 1999 Task Force Report and June 1999 Action Plan. The final deliverables, HAR and ABCD Form and Content Guides have been delivered to the Amarillo Area Office for comment. The expected date of completion to implement the guides is April 2000.

5.4 Streamline Review Processes and Ensure Proper Roles for Reviewers

Commitment 5.4.2—Define changes to NES and readiness review processes.

Deliverable #3 to issue DOE order 452.2 was mailed by the Deputy Assistant Secretary for Military Application and Stockpile Operations (DP-20) on December 6, 1999. Issuing DOE Orders 452.1B, "Nuclear Explosive and Weapon Surety Program" and 452.2B, "Safety of Nuclear Explosive Operations," is the final action against Commitment 5.4.2. Through the Departments letter dated December 13, 1999, closure of Commitment 5.4.2 was proposed. However, the referenced orders have not completed formal processing for publication causing Commitment 5.4.2 to remain open.

Commitment 5.4.3—Develop changes to NES process and report requirements. Issue changes to NES process, report requirements and other process attributes.

Deliverable #2 to revise DOE-STD-3015 was documented through the decision report delivered directly to the Board by DP-20's August 23, 1999 letter. This deliverable is a duplicate of those reported under Commitment 5.5.1. Therefore, the Department proposes closure of deliverable 5.4.3-#2 and will report publication of DOE-STD-3015 consistent with deliverable 5.5.1-#4.

5.5 Enhance NES Review Group Structure and Continuity

Commitment 5.5.1—Provide recommendations for NES review group structure and membership. Provide a senior level workshop to discuss and review recommendations. Issue a report documenting DP-20's decision. Issue revised requirements.

Deliverable #4 to issue DOE-STD-3015 was incorrectly reported as delivered to the Board through the Department's letter dated December 13, 1999. The DP-20 letter dated December 6, 1999, indicated that the revision would be forthcoming and would contain the planned adjustments as reported in the August 23, 1999, decision report to the Board. The DP-20 letter also transmitted the Nuclear Explosive Safety Study Group (NESSG) implementation guidance that describes and directs restructuring of the NESSG.

Commitment 5.5.2—Provide training and qualification standard recommendations along with the certification process for establishment and maintenance of NES review expertise. Revise and issue Standard 3015.

Deliverable #2 to revise and issue DOE Standard 3015 is a duplicate of Commitment 5.5.1, Deliverable #3 and #4. Therefore, to avoid reporting errors, the Department recommends that revising and issuing DOE Standard 3015 be reported under deliverable 5.5.1-#3 and 5.5.1-#4.

5.6 Improve Integration of NEO and ISM Initiatives

Commitment 5.6.1 – Develop a plan for Pantex Plant ISMSV Phase I review. Conduct the ISMSV Phase I review and issue a report. Upon satisfactory results from the ISMSV phase I review, approve the ISMS Description.

Deliverable #2 to conduct the ISMSV review and issue a report is incomplete. The Board was notified that the review could not take place

as originally scheduled through the Department's letter dated October 5, 1999. The ISMSV Phase I Review was rescheduled for January, 2000 to afford the operating contractor additional time to implement changes in requirements driven by several 98-2 commitments (e.g., 5.2.1, 5.3.2, 5.4.1) into plant standards and procedures. However, since these commitments have not been completed, the review is being re-scheduled.

Commitment 5.6.3 – Demonstrate implementation of the safety management process by approving the TSR conversion and BIO Upgrade modules.

Deliverable #1 to convert the plant's Critical Safety System Manual (CSSM) to the Technical Safety Requirement (TSR) remains incomplete. The original TSR contained a provisional approval requiring the operating contractor to develop a path forward correcting the technical issues found while reviewing the document. On September 1, 1999, the AAO approved the proposed changes to the TSR with additional directed changes. Consistent with the Department's original status letter of June 3, 1999, to the Board, this deliverable will not be closed until all technical issues are addressed and the TSR is approved. The estimated date of completion is March 2000.

Deliverable #2 to approve BIO/TSR Upgrade for lightning hazards remains incomplete. The Lightning BIO has not been approved. It was submitted to the Department for review in September. The result was that the BIO did not contain the two layers of control required by the Department and did not reflect the end-state including engineered controls for several critical areas such as hoist isolators, purge and backfill manifold isolators and transportation carts. The Lightning Justification for Continued Operations (JCO) was developed as an interim measure until the final Lightning BIO can be approved. The Board was notified of the status of this deliverable through the Department's letter dated November 4, 1999. Since the Department's letter was issued, the Lightning JCO was approved on November 7, 1999. A copy of the Lightning JCO approval is included with the Department's January Deliverable letter to the Board.

