



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



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# Project Update

Presented to:

**DOE/NRC Quarterly Management Meeting**

Presented by:

**W. John Arthur, III**

**OCRWM Deputy Director, Office of Repository Development**

**U.S. Department of Energy**

**June 6, 2005**

**Pahrump, NV**

# Goals and Objectives

- **Summarize the Yucca Mountain Project status including Management, Quality Assurance, and Safety Culture**
- **Discuss the status of reviews about the impacts associated with the U.S. Geological Survey e-mail issue**
- **Discuss the status of U.S. Department of Energy's preparations to submit the License Application and complete supporting systems and documentation**



# Waste Package Prototype



**Longitudinal seam welding on the 316 stainless steel inner vessel**



# Ongoing Site Improvements



# New Annunciator Panel

## March 2005

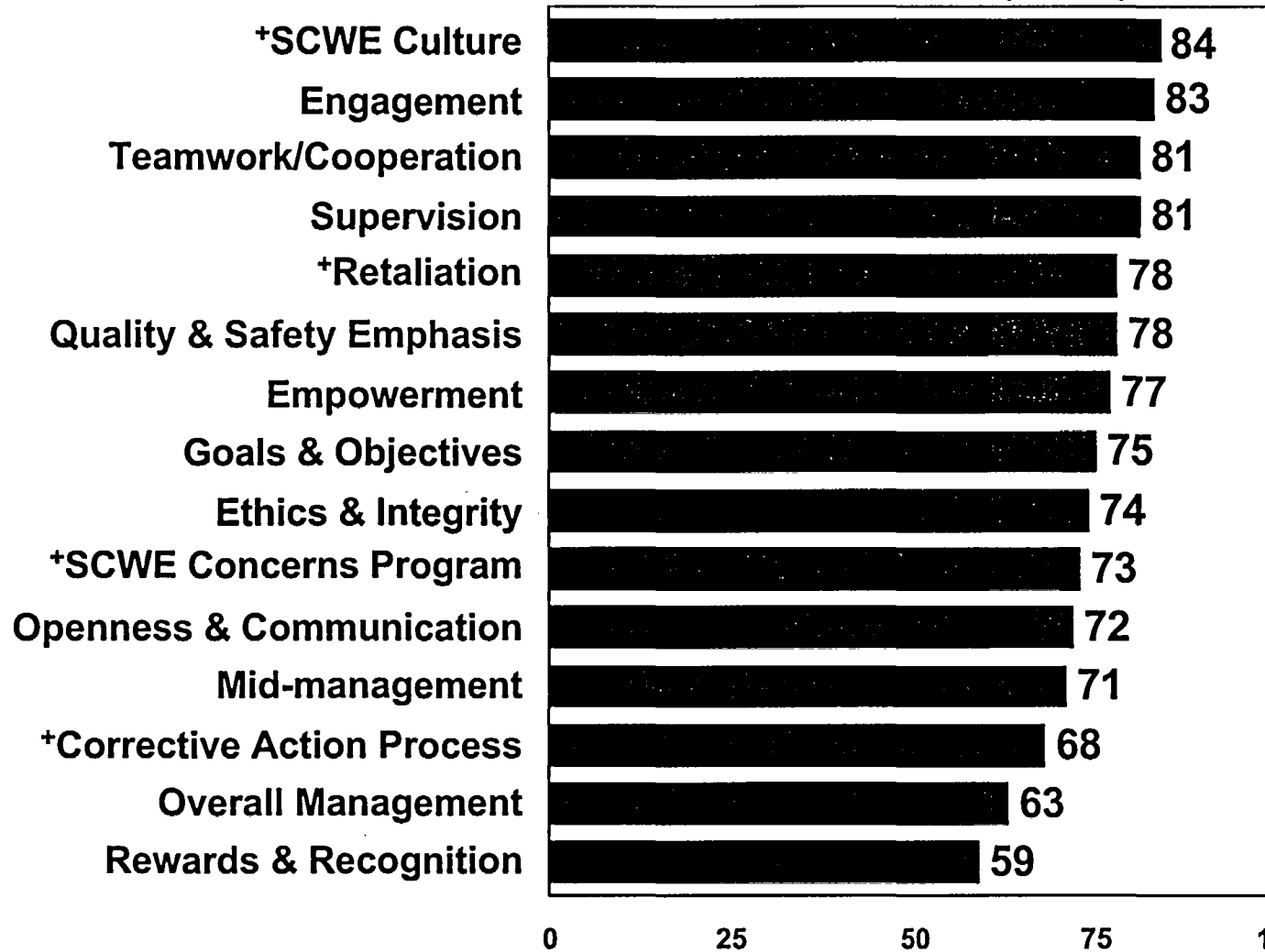
YMP	PERFORMANCE I												
	Overall Project (REQ - PMO Baseline)	CODE				SCHEDULE				LIFE CYCLE COST		TECH QUALITY	RISK
		CP (FTB)	1.84	G	SP (FTB)	1.47	G	DCVR	1.119	EM	1.119		
		CP (FTB)	0.98	G	SP (FTB)	0.97	G	TCPI <sub>EM</sub>	1.00	G			
WORK EXECUTION	Primary					Secondary					Focus Areas		
	1.1 Licensing (L.A.O.R.S.) DOE: K. Ziegler BSC: D. Beckwith G	1.2.1 LA Development (L.A.O.R.S.) DOE: K. Ziegler BSC: D. Beckwith V	1.4.1 NRC Commitments (L.A.O.R.S.) DOE: K. Ziegler BSC: D. Beckwith V	1.4.2 NRC Interactions Effectiveness DOE: K. Ziegler BSC: D. Beckwith G	1.4.3 NRC Dry Transfer Facility I OC (Design) DOE: H. Chiao BSC: L. Lucas L	1.2.4 Design Quality DOE: S. Lefkowitz BSC: B. Pivovarov V							
