UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

August 10, 2009

John T. Conway
Senior Vice President &
Chief Nuclear Officer
Pacific Gas and Electric Company
P.O. Box 3
Mail Code 104/6/601
Avila Beach, CA 93424

SUBJECT: NRC INSPECTION REPORT 050-275/09-007; 050-323/09-007; 072-026/09-001

Dear Mr. Conway:

This report covers six inspection visits made by the U.S. Nuclear Regulatory Commission (NRC) to your Diablo Canyon Power Plant Independent Spent Fuel Storage Installation (ISFSI) between January 27 and June 18, 2009. The purpose of the inspection was to observe your dry fuel storage preoperational testing activities, to independently assess your readiness to load spent fuel into the ISFSI, and to inspect your initial fuel loading operation. The initial loading of spent fuel into dry storage occurred between June 15 and 23, 2009. Overall, the NRC determined that with the exception of the two Non-Cited Violations (NCVs) described below, the licensee was well prepared and completed the initial cask loading in a safe manner. On July 2, 2009, a telephonic exit briefing was conducted with Mr. Jim Becker, Site Vice President, and other members of your staff. The enclosed report presents the scope and results of that inspection.

Based on the results of the inspection, the NRC has determined that two violations of NRC requirements occurred. The violations involved: (1) a failure to provide instructions to ensure that operational commitments that were assumed by the licensee to exist in the Licensing Basis Impact Evaluations were captured and included in procedures, and (2) a failure to control nonconforming components to prevent their inadvertent use. These Severity Level IV violations are being treated as NCVs consistent with Section VI.A. of the Enforcement Policy. The NCVs and the circumstances surrounding the violations are described in the subject inspection report. These violations are not being cited, in part, because of the low safety significance and because your staff entered the deficiencies into your corrective action program. If you contest the violations or severity level of the NCVs, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U. S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with a copy to the Regional Administrator, Region IV and the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Should you have any questions concerning this inspection, please contact the undersigned at (817) 860-8191 or Ray L. Kellar at (817) 860-8164.

Sincerely,

/RA/
D. Blair Spitzberg, Ph.D., Chief
Repository and Spent Fuel Safety Branch

Docket No.: 050-275
050-323
072-026

License No.: DPR-80
DPR-82
SNM-2511

Enclosure:
NRC Inspection Report 050-275/09-007; 050-323/09-007; 072-026/09-001

Attachments:
(1) Supplemental Inspection Information
(2) Diablo Canyon ISFSI - Inspector Notes

cc w/enclosure:
Sierra Club San Lucia Chapter
ATTN: Andrew Christie
P.O. Box 15755
San Luis Obispo, CA 93406

Nancy Culver
San Luis Obispo
Mothers for Peace
P.O. Box 164
Pismo Beach, CA 93448

Chairman
San Luis Obispo County
Board of Supervisors
1055 Monterey Street, Suite D430
San Luis Obispo, CA 93408

Truman Burns\Robert Kinosian
California Public Utilities Commission
505 Van Ness Ave., Rm. 4102
San Francisco, CA 94102

Diablo Canyon Independent Safety Committee
Attn: Robert R. Wellington, Esq.
Legal Counsel
857 Cass Street, Suite D
Monterey, CA 93940

Director, Radiological Health Branch
State Department of Health Services
P.O. Box 997414 (MS 7610)
Sacramento, CA 95899-7414

City Editor
The Tribune
3825 South Higuera Street
P.O. Box 112
San Luis Obispo, CA 93406-0112

James D. Boyd, Commissioner
California Energy Commission
1516 Ninth Street (MS 31)
Sacramento, CA 95814

James R. Becker, Site Vice President
Diablo Canyon Power Plant
P.O. Box 56
Avila Beach, CA 93424

Jennifer Tang
Field Representative
United States Senator Barbara Boxer
1700 Montgomery Street, Suite 240
San Francisco, CA 94111

Chief, Technological Hazards Branch
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA 94607-4052

