U.S. Department of Energy
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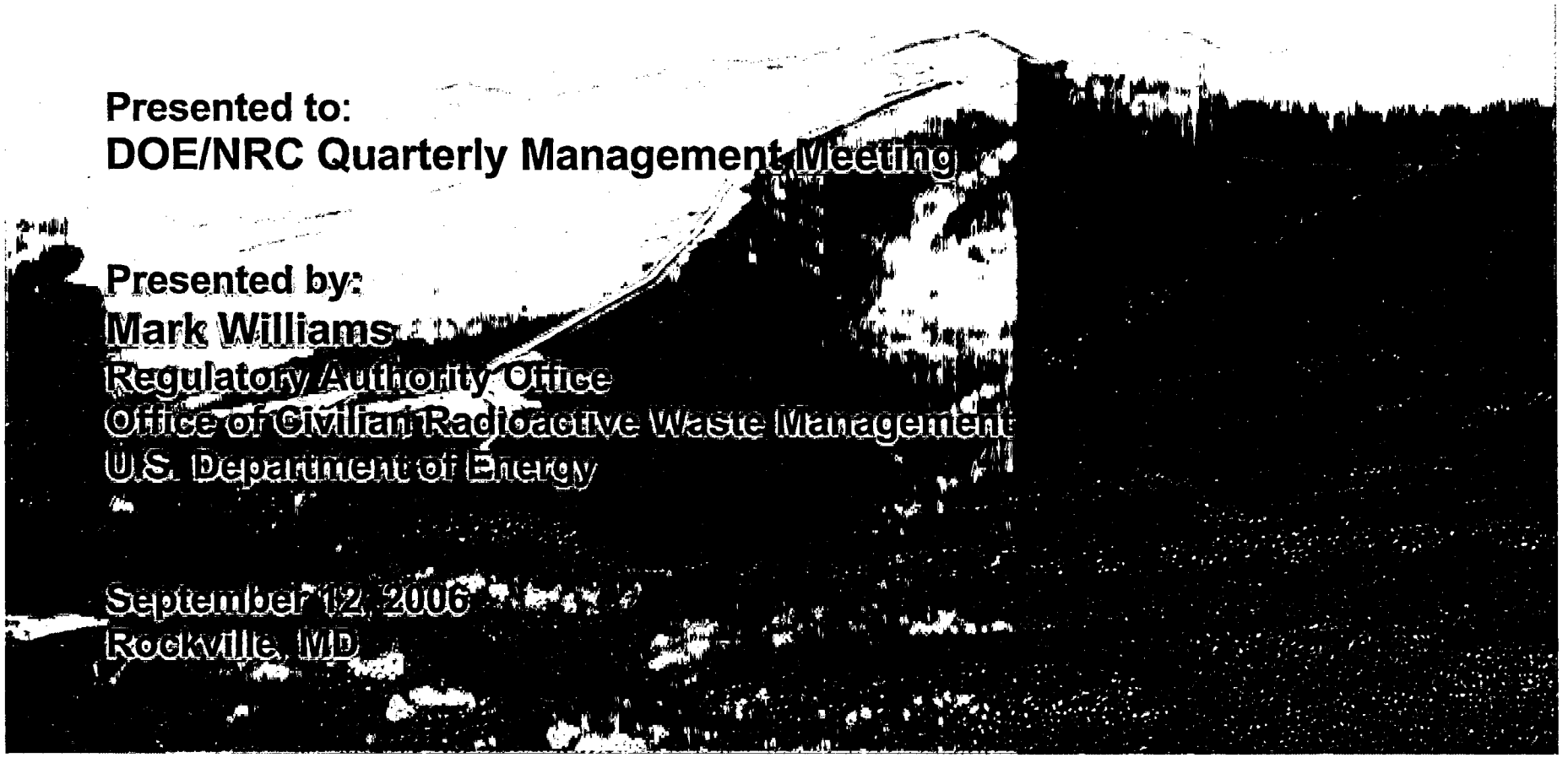
Licensing Update



Presented to:
DOE/NRC Quarterly Management Meeting

Presented by:
Mark Williams
Regulatory Authority Office
Office of Civilian Radioactive Waste Management
U.S. Department of Energy

September 12, 2006
Rockville, MD

Enclosure 3

Topics for Discussion

- Interactions
- License Application Project
- Key Technical Issue Agreements
- Response to NRC Observation Audit Report

Interactions Summary

- **Preclosure Safety Analysis (PCSA)**
  - **DOE commitment from 5/16/06 Technical Exchange**
  - **Reliability Guide: "Summary of Preclosure Safety Analysis Reliability Assessment Methodology" – DOE letter 8/25/06**
- **Preclosure Seismic Safety Basis Technical Exchange (6/7/06)**
  - **NRC issued 5/22/06 *Interim Staff Guidance on Seismically Initiated Event Sequences* and an earlier 1/24/06 staff letter on the same topic**
  - **DOE presented an approach consistent with Part 63 and proposed its acceptance in comments on the ISG**
  - **DOE will issue a revision to its Preclosure Seismic Design Topical Report in the Fall**

Interactions Summary

(Continued)

- **Design Changes Approved through DOE's Critical Decision-1 (CD-1) Process (8/29/06)**
  - DOE appreciates the regulatory insights that NRC provided in the presentations on *Regulatory Requirements for Transportation, Storage, Aging, and Disposal*
  - DOE described the CD-1 process, and the role of the TAD canister approach in the repository system
  - DOE will present sufficient design and safety analysis information in the LA for NRC safety determination that performance objectives will be met

Proposed NRC/DOE Technical Exchanges

- Total System Performance Assessment Model (10/24-25/06)
- Preclosure Safety Analysis Topics (11/7-9/06)
  - Aircraft Hazards
  - Consequences and Source Term (PCSA)
  - Reliability Analysis (including Human Reliability)
  - Technical Specifications
  - Systematic Approach to Training (General)
  - Criticality Event Sequences During Preclosure Period
- Science and Technology (12/5/06)
- Postclosure Criticality (12/6 or 7/06)
- Postclosure Peak Seismic Ground Velocity and Seismic Response (possibly 10/17/06)
- Colloids (possibly 11/2/06)

Proposed NRC/DOE Technical Exchanges

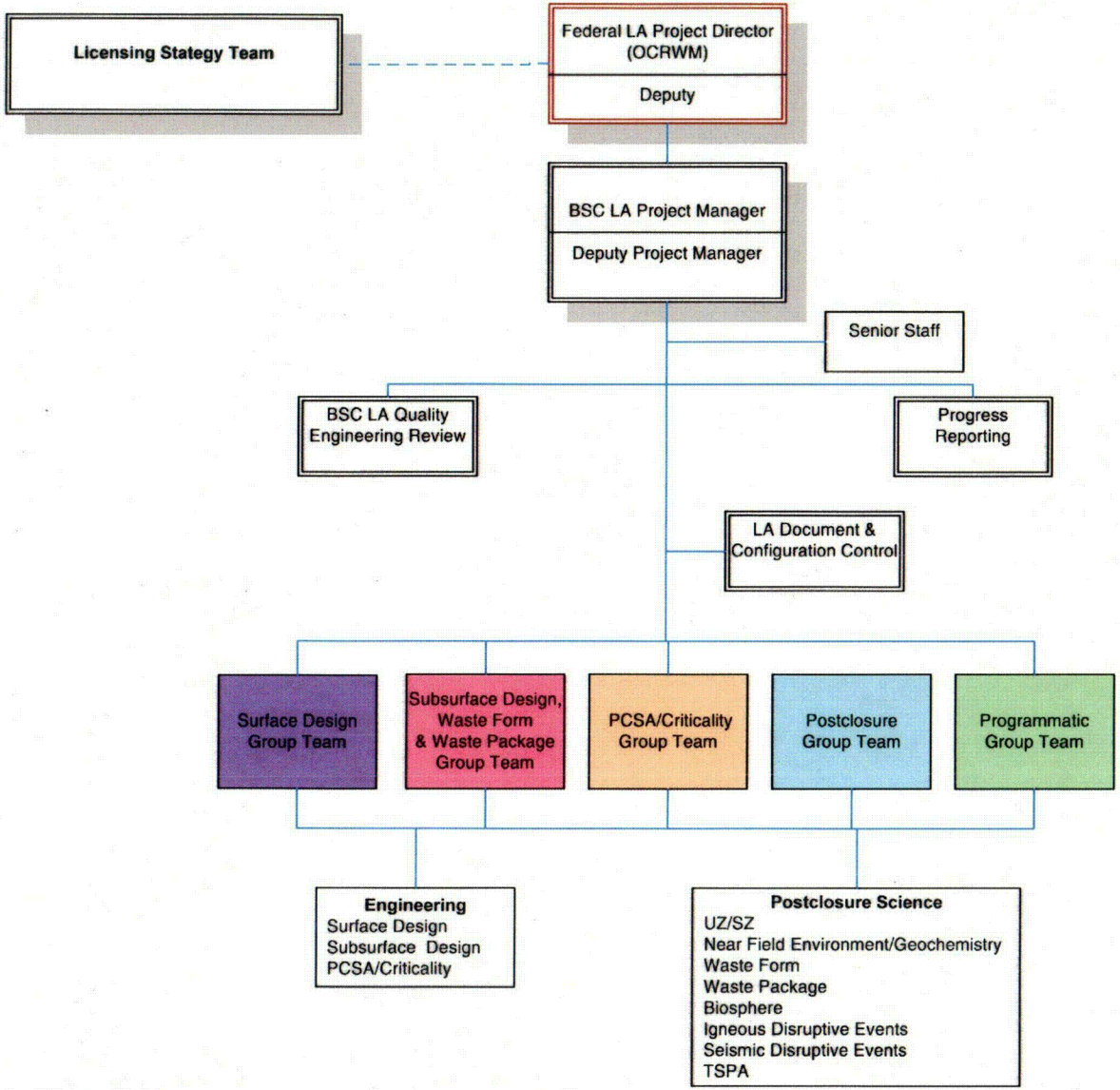
(Continued)

- Other Topics, schedule to be determined
  - Infiltration Model and Data
  - TAD Canister Performance Specifications
  - Igneous Activity Probability
  - Igneous Activity Consequences
  - Waste Package Corrosion
  - Drift Degradation
  - Colloids (if not scheduled)
  - Postclosure Peak Seismic Ground Velocity and Seismic Response (if not scheduled)
  - Near-Field Environment
  - Unsaturated-Zone Tests
  - Drip Shield Materials, Fabrication, and Performance
  - Stratigraphic Correlation of Model Units

License Application Project Description of Scope

- License Application (LA) Project – responsible for the preparation, review, validation, production, and delivery of the General Information (GI) and Safety Analysis Report (SAR) required by 10 CFR 63.21
  - Implements principles of DOE Order 413.3 for LA Project
  - Controls configuration
  - Integrates LA input from DOE, BSC, Lead Lab, NNPP, and EM
  - Validates LA completeness and accuracy prior to DOE approval
- Federal LA Project Director with BSC, Sandia & DOE
- LA Project divided into 5 technical groups:
  - Surface Design; Subsurface Design, Waste Form & Waste Package; PCSA/ Criticality; Postclosure; Programmatic

License Application Project



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License Application Project Current Status of Implementation

- **Management Tools**
  - LA Management Plan outlines process for developing, reviewing, approving, and delivering the LA, including
    - Development of requirements
    - Identification of supporting products
    - Requirements traceability maps
  - Integrated project schedule with products coded to LA sections
  - LA Teams are being mobilized

LA Requirements Mapping

10 CFR 63.21 and YMRP Mapping to LA Sections and CDR Groups

The relations illustrated here are summarized from our database mapping of requirements from 10 CFR 63.21 and the YMRP into the LA sections.

The ~110 relations shown between the YMRP outline of 50 topical areas of review and the LA sections actually represent ~3,000 discrete relationships between 503 YMRP acceptance criteria and subcriteria and the LA sections and subsections.

10 CFR 63 requirements are also traced at greater depth in our requirements traceability crosswalk database.

LEGEND: CDR GROUPS

- Surface Design Group
- Subsurface Design & Waste Package Group
- Preclosure Safety Analysis Group
- Programmatic Group
- Postclosure Group
- * Sections with subject matter to be addressed in planned NRC technical exchanges

Planning Date July 12, 2006

10 CFR 63.21 Content of Application

63.21(b) The General Information must include:

(1) General description of proposed geological repository operations area, activities
(2) Proposed schedules for construction, receipt of waste, and emplacement of wastes
(3) Description of security measures and physical protection, security organization, training and qualification (10 CFR 73.51)
(4) Description of material control and accounting system (10 CFR 63.78)
(5) Description of work conducted to characterize Yucca Mountain

63.21(c) The Safety Analysis Report must include:

(1) Description of features, events, processes at Yucca Mountain that might affect the design or performance of repository, to include:
  (i) Location of repository and boundaries
  (ii) Geology, hydrology, geochemistry
  (iii) Surface water hydrology, climatology
  (iv) Location of reasonably maximally exposed individuals
(2) Information about materials of construction, codes and DOE design and construction standards.
(3) Description of design of repository components and engineered barrier system, including:
  (i) Dimensions, material properties, design methods
  (ii) Design criteria and relationship to preclosure and postclosure performance objectives (10 CFR 63.111(b), 63.113(b), 63.113(c))
  (iii) Design basis and relationship to design criteria.
(4) Description (kind, amount, specifications) of radioactive materials to be received.
(5) Preclosure Safety Analysis of repository operations area for the period before permanent closure (10 CFR 63.111(a), 63.111(c))
(6) Description of program for control and monitoring of radioactive effluents and occupational exposure (10 CFR 63.111)
(7) Description of plans for retrieval and alternate waste storage of radioactive wastes.
(8) Description of design considerations to facilitate permanent closure and D&D of surface facilities.
(9) Assessment to determine the degree that features, events, and processes of the site that are expected to affect compliance with 10 CFR 63.113.
(10) Assessment of the anticipated geomechanical, hydrogeologic, and geochemical response to the design thermal loading.
(11) Assessment of the ability of the repository to limit radiological exposure for the period after permanent closure (10 CFR 63.113(b))
(12) Assessment of the ability of the repository to limit releases of radionuclides into the accessible environment (10 CFR 63.113(c))
(13) An assessment of the repository to limit radiological exposure after permanent closure in the event of human intrusion (10 CFR 63.113(d))
(14) Evaluation of the natural features of setting and design of the engineered barrier system that are considered barriers important to waste isolation (10 CFR 63.115)
(15) Explanation of measures used to support the models used to provide information in 10 CFR 63.21(c)(9) to (14).
(16) Identification of structures, systems, and components that require R&D to confirm the adequacy of design and a detailed description of the program designed to resolve the safety questions.
(17) A description of the Performance Confirmation Program that meets the requirements of 10 CFR 63, Subpart F.
(18) Identification and justification of the selection of variables, conditions, or other items that are probable subjects of license specifications, giving special attention to those that may significantly influence the final design.
(19) An explanation of how expert elicitation was used.
(20) A description of the Quality Assurance program defined in 10 CFR 63.142.
(21) A description of the radiological emergency response plan before permanent closure (10 CFR 63.161)
(22) The following information concerning activities in the operations area:
  (i) DOE organization and structure as it pertains to the construction and operations of the repository (delegations of authority, responsibilities, etc.)
  (ii) Identification of key positions for safety and operations
  (iii) Personnel qualifications and training requirements
  (iv) Plans for startup activities and testing.
  (v) Plans for conduct of normal operations, maintenance, surveillance, periodic testing, etc.
  (vi) Plans for permanent closure and D&D of the surface facilities
  (vii) Plans for any uses of the operations area other than for disposal of radioactive material.
(23) A description of the program to be used to maintain the records described in 10 CFR 63.71 and 63.72.
(24) A description of the controls that DOE will apply to restrict access and regulate land use at Yucca Mountain and adjacent areas, including a conceptual design of monuments that will be used to identify the site after permanent closure.

Yucca Mountain Review Plan Chapters and Sections

1 Review Plan for General Information
1.1 General Description
1.2 Proposed Schedules for Construction, Receipt, and Emplacement of Waste
1.3 Physical Protection Plan
1.4 Material Control and Accounting Program
1.5 Description of Site Characterization Work

2 Review Plan for Safety Analysis Report
2.1 Repository Safety Before Permanent Closure
2.1.1 Preclosure Safety Analysis
2.1.1.1 Site Description as it Pertains to Preclosure Safety Analysis
2.1.1.2 Description of Structures, Systems, Components, Equipment, and Operational Process Activities
2.1.1.3 Identification of Hazards and Initiating Events
2.1.1.4 Identification of Event Sequences
2.1.1.5 Consequence Analyses
2.1.1.6 Identification of Structures, Systems, and Components Important to Safety, Safety Controls, and Measures to Ensure Availability of the Safety Systems
2.1.1.7 Design of Structures, Systems, and Components Important to Safety and Safety Controls
2.1.1.8 Meeting the 10 CFR Part 20 As Low As is Reasonably Achievable Requirements for Normal Operations and Category 1 Event Sequences
2.1.2 Plans for Retrieval and Alternate Storage of Radioactive Wastes
2.1.3 Plans for Permanent Closure and Decontamination, or Decontamination and Dismantlement of Surface Facilities

2.2 Repository Safety After Permanent Closure
2.2.1 Performance Assessment
2.2.1.1 System Description and Demonstration of Multiple Barriers
2.2.1.2 Scenario Analysis and Event Probability
2.2.1.3 Model Abstraction
2.2.1.3.1 Degradation of Engineered Barriers
2.2.1.3.2 Mechanical Disruption of Engineered Barriers
2.2.1.3.3 Quantity and Chemistry of Water Contacting Engineered Barriers and Waste Forms
2.2.1.3.4 Radionuclide Release Rates and Solubility Limits
2.2.1.3.5 Climate and Infiltration
2.2.1.3.6 Flow Paths in the Unsaturated Zone
2.2.1.3.7 Radionuclide Transport in the Unsaturated Zone
2.2.1.3.8 Flow Paths in the Saturated Zone
2.2.1.3.9 Radionuclide Transport in the Saturated Zone
2.2.1.3.10 Volcanic Disruption of Waste Packages
2.2.1.3.11 Airborne Transport of Radionuclides
2.2.1.3.12 Concentration of Radionuclides in Ground Water
2.2.1.3.13 Redistribution of Radionuclides in Soil
2.2.1.3.14 Biosphere Characteristics
2.2.1.4 Demonstration of Compliance with Postclosure Public Health and Environmental Standards