	1.2 Facilities EPC Performance IOC (Design) DOE: H. Chiao BSC: L. Lucas G	1.2.2 Fuel Handling Facility IOC (Design) DOE: H. Chiao BSC: L. Lucas V	1.4.2 Cask Handling Facility IOC (Design) DOE: H. Chiao BSC: L. Lucas G	1.4.3 Dry Transfer Facility I OC (Design) DOE: H. Chiao BSC: L. Lucas L									
	1.3 Performance Safety Analysis Measurements DOE: E. Luchman BSC: D. Beckwith G												
	1.4 Post Closure Safety Analysis Measurements DOE: J. Ziegler BSC: D. Beckwith B, G												
	1.5 Site Operations DOE: E. Wade BSC: R. Piny V	1.5.1 Site Status DOE: E. Wade BSC: R. Piny V	1.5.2 Site Performance DOE: E. Wade BSC: R. Piny G										
	1.6 License Support Hardware (L.A.O.R.S.) DOE: K. Ziegler BSC: D. Beckwith L												
	KEY PROCESSES	Organization & Safety Culture										Focus Areas	
2.1 Safety Performance DOE: S. Wade BSC: M. Subramaniam B, G		2.1.1 Subcritical Safety Performance DOE: S. Wade BSC: M. Subramaniam B, G	2.1.2 Emergency Management DOE: S. Wade BSC: M. Subramaniam B	2.1.3 Nuclear Safety DOE: "None" BSC: "None" L									
2.2 Performance Bridge Construction DOE: D. Spence BSC: D. Spence V		2.2.1 License Extension Effectiveness DOE: D. Spence BSC: D. Spence G	2.2.2 Self Assessment Effectiveness DOE: D. Spence BSC: D. Spence B	2.2.3 Corrective Action Program Effectiveness DOE: D. Spence BSC: D. Spence V									
2.3 Work Management DOE: D. Spence BSC: J. Miskowicz G													
2.4 RCWE DOE: M. Van Der Pijp BSC: R. Piny G													
2.5 Human Performance DOE: D. Spence BSC: D. Spence G		2.5.1 Prevention Detector & Results DOE: D. Spence BSC: D. Spence G	2.5.2 Event Detection Detector & Results DOE: D. Spence BSC: D. Spence V	2.5.3 Correction Detector & Results DOE: D. Spence BSC: D. Spence L									
2.6 Quality Performance DOE: G. Eason BSC: M. Miskowicz V													