Deliverable #3 to approve BIO/TSR Upgrade for transportation hazards remains incomplete. The Transportation BIO has been re-scheduled due to competing priorities. The Board was notified of the status of this deliverable through the Department's letter dated December 13, 1999. Since the Department's letter was mailed, the Transportation BIO project plan is expected to be approved within the next 90 days.

Commitment 5.6.4 – Demonstrate implementation of the safety management process established for nuclear explosive operations. Evaluate effectiveness of safety management process improvements.

Deliverable #1 to re-authorize the existing W88 process in accordance with the tasks and schedule identified in the IWAP is incomplete. The Department extended the re-authorization date to April 2000 through their memo to the operating contractor dated November 10, 1999. On January 19, 2000, the W88 project team presented their case for a further extension to July 2000 based on rejection of their HAR/ABCD which requires an additional 18 weeks to revise. The SMT was briefed on the schedule extension.

5.7 W62 Specific Recommendation

Commitment 5.7.1—Re-authorization of the existing W62 process in accordance with the IWAP project plan. The department re-authorized the W62 on January 6, 2000. The Board was notified of the re-authorization by copy on the Department's memo to the Amarillo Area Office and Operating Contractor dated January 6, 2000.

5.8 Enhance Capacity to Complete Program Management and Safety Analysis Tasks

Commitment 5.8.1—Complete Strengths, Weaknesses, Opportunity and Threats (SWOT) analysis for project management skills. Prepare a long-term project management personnel plan.

Deliverable #3 to provide a long-term personnel plan for project management was incorrectly reported closed through the Department's letter dated September 7, 1999. There are two actions associated with the long-term personnel plan, which remain incomplete. The operating contractor is reporting an estimated completion date of February 2000.

Commitment 5.8.2—Strengthen skills and experience level of Pantex Team Leads.

Deliverable #2 to complete the defined actions necessary to strengthen the experience level of the Pantex Team Leads was reported closed through the Department's letter dated September 7, 1999, based upon the Pantex operating contractor reporting completion of identified actions against their long-term personnel plan. However, the final action to train personnel remains open. Therefore, this Deliverable 5.8.2#2 is considered open until all training has been completed. The operating contractor is reporting an estimated completion date of October 2000.

Commitment 5.8.3—Complete SWOT analysis for skills needed to prepare authorization basis documents (risk management). Prepare a long-term project management personnel plan.

> Deliverable #3 to provide a long-term personnel plan for project management is complete. A copy of the plan is included with the Department's January deliverable letter to the Board.

Commitment 5.8.4—Staff authorization basis review positions as AAO and DOE-AL. Complete qualification for individuals with authority to approve authorization basis documents.

> Deliverable #1 & #2--to complete staffing actions and qualification standards is complete. A copy of the AAO and Safety Analyst qualification standards is included with the Department's January deliverable letter to the Board.

APPENDIX

98-2 Deliverables and Milestones Matrix

The attached Matrix lists the Commitments and associated deliverables in numerical order. The shaded items have been completed and have been submitted or are in process of submission to the Board for recommended closure.

Deliverable No.	Deliverable	Deliverable Due Date	Deliverable Actual Date	Associated DOE Correspondence to the Board	Remarks	Status	Responsibility
5.1.1	Plant Standard 7401 & 7403	05/30/99	05/30/99	June 3, 1999--Letter, Glass to Conway	Deliverable satisfied	Delivered	MHC
5.1.2	Issue D&P Manual Chapter 11.1, Rev. 1	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway	Deliverable satisfied	Delivered	WPD
5.1.3	Issue TBP 901	08/30/99	08/27/99	September 7, 1999--Letter, Glass to Conway	TBP-901 was submitted to SNL for publication on 8/27/99. TBP-901 not issued via SNL publication system	Open?	WPD
5.1.4	Project Plans and Schedules (IWAP)	06/30/99		June 30, 1999--Letter, Glass to Conway August 6, 1999--Letter, Glass to Conway	Incomplete IWAP--Requires CHE Step II and BIO Plans	Open?	MHC WPD
5.2.1-#1	Issue D&P Manual Chapter 11.3	04/30/99	04/19/99	April 23, 1999-Letter, Glass to Conway	Deliverable satisfied	Delivered	WPD
5.2.1-#2	Issue TBP 901	08/30/99	08/27/99	September 7, 1999--Letter, Glass to Conway	TBP-901 was submitted to SNL for publication on 8/27/99. TBP-901 not issued via SNL publication system	Open?	WPD
5.2.2	Modify associated plant documents to meet new TBP 901 standards	11/30/99		None--Require revised due date	MHC has not submitted impact analysis because TBP-901 has not been published via the SNL system	Open?	MHC
5.2.3-#1	Review report with recommendations (tooling/procedure processes)	05/30/99	05/30/99	June 3, 1999--Letter, Glass to Conway		Delivered	MHC
5.2.3-#2	Implement process improvements (tooling/procedure processes)	08/30/99		None--Require revised due date		Open?	MHC
5.3.1-#1	AB Task Force Report	05/30/99	05/30/99	June 3, 1999--Letter, Glass to Conway		Delivered	MHC
5.3.1-#2	AB Action Plan	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway		Delivered	MHC
5.3.1-#3	AB Actions Complete	08/30/99		None--Require revised due date		Open?	MHC
5.3.2-#1	Issue AL SD 452.2A	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway		Delivered	WPD

Yellow=Action Delivered in 4/1-12/31/99
Green=Commitment Delivered 4/1-12/31/99
Purple=Action or Commitment Delivered in Jan 2000.

