CANISTER DOWNLOADING DISCUSSION

Incident & Lessons Learned

Understanding Causes & Taking Action

Charting the Path Forward

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External Engagement
During Nov. 28 CEP meeting, SCE discussed:

- What happened on Aug. 3
- Ceased operations to investigate
- What caused the incident
- In hypothetical drop, no breach or release as canister remains intact
- Actions to prevent reoccurrence
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Multiple reviews conducted with third-party support

• SCE and Holtec performed in-depth analyses to identify performance deficiencies and causes
• Causes identified in training, procedures, technology and oversight
• Third-party international engineering firm MPR reviewed analyses
• Independent Readiness Assessment Team comprised of experts in dry cask storage and regulatory compliance conducted reviews
Taking Action to Address Causes

- **Training**: Better training programs and re-training crews
- **Equipment**: Load monitoring, cameras & alarms
- **Corrective Action Program**: More effective to identify lessons learned
- **Oversight**: More intrusive and effective oversight of operations
- **Procedures**: More detailed procedures
• Fuel transfer operation (FTO) procedures revised to identify critical steps, required qualifications, load limits, and use of new equipment

• Oversight procedures revised to improve:
  – Review & acceptance of contractor procedures and training programs
  – Field performance of fuel transfer oversight through use of task guides
Training
Better training programs and re-training crews

• Revised training program and procedure to increase detail and specificity
• Retrained fuel transfer operations personnel
• Retrained oversight specialists on oversight procedure changes and process fundamentals
• Cameras and monitors to observe downloading remotely
• Load monitoring shackles with remote indication and alarms
• Rope on canister to verify physical status during downloading
• Vendor integrated into SCE Corrective Action Program (CAP) program for all problem identification and resolution associated with fuel transfer operations
• Training provided on lessons learned from Aug. 3 event and July 22 pre-cursor event
• All staff retrained on CAP use and requirements
• Enhanced oversight organization with additional fuel-transfer-experienced personnel

• Rigorous review of contractor procedures and training programs

• Strengthened SCE senior management observation program
Event Reporting & Actions to Strengthen Compliance

- Downloading incident occurred on Friday 8/3
  - SCE informally notified NRC on Monday 8/6
  - SCE filed formal report on 9/14

- Corrective actions
  - Enhanced reportability procedure with additional reporting guidance
  - Assessed other activities with reportability requirements
  - Trained staff on this event and notification requirements
  - After training, test effectiveness via real-time exercise
  - Biennial refresher training to ensure sustainability
Other Issues and Corrective Actions

- Through broad operational review, SCE and NRC identified other issues and developed corrective actions.
- Canister wear assessment and corrosion resistance.
- HI-PORT “Crawler” transporter haul path.
- Vertical Cask Transporter (VCT) seismic restraint.
Canister Wear Assessment

• Multiple methods used to evaluate potential wear during downloading
  – Engineering analysis by multiple models
    • Traditional wear analysis mathematical method
    • Advanced finite element analysis
  – Laboratory test demonstration
    • Used SONGS actual materials and applied forces up to 2X expected forces
  – Inspections to measure wear on representative sample of downloaded canisters
    • Scanned to measure indications on 3 previously loaded canisters

• Similar results obtained
  – Found insignificant wear impact to canister
    • Maximum cumulative wear less than the thickness of a credit card
Canister Inspections

- Precision digital borescope
- Capable of measuring depth and length of indications
- Remote-controlled robot
- Reached 99% of shell
  - Lower part of 3-inch-thick base plate not visible

New web page dedicated to inspections

https://www.songscommunity.com/need-to-know/overview/sce-conducts-spent-nuclear-fuel-canister-inspections
Canister Wear Assessment

- Robust design & fabrication of SONGS multi-purpose canisters
  - Type 316L stainless steel for improved corrosion resistance
  - 0.625 inch wall vs standard 0.500 inch
  - Laser peened welds to prevent chloride induced stress corrosion cracking
  - Two-pass weld technique to minimize introduction of heat

Conclusions
- Incidental wear during downloading poses no safety significance
- Wear marks re-form an oxide layer to protect from corrosion
  - No concern of increased corrosion or canister containment integrity
- Inspection & Maintenance program will monitor over time
“Crawler” Transporter Haul Path

Understanding Causes & Taking Action
Transporter Haul Path

- SCE identified issue with HI-PORT transporter haul route
  - Captured as part of broad review of operations after August incident
  - HI-PORT route too close to objects such as fence and light posts
- Notified the NRC on 12/19/18
- Analyzed obstructions and clearance
- Completed corrective actions to improve procedures and develop guidance for establishing the haul route
- Filed subsequent NRC report which included results of the causal analysis and corrective actions on 2/14/19
- NRC accepted corrective actions via Special Inspection
Vertical Cask Transporter (VCT) with Seismic Restraint

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HI-TRAC (transfer cask and canister)

Cask restraint strap
VCT Seismic Qualification

• NRC identified seismic stability issue during inspection
• SCE formally reported issue to NRC on 2/2/19
• Analysis demonstrated VCT operation without strap has no adverse effect under design-basis earthquake
• Corrective actions implemented
  – Procedures revised for movement of VCT
  – SCE will maintain strap attached and tightened until HI-TRAC needs to be lifted, lowered or moved into position in approach to cavity enclosure container (CEC)
• SCE will retract NRC Event Notification based on the analysis

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Charting the Path Forward
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- Remobilize staff for retraining and additional practice
- Requalification of staff
- NRC webinar 3/25/19
- SCE discusses incident during 3/28/19 CEP meeting
- NRC completes inspection activities
- SCE approves restart of fuel transfer operations
NRC Region IV

Scott Morris, Regional Administrator

Linda Howell, Deputy Director, DNMS
CEP PANEL QUESTIONS & COMMENTS

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