# 2004 Safety Conscious Work Environment (SCWE) Survey

## YMP 2004 Overall Category Scores

Total Percent Favorable (N=1,650)



+Indicates a new category for 2004

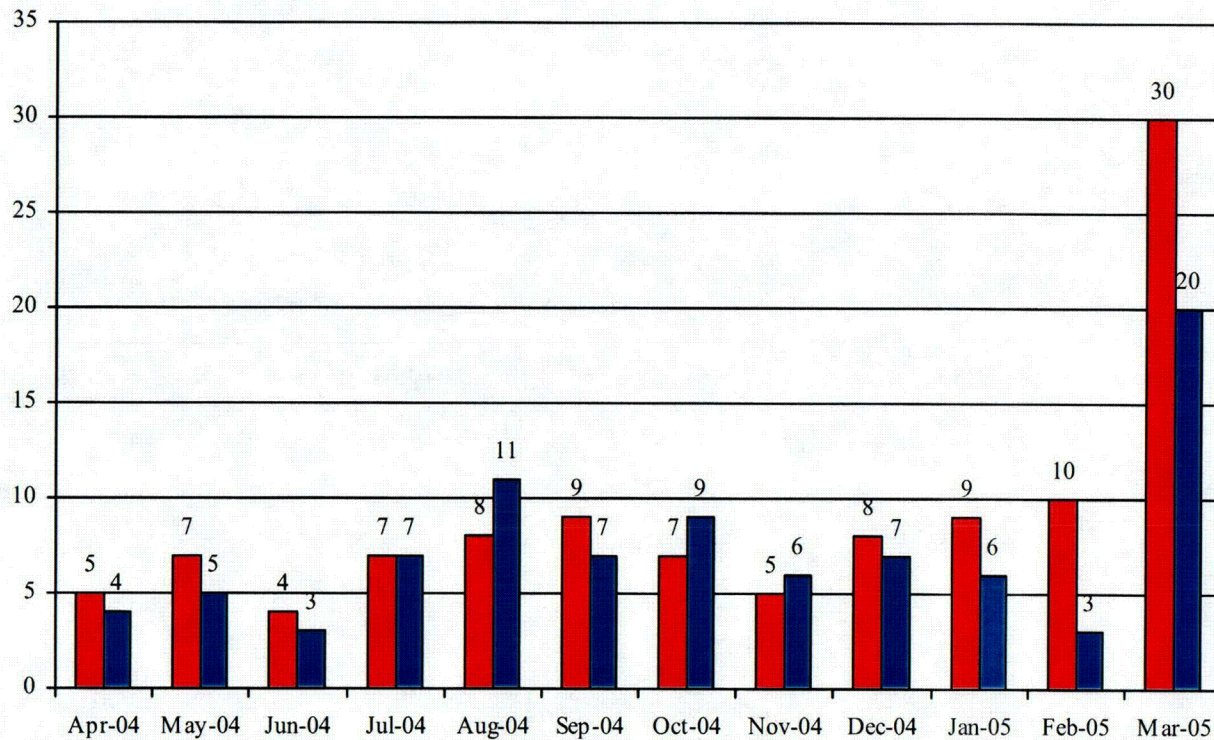


# Focus of SCWE Improvement Efforts

- Improve SCWE behaviors through Human Performance training, observation, and coaching
- Improve the ease-of-use and employee confidence in the Corrective Action Program (CAP)
- Improve employee willingness to use the Concerns Programs, with confidence that concerns will be thoroughly investigated and confidentiality will be maintained
- Improve confidence in commitment to quality
- Develop and implement organization-specific action plans as warranted
- Improve the survey instrument
- Complete alignment with best practices