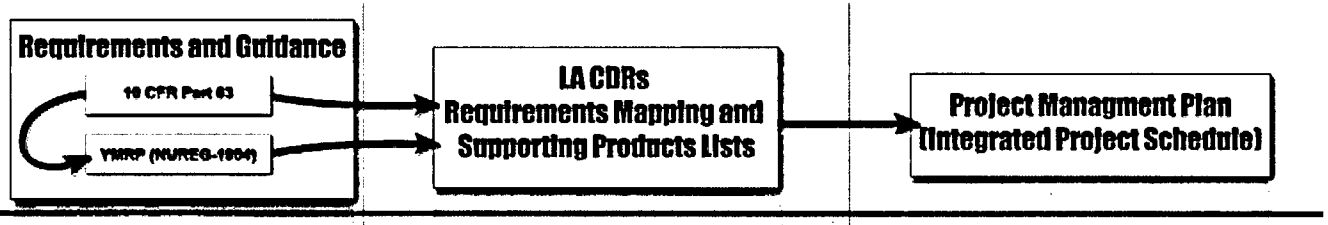
2.3 Research And Development Program to Resolve Safety Questions

2.4 Performance Confirmation Program

2.5 Administrative and Programmatic Requirements
2.5.1 Quality Assurance Program
2.5.2 Records, Reports, Tests, and Inspections
2.5.3 Training and Certification of Personnel
2.5.4 Expert Elicitation
2.5.5 Plans for Startup Activities and Testing
2.5.6 Plans for Conduct of Normal Activities Including Maintenance, Surveillance, and Periodic Testing
2.5.7 Emergency Planning
2.5.8 Controls to Restrict Access and Regulate Land Uses
2.5.9 Uses of Geologic Repository Operations Area for Purposes Other Than Disposal of Radioactive Wastes
2.5.10 License Specifications

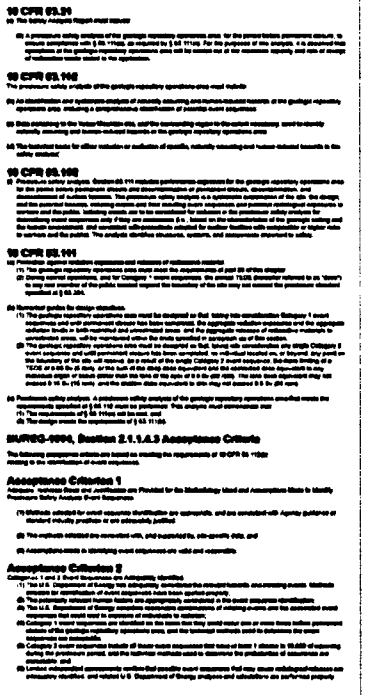
LA Project Management

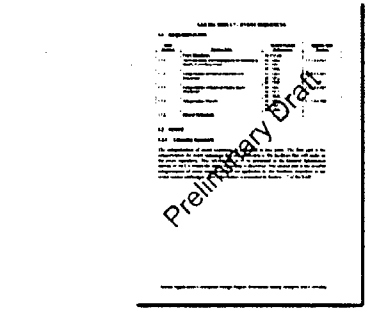
LA Requirements Flowdown

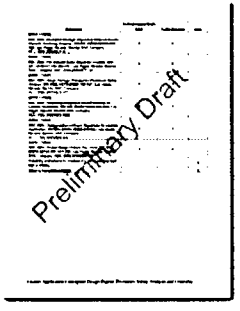


Example of LA Requirements Flowdown

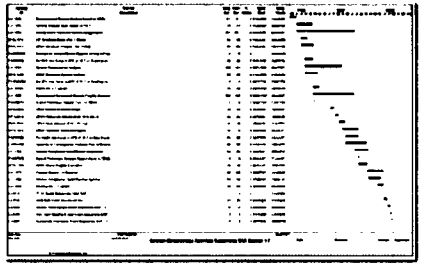
SAR Section 1.7: Categorization of Event Sequences—Seismic Methodology







Examples of Activities Logically Tied to Seismic Methodology Description in SAR Section 1.7 Schedule



LA Project Summary

- Federal Project Director and BSC/Sandia Project Manager have been identified
- LA Management Plan completion and approval
- Approve LA Conceptual Design Reports planned November 2006
- LA Project implementation underway

Potential Impacts of Programmatic Changes to Key Technical Issue Agreements

- DOE completed an evaluation of potential impacts of programmatic changes to KTI agreements considered complete by NRC. Results show:
  - Incorporation of TADs could impact 11 completed KTIs
  - Incorporation of INFIL rework could impact 1 completed KTI
  - Incorporation of peak dose work is not expected to impact any completed KTIs, assuming no change to the proposed EPA Standard (see handout)
- Approximately 13 associated documents would need to be reopened if these KTIs are impacted
- DOE will continue to examine completed KTIs for impacts from relevant changes in the program

Remaining Key Technical Issue Items and Additional Information Needs

- DOE plans to submit 3 AIN responses by the end of FY 2006 and 3 more by the end of CY 2006
- DOE will provide NRC with a schedule for AIN submittals when the planning effort is complete
  - We continue to expect that responses for some AINs, based on long-term activities, will not be available before the LA submittal

Response to NRC's Audit Observation Report

- On 9/11/06, DOE formally responded to NRC's Observation Audit Report OAR-05-05
- DOE undertook a wide variety of activities as a result of the audit and related events, including
  - More than 35 Condition Reports; 2 root cause analyses; 2 self assessments; an independent review
  - DOE also issued the *OCRWM Independent Review Team Report of the BSC Quality Assurance Audit BQAP-BSC-05-07* to provide additional information regarding NRC's issues
- Pursuant to 6/6/06 Management Meeting, DOE remains ready to incorporate this into the Technical Exchange schedule

FOR INFORMATION ONLY
Assuming Impact to Closed KTIs, Documents Associated with KTI Revision

KTI/AIN	KTI/AIN Summary	Potential TAD Impact	Potential INFIL Impact	Assuming Impact to Closed KTIs, Documents Associated with KTI Revision
CLST.3.02	In the revision to the "Summary of In-Package Chemistry for Waste Forms," AMR, address specific NRC questions regarding radiolysis, incoming water, localized corrosion, corrosion products, transient effects, and a sensitivity study on differing dissolution rates of components. DOE stated that these specific questions are currently being addressed in the revision of the "Summary of In--Package Chemistry for Waste Forms AMR", ANL-EBS-MD-000050 and related AMRs and calculations. To be available in January 2001.	Possible	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037)
ENFE.3.03	Provide analyses to verify that bulk-scale chemical processes dominate the in-package chemical environment. The DOE will provide analyses justifying the use of bulk chemistry as opposed to local chemistry for solubility and waste form degradation models. These analyses will be documented in an update to the Miscellaneous Waste-Form FEPs AMR (ANL-WIS-MD-000009) or in an update to the Summary of In-Package Chemistry for Waste Forms AMR (ANL-EBS-MD-000050), expected to be available in FY 02.	Possible	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037)
CLST.3.01	The revision to the "Summary of In-Package Chemistry for Waste Forms" In AMR, the NRC needs to know whether and how initial failures are included in the in-package chemistry modeling, taking into account the multiple barrier analysis. DOE stated that the "Summary of In-Package Chemistry for Waste Forms" AMR, ANL-EBS-MD-000050, deals with time since waste package breach, instead of time of waste package failures. The model is appropriate for the current implementation in the TSPA scenarios because breaches do not occur until after aqueous films may be sustained. Multiple barrier analyses are discussed in the TSPAI IRSR, and therefore will be discussed in the TSPA KTI Technical Exchange.	Possible	No	Summary of In-Package Chemistry for Waste Forms (ANL-EBS-MD-000050)
CLST.3.03	Provide a more detailed calculation on the in-package chemistry effects of radiolysis. DOE stated that the calculations recently performed as discussed at the 9/12/00 Technical Exchange and preceding teleconferences are being documented. These calculations will be referenced and justified in the revision of the "Summary of In-Package Chemistry for Waste Forms" AMR, ANL-EBS-MD-000050, and will be available in January 2001.	Possible	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037); EBS Radionuclide Transport Abstration (ANL-WIS-PA-000001)
ENFE.1.01	Provide updated FEPs AMRs with additional technical bases for those FEPs previously identified by the NRC in Rev 03 of the ENFE IRSR as inadequately screened. In Rev 03 of the ENFE IRSR, the NRC identified 17 FEPs associated with Subissue 1 for which no screening arguments were identified in the FEPs database, screening arguments were inconsistent with other project documents, or inadequate exclusion arguments were provided. The lack of screening arguments has been addressed in Rev 00 of the FEPs database and in Rev 00 of the supporting AMRs. Current revisions (or ICNs) of the FEPs AMRs, scheduled for completion in January 2001, will partially address the remaining NRC comments. Consideration of the remaining NRC comments will be provided in subsequent FEPs AMR revisions, expected to be available as periodic revisions, the entirety of which will be available prior to license application.	Possible	No	EBS FEPs (ANL-WIS-PA-000002); Waste Form FEPs (ANL-WIS-MD-000009); FEPs in SZ Flow and Transport (ANL-NBS-MD-000002)
ENFE.4.07	Provide updated FEPs AMRs with additional technical bases for those FEPs previously identified by the NRC in Rev. 03 of the ENFE IRSR as inadequately screened. In Rev 03 of the ENFE IRSR, the NRC identified 17 FEPs associated with Subissue 1 for which no screening arguments were identified in the FEPs data base, screening arguments were inconsistent with other project documents, or inadequate exclusion arguments were provided. The lack of screening arguments has been addressed in Rev 00 of the FEPs data base and Rev 00 of the supporting AMRs. Current revisions (or ICNs) of the FEPs AMRs, scheduled for completion in January 2001, will partially address the remaining NRC comments. Consideration of the remaining NRC comments will be provided in subsequent FEPs AMR revisions, expected to be available as periodic revisions, the entirety of which will be available prior to license application.	Possible	No	Development of the TSPA-LA Features, Events, and Processes (TDR-WIS-MD-000003) and appropriate process model-level FEPs AMRs
TSPAI.3.14	DOE should account for the full range of environmental conditions for the in-package chemistry model (ENG4.1.1). DOE will update the in-package chemistry model to account for scenarios and their associated uncertainties required by TSPA. This will be documented in the In-Package Chemistry AMR (ANL-EBS-MD-000056) expected to be available to NRC in FY 2003.	Likely	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037); EBS Radionuclide Transport Abstration (ANL-WIS-PA-000001); EBS FEPs (ANL-WIS-PA-000002); Waste Form FEPs (ANL-WIS-MD-000009); FEPs in SZ Flow and Transport (ANL-NBS-MD-000002)

FOR INFORMATION ONLY
Assuming Impact to Closed KTIs, Documents Associated with KTI Revision

KTI/AIN	*KTI/AIN Summary*	*Potential TAD Impact*	*Potential INFIL Impact*	*Assuming Impact to Closed KTIs, Documents Associated with KTI Revision*
CLST.2.09	Demonstrate the drip shield and waste package mechanical analysis addressing seismic excitation is consistent with the design basis earthquake covered in the SDSS KTI. DOE stated that the same seismic evaluations of waste packages and drip shield (revision of AMRs ANL-UDC-MD-000001 and ANL-XCS-ME-000001) will support both the SDSS KTI and the CLST KTI, therefore consistency is ensured. These revisions will be completed prior to LA.	Possible	No	Mechanical Assessment of the Waste Package Subject to Vibratory Ground Motion (CAL-WIS-AC-000001); Seismic Consequence Abstraction (ANL-EBS-MD-000027)
CLST.5.03	Provide the "Probability of Criticality Before 10,000 years" calculation. DOE stated that it will provide the calculation to NRC by November 1, 2000.	Highly likely	No	Screening Analysis of Criticality Features, Events, and Processes for LA (ANL-EBS-NU-000008); Probablity of Postclosure Criticality (CAL-MRG-NU-000012)
TSPAI.2.05	It is not clear to the NRC that the current list of FEPs (i.e., the list of FEPs documented in TDR-WIS-MD-000003, 00/01) is sufficiently comprehensive or exhibits the necessary attribute of being auditable (e.g., transparent and traceable). As discussed in the two TSPAI technical exchanges, there are unclear aspects of the approach that DOE plans to use to develop the necessary documentation of those features, events, and processes that they have considered. Accordingly, to provide additional confidence that the DOE will provide NRC with: (1) auditable documentation of what has been considered by the DOE, (2) the technical basis for excluding FEPs, and (3) an indication of the way in which included FEPs have been incorporated in the performance assessment; DOE will provide NRC with a detailed plan (the Enhanced FEP Plan) for comment. In the Enhanced FEP Plan, DOE will address the following items: (1) the approach used to develop a pre-screening set of FEPs (i.e., the documentation of those things that DOE considered and which the DOE would use to provide support for a potential license application), (2) the guidance on the level-of-detail that DOE will use for redefining FEPs during the enhanced FEP process, (3) the form that the pre-screening list of FEPs will take (e.g., list, database, other descriptions), (4) the approach DOE would use for the ongoing evaluation of FEPs (e.g., how to address potentially new FEPs), (5) the approach that DOE would use to evaluate and update the existing scope and description of FEPs, (6) the approach that DOE would use to improve the consistency in the level of detail among FEPs, (7) how the DOE would evaluate the results of its efforts to update the existing scope and definition of FEPs, (8) how the Enhanced FEP process would support assertions that the resulting set of FEPs will be sufficiently comprehensive (e.g., represents a wide range of both beneficial and potential adverse effects on performance) to reflect clearly what DOE has considered, (9) how DOE would indicate their disposition of included FEPs in Amodeling issues@), (11) how the hierarchical levels used to document the information would be used within DOE's enhanced FEP process, (12) how the Enhanced FEP Plan would result in documentation that facilitates auditing (i.e., lead to a process that is transparent and traceable), (13) DOE's plans for using configuration management controls to identify FEP dependencies on ongoing work and design changes. DOE will provide the Enhanced Plan to NRC by March 2002.	Possible	No	Development of the TSPA-LA Features, Events, and Processes (TDR-WIS-MD-000003) and appropriate process model-level FEPs AMRs
TSPAI.2.06	Provide justification for the approach to: (1) the level of detail used to define FEPs; (2) the degree of consistency among FEPs; and (3) comprehensiveness of the set of FEPs initially considered (i.e., before screening). DOE proposes to meet with NRC periodically to provide assessments of the DOE's progress, once it has initiated the Enhanced FEP process, and on changes to the approach documented in the Enhanced FEP Plan. During these progress meetings DOE agrees to provide a justification for their approach to: (1) the level of detail used to define FEPs; (2) the degree of consistency among FEPs; and (3) comprehensiveness of the pre-screening set of FEPs.	Possible	No	Development of the TSPA-LA Features, Events, and Processes (TDR-WIS-MD-000003) and appropriate process model-level FEPs AMRs
TSPAI.3.19	DOE will provide justification for the use of its evapotranspiration model, and defend the use of the analog site temperature data (UZ1.3.1). DOE will provide justification for the use of the evapotranspiration model, and justify the use of the analog site temperature data. The justification will be documented in an update to the Simulation of Net Infiltration for Modern and Potential Future Climates AMR (ANL-NBS-HS-000032) and the Future Climate Analysis AMR (ANL NBS-GS-000008). The AMRs are expected to be available to NRC in FY 2003.	No	Highly Likely	Simulation of Net Infiltration for Modern and Potential Future Climates (ANL-NBS-HS-000032); UZ Flow Models and Submodels (MDL-NBS-HS-000006)

NOTE: Incorporation of peak dose work is not expected to impact any completed KTIs, assuming no change to the proposed EPA standard.

Consolidated Action Items
From the NRC/DOE Quarterly Management Meetings
(September 12, 2006)

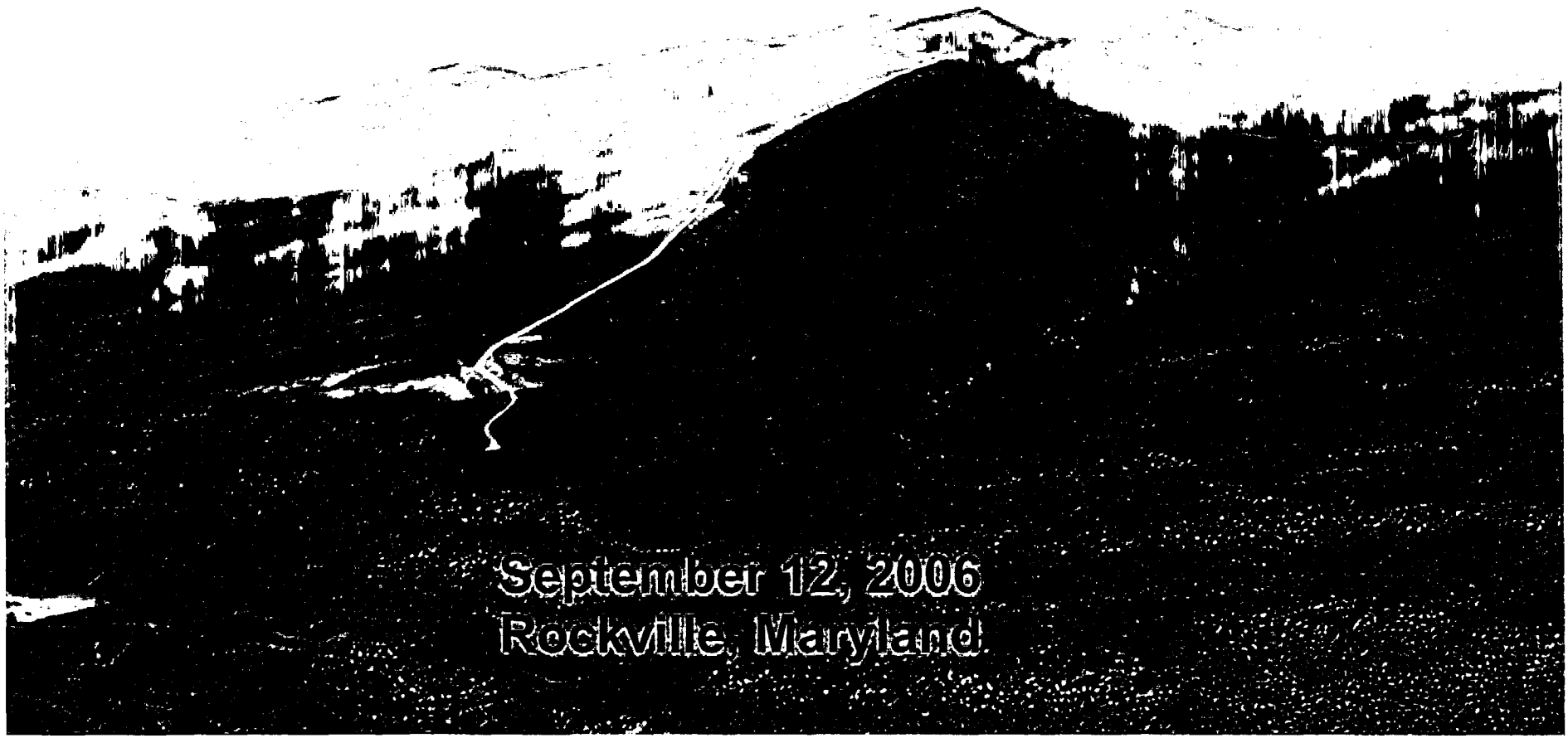
Item No.	Action Item	Description	Status
1	MM 0402-C1	DOE will identify any to-be-verified (TBV) data in the LA that needs to be qualified (if any) at the time of LA submittal (Commitment).	Open. This item will remain open until LA submittal.
2	MM 0506-01	DOE and NRC to determine the dates for the list of proposed technical interactions discussed during the June 6, 2005 Management Meeting.	Open. This item will remain open as a continuing action and progress will be reported at future management meetings. Recommend closure – Mark Williams will report the dates for TE's on 9/12.
3	MM 0509-01	DOE/NRC to hold technical exchange after the DOE report addressing the USGS alleged falsification of documents has been released by the Secretary.	Open. The report has been issued and a technical exchange will be scheduled when DOE's evaluation is complete (including the root cause, extent of condition, and action plan).
4	MM 0512-01	DOE to provide to NRC a schedule for submittal of planned additional information needs for the remaining key technical issues under review by the NRC.	Open. Recommend closure – Mark Williams will provide a schedule and the revised DOE approach on 9/12.
5	MM0606-01	DOE and NRC to hold an interaction (management meeting or technical exchange - technical exchange preferred) on DOE's response to NRC's audit observation report (January 9, 2006) regarding the BSC's LLNL report.	Open.
6	MM0606-02	DOE to provide NRC with the performance specifications for the Transport, Aging, and Disposal canister prior to scheduling a technical exchange on the TAD approach.	Open.
7	MM0606-03	NRC reiterated their request for a technical exchange on TSPA. The technical exchange will also include a discussion of DOE's transition plan for impacted workscope to Sandia National Laboratories.	Open. Recommend closure – DOE and NRC have scheduled a TSPA TE on 10/24-25/06.
8	MM0606-04	DOE and NRC to schedule a technical exchange on Science and Technology Program including a discussion of the set of controls that are in place to ensure appropriate development and integration of results from Science and Technology Program into baseline program.	Open. Recommend closure – DOE and NRC have scheduled a TE on S&T on 12/5/06.

