DIABLO CANYON POWER PLANT
Pre-application Meeting, Alternative Source Term License Amendment Request
February 3, 2015

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Agenda

- Diablo Canyon Power Plant (DCPP) Current Radiological Analysis Licensing Basis
- Issues to be Resolved by License Application Request (LAR)
- Alternative Source Term (AST) Analyses Summary
- AST Impact on Other Analyses
- Precedent

Agenda (cont.)

- Tech Spec (TS) Changes
- Documentation Changes
- PG&E Questions
- Staff Feedback

DCPP Current Licensing Basis

- AST Partial Implementation
  - Fuel Handling Accident (FHA) in the Fuel Handling Building
    - SER 163 and 165 to support changes to safety related ventilation filter testing program
- TID-14844 Source Terms
  - All other post-accident dose consequence analyses
  - Radiological Equipment Qualification (EQ)
  - Post-LOCA Operator Vital Area Mission Doses

DCPP Current Licensing Basis (cont.)

- Assumptions similar to NUREG 0800
  - Loss of Coolant Accident (LOCA)
  - Main Steam Line Break (MSLB)
  - Steam Generator Tube Rupture (SGTR)
  - FHA in the Containment

DCPP Current Licensing Basis (cont.)

- Pre-NUREG 0800, DCPP-Specific / No Control Room Dose Assessment
  - Control Rod Ejection Accident (CREA)
  - Locked Rotor Accident (LRA)
  - Loss-of Load (LOL) Event

DCPP Current Licensing Basis (cont.)

- RG 1.183 Iodine Release Rate Multiplier
  - SGTR (X 335)
- Dose Conversion Factors
  - Different accidents use different dose conversion factors
- Technical Support Center (TSC) Habitability for LOCA per NUREG-0737, Supplement 1
- Operation of Containment Spray during recirculation mode controlled by EOPs/TSC

Issues to Be Resolved by LAR

- Licensing Basis Verification Project
  - Voluntarily initiated by DCPP
  - Identified issues (addressed in Corrective Action Program)
    - Atmospheric dispersion factors methodology
    - Post-accident environmental release points
    - Containment purge system releases during LOCA
- Incorporate recent Control Room Tracer Gas Test Results

Proposed Changes to DCPP Licensing Basis

- Full Implementation of AST
- Remove dose contribution of a containment purge following a LOCA for purposes of hydrogen control per revised 10CFR50.44
- Remove “expected” accident dose assessments that were part of original license application
- Remove dose contribution to the CR operator during daily commute from site boundary to CR following a LOCA

AST Analyses Summary

- Analyzed Events
  - Loss of Coolant Accident (LOCA)
  - FHA in the Containment
  - FHA in the Fuel Handling Building (reanalysis)
  - Locked Rotor Accident (LRA)
  - Control Rod Ejection Accident (CREA)
  - Main Steam Line Break (MSLB)
  - Steam Generator Tube Rupture (SGTR)
  - Loss-of Load (LOL) Event

AST Analyses Summary (cont.)

- DCPP followed the guidance of RG 1.183, with two exceptions
  - Non-LOCA Gap Fractions (other than CREA)
    - Bounding values per isotope/isotope class provided in:
      - RG 1.25
      - NUREG/CR 5009
      - RG 1.183
  - FHA analyzed without concurrent loss of offsite power per guidance provided in IN 93-17, R1

AST Analyses Summary (cont.)

- Other aspects of AST analyses
  - Update of computer codes
  - Use of dose conversion factors (DCFs) from Federal Guidance Report (FGR) No. 11 & 12, as appropriate, for all design basis accidents
  - New offsite (per RG 1.145) and Control Room (ARCON 96) X/Q factors
    - Meteorological data from 2007 to 2011

AST Analyses Summary (cont.)

- Control Room Model
  - Updated CR ventilation system parameters due to new back-draft damper in CR emergency filter recirculation lines
  - Updated CR unfiltered inleakage based on 2012 CR Tracer Gas Test
  - Credit for CR “dual intake” ventilation design

AST Analyses Summary (Cont.)

- LOCA Analysis
  - Credit for Containment Spray in Recirculation Mode
    - Until ~6.25 hours
    - Manual Initiation
  - Updated Engineered Safety Features system leakage values and release points
  - Elimination of Containment Purge Pathway for Hydrogen Control

AST Analyses Summary (Cont.)