# Employee Concerns Program Cases/Concerns Received and Closed Rolling 12 Month (April 2004 – March 2005)

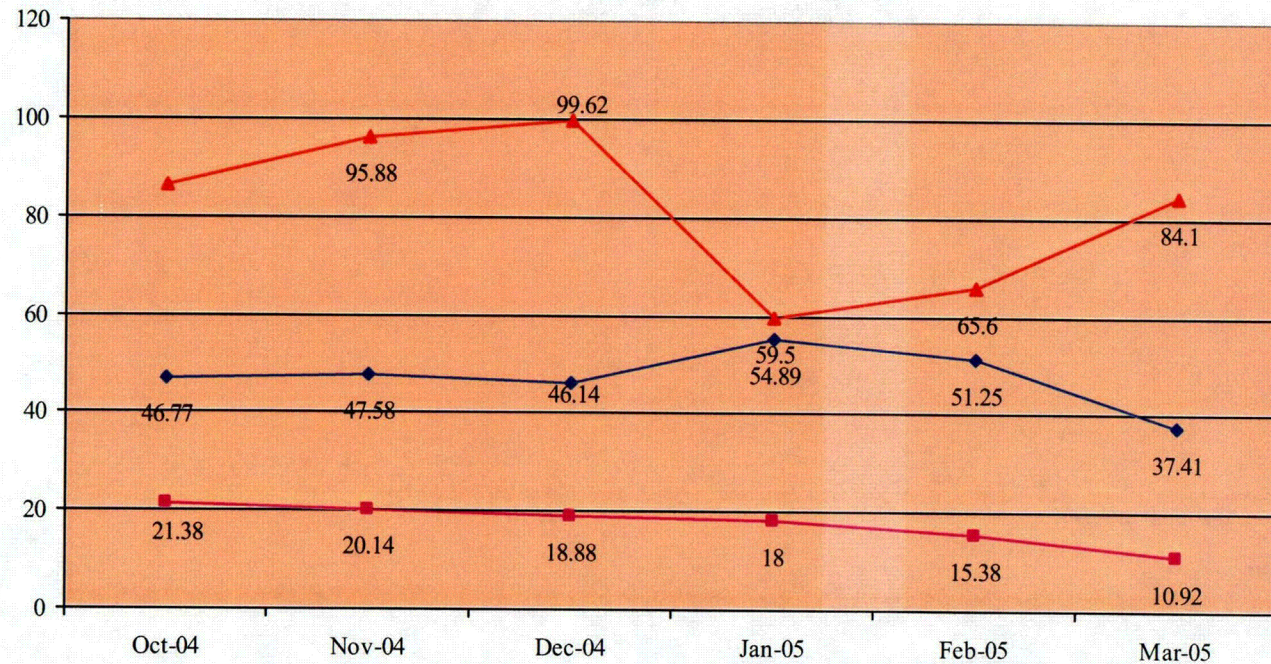


	Apr-04	May-04	Jun-04	Jul-04	Aug-04	Sep-04	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05
■ Cases/Concerns Received	5	7	4	7	8	9	7	5	8	9	10	30
■ Cases/Concerns Closed	4	5	3	7	11	7	9	6	7	6	3	20





# Employee Concerns Program Average Processing Time Rolling 6 month (October 2004 – March 2005)



	Oct-04	Nov-04	Dec-04	Jan-05	Feb-05	Mar-05
◆ Total Average Age	46.77	47.58	46.14	54.89	51.25	37.41
■ Routine Avg Age (30 Day Goal)	21.38	20.14	18.88	18	15.38	10.92
▲ Complex Ave Age (90 Day Goal)	86.36	95.88	99.62	59.5	65.6	84.1



# Level A Condition Reports

- **CR 3235 – Effectiveness of corrective actions – appropriate closure of CRs**
  - Issued 7/22/04
  - Planning (including root cause analysis) complete – 4/13/05
  - Due date for completion – 7/29/05
  - 17 actions remain open
  
- **CR 5559 - Extensive rework of technical work products**
  - New Level A CR - Issued 5/12/05
  - Planning (including root cause analysis) is underway



# USGS E-mail Evaluation Objectives

- Identify the technical work that may be called into question
- Identify the quality assurance controls and issues involved
- Determine the impact of the technical basis on
  - Site Recommendation
  - Key Technical Issue agreements
  - Draft License Application
- Strategy for corrective action



# USGS E-mail Preliminary Findings and Conclusions

- **A list of work items originated by the USGS employees has been identified beyond the primary work called into question**
- **The quality assurance controls provided some assurance that the USGS technical products substantively complied with program requirements**
- **The net infiltration estimates are technically defensible, being consistent with independently derived results and acknowledged as valid by a diverse technical community**



# USGS E-mail Preliminary Findings and Conclusions

(Continued)

- **There is no objective technical reason to question the technical basis of the SR, the KTI agreements, or the draft LA**
- **While the net infiltration estimates are considered technically defensible, it is prudent to provide additional assurance for the completeness and accuracy surrounding the work provided by the USGS employees**



# Summary

- **The USGS e-mail issue appears limited to a few individuals**
- **We are assessing a range of activities; the objective of which is to provide additional assurance regarding the completeness and accuracy of the work performed by certain USGS employees**
- **DOE continues work to complete the LA and prepare for submittal**
- **Good progress continues in management areas**
- **The national importance of this Project and the level of professional conduct expected of all Project personnel have been reinforced by recent events**





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



# Preclosure and Repository Design Update

Presented to:  
**DOE/NRC Quarterly Management Meeting**

Presented by:  
**Richard Craun**  
Office of Repository Development  
U.S. Department of Energy

June 6, 2005  
Pahrump, Nevada

# Design Update

- **Design Status**
  - NRC information requests
  - DOE initiated design enhancements
- **Path Forward**





# Design Status

- **At the February 2005 DOE/NRC Quarterly Management Meeting, an update was provided on the NRC's October 8, 2004 information request letter needs and the DOE initiated design enhancements**
- **Information Request**
  - **Site specific casks for aging**
  - **Important to Safety (ITS) electrical system boundary**
  - **Target reliability values for equipment and systems**
  - **Aircraft hazard**
  - **Seismic design methodology**