Deliverable No.	Deliverable	Deliverable Due Date	Deliverable Actual Date	Associated DOE Correspondence to the Board	Remarks	Status	Responsibility
5.3.2-#2	Revise D&P Manual Chapter 11.4	07/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway	Created D&P Manual Chapter 11.7 dedicated to USQ process in lieu of revision to 11.4	Delivered	WPD
5.3.2-#3	Combine requirements into one manual	04/30/00			The USQ process was defined in a new D&P Manual Chapter 11.7 instead of 11.4. *With the development of Section 11 to for NEO activities at Pantex and the new DOE Orders 452.2A and 2B, we are considering* ***not*** *to integrate any further to avoid creating blurred lines we have drawn between independent safety validation and line management activities. Both documents refer back to each other and are parallel.*	Open?	WPD
5.3.3-#1	Assessment for review of W88 HAR	11/30/99	12/13/99	December 13, 1999--Letter, Glass to Conway		Delivered	WPD
5.3.3-#2	Assessment for review of transportation BIO upgrade	11/30/99		None--Require revised due date	Require new date as a result of final approved Transportation BIO project plan.	Open?	AAO
5.4.1	D&P Manual Chapter 11.6	06/30/99	06/28/99	June 28, 1999--Letter, Glass to Conway		Delivered	WPD
5.4.2-#1	Initial issue of DOE-AL SD 452.2A	06/30/99	06/30/99	June 30, 1999-Letter, Glass to Conway		Delivered	WPD
5.4.2-#2	Submit revisions to DOE Order 452.2	06/30/99	06/30/99	June 30, 1999-Letter, Glass to Conway		Delivered	WPD
5.4.2-#3	Issue revised DOE Order 452.2	10/30/99	12/06/99	December 6, 1999--Letter Beck to Conway	DOE Order 452.2A not considered issued per Board	Open?	DP-20
5.4.3-#1	Develop NESS process changes & provide recommendations	07/30/99	06/30/99	August 6, 1999--Letter, Glass to Conway		Delivered	WSD
5.4.3-#2	Revise DOE STD-3015	11/30/99	12/10/99	December 10, 1999--Letter, Beck to Conway	DOE-STD-3015 was revised, but not formally issued. Tie actual publication and reporting of such to 5.5.1#4. Thus, consider this action delivered.	Delivered	DP-20

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Deliverable No.	Deliverable	Deliverable Due Date	Deliverable Actual Date	Associated DOE Correspondence to the Board	Remarks	Status	Responsibility
5.5.1-#1	Provide NESS recommendations	05/30/99	05/28/99	May 25, 1999--Letter, Glass to Conway May 28, 1999-Letter, Beck to Conway	DP-20 provided recommendations directly to the Board.	Delivered	WSD
5.5.1-#2	Senior level workshop	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway		Delivered	DP-20
5.5.1-#3	Decision Report	07/30/99	08/23/99	August 23, 1999--Letter, Beck to Conway		Delivered	DP-20
5.5.1-#4	Issue DOE-STD-3015	11/30/99	12/10/99	December 10, 1999--Letter, Beck to Conway	DOE-STD-3015 not considered issued until formally published. This action is the reporting result for 5.4.3#2 and 5.5.1#2.	Open?	DP-20
5.5.2-#1	Recommendations (NESS)	05/30/99	05/28/99	May 25, 1999--Letter, Glass to Conway May 28, 1999-Letter, Beck to Conway	DP-20 provided recommendations directly to the Board.	Delivered	WSD
5.5.2-#2	Revise & Issue DOE-STD-3015	11/30/99	12/10/99	December 10, 1999--Letter, Beck to Conway	DOE-STD-3015 was revised, but not formally issued. Tie actual publication and reporting of such to 5.5.1#4. Thus, consider this action delivered.	Delivered	DP-20
5.6.1-#1	ISMSV Phase 1 Review Plan	07/30/99	09/10/99	September 10, 1999--Letter, Glass to Conway		Delivered	AAO
5.6.1-#2	ISMSV Phase 1 Review Report	09/30/99		None--Require revised due date		Open?	AAO
5.6.1-#3	Approved ISMS Description	04/30/00		None--Require revised due date		Open?	AL
5.6.2-#1	ISMSV Phase II Review Plan	03/30/00		None--Require revised due date		Open?	AAO
5.6.2-#2	ISMSV Phase II Report	06/30/00		None--Require revised due date		Open?	AAO
5.6.3-#1	CSSM to TSR Conversion	05/30/99	05/30/99	June 3, 1999--Letter, Glass to Conway	On 9/1/99, AAO approved the proposed changes to the TSR with directed changes. Consistent with the transmittal letter to the board on 6/3/99, this deliverable will not be considered 100% satisfied until all technical issues are addressed and the TSR is fully implemented.	Open?	AAO MHC

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Purple=Action or Commitment Delivered in Jan 2000.

