# *PG&E Meeting with NRC on Proposed Part 50 LAR and use of a Single-Failure-Proof Lifting Device in the Refueling Building*

April 20, 2004

Humboldt Bay ISFSI Project

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# *Agenda*

- Introduction
- Overview
- HBPP Part 72 Application Status
- HBPP SAFSTOR Licensing Basis
- Cask Handling Concepts
- LAR Contents
- Major Analyses
- Proprietary Discussion of Davit Crane and Strand Jack

# *Overview of Humboldt Bay Unit 3*

- Unit 3 is a 65 MWe BWR co-located with 2 operating fossil units and 2 combustion turbines
- Unit 3 was shutdown in 1976 for refueling and seismic modifications
- Refueling Building upgraded to 0.5g. Did not obtain NRC concurrence on seismic hazard
- DPR-7 was amended in 1988 to a possession-only license (SAFSTOR)
- Part 72 license application for an ISFSI filed with the NRC in December 2003
- Plan to file Part 50 LAR in July 2004

# *Overview of Spent Fuel*

- Fuel stored in steel lined below grade spent fuel pool located in Refueling Building (RFB) next to Reactor Vessel
- 390 spent fuel assemblies - all but one stored in individual Boral cans
- No cooling required - approximately 35 watts per assembly with water of 78ºF

# *HBPP Part 72 Application Review Schedule*

- Application filed on December 19, 2003
- Acceptance review completed on February 2, 2004
- RAIs to be issued September 2004
- PG&E RAI response November 2004
- License issuance scheduled for August 2005

# *HBPP SAFSTOR Licensing Basis*

- SAFSTOR Accident Summary
  - Fuel handling accident and non-mechanistic heavy load drop
  - No criticality due to a seismically-induced or otherwise load-induced rearrangement of spent fuel assemblies
  - Spent fuel pool rupture
  - Impact of tsunami flooding
- SER Conclusions
  - Fuel handling accident or non-mechanistic heavy load drop doses are a small fraction of Part 100
  - Small likelihood of criticality due to seismic loads or other mechanical loads
  - Consequences of rupture of the SFP found acceptable
  - Offsite radiological consequences of a tsunami are bounded by the above

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# *Cask Handling Concepts*

## Handling under 0.5g design criteria

- Lower empty cask into pool using special single failure proof lifting device (device design is proprietary)
- Load casks and set MPC lid
- Install temporary lid restraint
- Lift loaded casks from pool using special single failure proof lifting device and perform initial cask decontamination
- Set loaded cask on rail dolly
- Perform initial tack welds on MPC lid

# *Cask Handling Concepts, cont.*

- Remove temporary lid restraint
- Prepare and perform MPC welding, drying, and helium backfill procedures.
- Install permanent HI-STAR overpack bolted closure plate
- Prepare and perform overpack drying and helium backfill procedures
- Perform final decontamination of the overpack
- Roll cask out of RFB on the rail dolly to be received by the transporter

# *Davit Crane Design*

- Dead load, lifted load, and seismic load
- ASME NF equipment support for davit crane structure
- ACI-349-01 Appendix for anchorage to concrete
- ACI-349-01 for capacity check of existing concrete under dead, hydrostatic, seismic, and anchorage loads
- Design seismic input is SSEERFB (ZPA = 0.5)
- ANSYS FEA with response spectra for 3-D seismic load cases
- NUREG-0612 and NUREG-0554 as applicable

# *LAR Contents*

- Heavy loads program
- Structural/seismic design
- Thermal design
- Radiological assessment
- Water chemistry considerations
- Criticality
- Accidents and events evaluated
  - Drops and tipovers
  - Natural phenomena

# *Design and Major Analyses*

- Seismic
- Davit crane
- Pool wall
- Cask on rail dolly
- Thermal analysis
- Criticality analysis
- Drops and tipover

# *Seismic*

- Analyses performed will be under existing licensing basis and using seismic design criteria of 0.5g
- Analyses
  - Davit crane and strand jack
  - Cask pit
  - Cask wash down area
  - Pool wall
  - Cask on rail dolly

# *Davit Crane*

- Methodology - finite element analysis using ANSYS 5.7
- Acceptance criteria - ASME Section III, NF for level D
- Analysis documented in HI-2033021 and show safety factors greater than 1.0

# *Pool Wall*

- Methodology - finite element analysis using ANSYS 5.7
- Acceptance criteria - ACI 349
- Analysis documented in HI-2033021 and shows pool wall under davit crane will withstand combined loads induced by the weight of the crane, the lifted load, and hydrodynamic loads under normal and earthquake conditions

# *Cask on Rail Dolly*

- Methodology - VisualNastran and Solidworks
- Acceptance criteria - HI-STAR HB on dolly does not tip over under 0.5g and acceleration is <60g under deterministic earthquake
- Analysis documented in HI-2033046 and show that the cask does not tip over during 0.5g and acceleration is <60g under deterministic earthquake

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# *Thermal Analysis*

- No cooling required for existing fuel in boral cans in the pool - approximately 35 watts per assembly with water of 78ºF
- No adverse effect on SFP water temperature or RFB HVAC based on the very low heat load of the fuel

# *Criticality Analysis*

- Analysis performed using the HI-STAR FSAR methodology which has been approved by the NRC through issuance of CoC No. 1008
- Analysis and associated codes are described in detail in the HI-STAR FSAR
- Part 72 SAR analysis results confirm the maximum reactivity for HI-STAR HB with failed fuel is well below 0.95 $k_{eff}$

# *Drops And Tip-over*

- Drops are not postulated since load handling equipment meets NUREG-0612 single failure proof requirements for 0.5g earthquake
- Tipover of cask on dolly is postulated for >0.5g earthquake and has acceleration <60g
- In the event of an earthquake greater than 0.5g resulting in a cask drop into the pool, existing SAFSTOR licensing basis is bounding

***Proprietary Information***