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	050-275; 050-323; 072-026
License No.:	DPR-80; DPR-82; SNM-2511
Report No.:	050-275/09-007; 050-323/09-007; 072-026/09-001
Licensee:	Pacific Gas and Electric Company (PG&E)
Facility:	Diablo Canyon Power Plant (DCPP)
Location:	7.5 miles NW of Avila Beach Avila Beach, California
Dates:	January 27, 2009, through June 18, 2009
Inspectors:	R. Kellar, P.E., RIV/DNMS, Lead R. Temps, NMSS/SFST C. Morell, NMSS/SFST J. Cook, NMSS/SFST M. Peck, RIV/DRP T. Brown, RIV/DRP
Accompanied By:	G. Schlapper, RIV/DNMS L. Brookhart, RIV/DNMS C. Regan, NMSS/SFST J. Parrott, NMSS/HLWRS
Approved By:	D. B.Spitzberg, Ph.D., Chief Repository and Spent Fuel Safety Branch, Region IV
Attachments:	1. Supplemental Inspection Information 2. Inspector Notes

ENCLOSURE

EXECUTIVE SUMMARY

Diablo Canyon Power Plant
Independent Spent Fuel Storage Installation
NRC Inspection Report 050-275/09-007; 050-323/09-007; 072-026/09-001

Pacific Gas & Electric (PG&E) was granted a site-specific license by the Nuclear Regulatory Commission (NRC) on March 22, 2004, that authorized the construction and operation of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI). The ISFSI was designed to hold up to 140 storage casks on seven concrete pads, although only two of the ISFSI pads and the Cask Transfer Facility (CTF) were initially constructed. An inspection of the ISFSI pad and CTF construction was performed by the NRC during 2006 (ML062220685). PG&E selected the Holtec HI-STORM 100SA system, which has been designed for high seismic applications.

This inspection report covers six inspection visits made by NRC to the Diablo Canyon Power Plant ISFSI between January 27 and June 18, 2009. The first inspection was of the canister welding process which occurred on January 27-28, 2009. The inspection of the fluid operations demonstration occurred on March 23-26, 2009. The inspection of the heavy load demonstrations outside of the power block occurred on April 14-17, 2009. An NRC team inspection of the licensee ISFSI related programs was conducted on May 4-7, 2009. The final demonstration that included placing the canister in the spent fuel pool and loading a "dummy" fuel assembly was inspected on June 8-11, 2009. Initial loading activities were inspected from June 15-18, 2009. Several minor problems were encountered during the initial loading operation, which were effectively resolved in a safety conscious manner by licensee management personnel. The licensee staff was observed practicing effective ALARA (as low as is reasonably achievable) principles during the canister loading process. The first HI-STORM cask loaded with spent fuel was placed into storage on the Diablo Canyon ISFSI pad on June 23, 2009. Overall, the licensee was well prepared and completed the initial cask loading in a safe manner.

Crane

- The structural analysis concluded that the fuel handling building would meet the design basis qualifications. The as-built crane weight after the addition of the new single-failure-proof trolley and hoist had been used in the structural analysis. The crane runway girder was found to have sufficient capacity to resist the maximum loads imposed by the Hosgri Earthquake, while lifting the maximum rated crane load (Attachment 2, Crane Support Structure, page 6).

- The crane rated load test was conducted to satisfy the requirements for a cold proof test. The test load used for the crane weighed 154 tons, which was within the specified tolerance allowed by the ASME B30.2 Code for the 125 percent load test. The structural steel temperature recorded during the test was 59.1 degrees Fahrenheit (Attachment 2, Cold Proof Testing, page 8).

Vacuum Drying / Hydro Testing / Helium

- The helium leak rate test of the multipurpose canister (MPC) vent and drain port cover plates combined with the lid-to-shell weld was demonstrated to have appropriate test sensitivity and a combined leakage acceptance level (Attachment 2, Helium Leak Rate, page 14).

- The hydrostatic testing process for the MPC confinement boundary was successfully demonstrated in accordance with the requirements of the ASME Code, Section III, Subsection NB, Article NB-6000, on the completed MPC lid-to-shell weld (Attachment 2, MPC Hydro Test, page 15).