# DOE Initiated Design Enhancement Status

- **Develop enhanced strategy for handling spent nuclear fuel in air**
- **Develop automated event trees**
- **Develop enhanced strategy for fire protection**
- **Incorporate direct radiation doses**
- **Incorporate off-normal event analyses**
- **Incorporate other radioactive material as potential source terms**
- **Utilize bounding source terms for Category 1 event sequences**
- **Develop enhanced thermal management strategy**



# Aging System

- **Evaluating existing storage system designs certified under 10 CFR 72 against YMP site specific criteria. Part 72 licensed vendor reports will describe the extent to which existing design analyses bound repository conditions**
  - Reports from four vendors are scheduled to be received in early June
  - Technical basis review and analyses scheduled to be received in late fall
- **Developing site specific cask system**
  - Bolted lids and integral metallic shielding
  - Requires unloading of spent nuclear fuel assemblies after aging
- **Developing site-specific canister system**
  - Design feasibility study has been completed
  - Cask overpack used in aging configuration
  - Canister designed for direct emplacement into a waste package after aging
  - Conceptual design based on existing component design configurations (PWR and BWR waste package basket designs placed in a canister with dimensions similar to a Navy long canister. The canister, once loaded and sealed, is placed in a Navy long waste package for disposal)

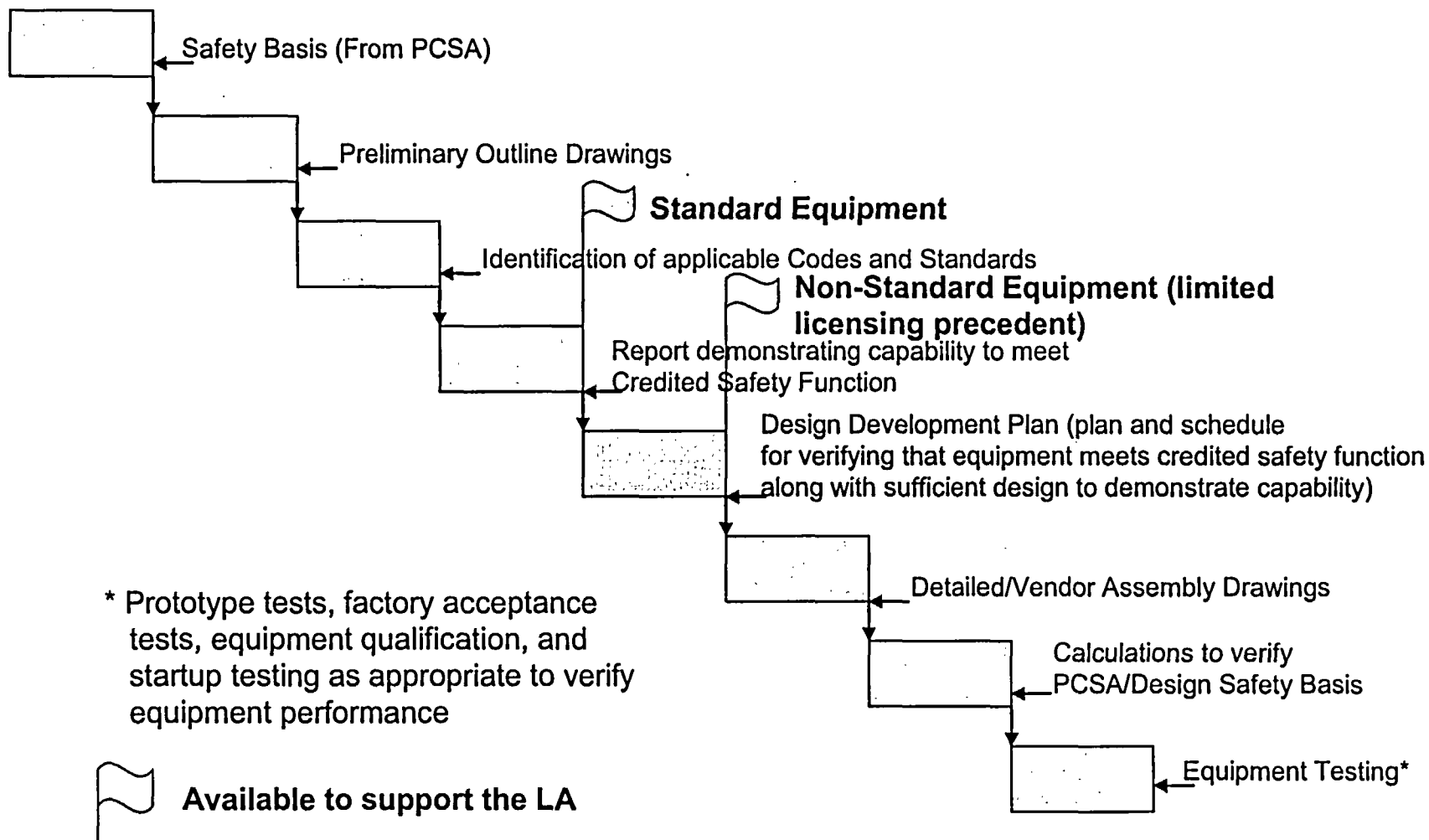


# Electrical System

- **At the time of our February 2005 meeting, a portion of the onsite electrical power system supplying surface facility ventilation fans was described as being important to safety**
- **As a result of design changes to consider handling fuel in air, the ventilation system design has been changed. Electrically powered ventilation fans are no longer credited with an ITS function. Required ITS ventilation exhaust flow provided by ejectors running off stored energy (liquid Nitrogen).**
- **The onsite electrical power system, including the diesel generators, provides operational continuity, life safety function, and defense-in-depth, but does not provide an ITS function**



# Design Development Plans



# Design Development Plans

(Continued)

- **Design Development Plans are being developed to define the path forward for demonstrating that target reliability values are achieved. Design Development Plans are being prepared for the following equipment or system:**
  - Waste package and cask trolleys, including rails
  - Site rail transfer cart (SRTC) and rails
  - Waste package transporter
  - Emplacement gantry
  - Trolley turntables
  - Cutting systems for dual-purpose canister (DPC) and waste packages
  - Waste package and transportation cask tilting machines
  - Trunnion collar removal machine
  - Aging cask and canister
- **Design Development Plans are scheduled for completion in June 2005**



# Aircraft Hazards/Frequency Analysis

- Completed updates to the *Identification of Aircraft Hazards* and the *Frequency Analysis of Aircraft Hazards for License Application* reports