Note: The Quarterly Management Meeting action items are designated as "MM yymm-nn" where yy is the two digit year, mm is a two digit month and nn is a two digit action item number from that meeting.

U.S. Department of Energy

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

DOE/NRC Quarterly Management Meeting



U.S. Department of Energy
Office of Civilian Radioactive Waste Management

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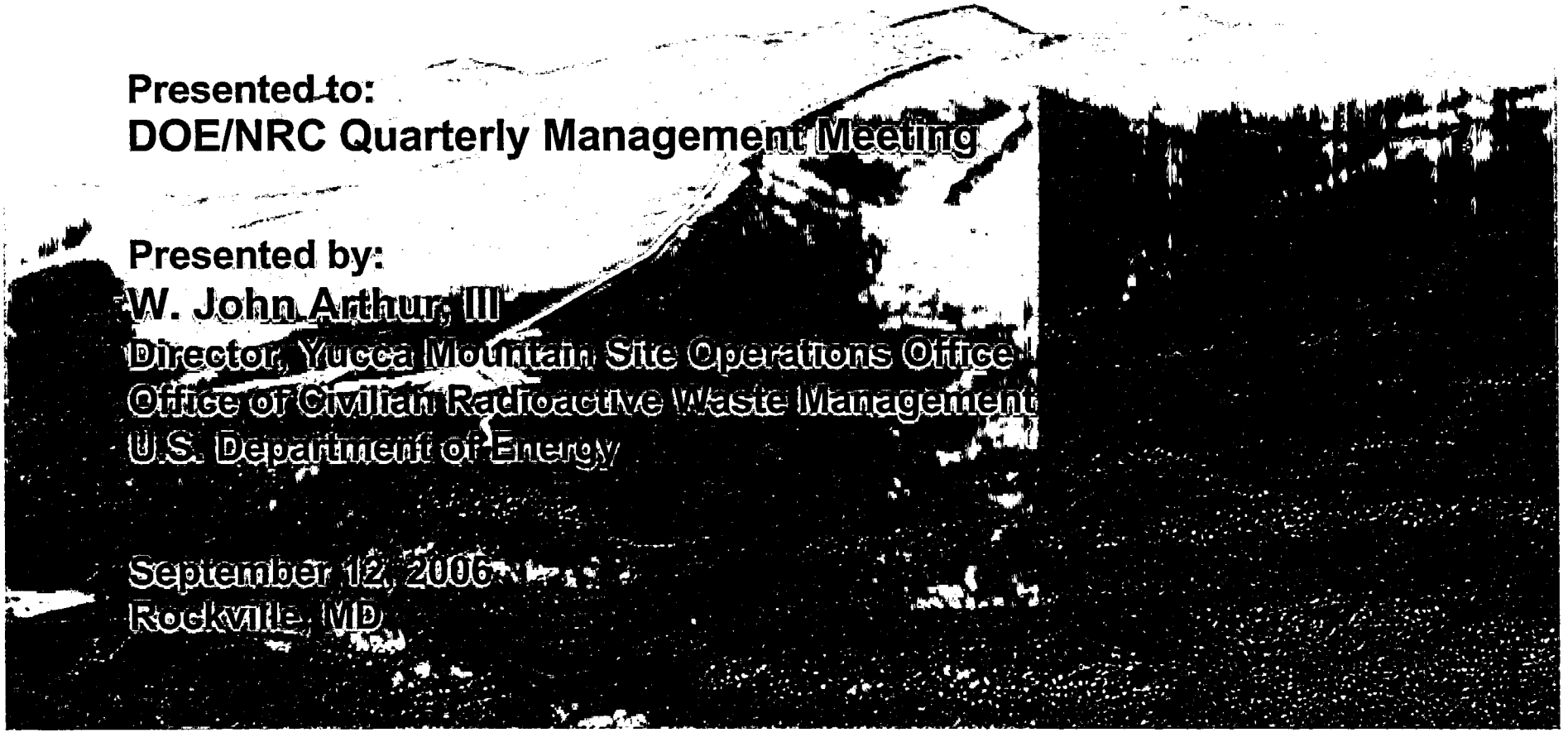
OCRWM Corrective Action Program Improvements



Presented to:
DOE/NRC Quarterly Management Meeting

Presented by:
W. John Arthur, III
Director, Yucca Mountain Site Operations Office
Office of Civilian Radioactive Waste Management
U.S. Department of Energy

September 12, 2006
Rockville, MD

Assessments

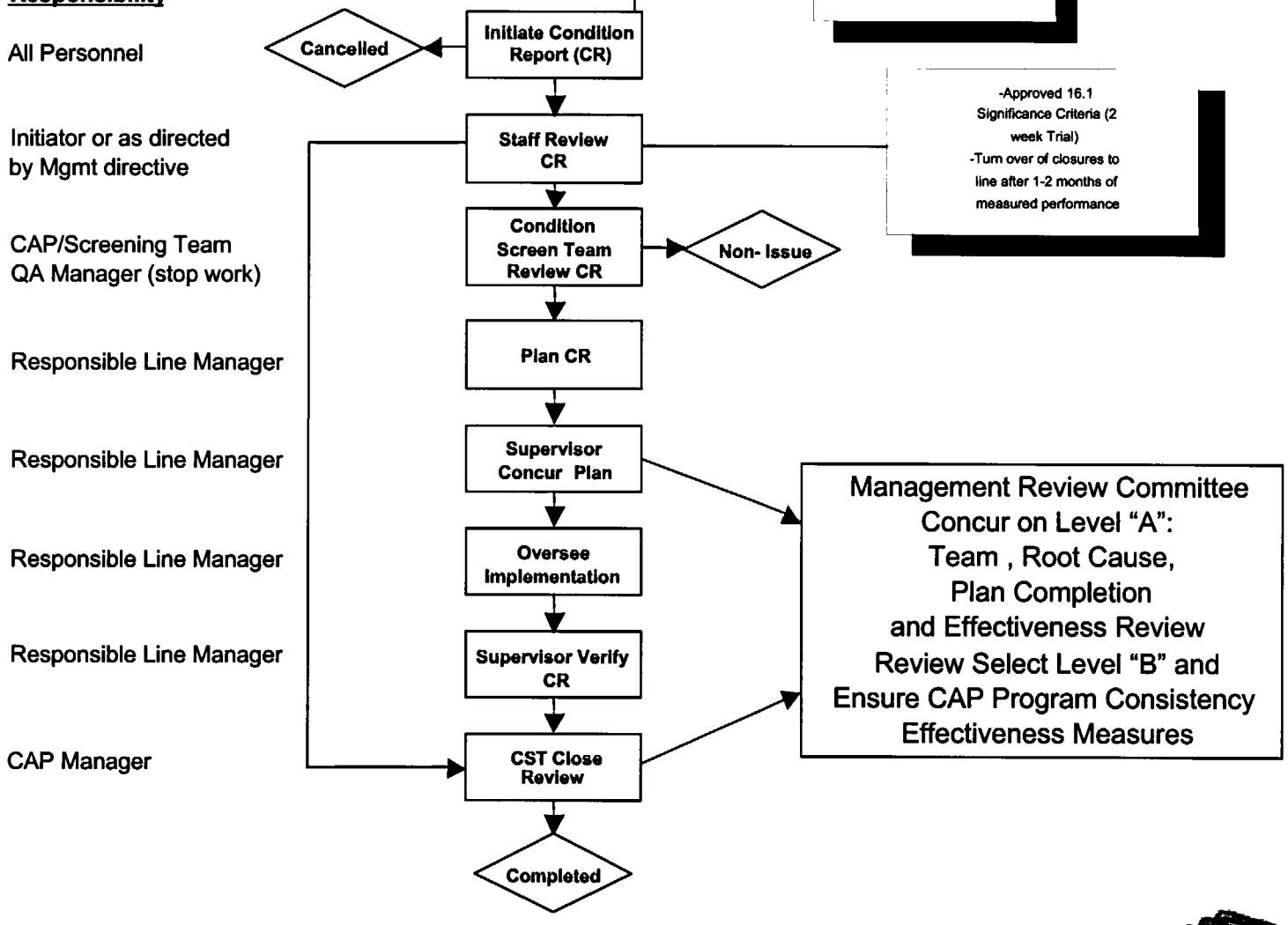
- Summary recommendations from the Government Accountability Office (GAO), IG, and DOE/BSC self assessment:
  - Focus was on closure rather than problem identification and resolution
  - Improve significance criteria definition for Level A's, B's, C's, and D's
  - Need stronger and consistent line management involvement in CAP
  - Clearer problem identification
  - Clear management expectations
  - Ensure conditions with potentially significant input/risk as identified and dealt with promptly
- Self Assessment covered majority of items found by GAO and IG report, and emphasized need to implement actions

Improvements Underway to Improve the Corrective Action Program

- Ability to write a good problem statement (improving clarity and detail, with substantiating evidence)
- Ensure correct significance level assignment
- MRC regular assessment of CAP positive behaviors/warning flags, and continuous improvement
- Improving performance measures with clear goals
- Line management ownership for CAP
- Effectiveness and timeliness of lessons learned
- Effectiveness review improvement
- QA Oversight – overview of Condition Screening Team (CST) acceptance, grading, closure, and effectiveness review

Revised OCRWM Corrective Action Process

Effective July 31, 2006



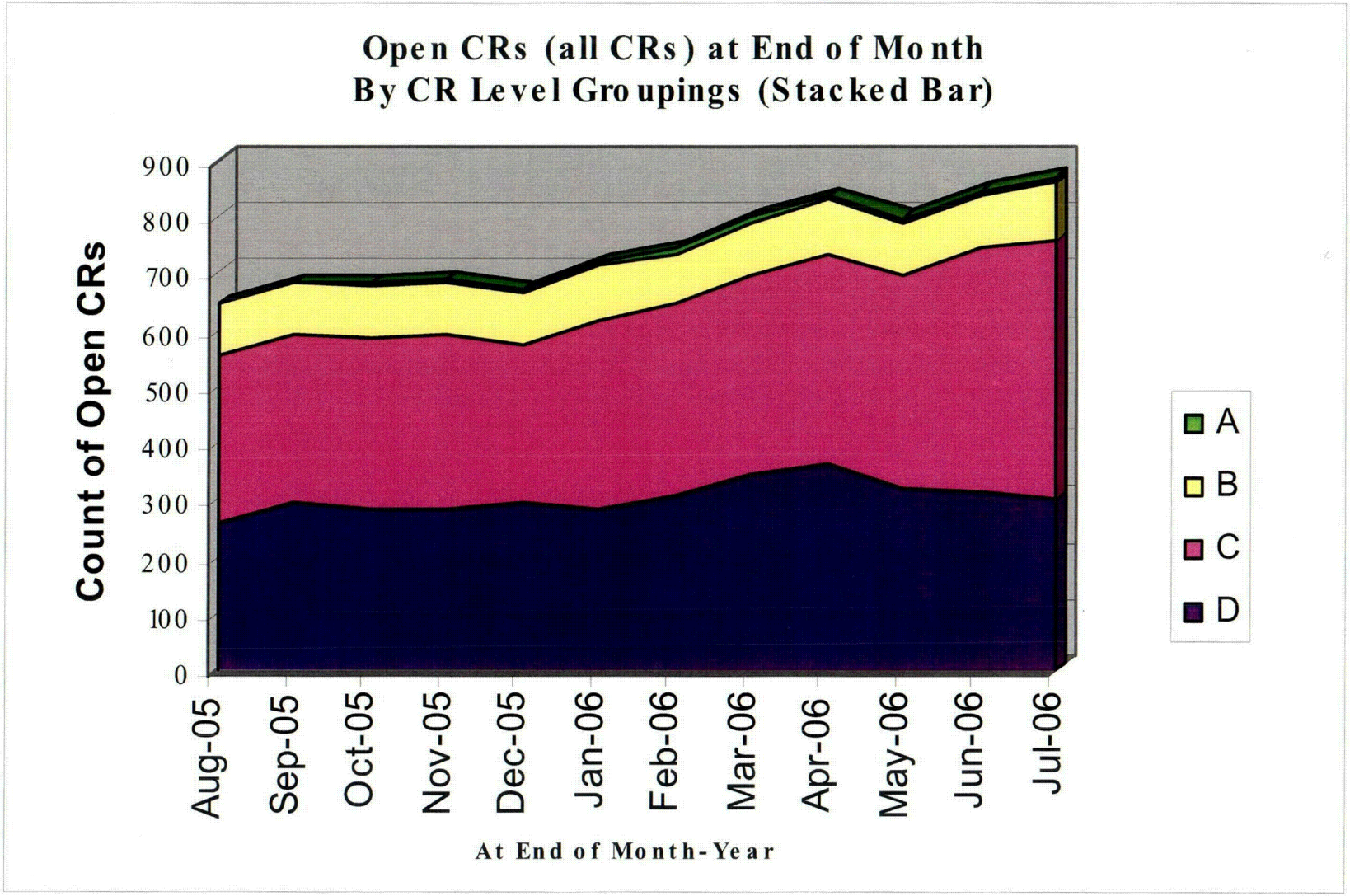
OCRWM MANAGEMENT REVIEW COMMITTEE – POSITIVE BEHAVIORS AND WARNING FLAGS

*SMARTER: Specific, Measurable, Accountable, Reasonable, Timely, Effective, Reviewed