- FHA
  - Credit for automatic initiation of CR emergency ventilation by safety related radiation monitors located at CR normal ventilation intake
  - Minimum decay time prior to fuel movement reduced from 100 hours to 72 hours
- MSLB, SGTR, LRA, CREA, LOL Event
  - Primary to secondary leakage is assumed to be a total of 0.75 gpm from all steam generators (equivalent to 1080 gallons per day)
  - TS limit is 150 gallons per day from any one steam generator

AST Impact on Other Analyses

- Radiation Environments for EQ
  - Continues to be based on TID-14844 source terms
    - Per NUREG-0933, "Resolution of Generic Safety Issues", Section 3.0, Item 187
    - No discernible risk reduction associated with adopting AST for EQ
  - Radiation environments for EQ in ESF HVAC filter cubicles will be evaluated for effect of reanalysis
  - Effect of CS in recirculation mode already incorporated in DCPP EQ radiation environments

AST Impact on Other Analyses (Cont.)

- Post-LOCA Vital Area Mission doses
  - Continues to be based on TID-14844 source terms
    - Per AST benchmarking study in SECY-98-154
    - TID-14844 more limiting earlier on in the event
- TSC Habitability
  - Evaluated for LOCA using AST

AST Precedent

- AST Submittals in General
  - Many AST submittals and approvals
- Containment Spray during Recirculation
  - DCPP already licensed for CS operation in Recirculation Mode
  - Salem Units 1 and 2
- Non-LOCA Gap Fractions
  - Millstone
  - Indian Point

AST Precedent

- Use of CB&I Proprietary Codes (next slide)
  - Beaver Valley
  - Fort Calhoun
  - CE System 80+ Design Certification

CB&I Stone & Webster Proprietary Codes

Code	Task	Precedent with AST Applications*
ACTIVITY2	Reactor coolant activity inventory	Beaver Valley Fort Calhoun
IONEXCHANGER	Secondary coolant activity inventory	Beaver Valley Fort Calhoun
EN-113	EAB and LPZ atmospheric dispersion factors, follows RG 1.145 methodology	Fort Calhoun
SWNAUA	Particulate aerosol removal coefficients	Beaver Valley Fort Calhoun CE System 80+ Design Cert
PERC2	Shine dose energy release rates and gamma energy releases, source terms for SW-QADCGGP	Beaver Valley Fort Calhoun CE System 80+ Design Cert
SW-QADCGGP	Direct shine dose to control room and EAB	Beaver Valley Fort Calhoun

*The listed codes have been used extensively by CB&I Stone & Webster in licensing applications supporting original licensing, as well as modifications to nuclear power plant design, and their results have been accepted by NRC.

Tech Spec Changes

- TS 1.1, Definition of Dose Equivalent I-131
  - Revised to only reference Table 2.1 of FGR 11 for dose conversion factors
  - Consistent with RIS 2006-04, item 10
  - Consistent with TSTF-490
- TS 3.4.16, RCS Specific Activity
  - Reduce Dose Equivalent XE-133 from ≤ 600 µCi/gm to ≤ 270 µCi/gm
    - Equivalent to ~0.5% fuel defects

Tech Spec Changes (Cont.)

- TS 3.6.3, Containment Isolation Valves
  - Currently allows operating 48-in containment purge supply and exhaust valves during Modes 1 through 4 under administrative controls
  - Revised to require these 48-in valves closed and deactivated during Modes 1 through 4
  - Eliminates potential release path following LOCA
  - Consistent with Standard TSs

Tech Spec Changes (Cont.)

- TS 5.5.11, Ventilation Filter Testing Program
  - Revise allowable methyl iodine penetration testing criteria for Auxiliary Building Ventilation system charcoal filter from 15% to 5%
  - Value used to determine charcoal filter efficiency for removing iodine from atmospheric releases
  - Filtration credit only taken for offsite dose from Residual Heat Removal (RHR) pump seal passive failure following a LOCA. CR dose does not credit filtration.

Tech Spec Changes (Cont.)

- TS 5.5.19, Control Room Envelope Habitability Program
  - Replace “whole body or its equivalent to any part of the body” to “TEDE”.

Documentation Changes

- TS Bases
- FSAR
- Procedures

PG&E Questions

- Requesting staff feedback on
  - Proposed changes to licensing basis (Slide 9)
  - Planned RG 1.183 exceptions (Slide 11)
    - Non-LOCA Gap Fractions
    - Analyzing FHA without concurrent loss of offsite power

Staff Feedback

- Staff Feedback