Deliverable No.	Deliverable	Deliverable Due Date	Deliverable Actual Date	Associated DOE Correspondence to the Board	Remarks	Status	Responsibility
5.6.3-#2	Approved BIO/TSR Upgrade for lightning hazards	10/30/99		November 4, 1999--Letter, Glass to Conway	Require new date as a result of final approved Lightning BIO project plan.	Open?	AAO MHC
5.6.3-#3	Approved BIO/TSR Upgrade for transportation hazards	11/30/99		December 13, 1999--Letter, Glass to Conway	Require new date as a result of final approved Transportation BIO project plan.	Open?	AAO MHC
5.6.4-#1	Re-authorization of the existing W88 process in accordance with the tasks and schedule identified in the IWAP	08/30/99		September 7, 1999--Letter, Glass to Conway November 10, 1999--Memo, Goodrum to Weinrich	Pursuant to Pantex Round Robin with Beck, the new target date for reauthorization is April 30, 2000	Open?	WPD
5.6.4-#2	Authorization of an SS-21 process for the W78 in accordance with the tasks and time interval identified in the IWAP	04/30/01		None--Require revised due date	Need to evaluate based on revised IWAP	Open?	WPD
5.6.5-#1	Review plan and criteria for final assessment of 98-2 actions	TBD		None--Determine date based upon completion of W78		Open?	AL
5.6.5-#2	Final Report	TBD		None--Two months following plan		Open?	AL
5.4	Begin Pantex Operations in accordance with the IWAP project plan	10/30/99	01/06/00	November 4, 1999--Letter, Glass to Conway January 6, 2000--Memo, Glass to Bernier & Weinrich (to Conway) February 4, 2000--Letter, Glass to Conway		Delivered	WPD
5.8.1-#1	SWOT analysis (project management)	05/30/99	05/30/99	June 3, 1999--Letter, Glass to Conway		Delivered	MHC

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Green=Commitment Delivered 4/1-12/31/99
Purple=Action or Commitment Delivered in Jan 2000.

Deliverable No.	Deliverable	Deliverable Due Date	Deliverable Actual Date	Associated DOE Correspondence to the Board	Remarks	Status	Responsibility
5.8.1-#2	Compensatory measure action plan (project management)	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway		Delivered	MHC
5.8.1-#3	Long term personnel plan for project management.	08/30/99	09/07/99	September 7, 1999--Letter, Glass to Conway	Letter reported closure based on 8/27/99 letter from MHC, but two MHC actions remain open and show 2/15/2000 completion date from MHC	Open?	MHC
5.8.2-#1	Revise training programs and complete training	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway		Delivered	MHC
5.8.2-#2	Complete defined actions	08/30/99	09/07/99	September 7, 1999--Letter, Glass to Conway	ECD for completing training is 10/1/2000	Open?	MHC
5.8.3-#1	SWOT analysis (AB personnel)	05/30/99	05/30/99	June 3, 1999--Letter, Glass to Conway		Delivered	MHC
5.8.3-#2	AB Compensatory measure action plan	06/30/99	06/30/99	June 30, 1999--Letter, Glass to Conway	Two actions carried forward under ABTF action plan	Delivered	MHC
5.8.3-#3	Long term personnel plan for project management.	09/30/99		October 5, 1999--Letter, Glass to Conway	January deliverable letter in draft formally submits MHC plan. ECD is 2/15/2000 for all actions in plan	Open?	MHC
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
5.8.4-#3	Complete qualification.	04/30/00		None--need revised date based on TQP schedule		Open?	OSS
Total	53						
Delivered	28						
Open	25						
6.2.1	Briefing & Written Report	07/30/99	7/29/99 8/17/99	August 8, 1999--Letter, Glass to Conway	Briefing held 8/17/99	Delivered	WPD
6.2.1	Briefing & Written Report	10/30/99	11/02/99	October 29, 1999--Letter, Glass to Conway	Briefing held 11/2/99	Delivered	WPD
6.2.1	Briefing & Written Report	01/30/00	02/07/00	February 7, 2000--Letter, Glass to Conway	Briefing scheduled for 2/10/2000 at Pantex		WPD

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