Emergency Planning

- The licensee had procedures in place to: (1) conduct biennial onsite exercises for simulated emergencies; (2) perform communication checks and phone number verification for offsite response organizations; and (3) conduct annual radiological, medical, and fire drills. The licensee's onsite exercises/drills included initiating events that affected the ISFSI (Attachment 2, Exercises 1, page 16).

Fuel

- Procedure PEP R-8G was utilized to perform a post loading verification of the fuel and fuel components that had been loaded into the MPC. The digital recording of the fuel serial numbers was independently verified prior to placing the lid on the MPC. During the independent verification of the fuel loaded into the first MPC, an error was discovered of a fuel insert that had been incorrectly placed into Fuel Assembly E22. The licensee initiated SAPN 50248487 to evaluate the potential impact of the incorrect fuel insert. The licensee had conservatively bounded the decay heat loading for all the fuel inserts when performing the canister loading calculations. Therefore, the fuel insert was acceptable for loading in the MPC and the serial number discrepancy was documented for the cask records (Attachment 2, Post Loading Verification, page 18).

- The inspector reviewed Procedure PEP R-MPC-32 and found that it met the Technical Specification requirements for regionalized and uniform loading patterns (Attachment 2, Regionalized and Uniform Fuel Loading, page 22).

Heavy Loads

- The licensee used Procedure MP M-42-DFS.1 to control the movement of the HI-TRAC transfer cask and other heavy loads associated with dry fuel storage operations inside the fuel handling building. Attachment 1 of this procedure provided the Plant Safety Review Committee approved safe load paths for movement of the dry fuel equipment (Attachment 2, Safe Load Paths, page 23).

Loading Operations

- The inspectors reviewed the documentation associated with the seismic connections of the HI-STORM casks to the ISFSI pad, the HI-TRAC to the Low Profile Transporter, the cask washdown area restraint system, and the CTF seismic anchors and found the systems to meet the design conditions that were associated with the seismic spectra at Diablo Canyon (Attachment 2, Loading Operations – ISFSI Cask Anchorage, Low Profile Transporter, Transfer Cask Restraint, Transporter Seismic Anchor, pages 24-28).

Non-Destructive Examinations (NDE)

- The licensee demonstrated that the mass spectrometer leak detector (MSLD) was capable of detecting helium to a sensitivity of one-half the acceptance leak rate. License Surveillance Requirement 3.1.1.3 specified that the total helium leak rate that was permitted through the MPC lid confinement weld combined with the drain and vent port welds were to be equal to or less than 5.0 E-6 atm-cc/sec (He). The Level III leak test inspector detected an indicated leak rate of 1.12 E-8 atm-cc/sec (He) using the MSLD during the demonstration held on January 27-28, 2009. The total MPC helium leak rate measured during the fist canister loading on June 20, 2009, was 2 E-9 atm-cc/sec (He) (Attachment 2, HMSLD Minimum Sensitivity, page 30).

- PCI Procedure PI-CNSTR-T-OP-230, Step 9.1.35 required that the final weld dye penetrant test (PT) be documented on Exhibit 1 of Procedure GQP-9.2. This form would be incorporated into the final document package for the canister and be retrievable along with the other permanent records. This was an acceptable method to document findings associated with the PT examinations of the weld surface (Attachment 2, Permanent Record, page 33).

Procedures and Technical Specifications

- The team verified that the Cask Transportation Evaluation Program (CTEP) procedure provided adequate controls over such activities as transport path walkdowns for identification of potential hazards and restrictions on parked as well as transient vehicles, including various sized tanker trucks, during cask transport activities (Attachment 2, Cask Transportation Program, page 36).

- Technical Specifications 5.1.3 and 5.1.4 required that the licensee establish a Loading & Unloading Program and an ISFSI Operations Program to control ISFSI related requirements. The inspectors found that the programs were being implemented through a series of procedures, specifications, and design change packages, which met the Technical Specification requirements. (Attachment 2, ISFSI Operations Program; Loading & Unloading Program, page 39).