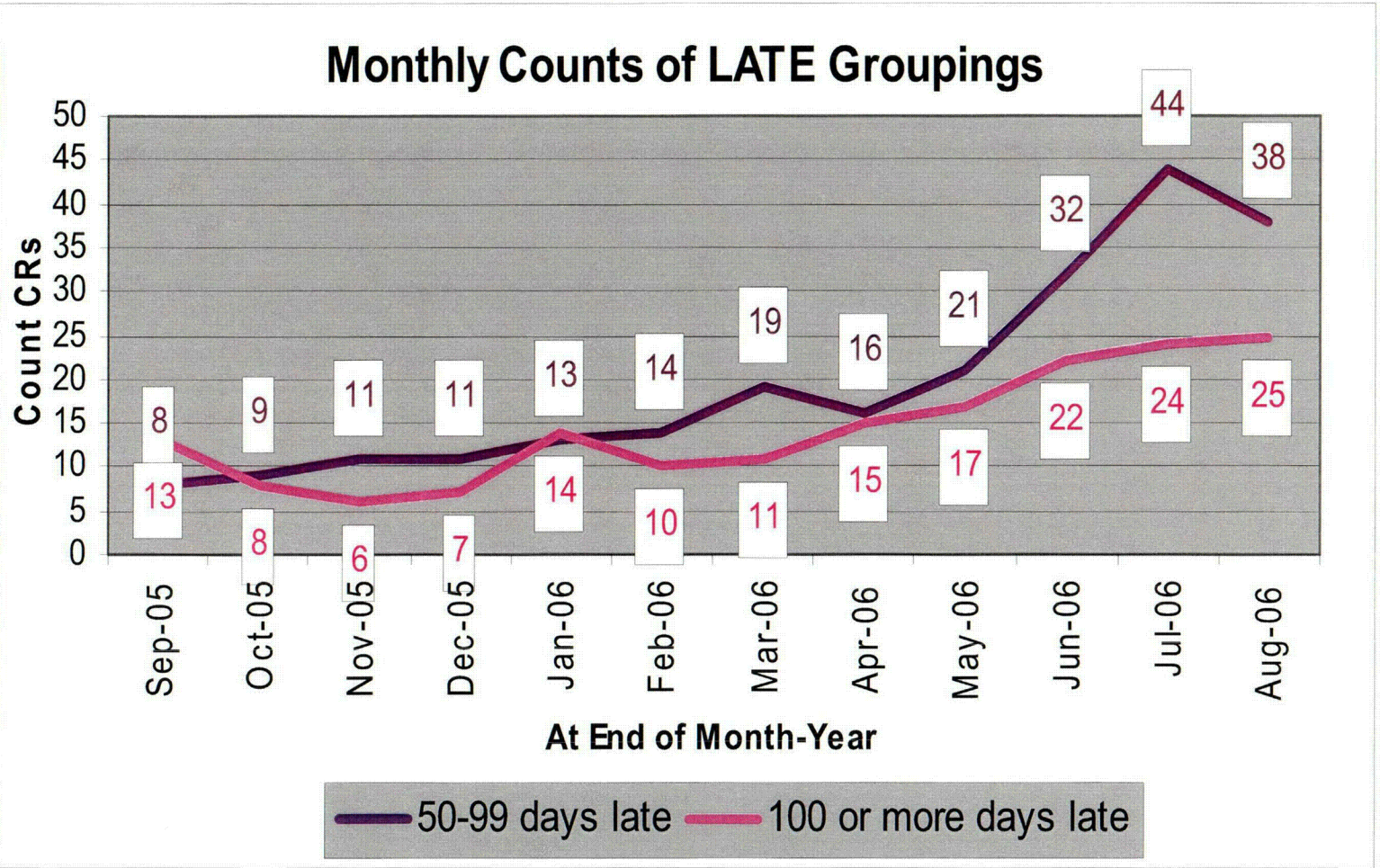
Positive Behaviors	*Warning Flags*
Selective: **MRC members ensure accurate and complete condition statements are defined and focus on the conditions that present the most significant risk for the organization.**	**•MRC inappropriately demands multiple actions on lower level issues either based on poor investigations or misunderstanding of the event and the organizational issues.** **•MRC overrides the CST determination – frequently requesting more investigations on lower level issues without adequate basis.MRC members do not adequately review their package prior to the MRC meeting or resolve comments with the preparers.**
Targeted Actions: **MRC members review and appropriately challenge the planned actions to ensure they meet the criteria and are appropriately classified.**	**•Actions that are reviewed and approved by MRC are not SMARTER*.** **•MRC directs an inappropriate number of assignments during the meeting without demanding a quality evaluation to determine the value of the actions.** **•Action items are approved that are not appropriately classified as CAs.**
Results Oriented: **MRC members review and appropriately challenge the actions to ensure they will get the desired results. Ensuring planned actions clearly define the end state and these can be directly related back to the identified gap.**	**•MRC members do not come prepared to effectively discuss lessons learned in the MRC meeting which results in additional actions being identified without the complete buy-in of the organization.** **•MRC members do not discuss major comments on lessons learned prior to the MRC meeting which results in inappropriate rework of products or unnecessary additional actions that are not focused on organizational improvements.** **•Poorly defined actions are created that cannot be directly tied to improve performance.**
Accountable: **MRC reviews and challenges to ensure that the appropriate organization/individual is held accountable to their performance and will be accountable to implement the identified actions.**	**•Supervisors/managers who approve lessons learned do not present or defend the products in MRC and are not held accountable to their quality.** **CAP Coordinators or preparers of investigations are solely held responsible for the quality of investigations and results that do not meet expectations.**
Teamwork: **MRC sponsors teamwork within the departments to ensure that problems are not resolved in silos. When appropriate, the MRC directs that additional organizations are involved in the resolution of cross functional problems or actions.**	**•Managers do not ensure their organizations support each other on the completion of an investigation resulting in investigations that are inappropriately focused on one aspect of the problems.** **MRC members are defensive and are looking to prevent work from being assigned to their organizations. Not being part of the solutions.**
Engaged in the Solution: **As appropriate, MRC requests updates or effectiveness reviews to ensure the appropriate actions are performed. MRC members work with the personnel performing investigations to ensure they understand the value of the investigation, appropriate resources are applied and scope of the investigation is appropriate.**	**•Managers drive reports to what they want to see instead of what the investigation determined to be the cause and appropriate corrective actions.** **•Managers do not believe in the value of the learning product and view the work as compliance rather than a method to improve organizational performance.MRC members do not follow-up after the MRC meeting to ensure that individuals understand the value of the investigation/actions assigned.**
Graded Approach: **MRC ensures that resources are applied to the most important problems and minor problems are appropriately addressed, but do not inappropriately over extend the organization. Through their actions, it is evident that MRC members are aware of the multiple processes that can be employed for performance improvement and actively encourages the use of the most appropriate tool.**	**•MRC members frequently add actions to lower level items without adequate basis.** **•MRC overrides CST determinations without understanding the reasons why the determination was made.** **MRC inappropriately drives investigations to prevent recurrence of lower level problems that results in the organization inappropriately shifting resources to focus on lower level problem areas instead of maintaining focus on key improvements initiatives.**
Innovative Solution: **Investigations result in true performance improvements that are both more effective and where appropriate more efficient. MRC members look for and reward creative solutions to identified conditions.**	**•MRC approved investigations inappropriately result in additional barriers being implemented that further complicate processes and drive to unnecessary resource expenditures without addressing the original weak barrier(s).** **•MRC approved actions lack focus.**
Creatively Challenging: **MRC creatively challenges investigations to ensure that the investigations provide true performance improvement.**	**•MRC members frequently repeat the comments of other members and continuously demand that additional actions be addressed.** **MRC members frequently have significant comments without contacting the preparers prior to the meeting or having a reasonable basis for their comment based on the significance of the problems.**

Open by Level – OCRWM

This graphic provides data on the overall quantity and type of open Condition Reports in the Corrective Action Program for OCRWM. This provides an indication of the overall volume of issues within the CAP system.
(Data current through end of July 2006)



Tracking 50-99 and 100+ Days Late
Goal: No Late Condition Reports



Data Provided & Verified by: BSC/OA/CAP

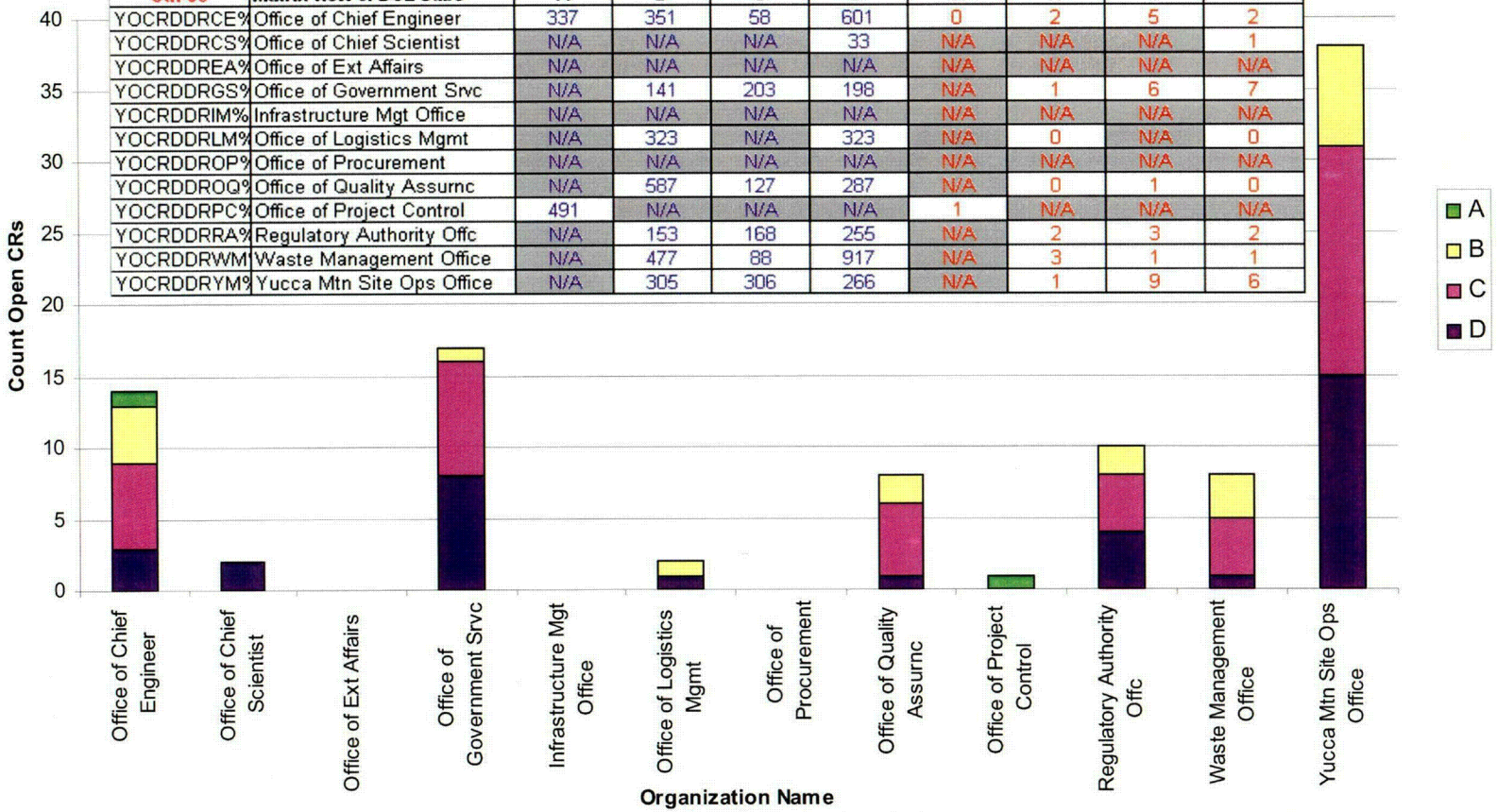
C-06

Departmental Process Activity – DOE

This graphic provides data on the quantity and age (including number late) of open Condition Reports in CAP sorted by DOE direct report organizations.
Data current through end of July 2006

DOE Direct-Report Organizations

		Average Age of Open (days)				Count of Open Items LATE			
Jul-06	Matrix view of DOE Subs	A	B	C	D	A	B	C	D
YOCRDDRCE%	Office of Chief Engineer	337	351	58	601	0	2	5	2
YOCRDDRCS%	Office of Chief Scientist	N/A	N/A	N/A	33	N/A	N/A	N/A	1
YOCRDDREA%	Office of Ext Affairs	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
YOCRDDRGS%	Office of Government Srvc	N/A	141	203	198	N/A	1	6	7
YOCRDDRIM%	Infrastructure Mgt Office	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
YOCRDDRLM%	Office of Logistics Mgmt	N/A	323	N/A	323	N/A	0	N/A	0
YOCRDDROP%	Office of Procurement	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
YOCRDDROQ%	Office of Quality Assurnc	N/A	587	127	287	N/A	0	1	0
YOCRDDRPC%	Office of Project Control	491	N/A	N/A	N/A	1	N/A	N/A	N/A
YOCRDDRRA%	Regulatory Authority Offc	N/A	153	168	255	N/A	2	3	2
YOCRDDRWM	Waste Management Office	N/A	477	88	917	N/A	3	1	1
YOCRDDRYM%	Yucca Mtn Site Ops Office	N/A	305	306	266	N/A	1	9	6

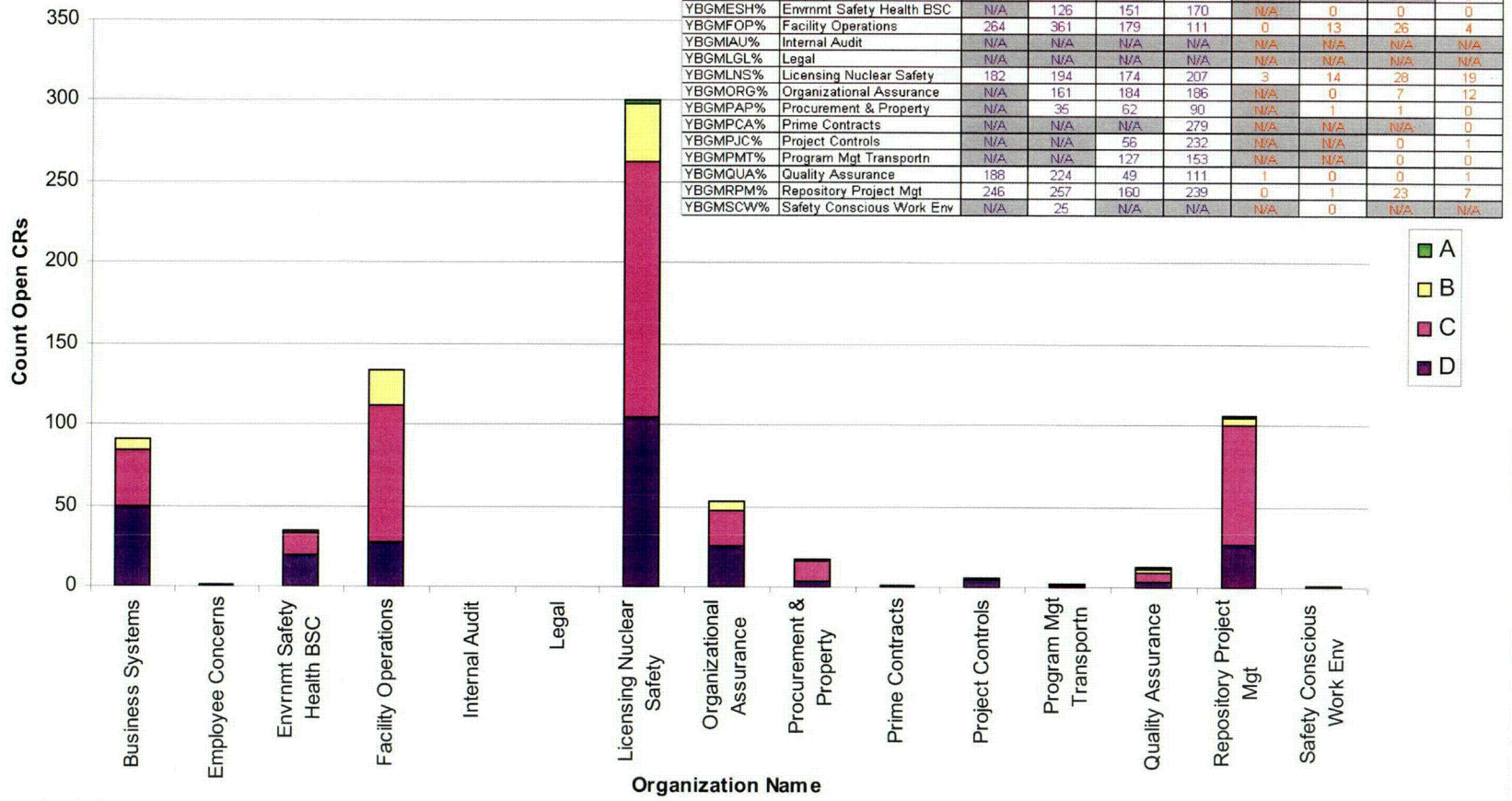


Departmental Process Activity – BSC

This graphic provides data on the quantity and age (including number late) of open Condition Reports in CAP sorted by BSC direct report organizations.
Data current through end of July 2006

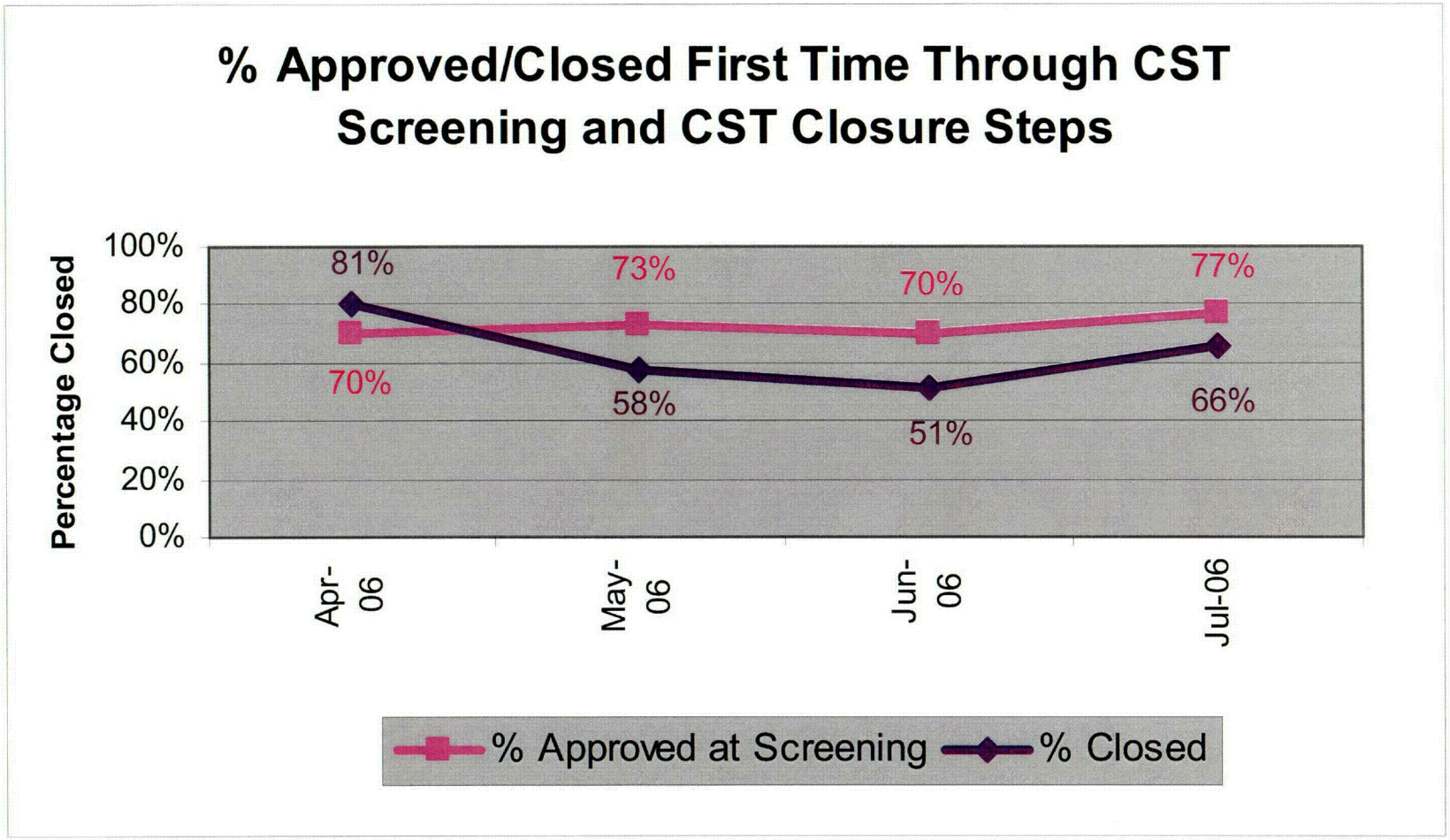
BSC Direct-Report Organizations

		Average Age of Open (days)				Count of Open Items LATE			
Jul-06	Matrix view of BSC Subs	A	B	C	D	A	B	C	D
YBGMBUS%	Business Systems	N/A	117	114	93	N/A	2	10	8
YBGMEMP%	Employee Concerns	N/A	N/A	N/A	92	N/A	N/A	N/A	0
YBGMESH%	Envrnmt Safety Health BSC	N/A	126	151	170	N/A	0	0	0
YBGMFOP%	Facility Operations	264	361	179	111	0	13	26	4
YBGMIAU%	Internal Audit	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
YBGMLGL%	Legal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
YBGMLNS%	Licensing Nuclear Safety	182	194	174	207	3	14	28	19
YBGMORG%	Organizational Assurance	N/A	161	184	186	N/A	0	7	12
YBGMPAP%	Procurement & Property	N/A	35	62	90	N/A	1	1	0
YBGMPCA%	Prime Contracts	N/A	N/A	N/A	279	N/A	N/A	N/A	0
YBGMPJC%	Project Controls	N/A	N/A	56	232	N/A	N/A	0	1
YBGMPMT%	Program Mgt Transportn	N/A	N/A	127	153	N/A	N/A	0	0
YBGMQUA%	Quality Assurance	188	224	49	111	1	0	0	1
YBGMRPM%	Repository Project Mgt	246	257	160	239	0	1	23	7
YBGMSCW%	Safety Conscious Work Env	N/A	25	N/A	N/A	N/A	0	N/A	N/A



