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Title: **DARHT: Integration of Authorization Basis Requirements and Worker Safety**

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Approach of the Dynamic Experimentation Division to

The Integration of Authorization Basis Requirements and Worker Safety

Prepared by the Los Alamos National Laboratory
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1.0 INTRODUCTION

This document describes the results of consensus agreements reached by the DARHT Safety Planning Team during the development of the update of the DARHT Safety Analysis Document (SAD). The SAD is one of the Authorization Basis (AB) Documents required by the Department prior to granting approval to operate the DARHT Facility. The DARHT Safety Planning Team is lead by Mr. Joel A. Baca of the Department of Energy Albuquerque Operations Office (DOE/AL). Team membership is drawn from the Department of Energy Albuquerque Operations Office, the Department of Energy Los Alamos Area Office (DOE/LAAO), and several divisions of the Los Alamos National Laboratory.

Revision 1 of the DARHT SAD had been written as part of the process for gaining approval to operate the Phase 1 (First Axis) Accelerator. Early in the planning stage for the required update of the SAD for the approval to operate both Phase 1 and Phase 2 (First Axis and Second Axis) DARHT Accelerator, it was discovered that a conflict existed between the Laboratory approach to describing the management of facility and worker safety.

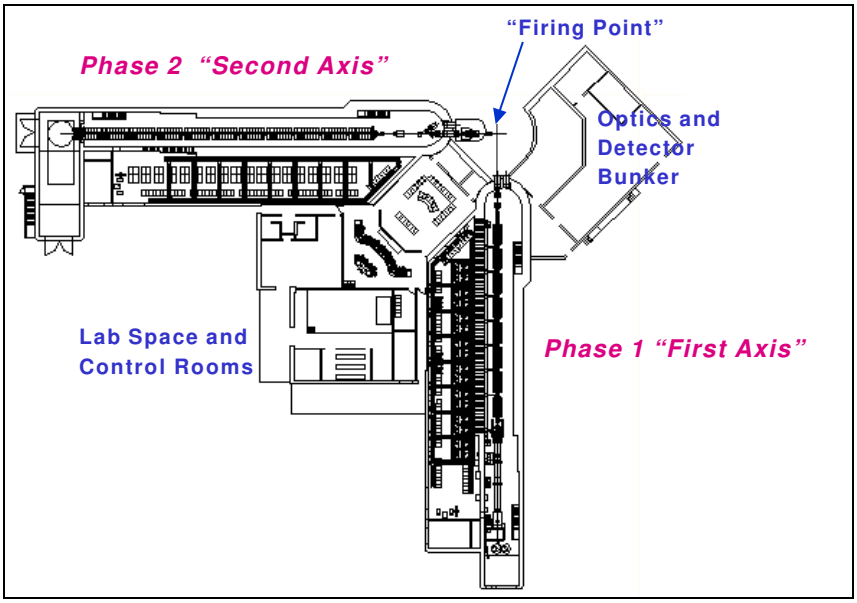

Figure 1 The DARHT Facility (Accelerator and R312 Firing Site)

2.0 DISCUSSION

The DOE Order 420.2, *Safety of Accelerator Facilities*,[1] specifies the required contents of Safety Analysis Documents in general. The order specifies that a description of the facility structures, systems, and components must be included in the SAD along with a description of the operations to be performed in the facility. A hazard analysis must be performed and an associated Accelerator Safety Envelope (ASE) must be developed. The ASE defines a set of physical and administrative bounding conditions that define the manner in which the facility may be operated without undue risk to workers, the public, and the environment. This approach is analogous to that used in the development of a Safety Analysis Report for a nuclear facility with one exception.

The difference in the approach presented in DOE Order 420.2 is the requirement to perform a hazard analysis which couples the hazards associated with the facility (structures, systems and components) with the hazards associated with worker safety issues. This requirement is not found in any other approach to safety analysis. The previous versions of the accelerator safety order had not contained the requirement that the hazard analysis combine worker safety issues with facility safety issues.

