HUMBOLDT BAY ISFSI
License Renewal Application

Pre-Application Meeting
December 12, 2017

Meeting Attendees

- Tom Jones – Pacific Gas and Electric (PG&E) Director, Strategic Initiatives
- Brent Rittmer – Humboldt Bay ISFSI Manager
- Philippe Soenen – PG&E Decommissioning Environmental and Licensing Manager
- Johns Griffiths – Holtec Corporate Director – Engineering Design
- Matt Britz – Holtec Design Engineer

Meeting Purpose / Goals

- **Provide background information to the NRC staff on the Humboldt Bay (HB) Independent Spent Fuel Storage Installation (ISFSI)**
- **Provide preliminary information to the NRC staff on the license renewal application**
- **Obtain feedback from the NRC staff on the license renewal application:**
  - Pre-application inspection results
  - 40-year license renewal from expiration date of current license
  - Alternative to tollgate assessments
  - License conditions

Description of the HB ISFSI Site

- Three miles south of Eureka in northwestern California
- Located at Humboldt Bay on the Pacific Ocean
- ISFSI is positioned on top of Buhne Point Hill (42 ft. elevation)

* ISFSI is within the owner-controlled area for HB Power Plant, which is under active decommissioning

HB ISFSI License

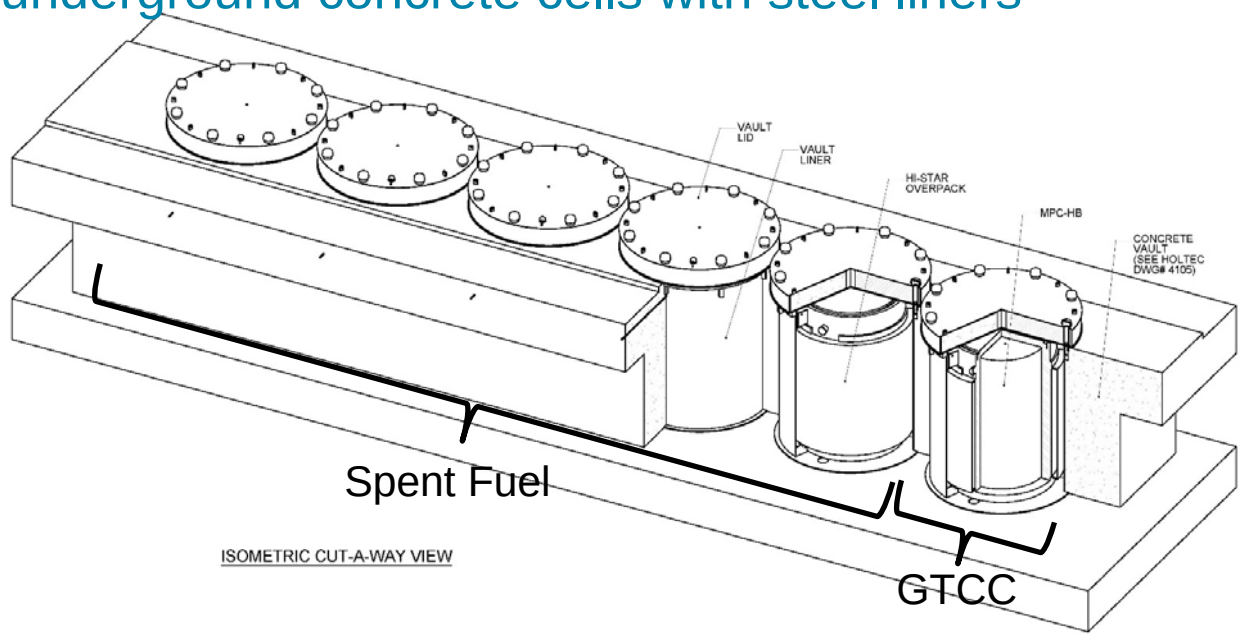
- Part 72 site-specific ISFSI license
- Five spent fuel casks and one greater than class C (GTCC) waste cask
  - Contained in an underground vault with six cells
- Spent fuel loaded in five casks in 2008; GTCC waste cask loaded in 2013
  - All casks are loaded and are in long-term storage mode
  - Cask transfer equipment is shared with Diablo Canyon ISFSI and is stored at Diablo Canyon
- No high-burnup fuel
- Heat loads at time of fuel load were approximately 1.9 kW / cask
- ISFSI license expires in November 2025
- Planned ISFSI license renewal application (LRA) submittal by the end of Q1 2018