Percent Approved/Closed by CST

This line chart provides data on the number of Condition Reports approved and closed the first time through the CST Screening and CST Closure steps given as a percentage.
Data current through end of July 2006
Goal: 90% acceptance rate - turnover closures to Line Managers



CAP Performance Improvement Management Plan

- In addition to listed actions the following overall actions are intended to levelize the CAP knowledge of process and expectations across the organization;
  1. Create a CAP program book similar to industry
  2. Roll down content through out organization using CAP and line managers (expectations and case studies)
  3. MRC and CST process to be proceduralized
  4. Tracking late's to a "no late goal"
  5. Combined trending programs

Results/Effectiveness

- MRC review has improved and agendas are more focused
- MRC tracking of level A's has improved and will have effectiveness reviews planned
- Improved CR significance criteria definition
- Increasing line accountability
- CST has improved expectation on closure
- Improved "project-wide" look at issues
- Number of late CRs have declined

Improvement Still Needed

- MRC continued review of effectiveness of issue resolution
- Using trending Information more effectively
- CAP Screen Team (CST) – CR closure transition back to the line based on sustained performance
- Stronger accountability for problem identification and resolution
- Evaluate effectiveness of program utilizing industry experience in November

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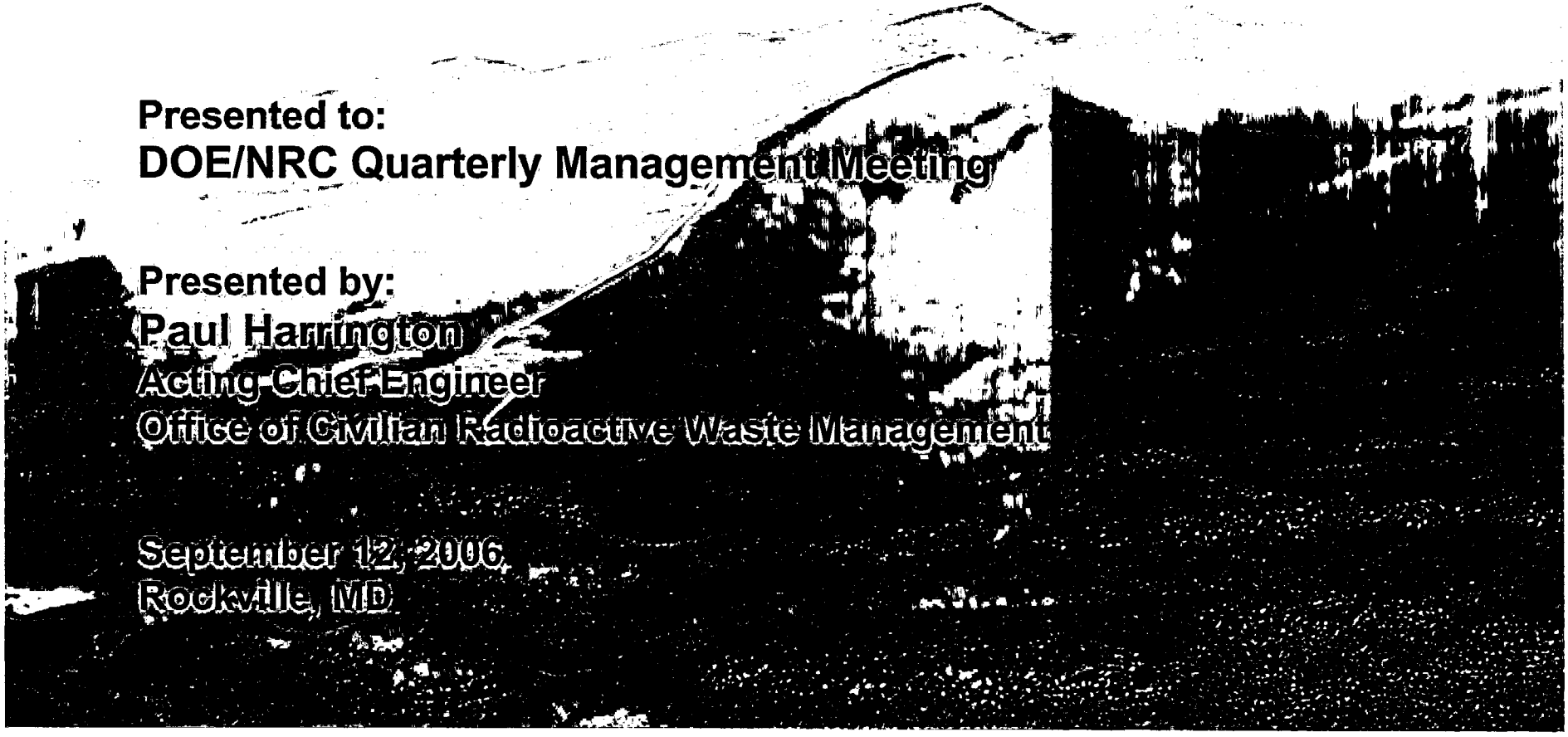
Design Overview



Presented to:
DOE/NRC Quarterly Management Meeting

Presented by:
Paul Harrington
Acting Chief Engineer
Office of Civilian Radioactive Waste Management

September 12, 2006
Rockville, MD

Design Overview

- Critical Decision 1 (CD-1) change to canister-based waste disposal system
- Status of Transport, Aging and Disposal canister (TAD) performance specification development
- Design control and requirements management
- Status of Preclosure Safety Analysis (PCSA) reliability methodology

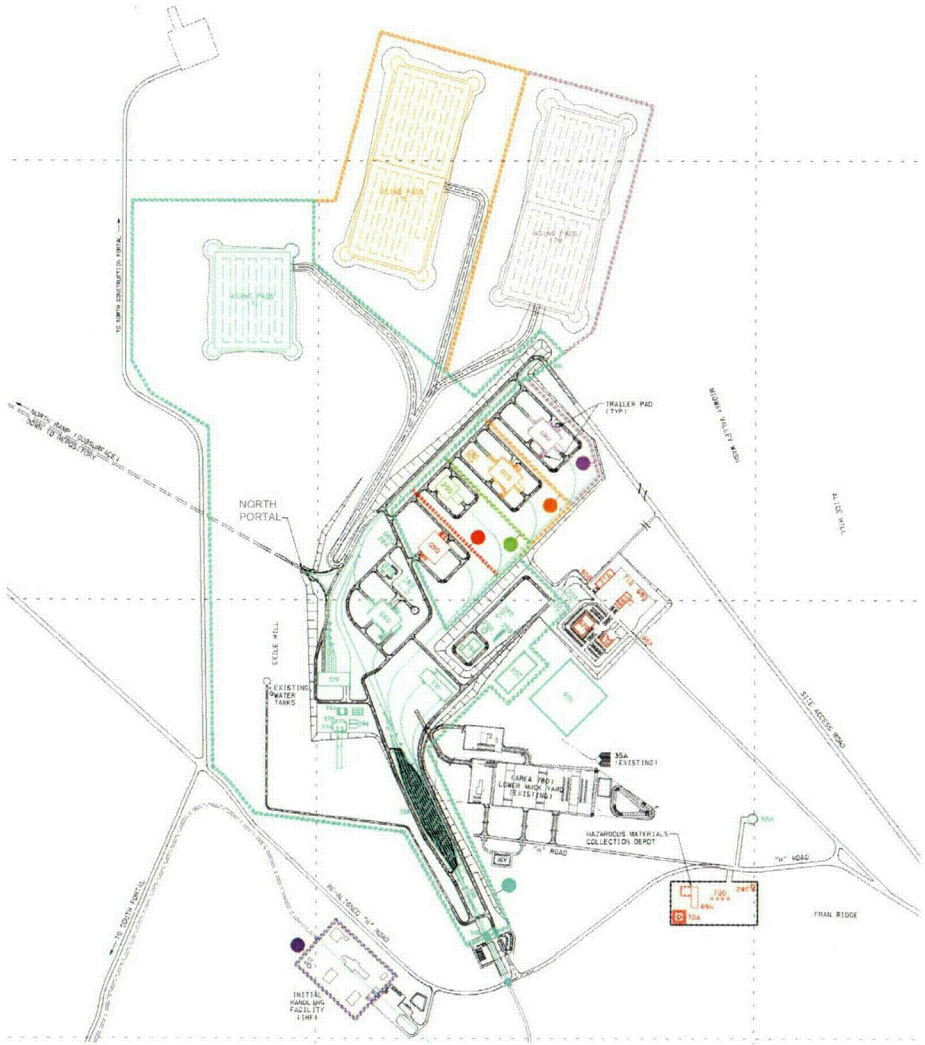
CD-1 Changes

- Addition of TAD canisters changed the operating strategy of the facilities
- CD-1 surface facilities include
  - Initial Handling Facility (IHF)
  - Canister Receipt and Closure Facilities (CRCFs)
  - Wet Handling Facility (WHF)
  - Receipt Facility (RF)
- No significant changes to the subsurface facility
- Waste package design for TAD based on naval long waste package
- New DOE waste package configurations with shield plug for consistency of operations

Programmatic Requirements

- Receive 70,000 Metric Tons Heavy Metal (MTHM) at a rate of 3,000 MTHM of Commercial Spent Nuclear Fuel (CSNF) a year
  - 63,000 MTHM of CSNF
  - 7,000 MTHM of HLW, Naval, and DOE SNF
- Provide aging for up to 21,000 MTHM of CSNF
- Receive 90 percent of CSNF in disposable canisters
- Receive 10 percent of CSNF as individual assemblies in transportation casks or non-disposable canisters and repackage underwater into TADs

Site Overview



LEGEND

AREA No.	DESCRIPTION
--	WASTE PACKAGE RECEIPT FACILITY (150 COMBINED WITH 230)
050	WET HANDLING FACILITY (WHF)
060	CANISTER RECEIPT AND CLOSURE FACILITY 1 (CRCF 1)
070	CANISTER RECEIPT AND CLOSURE FACILITY 2 (CRCF 2)
080	CANISTER RECEIPT AND CLOSURE FACILITY 3 (CRCF 3)
110	DRY TRANSFER FACILITY #1 (DTF-1) - REMOVED
120	DRY TRANSFER FACILITY #2 (DTF-2) - REMOVED
130	REMEDIATION FACILITY (RF) - REMOVED
14A	TRANSPORTATION CASK RECEIPT/RETURN FACILITY (TCRRF) - REMOVED
14B	TRANSPORTATION CASK BUFFER AREA - REMOVED
160	LOW LEVEL WASTE HANDLING (LLWH)
17A-17J	AGING PADS - REMOVED
17K	AGING PADS (500 SPACES)
17L	AGING PADS (1000 SPACES)
17M	AGING PADS (1000 SPACES)
200	RECEIPT FACILITY (RF)
220	HEAVY EQUIPMENT MAINTENANCE FACILITY (HEMF)
230	WAREHOUSE & NON-NUCLEAR RECEIPT FACILITY (WNNRF)
240	CENTRAL CONTROL CENTER FACILITY (CCCF)
25A	UTILITIES FACILITY (UF)
25B	COOLING TOWER
25C	EVAPORATION POND
25D	SERVICE GASES STORAGE AREA
26A	4.16KV SWITCHGEAR FACILITY
26B	STANDBY GENERATOR FACILITY
26D	EMERGENCY DIESEL GENERATOR FACILITY (EDG)
27A	SWITCHYARD (230KV & 138KV)
27B	12.47KV SWITCHGEAR FACILITY
28A	FIREWATER FACILITY (CENTRAL)
28B	FIREWATER FACILITY (SOUTH)
28C	FIREWATER FACILITY (EAST)
28D	FIREWATER FACILITY (WEST) - REMOVED
28E	FIREWATER FACILITY (NORTH)
30A	CENTRAL SECURITY STATION
30B	CASK RECEIPT SECURITY STATION
30C	NORTH PERIMETER SECURITY STATION
33A	RAIL CAR STAGING AREA
33B	TRUCK STAGING AREA
33C	BUS STAGING AREA
35A	SEPTIC TANK AND LEACH FIELD - EXISTING
62D	ADMINISTRATION FACILITY
63A	FIRE, RESCUE & MEDICAL FACILITY (OPERATIONS)
63B	FIRE, RESCUE & MEDICAL FACILITY (CONSTRUCTION / REMOTE)- REMOVED
65A	ADMINISTRATION SECURITY STATION (SOUTH)
65B	ADMINISTRATION SECURITY STATION (NORTH)
66A	HELICOPTER PAD (OPERATIONS)
66B	HELICOPTER PAD (CONSTRUCTION/REMOTE) - REMOVED
68A	WAREHOUSE/CENTRAL RECEIVING
68B	MATERIALS/YARD STORAGE
68D	VEHICLE MAINTENANCE AND MOTOR POOL
70D	FUEL DEPOT
70A	DIESEL FUEL OIL STORAGE
71A	CRAFT SHOPS
71B	EQUIPMENT/YARD STORAGE
78D	LOWER MUCK YARD (LMY) - EXISTING
90A	STORM WATER RETENTION POND

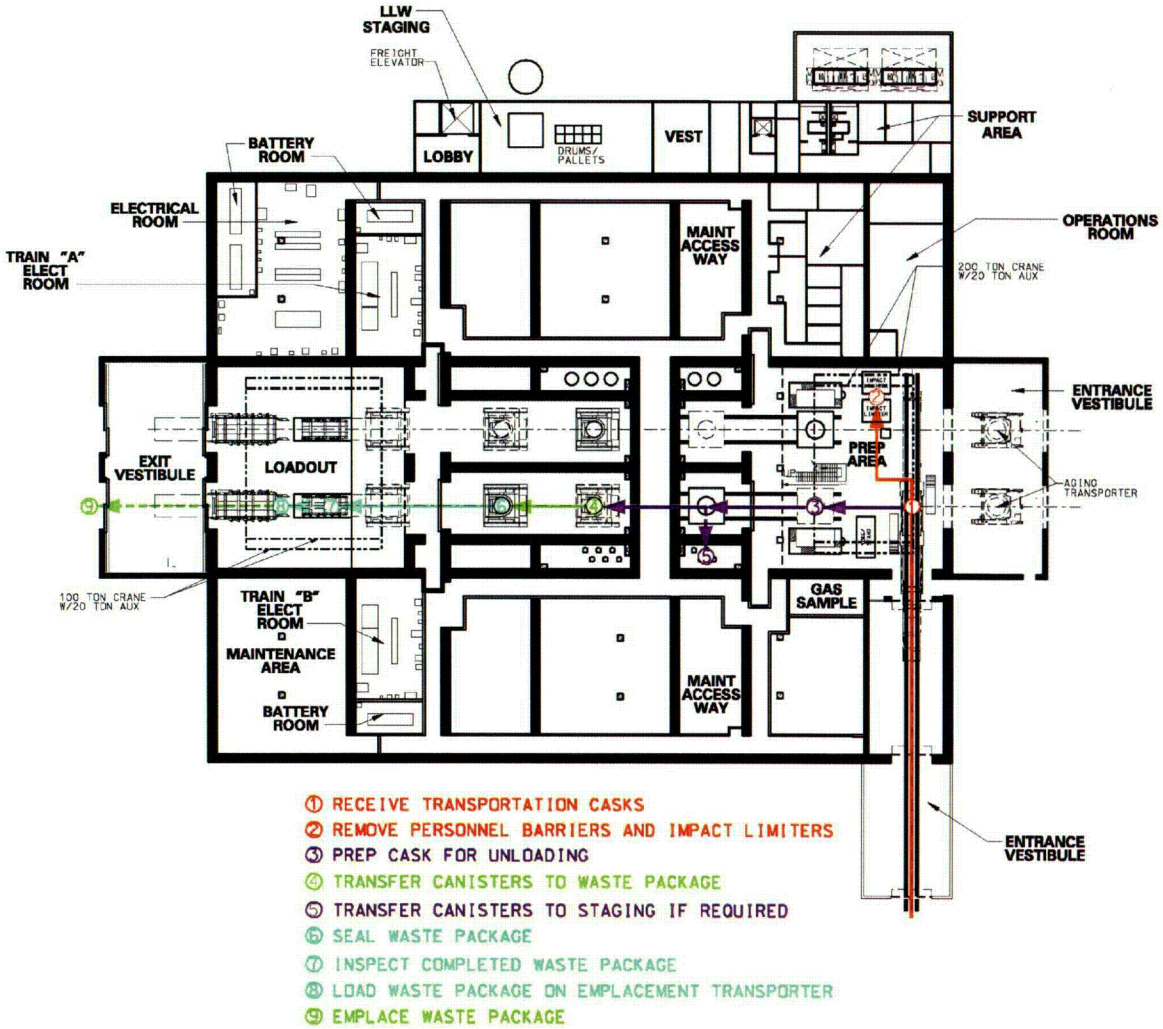
- - - - EXISTING
FENCE
FUTURE
OVERHEAD POWER LINE
ROAD
SECURITY FENCE
RAILROAD
CONTOURS

NOTES:

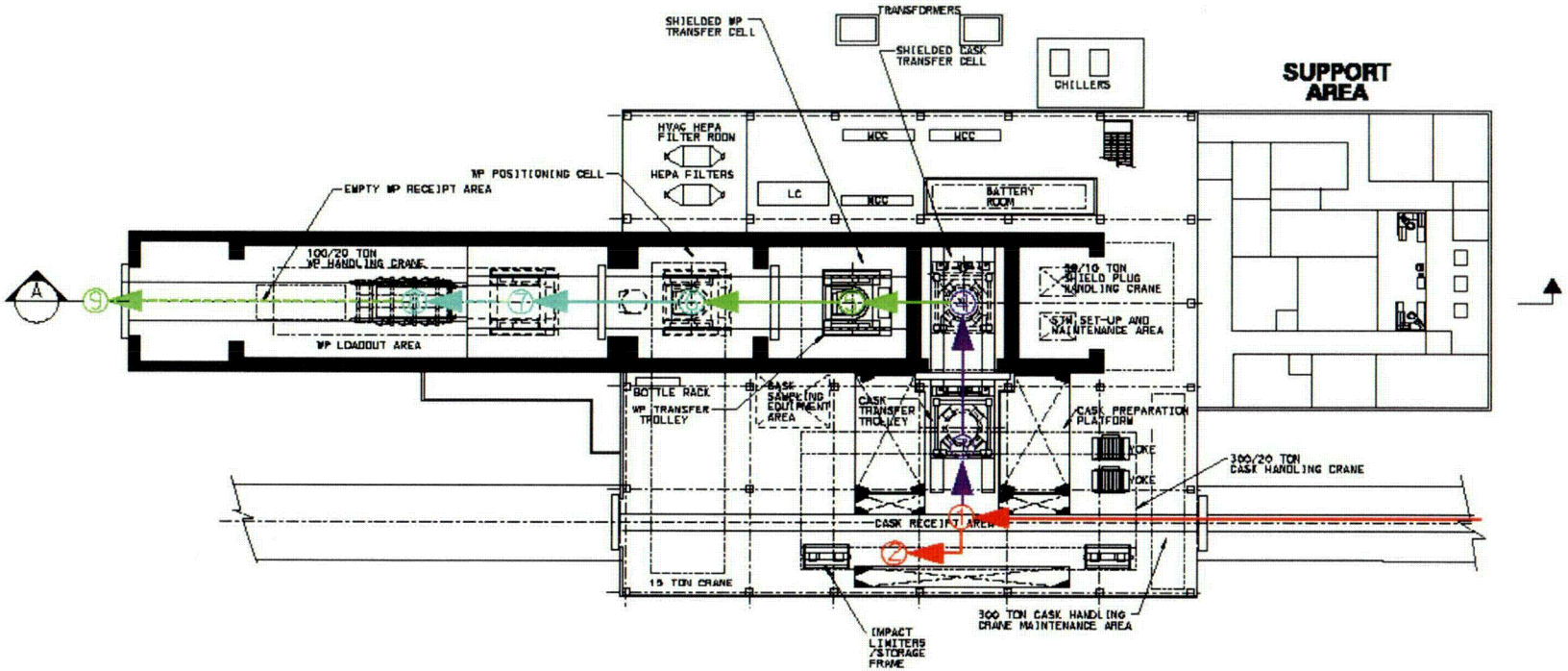
1. RAILROAD ALIGNMENT SHOWN IS CONCEPTUAL.
2. ROAD ALIGNMENT SHOWN IS CONCEPTUAL AND IS SUBJECT TO CHANGE AS THE FACILITY DESIGN DEVELOPS.
3. LOWER MUCK YARD SHOWN FOR REFERENCE ONLY (EXISTING).
4. FACILITY SIZES AND LOCATIONS SHOWN ON THIS DRAWING ARE APPROXIMATE AND SUBJECT TO CHANGE BASED ON DESIGN DEVELOPMENT.