- Procedure XI3.ID6 was reviewed and determined to contain adequate controls and instructions to address the Technical Specification 5.1.1 requirement to control changes to the Technical Specification Bases (Attachment 2, TS Bases Control Program, page 43).

Quality Assurance

- Regulation 10 CFR 72.150 required the licensee to prescribe activities affecting quality by documented instructions and procedures appropriate to the circumstance and require that the instructions and procedures be followed. Contrary to this, the licensee failed to provide instructions to ensure that operational commitments assumed in the Licensing Basis Impact Evaluations were included in procedures. The licensee entered the issue into their corrective action program as SAPN 50237790. This Severity level IV violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 72-26/0901-01) (Attachment 2, Instructions, Procedures & Drawings, page 45).

- Regulation 10 CFR 72.170 required the licensee to establish measures to control materials and components that do not conform in order to prevent their inadvertent use. Contrary to this, the licensee had not controlled the use of the HI-TRAC transfer cask to prevent inadvertent use after identification of the nonconforming indentation on the side of the cask. The licensee entered the issue into their corrective action program as SAPN 50249084. This Severity Level IV violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 72-26/0901-02) (Attachment 2, Nonconforming Components, page 46).

Radiological

- The ALARA program was found to be implemented through plans, administrative procedures, numerous working level procedures, and guidance documents. The Used Fuel Storage Project Radiation Protection ALARA Plan contained exposure estimates developed from benchmarking other sites that had already conducted spent fuel loading campaigns utilizing similar dry cask storage systems (Attachment 2, ALARA, page 48).

Special Lifting Devices

- The licensee provided documentation that the HI-STORM lift brackets, HI-TRAC lift links, MPC lift cleats, and HI-TRAC trunnions, which are all used for lifting a critical load with a single path hoisting arrangement, had been subjected to a load test equal to 300 percent of the maximum service load for a 10 minute period. Following the load test, each special lifting device (SLD) underwent NDE with satisfactory results (Attachment 2, Acceptance Testing – Critical Loads, page 55).

Training

- The Diablo Canyon ISFSI training and certification program met the requirements of 10 CFR 72.190. The program included Job Performance Measures (JPMs) to evaluate the competence of the trainees during performance of the assigned tasks (Attachment 2, Certification of Personnel, page 59).

Welding

- Procedure PI-CNSTR-T-OP-230 contained instructions to perform a visual examination of the lid-to-shell root pass per ASME Section III, Subsection NF and a PT of the weld in accordance with ASME Section III, Subsection NB. Measurements were made of the depth of the root pass and additional measurements were made of the subsequent weld layers (Attachment 2, Lid-To-Shell Weld PT, page 63).

SUPPLEMENTAL INSPECTION INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee Personnel:

J. Fledderman, Director, Strategic Projects
T. Grebel, Manager, Strategic Projects Licensing Manager
S. Guess, Reactor Engineer
R. Hagler, Used Fuel Project Engineer
G. Heggli, Licensing Engineer
M. Mayer, Supervisor Reactor Engineering
L. Pulley, Used Fuel Storage Programs Manager
L. Sharp, Senior Director, Engineering
L. Strickland, Used Fuel Storage Project Manager

Contract Personnel:

M. DeWitt, Quality Verification Engineer
S. Flickinger, Staff Mechanical Engineer
D. O'Conner, Quality Verification Engineer
D. Page, RP ALARA Engineer
C. Pendleton, Staff Nuclear Engineer
S. Rowland, Loading Supervisor
S. Soler, Project Manager

INSPECTION PROCEDURES USED

60854.1	Preoperational Testing of an Independent Spent Fuel Storage Installations at Operating Plants
60855.1	Operation of an Independent Spent Fuel Storage Installation at Operating Plants
60857	Review of 10 CFR 72.48 Evaluations

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

NCV 72-026/0901-01	Failure to provide instructions to ensure that operational commitments assumed in the Licensing Basis Impact Evaluations were included in procedures.
NCV 72-026/0901-02	Failure to control the use of the HI-TRAC transfer cask to prevent inadvertent use after identification of the nonconforming indentation on the side of the cask.