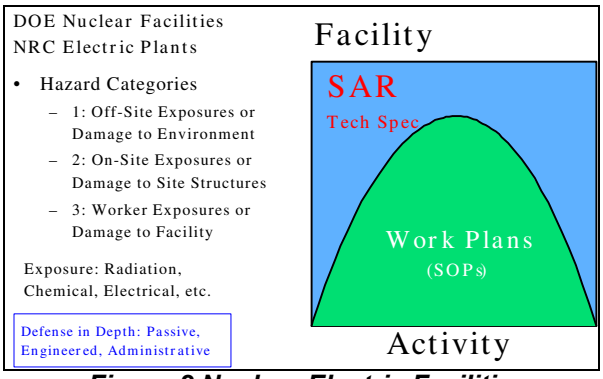

Figure 2 Nuclear Electric Facilities

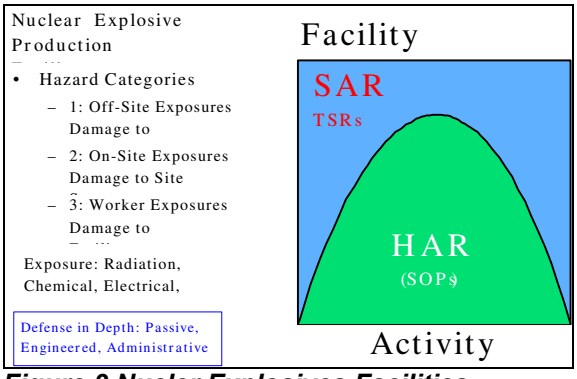

Figure 3 Nucler Explosives Facilities

The DOE Orders for nuclear facility safety analysis reports[2] (an Authorization Basis Document) do not require simultaneous consideration of facility safety issues and worker safety issues. The DOE Orders for nuclear explosives hazard analyses reports[3] clearly separate consideration of facility concerns (documented in the Safety Analysis Report) from worker safety concerns (documented in the Hazard Analysis Report). Similarly, the requirements promulgated by the Nuclear Regulatory Commission have no such requirement to mix worker safety issues with facility safety issues within the reactor facility safety analysis reports for electric nuclear reactors.[4] The Laboratory has generated Laboratory Program Requirements and Laboratory Implementation Requirements that are consistent with the approach taken in the DOE Orders for Authorization Basis Documentation for performing safety analyses for nuclear facilities[5] and non-nuclear facilities.[6]

The complete description of the approach taken by the Laboratory to integrate facility safety issues with worker safety issues is described in LAUR-98-2837, Rev. 3, *Integrated Safety Management Description Document*.[7] Integrated Safety Management (ISM) Core Functions are define the approach to ISM as applied by the Laboratory to Institution, Facility, and Activity/Worker safety considerations and analyses.

(1) Define the scope of work
(2) Analyze the hazards and environmental aspects

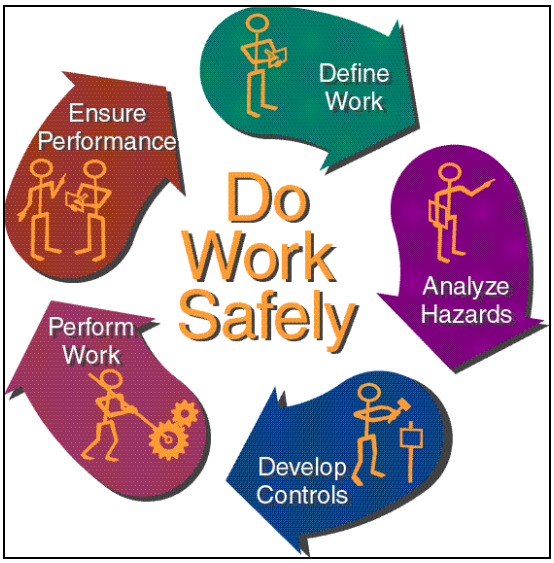

Figure 4 Principles of ISM - Core Functions

(3) Develop and implement the controls
(4) Perform the work
(5) Ensure performance

