



# Decommissioning **San Onofre**

Nuclear Generating Station

## SONGS Recent Dry Storage Operating Experience

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*NRC RegCon*  
9/17/19

# Topics

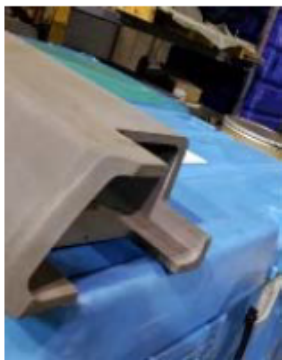
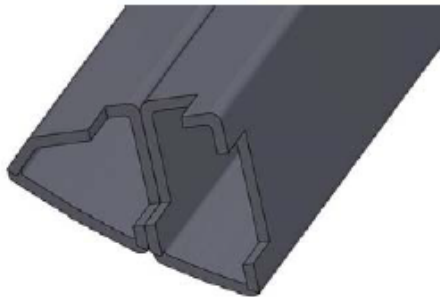
- Shim Standoffs
- Multi-Purpose Canister (MPC) Downloading Event
  - Canister Wear Assessment
- HI-PORT Seismic Analysis
- Vertical Cask Transporter (VCT) Seismic Analysis (“Belly Band”)
- Lessons Learned Summary
- Current Status



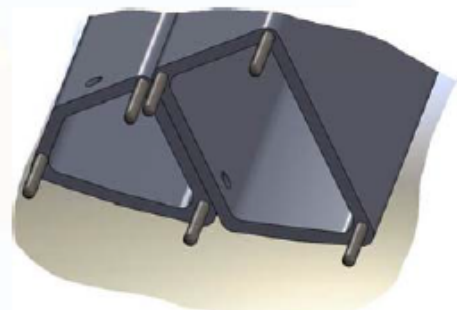
Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Shim Designs

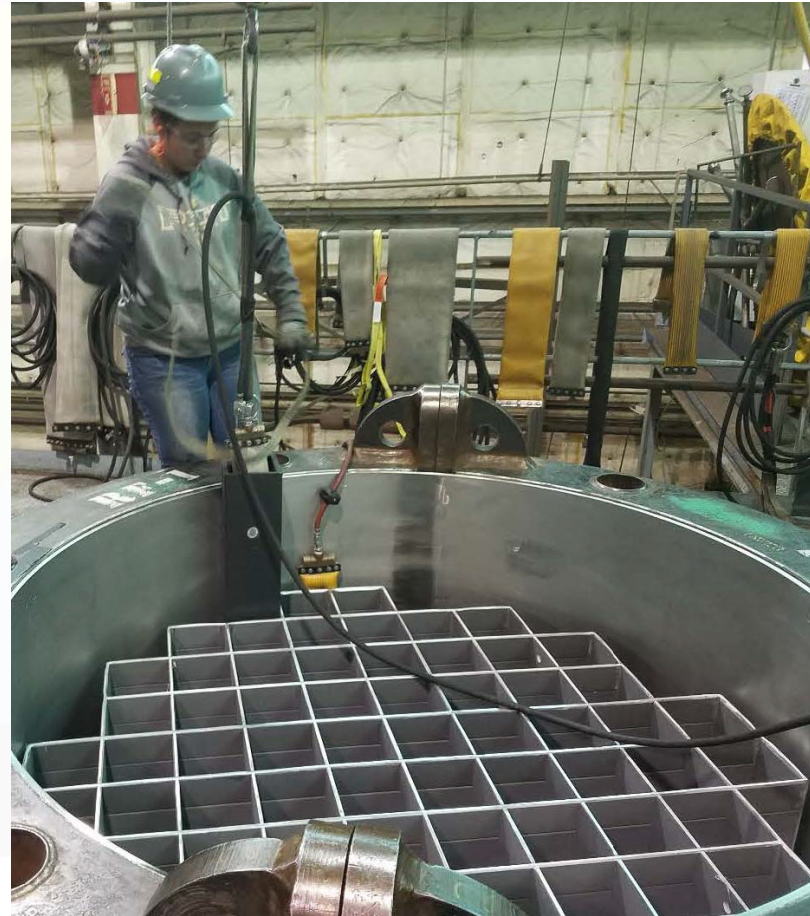
## Original Design



## New Design



# Basket Shims





# Shim Standoffs

- First broken Shim Standoff (SSO) discovered 2/20/2018 during canister receipt inspection
- Four SONGS MPCs use SSO design
- Fuel stored safely within SSO design MPCs, even if all SSOs were to fail non-mechanistically (heat-loads much lower than design and licensed limits)

# Canister Downloading Event

## What Happened

- On Aug. 3, 2018, as a loaded MPC was being downloaded into its storage vault, it became lodged on the shield ring
  - For less than an hour, the MPC remained lodged and was not suspended by the rigging