INITIAL HANDLING OPERATION AREA
CRCF 1 OPERATIONS AREA
WET HANDLING FACILITY (WHF) OPERATIONS AREA ADDITION
RECEIPT FACILITY OPERATIONS AREA ADDITION
CRCF 2 OPERATIONS AREA ADDITION
CRCF 3 OPERATIONS AREA ADDITION

CRCF Layout

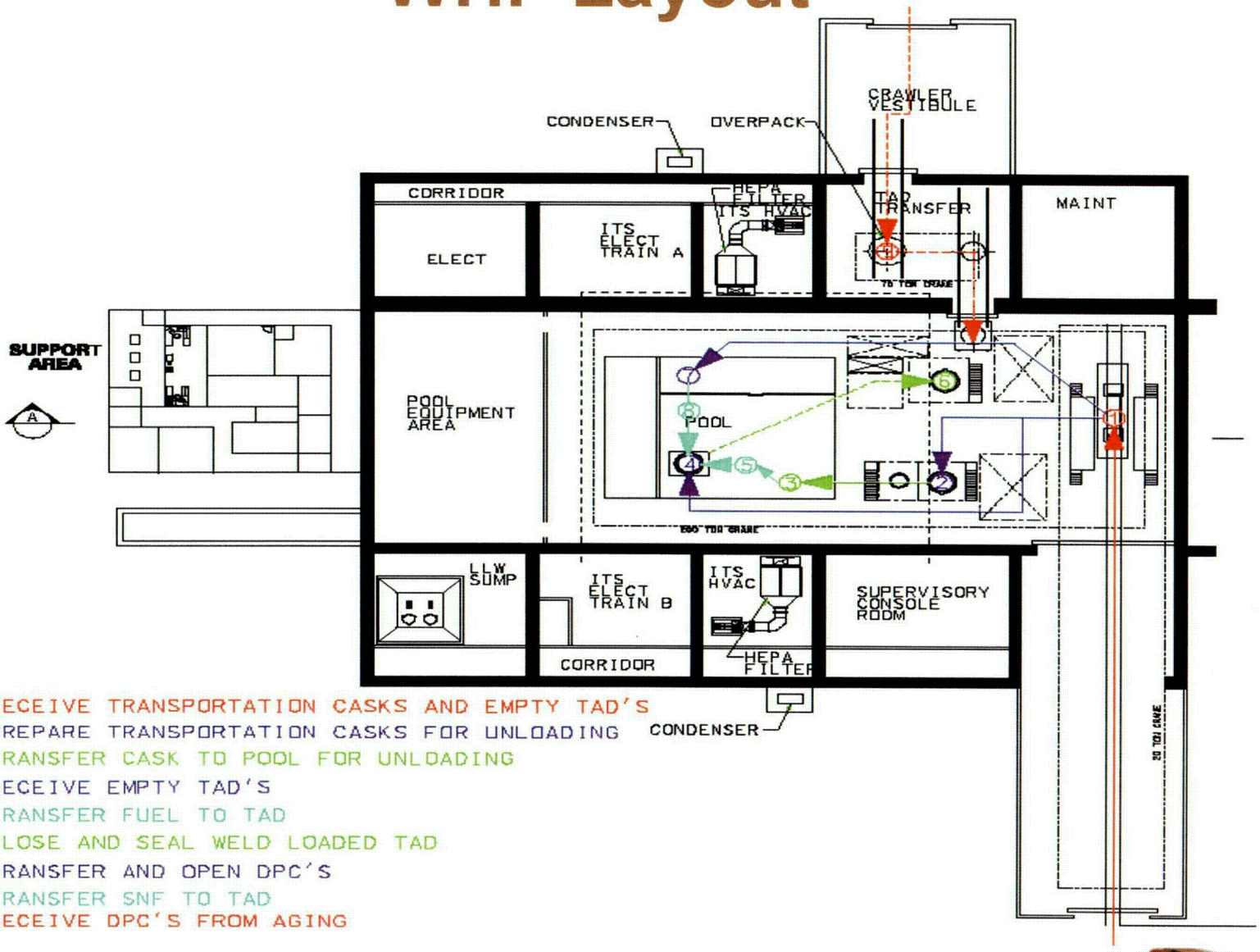

LLW STAGING
FREIGHT ELEVATOR
LOBBY
DRUMS/ PALLETS
VEST
SUPPORT AREA
BATTERY ROOM
ELECTRICAL ROOM
TRAIN "A" ELECT ROOM
MAINT ACCESS WAY
OPERATIONS ROOM
200 TON CRANE W/20 TON AUX
ENTRANCE VESTIBULE
EXIT VESTIBULE
LOADOUT
PREP AREA
AGING TRANSPORTER
100 TON CRANE W/20 TON AUX
TRAIN "B" ELECT ROOM
MAINTENANCE AREA
BATTERY ROOM
GAS SAMPLE
MAINT ACCESS WAY
ENTRANCE VESTIBULE
① RECEIVE TRANSPORTATION CASKS
② REMOVE PERSONNEL BARRIERS AND IMPACT LIMITERS
③ PREP CASK FOR UNLOADING
④ TRANSFER CANISTERS TO WASTE PACKAGE
⑤ TRANSFER CANISTERS TO STAGING IF REQUIRED
⑥ SEAL WASTE PACKAGE
⑦ INSPECT COMPLETED WASTE PACKAGE
⑧ LOAD WASTE PACKAGE ON EMPLACEMENT TRANSPORTER
⑨ EMPLACE WASTE PACKAGE

IHF Layout

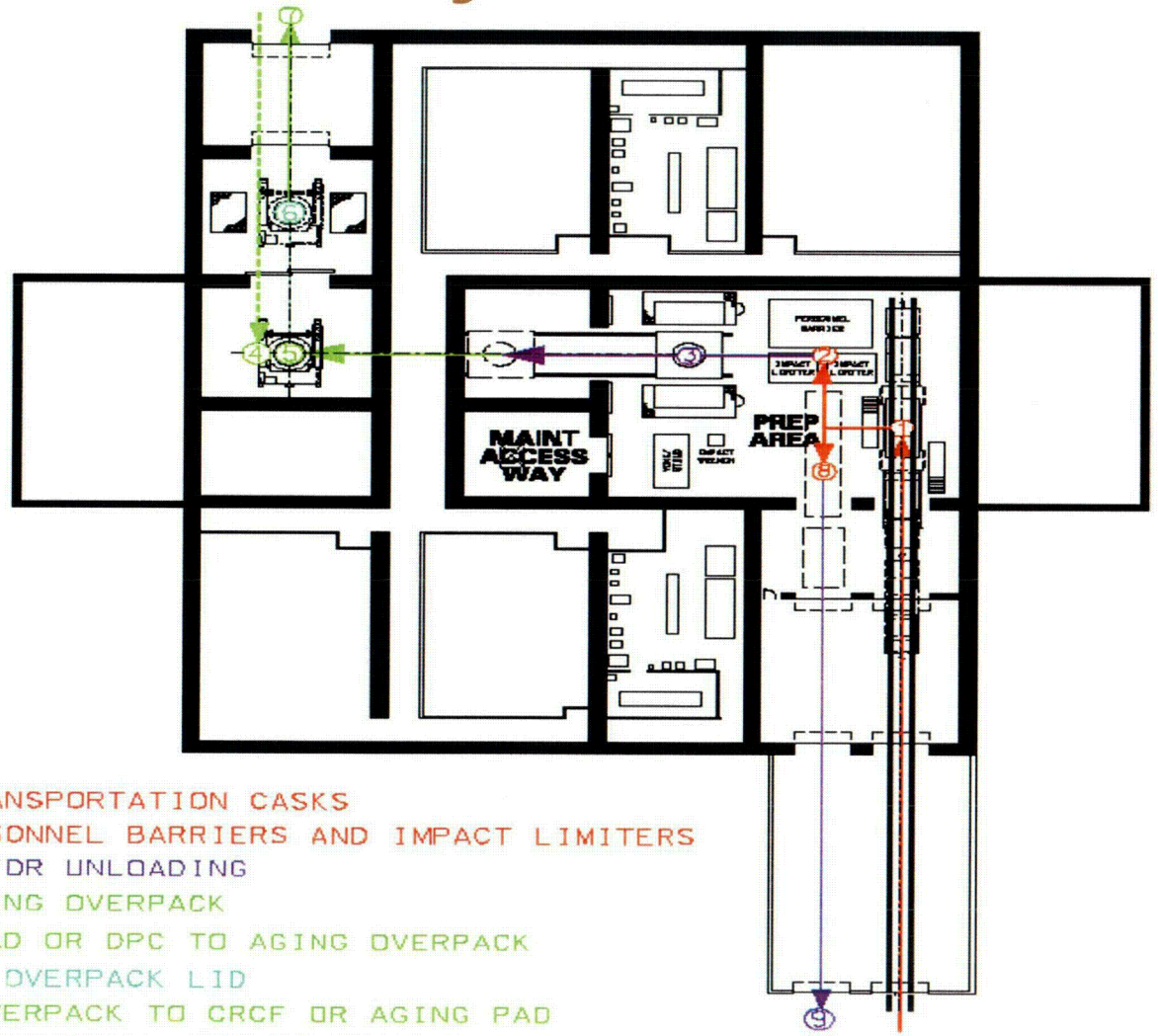


① RECEIVE TRANSPORTATION CASKS
② REMOVE PERSONNEL BARRIERS AND IMPACT LIMITERS
③ PREP CASK FOR UNLOADING
④ TRANSFER CASK TO UNLOAD STATION
⑤ TRANSFER CANISTERS TO WASTE PACKAGE
⑥ SEAL WASTE PACKAGE
⑦ INSPECT COMPLETED WASTE PACKAGE
⑧ LOAD WASTE PACKAGE ON EMPLACEMENT TRANSPORTER
⑨ EMPLACE WASTE PACKAGE

WHF Layout


CONDENSER
OVERPACK
CRAWLER VESTIBULE
CORRIDOR
HEPA FILTER ITS HVAC
TAD TRANSFER
MAINT
ELECT
ITS ELECT TRAIN A
SUPPORT AREA
A
POOL EQUIPMENT AREA
POOL
LLW SUMP
ITS ELECT TRAIN B
ITS HVAC
SUPERVISORY CONSOLE ROOM
CORRIDOR
HEPA FILTER
CONDENSER
① RECEIVE TRANSPORTATION CASKS AND EMPTY TAD'S
② PREPARE TRANSPORTATION CASKS FOR UNLOADING
③ TRANSFER CASK TO POOL FOR UNLOADING
④ RECEIVE EMPTY TAD'S
⑤ TRANSFER FUEL TO TAD
⑥ CLOSE AND SEAL WELD LOADED TAD
⑦ TRANSFER AND OPEN DPC'S
⑧ TRANSFER SNF TO TAD
⑨ RECEIVE DPC'S FROM AGING

RF Layout



① RECEIVE TRANSPORTATION CASKS
② REMOVE PERSONNEL BARRIERS AND IMPACT LIMITERS
③ PREP CASK FOR UNLOADING
④ RECEIVE AGING OVERPACK
⑤ TRANSFER TAD OR DPC TO AGING OVERPACK
⑥ BOLT AGING OVERPACK LID
⑦ TRANSFER OVERPACK TO CRCF OR AGING PAD
⑧ TRANSFER HORIZONTAL DPC TO TRAILER
⑨ TRANSFER DPC TRAILER TO AGING PAD

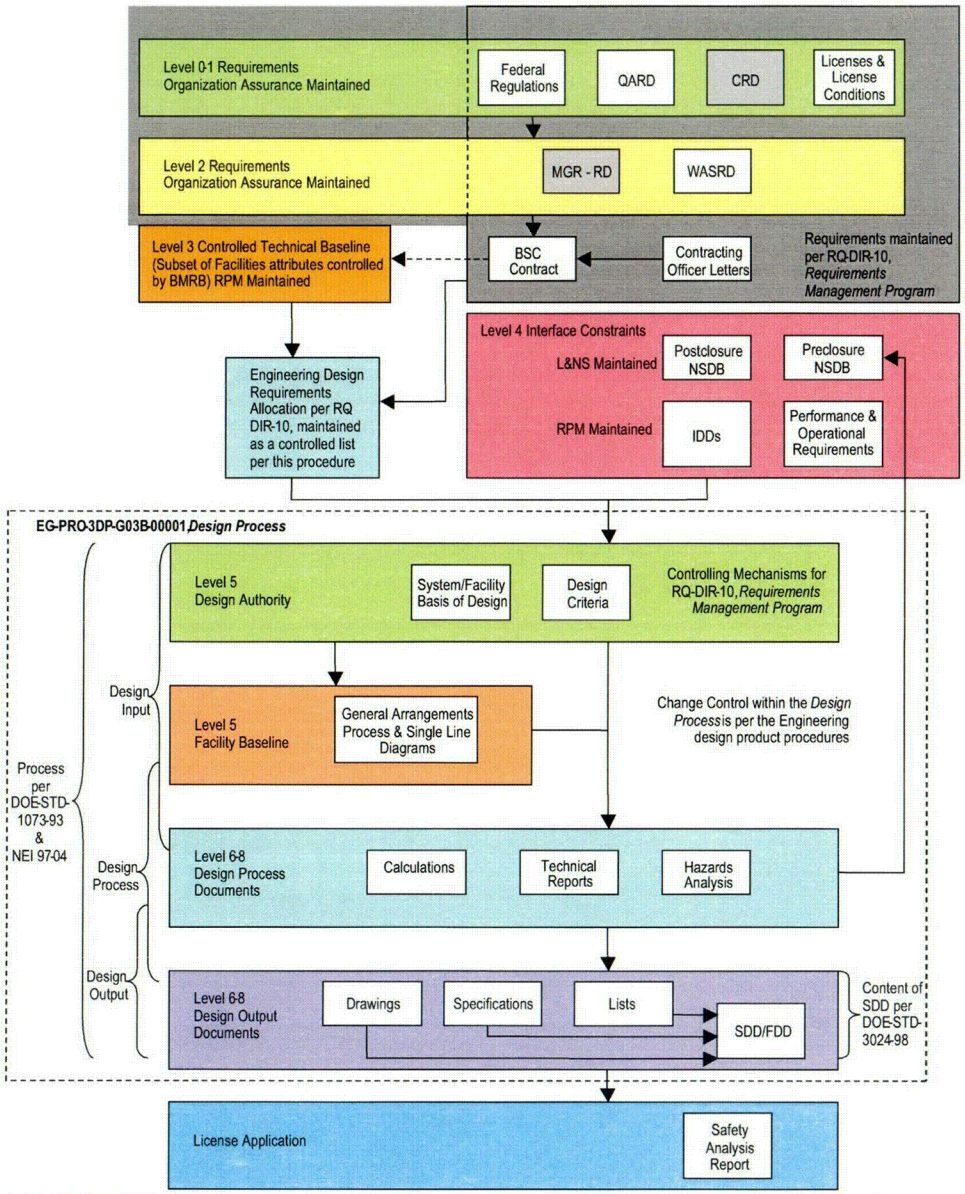
TAD Performance Specification Status

- DOE is continuing to develop the TAD performance specification
- DOE is tailoring the specification to facilitate the development of a TAD canister design by the private sector
- Performance specification is targeted for issuance in November 2006
- DOE acknowledges receipt of NRC letter, Transport, Aging and Disposal Canister for Spent Nuclear Fuel Management, dated August 10, 2006
- DOE encourages a technical exchange on TAD performance specifications in December 2006 or January 2007, at which time DOE will be prepared to discuss the August 10, 2006, letter