Closed

NCV 72-026/0901-01 Failure to provide instructions to ensure that operational commitments assumed in the Licensing Basis Impact Evaluations were included in procedures.

NCV 72-026/0901-02 Failure to control the use of the HI-TRAC transfer cask to prevent inadvertent use after identification of the nonconforming indentation on the side of the cask.

Discussed

None

LIST OF ACRONYMS

ALARA	As Low As is Reasonably Achievable
AR	Action Request (Problem Report)
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
CFR	Code of Federal Regulations
CTF	Cask Transfer Facility
CTEP	Cask Transportation Evaluation Program
CWA	Cask Washdown Area
DCP	Design Change Package
DCPP	Diablo Canyon Power Plant
FHB	Fuel Handling Building
FHD	Forced Helium Dehydrator
FSAR	Final Safety Analysis Report
GTAW	Gas Tungsten Arc Weld
HPP	Holtec Project Procedure
ITS	Important-To-Safety
ISFSI	Independent Spent Fuel Storage Installation
JPM	Job Performance Measures
LBIE	Licensing Basis Impact Evaluation
LPT	Low Profile Transporter
M&TE	Measuring and Test Equipment
MPC	Multi-Purpose Canister
MSLD	Mass Spectrometer Leak Detector
NCV	Non-Cited Violation
NDE	Non Destructive Examination
NITS	Not-Important-To-Safety
NRC	Nuclear Regulatory Commission
PG&E	Pacific Gas and Electric
PPMB	Parts per Million Boron
PQR	Procedure Qualification Record
PT	Liquid Penetrant Test

SAPN	Systems Application and Processes Notification (Problem report)
SLD	Special Lifting Device
SMDR	Supplier Manufacturer Deviation Report
TS	Technical Specification
TSA	Transporter Seismic Anchor
VCT	Vertical Cask Transporter
VT	Visual Test
WPQ	Welder Performance Qualification
WPS	Welding Procedure Specification
WML	Welder Maintenance Log

ATTACHMENT 2

INSPECTOR NOTES
DIABLO CANYON ISFSI
(Docket 72-026)
(TABLE OF CONTENTS)

Diablo Canyon ISFSI
(Docket 72-026)
(INSPECTOR NOTES)

Category: Crane Design **Topic:** Bridge and Trolley Brakes

Reference: NUREG 0554, Section 5.1

Requirement: Bridge and trolley control and holding brakes should be: a) rated at 100% of maximum drive torque that can be developed at the point of application and; b) automatically actuate on interruption of power and overspeed. The holding brakes should be designed so that they cannot be used as foot-operated slowdown brakes. Drag brakes should not be used.

Finding: This requirement was achieved. Attachment A of DCP M-49774 provided documentation that the bridge and trolley control and holding brakes were rated at 100 percent of the maximum drive torque. The brakes were reported to be incapable of being used as a foot-operated slowdown brake or a drag brake. The bridge and trolley brakes were mechanically tripped to the "on" or "holding" position in the event of a malfunction in the power supply or an overspeed condition.

Documents Reviewed: DCP M-49774, "Safety Analysis Report for P&H SUPERSAFE Single Failure Proof Diablo Canyon Fuel Handling Crane," Attachment A, Revision 1;

Category: Crane Design **Topic:** Hoist Holding Brake Operation

Reference: NUREG 0554, Section 4.9

Requirement: The minimum hoist braking system should included one power control braking system (not mechanical or drag brake type) and two holding brakes. Holding brakes should have a minimum brake capacity of 125% of the torque developed during the hoisting operation at the point of brake application, and should be automatically applied to the full holding position when power is off, and under overspeed condition and overload conditions.

Finding: This requirement was achieved. Attachment A of DCP M-49774 documented that the new single-failure-proof main hoist included two shoe type mechanical hoist holding brakes rated at 150 percent of the full load hoisting torque and a magnatorque brake that activated upon loss of power. The Diablo Canyon single-failure-proof main hoist utilized dual (redundant) failsafe holding brakes that were automatically activated when electrical power was lost.