HB Power Plant Decommissioning

- HB Power Plant Unit 3 Shutdown: July 1976
- Estimated completion date of decommissioning (physical work): 2018
- Estimated completion date for Part 50 license termination: 2020
- Work Remaining:
  - Removal of caisson underground piping and structures
  - Restoration of intake/discharge canals

Overview of HB Cask System

- Use a modified version of the Holtec HI-STAR 100 System:
  - HI-STAR 100 Multi-Purpose Container (MPC)-HB and HB cask (also referred to as overpack) – licensed for storage and transport
  - HI-STAR HB GTCC waste container and HB overpack – licensed for storage
- MPC-HB (seal welded) and HB overpack (bolted) are helium-filled
- The GTCC waste container (seal welded) contains helium and overpack (bolted) contains ambient air
- Overpacks are stored in underground concrete cells with steel liners
- Vaults are closed off from weather by bolted, caulked vault lids
- Each cell contains a drainage system in the event of water intrusion

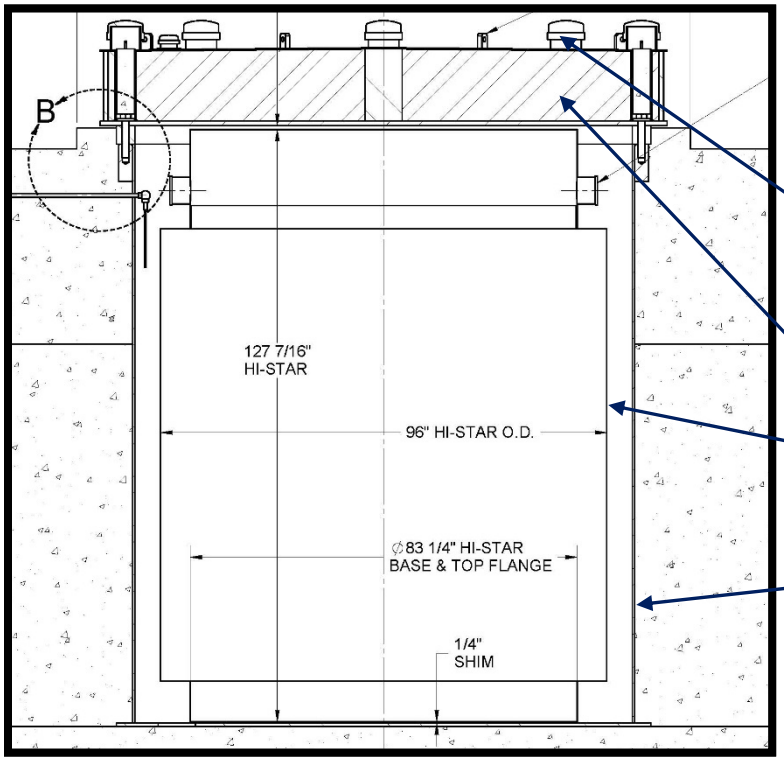


Existing HB ISFSI Inspections

- Water intrusion inspection since initial loading
  - Requires boroscope inspection via the access port if water is identified
  - Previously identified water on a cell floor (2012); corrective actions included:
    - caulking the vault lids to prevent water intrusion
    - conducting periodic caulk inspections and standpipe inspections
    - keeping the drainage pipe valve open to allow draining
  - Subsequent inspections showed no water intrusion
- Thermoluminescent dosimeter (TLD) dose monitoring compiled quarterly since initial loading
  - No adverse dose trend observed compared to background
- Annual visual inspection of 100 percent of accessible exterior vault concrete for degradation
  - No significant findings – minor cracking was within ACI 349.3 Tier 1 and 2 criteria
- Annual ISFSI vault concrete settlement monitoring
  - No measureable settlement identified

Access to Overpack

- While vault lid is installed, overpack access is limited to a 3-inch access port
- ~5.5-inch or greater space between vault liner and overpack
- 0.25-inch space at bottom of overpack