- Current approach credits a no fly zone and for military aircraft robustness of the waste handling facilities and barrier surrounding aging pads to withstand aircraft crash
- Approach also relies on a no fly zone
  - 5.5 nautical miles radius
  - 14,000 feet mean sea level (MSL) upper bound
  - 5,000 overflights/year allowable
  - Interfacing with the Air Force regarding an Memorandum Of Understanding
- Based on this approach the probability of an aircraft crash to a potentially vulnerable areas of the Geologic Repository Operations Area (GROA) is beyond a Category 2 event sequence



# Seismic Design Methodology

- The methodology for analyzing and demonstrating compliance with 10 CFR 63 performance objectives for seismically initiated event sequences has been stable for several years
- During our February 2005 meeting a description of the preclosure seismic design methodology was provided. Since this meeting, the project has completed or revised the following documents:
  - Technical basis document for low probability seismic events
  - Seismic consequence abstraction report
  - Earthquake ground motion input for preclosure seismic design and postclosure performance assessment
  - Peak ground velocities for seismic events, and
  - Seismic analysis for preclosure safety
- The current focus is on:
  - Completing the multiple lumped mass stick models with soil springs for ITS surface facilities and obtaining additional geotechnical data for dynamic soil-structure interaction analysis





# DOE Initiated Design Enhancement Status

- **Develop enhanced strategy for handling spent nuclear fuel in air**
- **Develop automated event trees**
- **Develop enhanced strategy for fire protection**
- **Incorporate direct radiation doses**
- **Incorporate off-normal event analyses**
- **Incorporate other radioactive material as potential source terms**
- **Utilize bounding source terms for Category 1 event sequences**
- **Develop enhanced thermal management strategy**



# Fuel In Air

- Completed and released the *Commercial Spent Nuclear Fuel in Air Study* in late March 2005. This report helped define, quantify, and provide background information on fuel performance when handled in air.
- Using this information the current design efforts are focused on the following:
  - Designing an inerted transfer cell in the Fuel Handling Facility and the Dry Transfer Facilities
  - Reviewing licensing precedent associated with transportation and/or storage casks safety analyses that consider impacts with and without impact limiters or crush pads



# Automated Event Trees and Fire Hazard Analyses

- **Automated event tress**
  - Completed the development of automated event tree analysis using conventional code (SAPHIRE)
  - The event sequences associated with design modifications to address fuel in air will be categorized as part of the upcoming revision to the Categorization of Event Sequences analysis
- **Fire Hazard Analysis**
  - Completed and released fire hazard analyses for the Fuel Handling Facility, Canister Handling Facility, and Dry Transfer Facility
  - Design changes as a result of fuel in air will result in revisions to the Fuel Handling Facility and Dry Transfer Facility reports