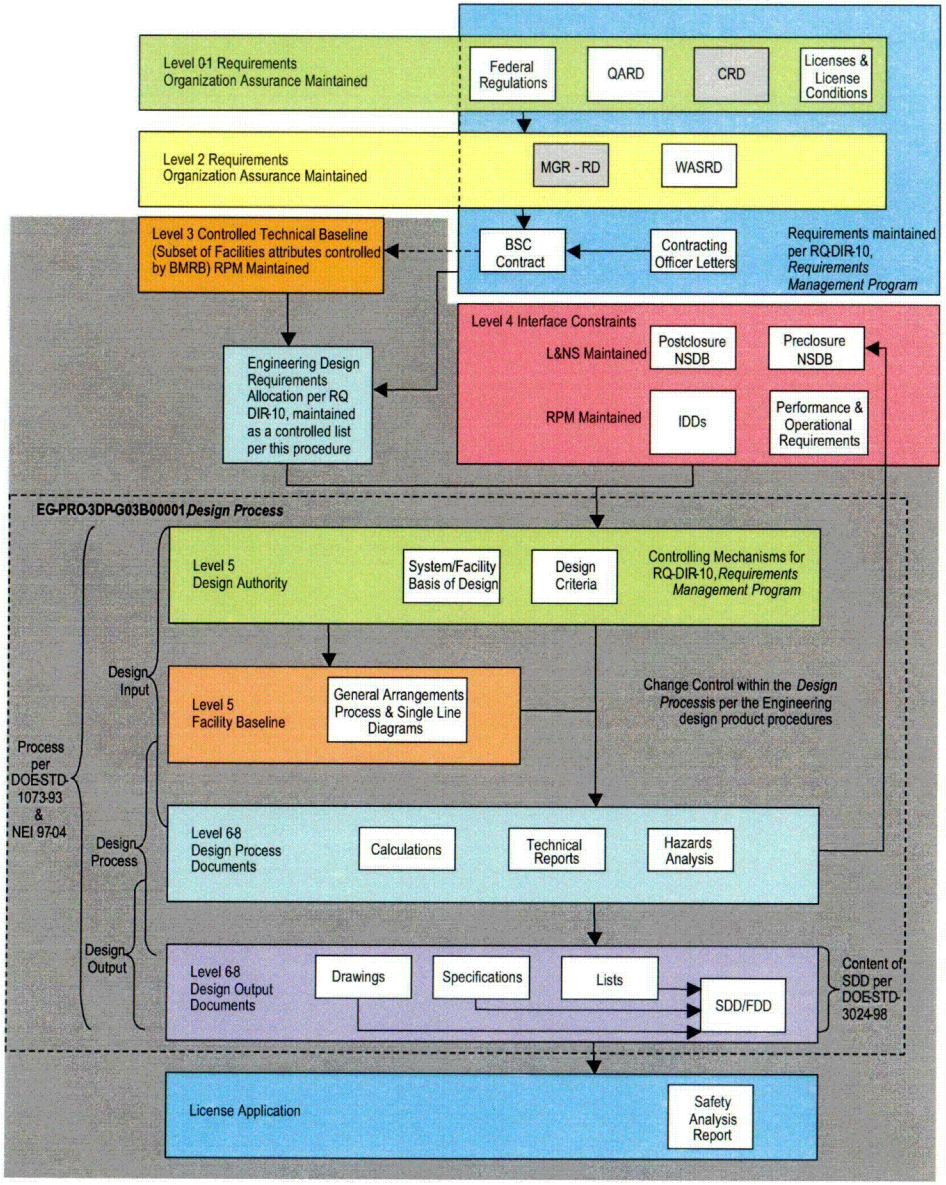
Design Control

- DOE committed to QARD requirements for Design Control
- CD-1 approval allows the completion and flowdown of technical and programmatic requirements
  - CRWMS Requirements Document (CRD) Revision 7 issued
  - Monitored Geologic Repository Systems Requirement Document (MGR-RD) Revision 1 near issuance
- DOE administrative hold on BSC approval of quality-affecting engineering and PCSA products has been lifted, based upon readiness review and other actions
- Allows BSC to proceed with development of the Basis of Design and Project Design Criteria documents in support of the LA
- DOE design control assessment will be performed in late fall

Design Hierarchy



Design Hierarchy (Continued)



Requirements Management

- DOE's current set of repository requirements management documents, updated to incorporate TADs
  - Level 1 requirements document: CRD
  - Level 2 requirements document: MGR-RD
- DOE pursuing additional enhancements to requirements management

Requirements Management

(Continued)

- **BSC's approach to Requirements Management**
  - **Described in LP-2.15Q, *Managing Requirements***
  - **Flows DOE Level 1 and 2 requirements to Requirements Area Owners**
  - **Engineering requirements allocated to Basis of Design and Project Design Criteria documents via EG-PRO-3DP-G04B-0000, *Design Criteria***

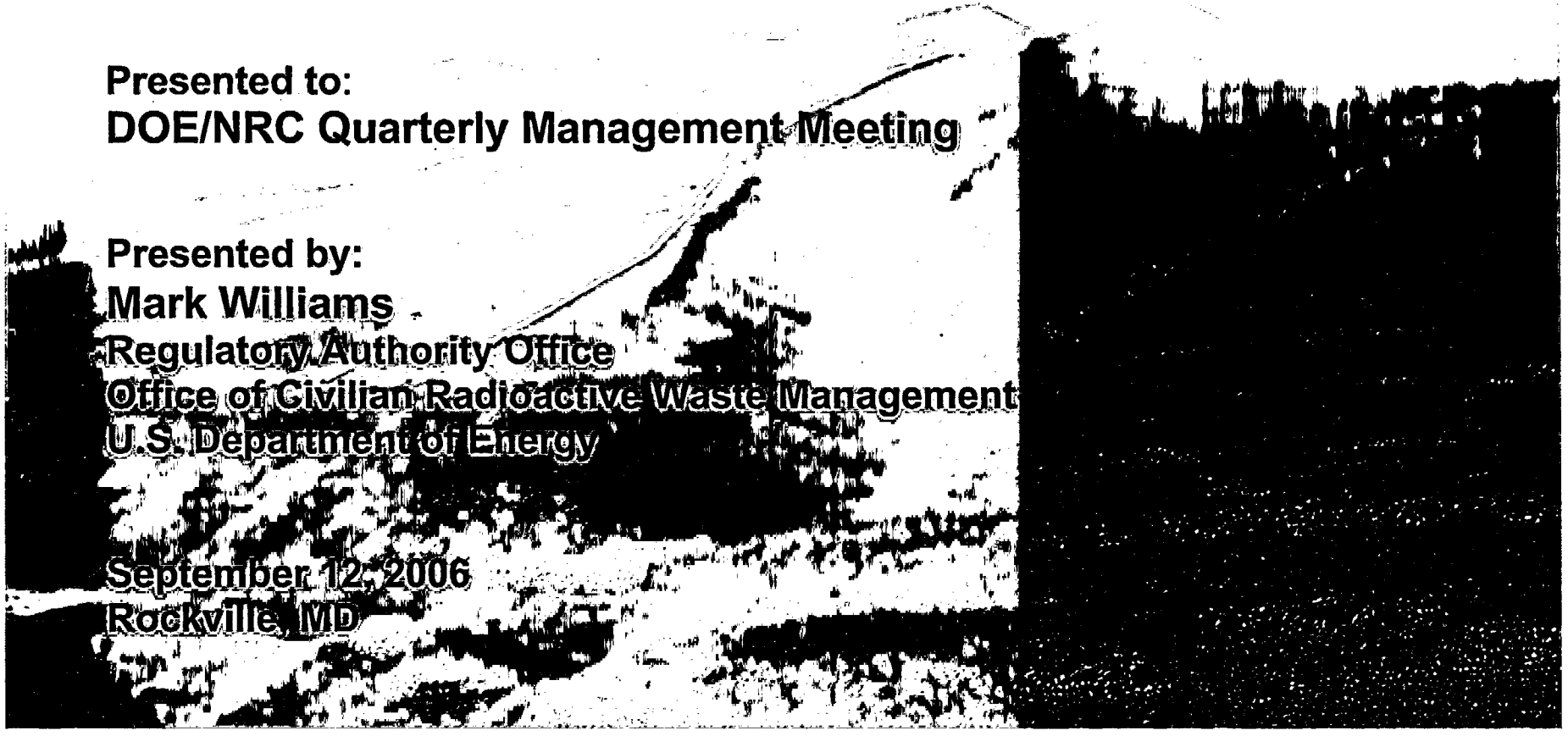
Preclosure Safety Analysis Reliability Methodology

- Approach to development of reliabilities for systems, structures and components important to safety for important to waste isolation will be as discussed in the recent Technical Exchange
- DOE has developed a methodology for establishing the reliabilities of SSCs credited in event sequences
- DOE provided that methodology to NRC on August 25, 2006

Summary

- Design of waste transfer facilities has been revised to support system based primarily on use of disposable canisters
- Minimizes handling of individual SNF assemblies; expected to eliminate Category 1 event sequences
- TAD performance specification to be provided to industry for design development
- Improvements have been made to design control process, including management of requirements
- Additional surveillance will be done to ensure that design control has been established and is maintained
- PCSA reliability methodology has been provided to NRC for information

Licensing Update



Presented to:
DOE/NRC Quarterly Management Meeting

Presented by:
Mark Williams
Regulatory Authority Office
Office of Civilian Radioactive Waste Management
U.S. Department of Energy

September 12, 2006
Rockville, MD

Topics for Discussion

- Interactions
- License Application Project
- Key Technical Issue Agreements
- Response to NRC Observation Audit Report

Interactions Summary

- **Preclosure Safety Analysis (PCSA)**
  - DOE commitment from 5/16/06 Technical Exchange
  - Reliability Guide: "Summary of Preclosure Safety Analysis Reliability Assessment Methodology" – DOE letter 8/25/06
- **Preclosure Seismic Safety Basis Technical Exchange (6/7/06)**
  - NRC issued 5/22/06 *Interim Staff Guidance on Seismically Initiated Event Sequences* and an earlier 1/24/06 staff letter on the same topic
  - DOE presented an approach consistent with Part 63 and proposed its acceptance in comments on the ISG
  - DOE will issue a revision to its Preclosure Seismic Design Topical Report in the Fall

Interactions Summary

(Continued)

- **Design Changes Approved through DOE's Critical Decision-1 (CD-1) Process (8/29/06)**
  - DOE appreciates the regulatory insights that NRC provided in the presentations on *Regulatory Requirements for Transportation, Storage, Aging, and Disposal*
  - DOE described the CD-1 process, and the role of the TAD canister approach in the repository system
  - DOE will present sufficient design and safety analysis information in the LA for NRC safety determination that performance objectives will be met

Proposed NRC/DOE Technical Exchanges

- Total System Performance Assessment Model (10/24-25/06)
- Preclosure Safety Analysis Topics (11/7-9/06)
  - Aircraft Hazards
  - Consequences and Source Term (PCSA)
  - Reliability Analysis (including Human Reliability)
  - Technical Specifications
  - Systematic Approach to Training (General)
  - Criticality Event Sequences During Preclosure Period
- Science and Technology (12/5/06)
- Postclosure Criticality (12/6 or 7/06)
- Postclosure Peak Seismic Ground Velocity and Seismic Response (possibly 10/17/06)
- Colloids (possibly 11/2/06)

Proposed NRC/DOE Technical Exchanges

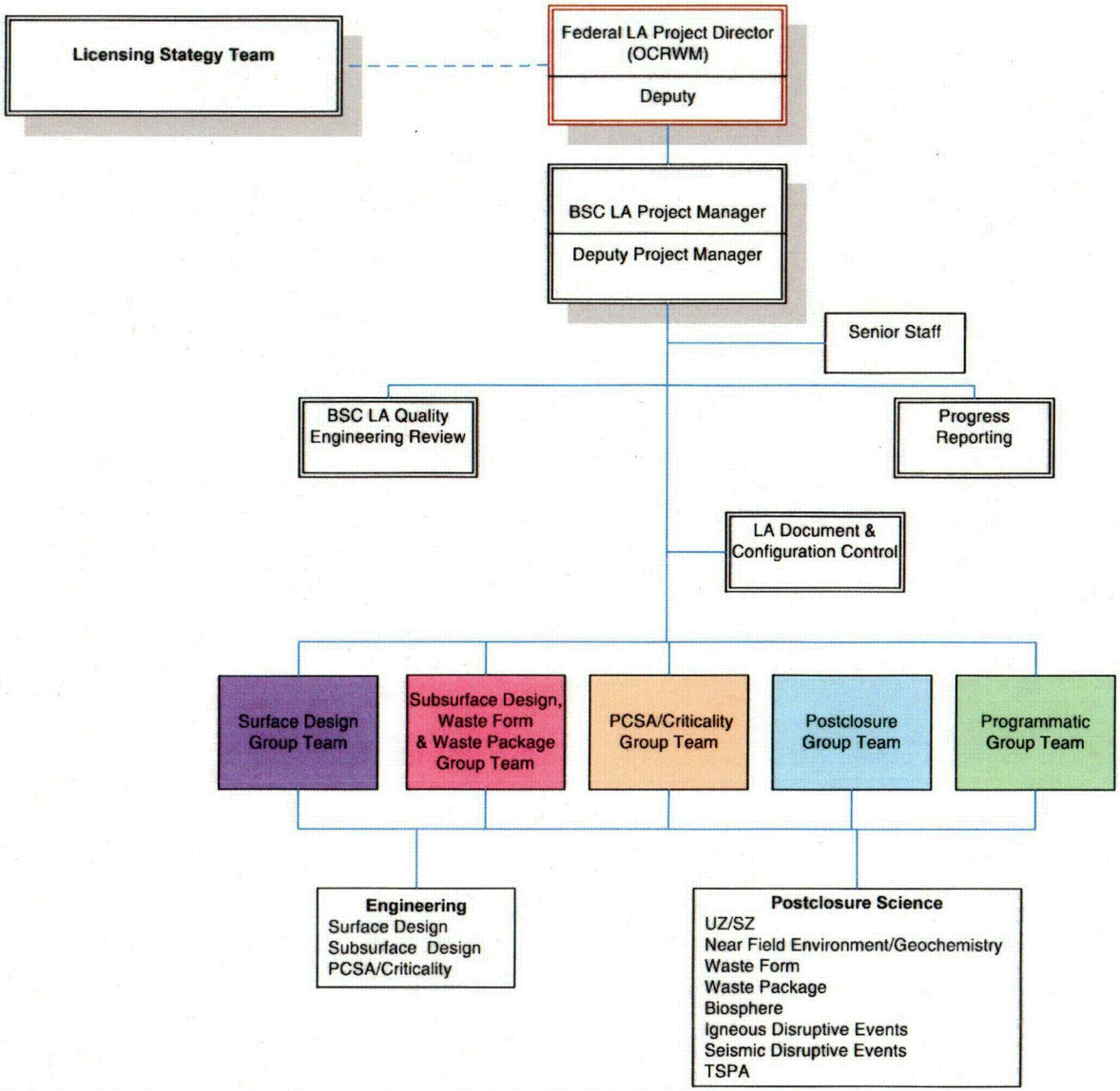
(Continued)

- Other Topics, schedule to be determined
  - Infiltration Model and Data
  - TAD Canister Performance Specifications
  - Igneous Activity Probability
  - Igneous Activity Consequences
  - Waste Package Corrosion
  - Drift Degradation
  - Colloids (if not scheduled)
  - Postclosure Peak Seismic Ground Velocity and Seismic Response (if not scheduled)
  - Near-Field Environment
  - Unsaturated-Zone Tests
  - Drip Shield Materials, Fabrication, and Performance
  - Stratigraphic Correlation of Model Units

License Application Project Description of Scope

- License Application (LA) Project – responsible for the preparation, review, validation, production, and delivery of the General Information (GI) and Safety Analysis Report (SAR) required by 10 CFR 63.21
  - Implements principles of DOE Order 413.3 for LA Project
  - Controls configuration
  - Integrates LA input from DOE, BSC, Lead Lab, NNPP, and EM
  - Validates LA completeness and accuracy prior to DOE approval
- Federal LA Project Director with BSC, Sandia & DOE
- LA Project divided into 5 technical groups:
  - Surface Design; Subsurface Design, Waste Form & Waste Package; PCSA/ Criticality; Postclosure; Programmatic

License Application Project



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License Application Project Current Status of Implementation

- **Management Tools**
  - LA Management Plan outlines process for developing, reviewing, approving, and delivering the LA, including
    - Development of requirements
    - Identification of supporting products
    - Requirements traceability maps
  - Integrated project schedule with products coded to LA sections
  - LA Teams are being mobilized

LA Requirements Mapping

10 CFR 63.21 and YMRP Mapping to LA Sections and CDR Groups

The relations illustrated here are summarized from our database mapping of requirements from 10 CFR 63.21 and the YMRP into the LA sections.

The ~110 relations shown between the YMRP outline of 50 topical areas of review and the LA sections actually represent ~3,000 discrete relationships between 503 YMRP acceptance criteria and subcriteria and the LA sections and subsections.

10 CFR 63 requirements are also traced at greater depth in our requirements traceability crosswalk database.

LEGEND: CDR GROUPS

- Surface Design Group
- Subsurface Design & Waste Package Group
- Preclosure Safety Analysis Group
- Programmatic Group
- Postclosure Group
- * Sections with subject matter to be addressed in planned NRC technical exchanges

Planning Date July 12, 2006

10 CFR 63.21 Content of Application

63.21(b) The General Information must include:

(1) General description of proposed geological repository operations area, activities
(2) Proposed schedules for construction, receipt of waste, and emplacement of wastes
(3) Description of security measures and physical protection, security organization, training and qualification (10 CFR 73.51)
(4) Description of material control and accounting system (10 CFR 63.78)
(5) Description of work conducted to characterize Yucca Mountain

63.21(c) The Safety Analysis Report must include:

(1) Description of features, events, processes at Yucca Mountain that might affect the design or performance of repository, to include:
  (i) Location of repository and boundaries
  (ii) Geology, hydrology, geochemistry
  (iii) Surface water hydrology, climatology
  (v) Location of reasonably maximally exposed individuals
(2) Information about materials of construction, codes and DOE design and construction standards.
(3) Description of design of repository components and engineered barrier system, including:
  (i) Dimensions, material properties, design methods
  (ii) Design criteria and relationship to preclosure and postclosure performance objectives (10 CFR 63.111(b), 63.113(b), 63.113(c))
  (iii) Design basis and relationship to design criteria.
(4) Description (kind, amount, specifications) of radioactive materials to be received.
(5) Preclosure Safety Analysis of repository operations area for the period before permanent closure (10 CFR 63.111(a), 63.111(c))
(6) Description of program for control and monitoring of radioactive effluents and occupational exposure (10 CFR 63.111)
(7) Description of plans for retrieval and alternate waste storage of radioactive wastes
(8) Description of design considerations to facilitate permanent closure and D&D of surface facilities.
(9) Assessment to determine the degree that features, events, and processes of the site that are expected to affect compliance with 10 CFR 63.113.
(10) Assessment of the anticipated geomechanical, hydrogeologic, and geochemical response to the design thermal loading.
(11) Assessment of the ability of the repository to limit radiological exposure for the period after permanent closure (10 CFR 63.113(b))
(12) Assessment of the ability of the repository to limit releases of radionuclides into the accessible environment (10 CFR 63.113(c))
(13) An assessment of the repository to limit radiological exposure after permanent closure in the event of human intrusion (10 CFR 63.113(d))
(14) Evaluation of the natural features of setting and design of the engineered barrier system that are considered barriers important to waste isolation (10 CFR 63.115)
(15) Explanation of measures used to support the models used to provide information in 10 CFR 63.21c(9) to (14).
(16) Identification of structures, systems, and components that require R&D to confirm the adequacy of design and a detailed description of the program designed to resolve the safety questions.
(17) A description of the Performance Confirmation Program that meets the requirements of 10 CFR 63, Subpart F.
(18) Identification and justification of the selection of variables, conditions, or other items that are probable subjects of license specifications, giving special attention to those that may significantly influence the final design.
(19) An explanation of how expert elicitation was used.
(20) A description of the Quality Assurance program defined in 10 CFR 63.142.
(21) A description of the radiological emergency response plan before permanent closure (10 CFR 63.161)
(22) The following information concerning activities in the operations area:
  (i) DOE organization and structure as it pertains to the construction and operations of the repository (delegations of authority, responsibilities, etc.)
  (ii) Identification of key positions for safety and operations
  (iii) Personnel qualifications and training requirements
  (iv) Plans for startup activities and testing
  (v) Plans for conduct of normal operations, maintenance, surveillance, periodic testing, etc.
  (vi) Plans for permanent closure and D&D of the surface facilities
  (vii) Plans for any uses of the operations area other than for disposal of radioactive material.
(23) A description of the program to be used to maintain the records described in 10 CFR 63.71 and 63.72.
(24) A description of the controls that DOE will apply to restrict access and regulate land use at Yucca Mountain and adjacent areas, including a conceptual design of monuments that will be used to identify the site after permanent closure.