Vault Lid Lifting Lug

Vault Lid Bolt Covers

Vault Lid

Overpack

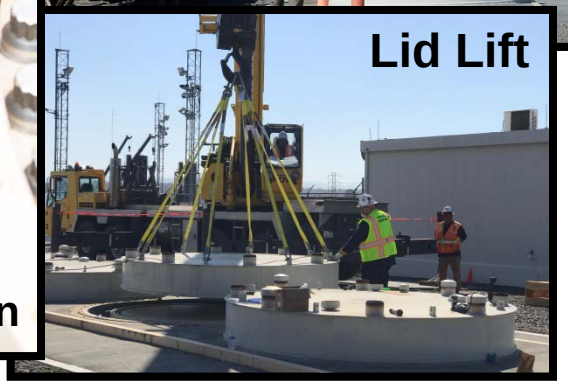
Vault Liner

Pre-Application Inspection Scope

1. As-found condition of the vault lid caulking
2. Removal of one vault lid (cell #2)
3. Measure dose rate readings on the top of the HI-STAR 100 HB overpack
4. Visual inspection of the accessible portions of the overpack, vault liner, & vault lid bottom
5. Relief device inspection, and contingency replacement, as needed
6. Re-installation of the vault lid
7. As-left condition of the vault lid Caulking

Acceptance criteria was consistent with that presented in applicable example aging management programs (AMPs) in draft NUREG-2214 and NUREG-1927.

Video Clip



Pre-Application Inspection Results

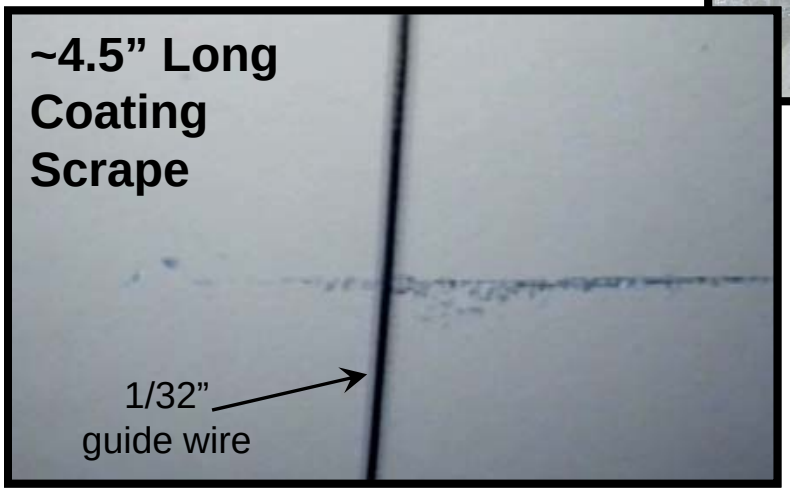
Vault Lid Bolting

- Expanded scope of bolting inspection based on findings
- Replaced six out of 48 bolts for all vaults
- Results entered into Corrective Action Program (CAP) for evaluation

Replaced Vault Lid Bolt

VT-3 Inspection – Overpack & Vault Liner

- Overall good condition, no relief device replacement needed
- One location with temporary repair
- Minor indications noted & entered into CAP



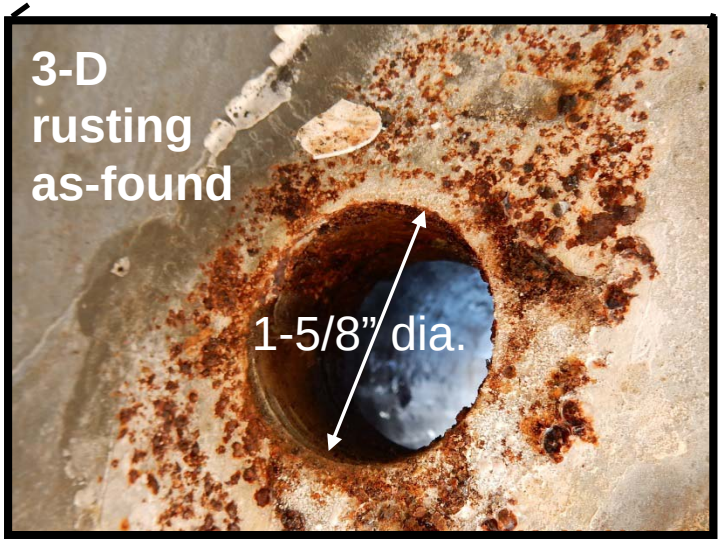
Pre-Application Inspection Results

VT-3 Inspection – Vault Lid

- Lid in good condition overall
- Localized 3-D rusting at two bolt holes
  - All corrosion cleaned
- Results entered into CAP for evaluation