# Direct Radiation Sources and Low-level Waste Sources

- The inadvertent direct exposure to workers due to failure of shield door interlocks has been considered in the Categorization of Event Sequences analysis, and requirements established in the Nuclear Safety Design Basis such that the frequency of occurrence is required to be less than a Category 1 event
- An engineering study has been completed to quantify other potential source terms such as filters, low level liquid from decontamination and firewater, and solid waste such as empty Dual Purpose Canisters and dry active waste
  - The dose from event sequences related to these other source terms will be calculated as part of an update of the dose consequence analysis
  - The event sequences associated with other potential source terms will be categorized as part of the upcoming revision to the Categorization of Event Sequences analysis



# Thermal Management Strategy

- **Developed an initial thermal management strategy report, and a Waste Package and Drift Loading Study**
- **The results of these reports will be incorporated into an enhanced thermal management study scheduled for release in early June 2005**



# Conclusion and Path Forward

- **Project focus**
  - Commercial spent nuclear fuel in air design changes
  - Support to NRC information needs
- **Path forward – specific areas ready for technical interactions**
  - Preclosure safety analysis process
  - Material handling
  - Non-standard equipment
  - Waste package transporter and emplacement gantry





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# Quality Assurance Overview

Presented to:  
**DOE/NRC Quarterly Management Meeting**

Presented by:  
**R. Dennis Brown**  
Director, Office of Quality Assurance  
Office of Repository Development  
Office of Civilian Radioactive Waste Management  
U.S. Department of Energy

June 6, 2005  
Pahrump, Nevada

# Quality Assurance Overview

- **Quality Assurance Requirements and Description (QARD)**
- **Corrective Action Program (CAP) Oversight**
- **Corrective Action Report (CAR)-001 Status**
- **Trend Evaluation and Reporting**
- **Performance Based Auditing**
- **Office of Quality Assurance (OQA) Audits/Surveillances**
- **Management & Operating (M&O) Contractor Quality Assurance (QA) Audits/Surveillances**





# Quality Assurance Requirements and Description

- QARD Rev 17 sent to NRC for review and acceptance on April 11, 2005
- Currently being reviewed by NRC for acceptance



# Corrective Action Program Oversight

- **Three M&O surveillances of effectiveness of Condition Report (CR) actions**
- **Four M&O surveillances of Level C CR processing**
- **OQA surveillance of DOE Level C CR processing**
- **As a result of the number of CAP process issues, AP-16.1Q is being revised to make the initiation process clearer and easier to follow**



# CAR-001 Status

- **Condition Report 99, also known as CAR-001 on model validation, closed February 22, 2005**
- **CR 4961 issued to track five model AMRs**