[General Information]

[Chapter 1]

SURFACE

SUBSURFACE

INFRASTRUCTURE

WASTE PACKAGE & WASTE FORM

PRECLOSURE SAFETY ANALYSIS

CRITICALITY

[Chapter 2]

[Chapter 3]

[Chapter 4]

[Chapter 5]

Yucca Mountain Review Plan Chapters and Sections

1 Review Plan for General Information
1.1 General Description
1.2 Proposed Schedules for Construction, Receipt, and Emplacement of Waste
1.3 Physical Protection Plan
1.4 Material Control and Accounting Program
1.5 Description of Site Characterization Work

2 Review Plan for Safety Analysis Report

2.1 Repository Safety Before Permanent Closure
2.1.1 Preclosure Safety Analysis
2.1.1.1 Site Description as it Perteins to Preclosure Safety Analysis
2.1.1.2 Description of Structures, Systems, Components, Equipment, and Operational Process Activities
2.1.1.3 Identification of Hazards and Initiating Events
2.1.1.4 Identification of Event Sequences
2.1.1.5 Consequence Analyses
2.1.1.6 Identification of Structures, Systems, and Components Important to Safety, Safety Controls, and Measures to Ensure Availability of the Safety Systems
2.1.1.7 Design of Structures, Systems, and Components Important to Safety and Safety Controls
2.1.1.8 Meeting the 10 CFR Part 20 As Low As is Reasonably Achievable Requirements for Normal Operations and Category 1 Event Sequences
2.1.2 Plans for Retrieval and Alternate Storage of Radioactive Wastes
2.1.3 Plans for Permanent Closure and Decontamination, or Decontamination and Dismantlement of Surface Facilities

2.2 Repository Safety After Permanent Closure
2.2.1 Performance Assessment
2.2.1.1 System Description and Demonstration of Multiple Barriers
2.2.1.2 Scenario Analysis and Event Probability
2.2.1.3 Model Abstraction
2.2.1.3.1 Degradation of Engineered Barriers
2.2.1.3.2 Mechanical Disruption of Engineered Barriers
2.2.1.3.3 Quantity and Chemistry of Water Contacting Engineered Barriers and Waste Forms
2.2.1.3.4 Radionuclide Release Rates and Solubility Limits
2.2.1.3.5 Climate and Infiltration
2.2.1.3.6 Flow Paths in the Unsaturated Zone
2.2.1.3.7 Radionuclide Transport in the Unsaturated Zone
2.2.1.3.8 Flow Paths in the Saturated Zone
2.2.1.3.9 Radionuclide Transport in the Saturated Zone
2.2.1.3.10 Volcanic Disruption of Waste Packages
2.2.1.3.11 Airborne Transport of Radionuclides
2.2.1.3.12 Concentration of Radionuclides in Ground Water
2.2.1.3.13 Redistribution of Radionuclides in Soil
2.2.1.3.14 Biosphere Characteristics
2.2.1.4 Demonstration of Compliance with Postclosure Public Health and Environmental Standards

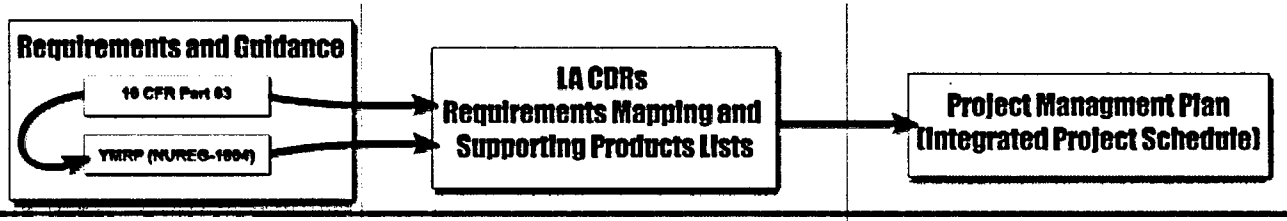
2.3 Research And Development Program to Resolve Safety Questions

2.4 Performance Confirmation Program

2.5 Administrative and Programmatic Requirements
2.5.1 Quality Assurance Program
2.5.2 Records, Reports, Tests, and Inspections
2.5.3 Training and Certification of Personnel
2.5.4 Expert Elicitation
2.5.5 Plans for Startup Activities and Testing
2.5.6 Plans for Conduct of Normal Activities Including Maintenance, Surveillance, and Periodic Testing
2.5.7 Emergency Planning
2.5.8 Controls to Restrict Access and Regulate Land Uses
2.5.9 Uses of Geologic Repository Operations Area for Purposes Other Than Disposal of Radioactive Wastes
2.5.10 License Specifications

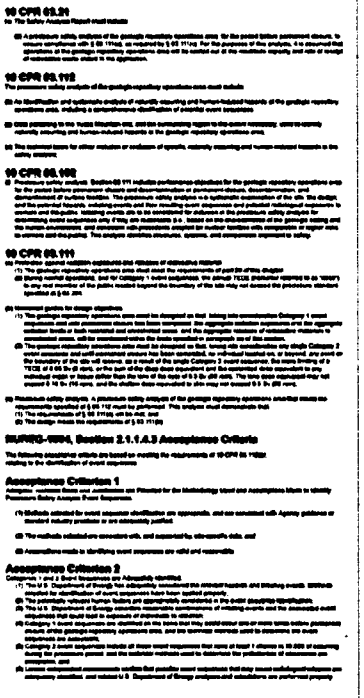
LA Project Management

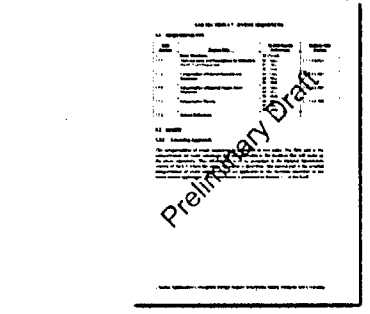
LA Requirements Flowdown

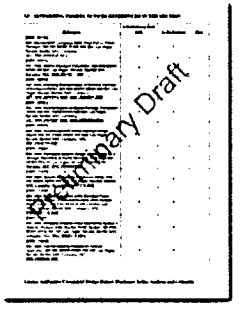


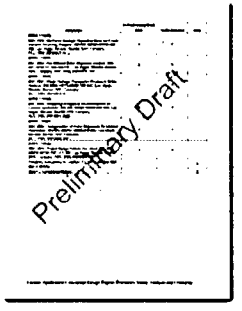
Example of LA Requirements Flowdown

SAR Section 1.7: Categorization of Event Sequences—Seismic Methodology

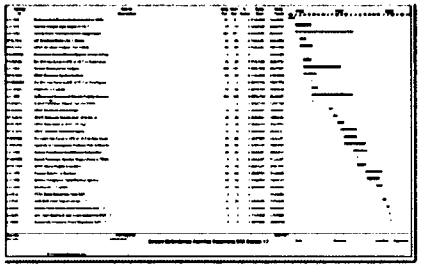








Examples of Activities Logically Tied to Seismic Methodology Description in SAR Section 1.7 Schedule



LA Project Summary

- Federal Project Director and BSC/Sandia Project Manager have been identified
- LA Management Plan completion and approval
- Approve LA Conceptual Design Reports planned November 2006
- LA Project implementation underway

Potential Impacts of Programmatic Changes to Key Technical Issue Agreements

- DOE completed an evaluation of potential impacts of programmatic changes to KTI agreements considered complete by NRC. Results show:
  - Incorporation of TADs could impact 11 completed KTIs
  - Incorporation of INFIL rework could impact 1 completed KTI
  - Incorporation of peak dose work is not expected to impact any completed KTIs, assuming no change to the proposed EPA Standard (see handout)
- Approximately 13 associated documents would need to be reopened if these KTIs are impacted
- DOE will continue to examine completed KTIs for impacts from relevant changes in the program

Remaining Key Technical Issue Items and Additional Information Needs

- DOE plans to submit 3 AIN responses by the end of FY 2006 and 3 more by the end of CY 2006
- DOE will provide NRC with a schedule for AIN submittals when the planning effort is complete
  - We continue to expect that responses for some AINs, based on long-term activities, will not be available before the LA submittal

Response to NRC's Audit Observation Report

- On 9/11/06, DOE formally responded to NRC's Observation Audit Report OAR-05-05
- DOE undertook a wide variety of activities as a result of the audit and related events, including
  - More than 35 Condition Reports; 2 root cause analyses; 2 self assessments; an independent review
  - DOE also issued the *OCRWM Independent Review Team Report of the BSC Quality Assurance Audit BQAP-BSC-05-07* to provide additional information regarding NRC's issues
- Pursuant to 6/6/06 Management Meeting, DOE remains ready to incorporate this into the Technical Exchange schedule

FOR INFORMATION ONLY
Assuming Impact to Closed KTIs, Documents Associated with KTI Revision

KTI/AIN	KTI/AIN Summary	Potential TAD Impact	Potential INFIL Impact	Assuming Impact to Closed KTIs, Documents Associated with KTI Revision
CLST.3.02	In the revision to the "Summary of In-Package Chemistry for Waste Forms," AMR, address specific NRC questions regarding radiolysis, incoming water, localized corrosion, corrosion products, transient effects, and a sensitivity study on differing dissolution rates of components. DOE stated that these specific questions are currently being addressed in the revision of the "Summary of In--Package Chemistry for Waste Forms AMR", ANL-EBS-MD-000050 and related AMRs and calculations. To be available in January 2001.	Possible	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037)
ENFE.3.03	Provide analyses to verify that bulk-scale chemical processes dominate the in-package chemical environment. The DOE will provide analyses justifying the use of bulk chemistry as opposed to local chemistry for solubility and waste form degradation models. These analyses will be documented in an update to the Miscellaneous Waste-Form FEPs AMR (ANL-WIS-MD-000009) or in an update to the Summary of In-Package Chemistry for Waste Forms AMR (ANL-EBS-MD-000050), expected to be available in FY 02.	Possible	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037)
CLST.3.01	The revision to the "Summary of In-Package Chemistry for Waste Forms" In AMR, the NRC needs to know whether and how initial failures are included in the in-package chemistry modeling, taking into account the multiple barrier analysis. DOE stated that the "Summary of In-Package Chemistry for Waste Forms" AMR, ANL-EBS-MD-000050, deals with time since waste package breach, instead of time of waste package failures. The model is appropriate for the current implementation in the TSPA scenarios because breaches do not occur until after aqueous films may be sustained. Multiple barrier analyses are discussed in the TSPAI IRSR, and therefore will be discussed in the TSPA KTI Technical Exchange.	Possible	No	Summary of In-Package Chemistry for Waste Forms (ANL-EBS-MD-000050)
CLST.3.03	Provide a more detailed calculation on the in-package chemistry effects of radiolysis. DOE stated that the calculations recently performed as discussed at the 9/12/00 Technical Exchange and preceding teleconferences are being documented. These calculations will be referenced and justified in the revision of the "Summary of In-Package Chemistry for Waste Forms" AMR, ANL-EBS-MD-000050, and will be available in January 2001.	Possible	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037); EBS Radionuclide Transport Abstration (ANL-WIS-PA-000001)
ENFE.1.01	Provide updated FEPs AMRs with additional technical bases for those FEPs previously identified by the NRC in Rev 03 of the ENFE IRSR as inadequately screened. In Rev 03 of the ENFE IRSR, the NRC identified 17 FEPs associated with Subissue 1 for which no screening arguments were identified in the FEPs database, screening arguments were inconsistent with other project documents, or inadequate exclusion arguments were provided. The lack of screening arguments has been addressed in Rev 00 of the FEPs database and in Rev 00 of the supporting AMRs. Current revisions (or ICNs) of the FEPs AMRs, scheduled for completion in January 2001, will partially address the remaining NRC comments. Consideration of the remaining NRC comments will be provided in subsequent FEPs AMR revisions, expected to be available as periodic revisions, the entirety of which will be available prior to license application.	Possible	No	EBS FEPs (ANL-WIS-PA-000002); Waste Form FEPs (ANL-WIS-MD-000009); FEPs in SZ Flow and Transport (ANL-NBS-MD-000002)
ENFE.4.07	Provide updated FEPs AMRs with additional technical bases for those FEPs previously identified by the NRC in Rev. 03 of the ENFE IRSR as inadequately screened. In Rev 03 of the ENFE IRSR, the NRC identified 17 FEPs associated with Subissue 1 for which no screening arguments were identified in the FEPs data base, screening arguments were inconsistent with other project documents, or inadequate exclusion arguments were provided. The lack of screening arguments has been addressed in Rev 00 of the FEPs data base and Rev 00 of the supporting AMRs. Current revisions (or ICNs) of the FEPs AMRs, scheduled for completion in January 2001, will partially address the remaining NRC comments. Consideration of the remaining NRC comments will be provided in subsequent FEPs AMR revisions, expected to be available as periodic revisions, the entirety of which will be available prior to license application.	Possible	No	Development of the TSPA-LA Features, Events, and Processes (TDR-WIS-MD-000003) and appropriate process model-level FEPs AMRs
TSPAI.3.14	DOE should account for the full range of environmental conditions for the in-package chemistry model (ENG4.1.1). DOE will update the in-package chemistry model to account for scenarios and their associated uncertainties required by TSPA. This will be documented in the In-Package Chemistry AMR (ANL-EBS-MD-000056) expected to be available to NRC in FY 2003.	Likely	No	In-Package Chemistry Abstraction (ANL-EBS-MD-000037); EBS Radionuclide Transport Abstration (ANL-WIS-PA-000001); EBS FEPs (ANL-WIS-PA-000002); Waste Form FEPs (ANL-WIS-MD-000009); FEPs in SZ Flow and Transport (ANL-NBS-MD-000002)

FOR INFORMATION ONLY
Assuming Impact to Closed KTIs, Documents Associated with KTI Revision

KTI/AIN	*KTI/AIN Summary*	*Potential TAD Impact*	*Potential INFIL Impact*	*Assuming Impact to Closed KTIs, Documents Associated with KTI Revision*
CLST.2.09	Demonstrate the drip shield and waste package mechanical analysis addressing seismic excitation is consistent with the design basis earthquake covered in the SDSS KTI. DOE stated that the same seismic evaluations of waste packages and drip shield (revision of AMRs ANL-UDC-MD-000001 and ANL-XCS-ME-000001) will support both the SDSS KTI and the CLST KTI, therefore consistency is ensured. These revisions will be completed prior to LA.	Possible	No	Mechanical Assessment of the Waste Package Subject to Vibratory Ground Motion (CAL-WIS-AC-000001); Seismic Consequence Abstraction (ANL-EBS-MD-000027)
CLST.5.03	Provide the "Probability of Criticality Before 10,000 years" calculation. DOE stated that it will provide the calculation to NRC by November 1, 2000.	Highly likely	No	Screening Analysis of Criticality Features, Events, and Processes for LA (ANL-EBS-NU-000008); Probablity of Postclosure Criticality (CAL-MRG-NU-000012)
TSPAI.2.05	It is not clear to the NRC that the current list of FEPs (i.e., the list of FEPs documented in TDR-WIS-MD-000003, 00/01) is sufficiently comprehensive or exhibits the necessary attribute of being auditable (e.g., transparent and traceable). As discussed in the two TSPAI technical exchanges, there are unclear aspects of the approach that DOE plans to use to develop the necessary documentation of those features, events, and processes that they have considered. Accordingly, to provide additional confidence that the DOE will provide NRC with: (1) auditable documentation of what has been considered by the DOE, (2) the technical basis for excluding FEPs, and (3) an indication of the way in which included FEPs have been incorporated in the performance assessment; DOE will provide NRC with a detailed plan (the Enhanced FEP Plan) for comment. In the Enhanced FEP Plan, DOE will address the following items: (1) the approach used to develop a pre-screening set of FEPs (i.e., the documentation of those things that DOE considered and which the DOE would use to provide support for a potential license application), (2) the guidance on the level-of-detail that DOE will use for redefining FEPs during the enhanced FEP process, (3) the form that the pre-screening list of FEPs will take (e.g., list, database, other descriptions), (4) the approach DOE would use for the ongoing evaluation of FEPs (e.g., how to address potentially new FEPs), (5) the approach that DOE would use to evaluate and update the existing scope and description of FEPs, (6) the approach that DOE would use to improve the consistency in the level of detail among FEPs, (7) how the DOE would evaluate the results of its efforts to update the existing scope and definition of FEPs, (8) how the Enhanced FEP process would support assertions that the resulting set of FEPs will be sufficiently comprehensive (e.g., represents a wide range of both beneficial and potential adverse effects on performance) to reflect clearly what DOE has considered, (9) how DOE would indicate their disposition of included FEPs in Amodeling issues@), (11) how the hierarchical levels used to document the information would be used within DOE's enhanced FEP process, (12) how the Enhanced FEP Plan would result in documentation that facilitates auditing (i.e., lead to a process that is transparent and traceable), (13) DOE's plans for using configuration management controls to identify FEP dependencies on ongoing work and design changes. DOE will provide the Enhanced Plan to NRC by March 2002.	Possible	No	Development of the TSPA-LA Features, Events, and Processes (TDR-WIS-MD-000003) and appropriate process model-level FEPs AMRs
TSPAI.2.06	Provide justification for the approach to: (1) the level of detail used to define FEPs; (2) the degree of consistency among FEPs; and (3) comprehensiveness of the set of FEPs initially considered (i.e., before screening). DOE proposes to meet with NRC periodically to provide assessments of the DOE's progress, once it has initiated the Enhanced FEP process, and on changes to the approach documented in the Enhanced FEP Plan. During these progress meetings DOE agrees to provide a justification for their approach to: (1) the level of detail used to define FEPs; (2) the degree of consistency among FEPs; and (3) comprehensiveness of the pre-screening set of FEPs.	Possible	No	Development of the TSPA-LA Features, Events, and Processes (TDR-WIS-MD-000003) and appropriate process model-level FEPs AMRs
TSPAI.3.19	DOE will provide justification for the use of its evapotranspiration model, and defend the use of the analog site temperature data (UZ1.3.1). DOE will provide justification for the use of the evapotranspiration model, and justify the use of the analog site temperature data. The justification will be documented in an update to the Simulation of Net Infiltration for Modern and Potential Future Climates AMR (ANL-NBS-HS-000032) and the Future Climate Analysis AMR (ANL NBS-GS-000008). The AMRs are expected to be available to NRC in FY 2003.	No	Highly Likely	Simulation of Net Infiltration for Modern and Potential Future Climates (ANL-NBS-HS-000032); UZ Flow Models and Submodels (MDL-NBS-HS-000006)

NOTE: Incorporation of peak dose work is not expected to impact any completed KTIs, assuming no change to the proposed EPA standard.