The LIR for non-nuclear facility safety authorization[6] requires the development of a Facility Safety Plan (FSP) as part of the authorization basis for nonnuclear facilities. It defines the part of the total ISM process that is relevant to the authorization basis as that part of a facility safety plan that documents a facility's activities, hazard/consequence analyses, and related facility-level controls. This is just the part, which corresponds to the first three Integrated Safety Management (ISM) core functions: Define Work, Analyze Hazards, and Develop Controls. It includes those aspects of facility design and facility operational requirements on which the authorizing individual(s) relies for granting authorization to operate. The ISM Description Document expresses this as follows:

> "Facility Requirements
> Facilities often provide structures and systems that control or mitigate hazards of work performed within the facility. These controls and systems are called facility-level controls. The existence of and performance of these controls allow work to be done safely within the facility. These facility-level controls and expectations are documented in the facility safety plans (FSPs). The ISM system, through its requirements (LPRs and LIRs), places expectations on the functioning of these facility-level controls."[7]

The facility management is responsible for providing those aspects of the facility, which provide a safe working environment and may provide protective equipment for the use of workers. This approach represents and acknowledgment that workers within the facility may not be direct in-line employees of the facility. It is especially applicable to a facility like DARHT. Contractor and craft organizations or user groups perform much of the work at DARHT. The facility can not be responsible for worker safety for personnel that are not in-line employees of the facility. That is not to say that the facility manager is not responsible for the safety of workers that are part of the in-line management chain of the facility. Clearly, the facility manager must provide worker safety plans, processes, and procedures for the in-line employees of the facility. However, the requirements for these items are do not belong as part of the facility safety envelope defined within the safety analysis documentation. This line of demarcation between facility and worker safety requirements provides a clean separation between facility safety responsibilities and worker safety responsibilities. At the same time it provides a clear separation for documenting safety requirements related to each discipline. The ISM Description Document expresses the worker safety requirements as follows:

> "Worker Requirements
> The WSS, LPRs, and LIRs also provide expectations for work activities within a facility that do not involve the facility itself. These expectations are met using the safe work practices work-control process, which embeds the five-step process in its work and worker authorization process. Safe work practices address the majority of work activities at the Laboratory, including low-hazard office and

administrative work and hazardous experimental work. The controls developed by applying the five steps through safe work practices are documented in hazard control plans (HCPs) for the activity or collection of activities to be authorized and performed."[7]

According the Laboratory Implementation Requirement documents, the facility safety requirements are documented in the Facility Safety Plan. The worker safety requirements are documented in the Hazard Control Plans. The considerations appropriate to both areas of safety are considered in separate documents. Because the Authorization Basis documents are primarily involved with facility safety, the Facility Safety Plan will certainly be part of the authorization basis for the facility. A requirement for the development of Hazard Control Plans may be found in the Facility Safety Plan, however, the requirement is expected to be listed by work function only. The details of the specific safety requirements are left to the Hazard Control Plans. Both the Facility Safety Plan and the Hazard Control Plans may have related plans and procedures related to specific operations and controls.