Dose Rate Measurements

- As-expected, met acceptance criteria



HB ISFSI License Renewal Application

- Will follow NUREG-1927, Rev. 1, NEI 14-03, and the draft Managing Aging Processes in Storage (MAPS) Report guidance (NUREG-2214)
- Consistent with Part 54 LR, will apply for a 40-year extension of existing license
  - LRA will request a 40-year extension from the current license expiration date, not 40 years from date of LRA approval
  - Surry LR was granted for 40 years from expiration with 1.5 years remaining on initial license term
- Using Trojan, Prairie Island, NUHOMS, and Calvert Cliffs LRAs, requests for additional information (RAIs), and Safety Evaluation Reports (SERs) and draft HI-STAR CoC LRA as guidance

HB ISFSI License Renewal Application Overview

- Chapter 1, General Information, including required financial information
- Chapter 2, Scoping Evaluation
- Chapter 3, Aging Management Review
- Chapter 4, Time-Limited Aging Analyses
- Appendix A, Aging Management Program
- Appendix B, Granted Exemptions
- Appendix C, Proposed License Changes
- Appendix D, Final Safety Analysis Report (FSAR) Supplement
- Appendix E, Pre-Application Inspection Report
- Appendix F, Environmental Report

HB ISFSI Scoping Results

Structures/Components	Criterion 1	Criterion 2	In-Scope
Spent Fuel Assemblies	Yes	N/A	Yes
MPC-HB (includes fuel basket)	Yes	N/A	Yes
HI-STAR 100 HB Overpack	Yes	N/A	Yes
Cask Transportation System[1]	Yes	N/A	No[2, 3]
ISFSI Storage Vault	Yes	N/A	Yes
Damaged Fuel Container	Yes	N/A	Yes
Helium Fill Gas	Yes	N/A	No[2]
Lid Retention Device	Yes	N/A	No[2]
HI-STAR 100 HB GTCC Waste Container (GWC)	Yes	N/A	Yes
HI-STAR 100 HB GTCC Overpack	Yes	N/A	Yes
Process Waste Container	Yes	N/A	Yes
Process Waste	No	No	No
GTCC Waste	No	No	No
Security Systems, Fencing, Lighting	No	No	No
Electrical Power, Communications Systems	No	No	No
Automated Welding System (AWS)	No	No	No
MPC Forced Helium Dehydration System	No	No	No
Overpack Vacuum Drying System	No	No	No
Rail Dolly	No	No	No
ISFSI Storage Vault Drainage Pipe	No	No	No

Notes:

1. Includes, but is not limited to the cask transporter, transporter lift links, and transporter connector pins.
2. These components are listed as ITS in the HB ISFSI FSAR, but only supported initial loading of the casks. Because these components do not support a long-term storage or retrievability function, they are not in the scope of license renewal.
3. Plant procedures dictate required inspections of the cask transportation system prior to future use.

HB ISFSI Scoping and Aging Management Review

- LRA will breakdown into sub-components per fabrication drawing bill of materials listings and provide the safety intended functions
  - Licensing drawings are docketed in the HB ISFSI FSAR Update
  - Proprietary fabrication drawings will be made available in an electronic reading room or during inspection

- Aging Management Review (AMR) is only conducted on those sub-components that have a safety intended function or whose failure could prevent fulfillment of a safety function:
  - Safety function based on confinement, sub-criticality control, heat transfer, structural integrity, shielding, and retrievability

- AMR tables in Chapter 3 provide materials, internal and external environments, aging effects/mechanisms, and aging management

- Chapter 3 will provide references used to determine aging effects (MAPS Report, Electric Power Research Institute Structural Tools, NUREG-1801, etc.)

HB ISFSI AMP

PG&E is proposing two AMPs to manage all aging effects requiring management as follows: External Surfaces Monitoring and Reinforced Concrete Structures

SSC	Inspection	Frequency	Inspection Details / Acceptance Criteria
Overpack and Overpack Coating	Visual verification – 100% accessible areas	Annual	Visual inspection of areas accessible by a standard articulating boroscope via the access port for all vault cells Acceptance criteria are consistent with draft MAPS Report for External Surfaces
		5 Years	Lift lid on one cell (same cell each time for trending purposes) VT-3 inspection of areas accessible by a standard articulating boroscope without lifting the cask Acceptance criteria same as annual
Vault Liner and Coating	Visual verification– 100% accessible areas	Annual	Visual inspection of areas accessible by a standard articulating boroscope via the access port for all vault cells Acceptance criteria are consistent with draft MAPS Report for External Surfaces
		5 Years	Lift lid on one cell (same cell as overpack inspection) Acceptance criteria same as annual
Vault Lid Caulk	Visual verification	Annual	Engineering visual inspection Indications of gaps, tears, and/or weak spots are entered into CAP.