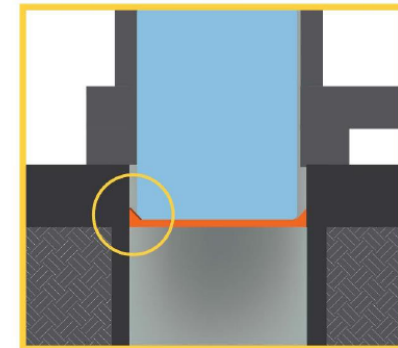
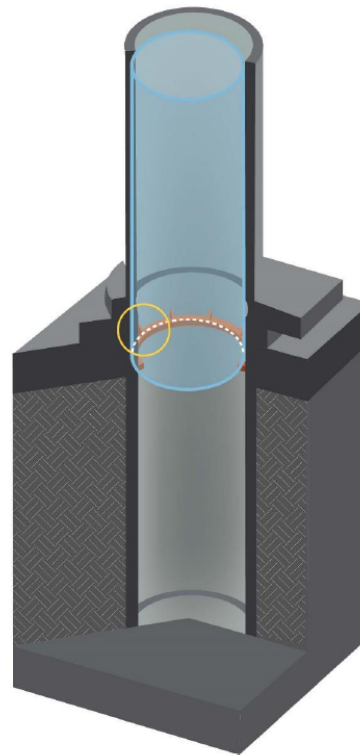
## Significance

- Although unlikely, the canister could have fallen 18 feet to the bottom of the Cavity Enclosure Container (CEC)
- Canisters have been analyzed to be able to withstand drops of up to 25 feet with a substantial margin of safety
- During the event there was no radiological risk to employees or the public; however, this is still an unacceptable incident

# Description of Event

- MPC lodged on shield ring
- Shield ring is 2" thick; welded in place

## What happened on Aug. 3



■ MPC WEDGED IN CEC

# Description of Event





Understanding  
Causes &  
Taking Action

# Taking Action to Address Causes

## Procedures

More detailed  
procedures

## 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



Understanding  
Causes &  
Taking Action

## 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

Understanding  
Causes &  
Taking Action



## 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

Understanding  
Causes &  
Taking Action



## Equipment

Load monitoring,  
cameras & alarms

- Cameras and monitors to observe downloading remotely
- Load monitoring shackles with remote indication and alarms
- Rope on canister to verify physical status during downloading



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Understanding  
Causes &  
Taking Action



## Corrective Action Program

More effective to  
identify lessons  
learned

- 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, 2018 event and July 22, 2018 event
- All staff retrained on CAP use and requirements

Understanding  
Causes &  
Taking Action

## Oversight

More intrusive and  
effective oversight  
of operations



- 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 8/3/18
  - SCE informally notified NRC on Monday 8/6/18
  - SCE filed formal report on 9/14/18
- 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

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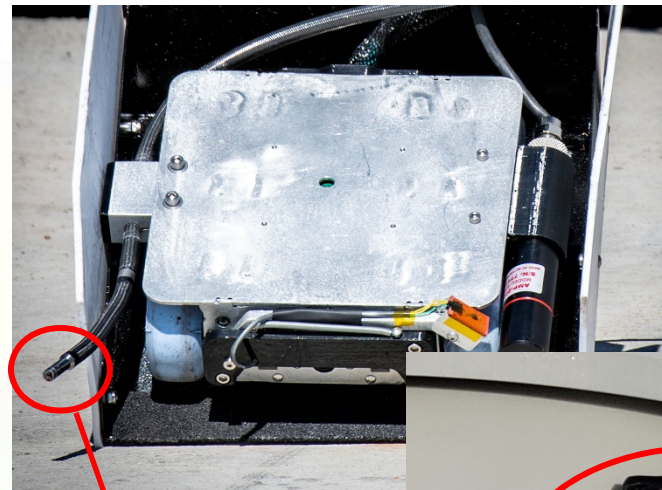
# Canister Wear Assessment

- Holtec UMAX FSAR states no risk of MPC scratching due to ample clearances
- FSAR statement revised via 10 CFR 72.48 process
  - NRC concurred with use of 10 CFR 72.48 process to make change without prior NRC approval



# Canister Inspections

- Precision digital borescope
- Capable of measuring depth and length of indications
- Remote-controlled robot
- Reached 92% of shell
  - Lower part of 3-inch-thick base plate not visible



Borescope  
(camera)



Robot

*New web page dedicated to inspections*

<https://www.songscommunity.com/need-to-know/overview/sce-conducts-spent-nuclear-fuel-canister-inspections>

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# 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



Understanding  
Causes &  
Taking Action

# “Crawler” Transporter Haul Path



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# 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

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# Vertical Cask Transporter with Seismic Restraint



**HI-TRAC**  
(transfer cask  
and canister)

**Cask restraint  
strap**

# Vertical Cask Transporter 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 CEC
- SCE retracted NRC Event Notification based on the analysis

# Lessons Learned Summary

- Recommend reviewing SCE's Downloading Event Pre-Decisional Enforcement Conference presentation for relevance to your site and potential changes to site programs and procedures:

<https://www.nrc.gov/docs/ML1902/ML19023A033.pdf>

# Current Status

## [As of 9/10/19]

- Since resuming fuel transfer operations:
  - 4 MPCs moved to the Independent Spent Fuel Storage Installation and downloaded
  - 40 MPCs remain to be loaded

**END**