3.0 APPROACH

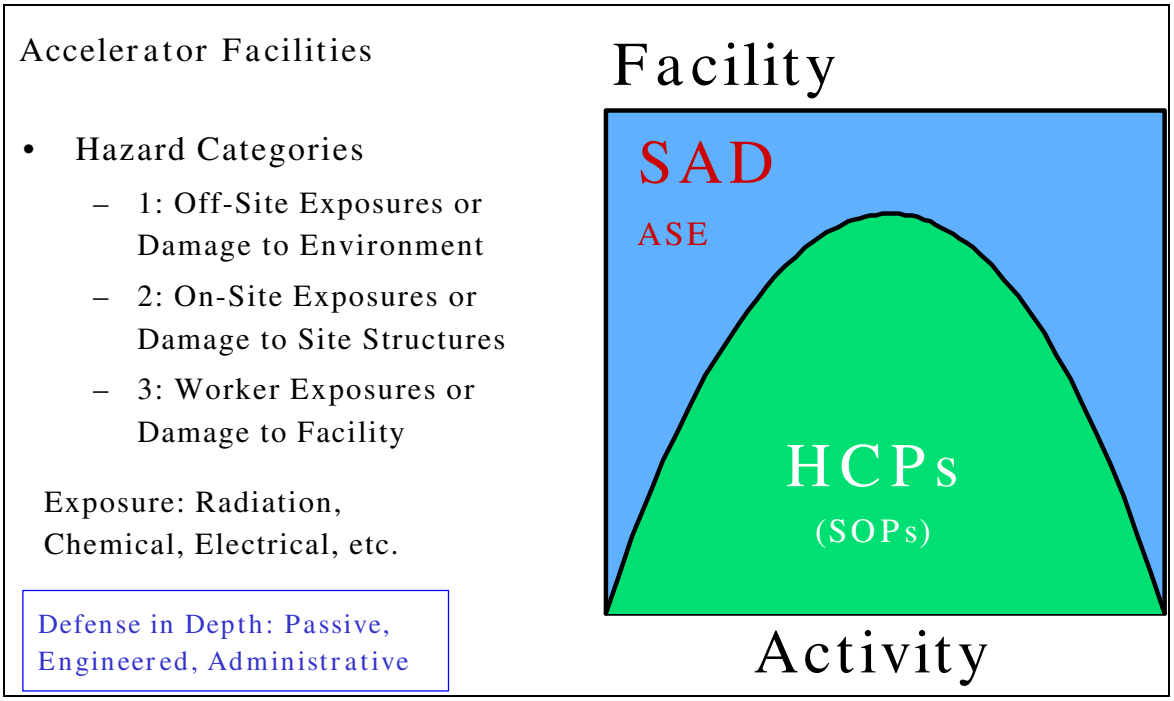

Figure 5 Accelerator Facilities

The DARHT Safety Planning Team adopted an approach to the development of the DARHT Safety Analysis Document, which encompasses the considerations discussed in the previous section. The DARHT Safety Analysis Document will be Facility Oriented. That is the DARHT SAD will be written in accordance with the Accelerator Safety Order and include a full process hazard analysis (PHA). The PHA will include a consideration of all hazards associated with the facility for local workers, co-located workers, on-site consequences, and off-site consequences. A full range of accident initiators will be considered both external and internal.

In the DARHT Safety Analysis Document, Chapter 5, will be "Facility Oriented." Only those Operational Safety Requirements directly related to the facility structures, systems, and components will be listed directly as part of the Accelerator Safety Envelope. When additional hazard controls such as administrative controls are necessary to ensure worker safety, additional documents implementing those requirements will be listed in the SAD by operational or functional category e.g. radiation control plans, maintenance plans, and training plans. The full implementation of any worker safety issues will be documented in Hazard Control Plans. Hazard Control Plans will be developed to satisfy the requirement for worker safety as listed in the Laboratory Integrated Safety Management Document.[7] The DARHT Safety Analysis Document may also serve as the Facility Safety Plan as specified in the Integrated Safety Management Document.

The Hazard Control Plans will be "Worker Safety" oriented. The Hazard Control Plans will present a full implementation of the Integrated Safety Management Document. The Hazard Control Plans will address the ISM Core Functions and Work Smart Standards.

4.0 REFERENCES

1. DOE Order 420.2, *Safety of Accelerator Facilities*, 11-5-98, Change 1: 5-26-99.

2. DOE Order 5480.23, *Nuclear Safety Analysis Report*, 4-10-92, Change 1: 4-10-94.

3. DOE Order 452.2A, *Safety of Nuclear Explosives Operations*, Jan 17, 1997, and DOE Guide 452.2A-1A, *Implementation Guide for DOE Order 452.2A, Safety of Nuclear Explosives Operations*, Jan 17, 1997.

4. NRC Regulatory Guide 1.70, Revision 3, *Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants*, LWR Edition, November 1978.

5. LIR 300-00-06.0, *Nuclear Facility Safety Authorization*, Los Alamos National Laboratory, Laboratory Implementing Requirements, 11/03/99.

6. LIR 300-00-07.0, *Nonnuclear Facility Safety Authorization*, Los Alamos National Laboratory, Laboratory Implementing Requirements, 11/03/99.

7. LAUR-98-2837, Rev. 3, *Integrated Safety Management Description Document*, Los Alamos National Laboratory, September 1999.