HB ISFSI AMP

SSC	Inspection/Test	Frequency	Inspection Details / Acceptance Criteria
Vault Lid Bolting	Visual verification – 100% bolting	5 Years	Engineering visual inspection Indications of loss of material that would preclude adequate thread engagement or adequate function of the shank or head are entered into CAP.
Vault Exterior Concrete	Visual inspection of 100% of above-grade concrete	Annual	Engineering inspection using ACI-349.3-R02 less than Tier 2 acceptance criteria
		5 Years	ACI-349.3-R02 engineering inspection, including vault settlement monitoring
	Below-grade concrete	Opportunistic	ACI-349.3-R02 examination of inaccessible below-grade concrete conducted when excavated for any reason
Shielding	Radiation monitoring	Quarterly	TLD dose results and dose rate at each vault lid Acceptance criteria are consistent with FSAR calculated dose rates
		5 Years	Measurements at each overpack lid (that is exposed) and each vault lid Acceptance criteria are consistent with FSAR calculated dose rates
Soil	Soil testing	5 Years	Chemical analysis of pH, and concentrations of chlorides and sulfates of soil in the vicinity of the HB ISFSI to confirm that the soil is non-aggressive.

- No proposed aging management for overpack internals, MPC internal/external, GWC internals, and process waste container internal/external due to helium environment.

HB ISFSI AMP Effectiveness

- A Program Health Report will be issued annually. It includes:
  - AMP health performance metrics
  - issues that impact or may impact AMP performance; actions required
  - operating experience (OE) evaluations, including:
    - Humboldt Bay ISFSI-specific OE
    - ISFSI Aging Management INPO Database (AMID)
    - NRC generic correspondence
    - Holtec OE
    - Industry working group OE

HB ISFSI AMP Effectiveness

- Tollgates were proposed in NEI 14-03 to evaluate operating experience for those topics where further research was required to determine how best to manage potential aging.
- In lieu of a tollgate assessment, PG&E will evaluate AMP effectiveness on a five-year basis consistent with NEI 14-12, “Aging Management Program Effectiveness,” Revision 0.
- It includes an in-depth self-assessment of each AMP element:
  - Compilation and review of OE
  - Trending of ISFSI system performance
  - Conclusions of whether the AMP is effective

HB ISFSI Time-Limited Aging Analyses

- Developed a preliminary list of time-limited aging analyses (TLAAs) and technical evaluations based on previous LRA reviews, HB ISFSI design and licensing documentation reviews, and NRC guidance

- Two evaluations were identified as meeting all six TLAA criteria and were evaluated for the additional 40 years:
  - Neutron absorber and shielding performance
  - Fatigue of the overpack closure bolts and threads

- Although not TLAAs, one evaluation was reviewed to disposition aging on systems, structures, and components within the scope of renewal, and justify their exclusion from an AMP:
  - Fatigue of the MPC-HB and overpack

HB ISFSI Proposed License Conditions

- Proposed license changes will be provided in LRA Appendix C
- Includes new conditions to:
  - Implement the FSAR Supplement into the FSAR once the renewed license is issued
    - Scoping Results
    - AMR Results
    - AMPs Summary
    - TLAA Summary
  - Issue and maintain procedures to implement the AMPs
- No AMP descriptions in the license, but referenced via the FSAR Supplement
- No proposed changes to Technical Specifications

HB ISFSI Environmental Supplement

- Incorporating the original HB ISFSI license application environmental report (ER) by reference
  - Noting updates regarding site-specific potential impacts since the original ER (e.g., demography, air quality, species lists)
  - Addressing the generic findings described in NUREG-2157, Generic Environmental Impact Statement for Continued Storage
- Following Prairie Island and Trojan Environmental Supplement precedence

Conclusion

- Renewal submittal planned for the end of Q1 2018
- Following existing guidance and previously-approved applications as much as possible:
  - Pre-application inspection
  - 40-year license renewal from expiration date of current license
  - Alternative to tollgate assessments
  - License conditions
- Propose two aging management programs for management of the overpack external surfaces, vault liner, and vault concrete