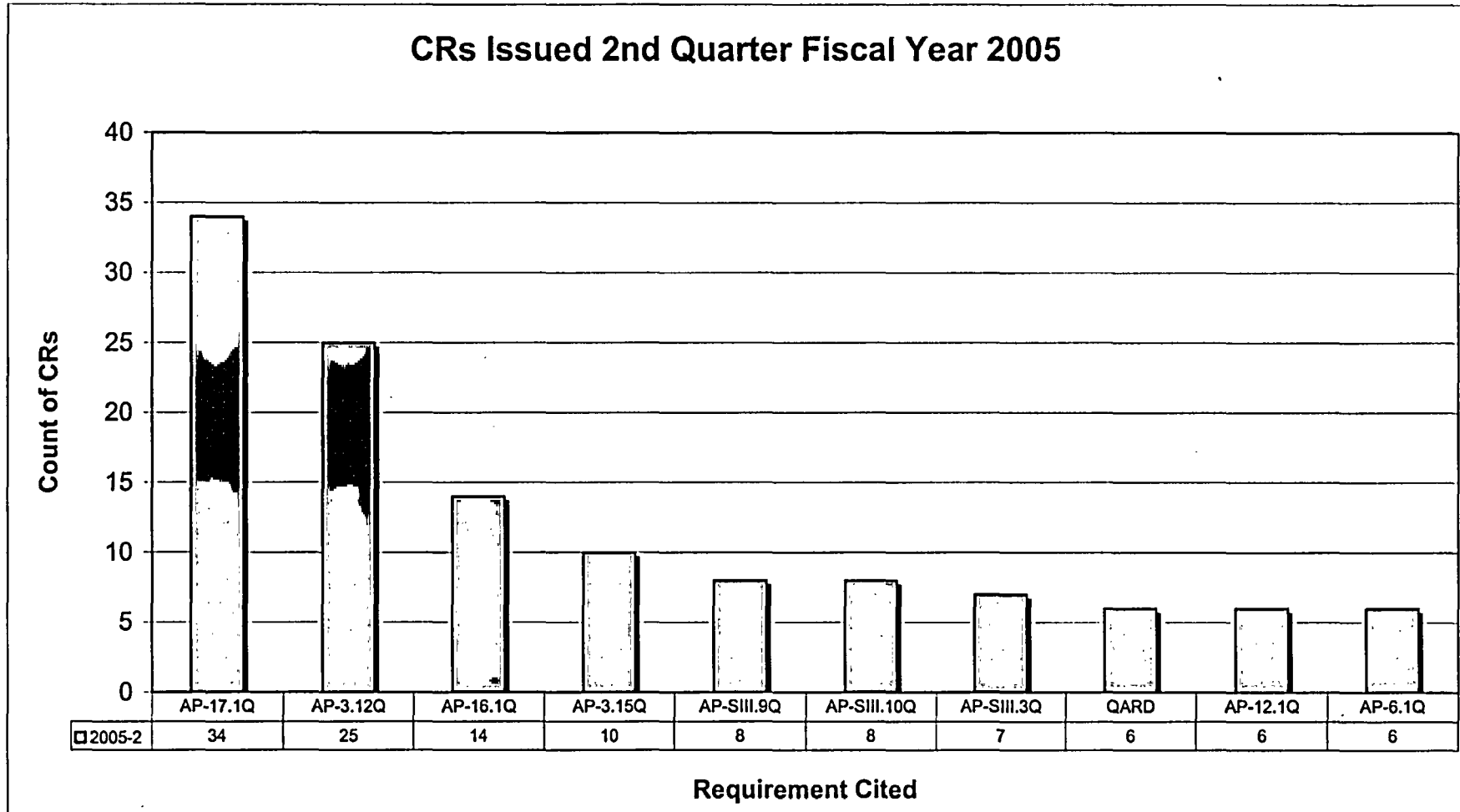
# Trend Evaluation and Reporting

- **2nd Quarter FY2005 Trend Evaluation Report issued May 20, 2005**
- **Human Performance continues to be the dominant causal factor for the 2nd Quarter**
- **Decline in percent of line identification of Level A and B conditions identified as an adverse trend**
- **Consistently high level of CRs with event codes relating to Data Management – Further investigation is underway**



# Trend Evaluation and Reporting

(Continued)



# Performance Based Auditing

- **History of performance based auditing at YMP**
- **Benchmarked NRC Inspection Methodology and Industry Standards**
- **Future approach to audits**



# Office of Quality Assurance Audits/Surveillances

- **Completed Audits**
  - Compliance Audit of BSC Procurement
  - Compliance Audit of National Laboratory Activities
  - Compliance Audit of USGS
- **Completed Surveillances**
  - DOE processing of Level C CRs



# Office of Quality Assurance Audits/Surveillances

(Continued)

- **Upcoming Audits**
  - BSC Procedure Adequacy
  - Software QA Activities
  - BSC Design
  - Augmented QA Program and Site Activities
  
- **Upcoming Surveillances**
  - BSC processing of Level C CRs





# Office of Quality Assurance Audits/Surveillances

(Continued)

- **Completed EM/OCRWM Audits**
  - National Spent Nuclear Fuel Program (Idaho)
  - Savannah River Defense Waste Processing Facility (High-Level Waste)
  - West Valley (High-Level Waste)
  
- **Upcoming EM/OCRWM Audits**
  - Hanford Spent Nuclear Fuel
  - Hanford Office of River Protection (High-Level Waste)



# Management and Operating Contractor Quality Assurance Audits/Surveillances

- **Completed QA Audits**
  - Design Control Process (Compliance based and Limited Scope)
  - Compliance Audit of M&O Las Vegas Activities
- **Completed QA Surveillances**
  - Seven Data Confirmation, Use of Data, Memos, Document Input Reference System
  - Design and Criticality Calculations
  - Site Maintenance Program
  - Licensing Support Network
  - Independent Technical Review of Total System Performance Assessment



# Management and Operating Contractor Quality Assurance Audits/Surveillances

(Continued)

- **Upcoming QA Audits**
  - **Corrective Action Program (Performance-based)**
  - **Scientific Investigation, Sample Control and Measuring and Testing Equipment (Performance-based)**
  
- **Upcoming Notable QA Surveillances**
  - **Four Surveillances of Processing of Level C CRs**
  - **Two AMRs and One Criticality Calculation Evaluation**
  - **Data submittals to Technical Data Management System by LLNL**
  - **Use of Qualified-Verification Level 2 Data on Engineered Products**
  - **Design Interface between Engineering and Pre-Closure**

