Interface Management
for the
Mined Geologic Disposal System

Purpose

The purpose of this paper is to present the interface management process that is to be used for Mined Geologic Disposal System (MGDS) development.

Background

As part of the systems engineering and integration performed on the Yucca Mountain Project (YMP), interface management is critical in the development of the potential MGDS. The application of interface management on the YMP directly addresses integration between physical elements of the MGDS and the organizations responsible for their development.

Integrated Product Team

An Interface Management Integrated Product Team, consisting of members from M&O design organizations, Systems Integration, and Configuration Management, was formed to develop and recommend an interface management process to be used on the YMP by the M&O to identify, document, and manage interfaces of the MGDS element of the Civilian Radioactive Waste

Management System (CRWMS). In addition to the development of an interface management process, the team was also chartered with the task of identifying critical MGDS interfaces. The team was formed in response to the transition of interface management responsibility from the DOE Yucca Mountain Site Characterization Office to the M&O.

Interface Levels

The YMP Configuration Management Plan defines the interface control levels which are hierarchical levels that have been established for the control of interfaces within or between configuration items. The levels are defined as:

Level A - interfaces between the CRWMS and other external systems (e.g., waste producers)

Level B - interfaces between the CRWMS system elements (Waste Acceptance, Repository, Transportation, and Storage)

Level C - interfaces between the YMP segments and subsystems (e.g., Repository Waste Package, ESF, and Site)

Level D - interfaces internal to a YMP segment or subsystem.

Interface Management Process

The basic process for interface management is summarized as follows:

A. Interface requirements will be captured in the Mined Geological Disposal System Requirements Document (MGDSRD), System Description Documents (SDDs), and specifications, depending upon the level of the interfaces. Interface requirements analysis will utilize the functional analyses, concept descriptions, design descriptions, and requirements analyses activities associated with the development of the system description documents and the maintenance of the MGDSRD. The result of the interface requirements analysis will be the identification of the interfaces to be controlled. Interface control is accomplished in the following manner:

1. Support for Level A and B interfaces will be through participation in Program interface processes and ICD development.
2. Level C interface control functions will be performed by the Project Change Control Board, consisting of senior representatives from each of the organizational operations areas.
3. Control of Level D interfaces will be performed by the responsible organization using existing plans, procedures and guidelines (such as QAP-3-X series and design guidelines).

B. The interface definition that implements those requirements or assumptions associated

with the interface will be documented in interface control documents (ICDs).

The ICDs will capture the agreements made by all affected organizations on the interface definition. The parameters, envelopes, operational and safety aspects, and other elements that describe the interface must be developed in a collaborative manner, documented in an ICD, approved by the affected organizations, and managed by the M&O Level III change control board (for Level C interfaces).

- C. The ICDs will be prepared per Nevada Line Procedure NLP-3-34, a procedure that has been written to support the interface management process.
- D. The ICDs are Quality Affecting (Q) and are considered design input.
- E. Interface designs will be documented in the YMP technical baseline in design documentation.
- F. Critical interfaces requiring managed control will be identified by utilizing the physical architecture, associated definitions for the physical architecture, the functional analysis that drove the physical architecture, and the concept of operations.

The following interfaces were determined to be the critical MGDS interfaces:

Transportation Cask System to Surface Repository

Transportation Cask to Assembly Transfer System

Transportation Cask to Waste Handling Building (WHB) System

Transportation Cask to Carrier Preparation Building System

Transportation Cask to CPB Material Handling System

Transportation Cask to Carrier/Cask Transport System

Transportation Cask to Carrier/Cask Handling System

Transportation Cask to Canister Transfer System

Disposal Container to Surface Repository

Disposal Container to Assembly Transfer System

Disposal Container to Canister Waste Transfer System

Disposal Container to Disposal Container Handling System

Disposal Container to Waste Package Remediation System

Disposal Container to WHB System

Subsurface Repository to Surface Repository

Subsurface Utilities to Surface Utilities

Waste Emplacement System to WHB System

Waste Emplacement System to Disposal Container Handling System

Subsurface Emplacement Transportation System to WHB System

Disposal Container to Subsurface Repository

Disposal Container to Waste Emplacement System

Disposal Container to Backfill Emplacement System

Disposal Container to Waste Retrieval System

Waste Package to Engineered Barrier System

Relationship to Quality Assurance Program

The Quality Assurance Requirements and Description (QARD) is the principal Quality Assurance (QA) document for the Civilian Radioactive Waste Management Program (Program). The QARD contains several requirements concerning interface management in Section 3.2.9. The nature of the interface control documentation and its use in tracking interfaces as an adjunct to the design control process, as well as the interface control documentation implementing the requirements of Section 3.2.9 of the QARD, mandate that the ICDs are products subject to QA requirements.

Relationship to the Design Control Process

The ICD assists the design control process by providing for the identification and characterization of interfaces and for achieving an agreement on the interface design. The interface control documentation provides the designer with a tool to facilitate the inter-working relationships at item boundaries in a structured manner. The designers must capture the design at the interface with another item within the scope of drawings and specifications or other design-initiated

documentation in accordance with appropriate design control procedures.

An initiative to utilize interface management and the ICD development process for organizational interfaces is also being pursued to help ensure consistent use of information by multiple organizations.

Conclusion

An interface management process for the MGDS has been developed and is being implemented on the YMP. Interface control documentation and associated plans and procedures have been developed, and candidate controlled interfaces have been identified.