Documents Reviewed: DCP M-49774, "Safety Analysis Report for P&H SUPERSAFE Single Failure Proof Diablo Canyon Fuel Handling Crane," Attachment A, Revision 1;

Category: Crane Design **Topic:** Provisions For Manual Operation

Reference: NUREG 0554, Sections 3.4

Requirement: A crane that has been immobilized because of failure of controls or components while holding a critical load should be able to hold the load or set the load down while repairs or adjustments are made. This can be accomplished by inclusion of features that will

permit manual operation of the hoisting system and the bridge and trolley transfer mechanisms by means of appropriate emergency devices.

Finding: This requirement was achieved. During the factory acceptance testing documented in Procedure 35778-10, a test load of 312,550 pounds was lowered using the main hoist. A manual process was used to simulate an emergency lowering of the main hoist capacity load that included the Magnatorque brake and the two shoe brakes. The test was completed satisfactorily.

At Diablo Canyon, following the full weight crane test of the new single-failure-proof trolley and main hoist on May 27, 2009, the licensee performed a manual movement test of the crane bridge and trolley. No problems were noted during the test.

Documents Reviewed: Work Order 68003884, "FHB Crane Optimization," Dated May 26, 2009; P&H Procedure 35778-10, "Diablo Canyon Fuel Handling Building Single Failure Proof Trolley Factory Acceptance Test Procedure," Revision 1

Category: Crane Design **Topic:** Seismic Events During Cask Movement

Reference: NUREG 0554, Section 2.5

Requirement: The crane should be designed to retain control of and hold the load, and the bridge and trolley should be designed to remain in place on their respective runways with their wheels prevented from leaving the tracks during a seismic event.

Finding: This requirement was achieved. The new trolley, including main hoist, was designed and fabricated to meet ASME NOG-1 requirements. The main hoist was single-failure-proof and designed to maintain control of the maximum rated load during the seismic spectra included in the fabrication requirements for Diablo Canyon (including Hosgri Earthquake, Double Design Earthquake and Long Term Seismic Program). The FSAR Update included a discussion of the vertical stops that were located 1/2 inch above the top of the crane bridge ends. The beam extends the entire length of both crane runways to prevent uplift and derailing during a seismic event. The new trolley was fabricated and mounted to the bridge with seismic restraints to prevent uplift from the overhead crane bridge and was analyzed in Attachment A to Design Calculation 9000009488.

Documents Reviewed: Diablo Canyon Units 1 & 2 FSAR Update, Section 9.1.4.2.1.3, "Fuel Handling Area Crane," Revision 18; Design Change Package (DCP) 49774, Revision 1; Design Calculation 9000009488, Revision 3

Category: Crane Design **Topic:** Seismically Induced Load Swing

Reference: NUREG 0554, Section 2.5;

Requirement: The maximum critical load plus operational and seismically induced pendulum and swing load effects on the crane should be considered in the design of the trolley and should be added to the trolley weight for the design of the bridge.

Finding: This requirement was achieved. Calculation 52.15.9.14 included a seismic analysis of the crane with the maximum crane load suspended from the trolley at several locations along the bridge. Included in the ANSYS analysis were horizontal/vertical seismic inputs associated with the Hosgri earthquake with the main hoist/trolley located at mid-span, end-span and quarter span locations along the bridge. The main hoist load block,

containing the maximum crane load was analyzed at 7 feet below the trolley and 55 feet below the trolley. The new trolley and hoist had been designed and fabricated to ASME NOG-1 requirements and were found to be fully capable of supporting the load during a seismic event.

Documents Reviewed: Calculation 52.15.9.14, "Evaluation for Dead Load, Operating Loads, Design Earthquake, Double Design Earthquake, Hosgri Earthquake, and Long Term Seismic Program Earthquake," Revision 8

Category: Crane Design **Topic:** Two-Block Protection

Reference: NUREG 0554, Section 4.5

Requirement: The complete hoisting system should have the required strength to resist failure during two-blocking. As an alternative, a system of upper travel limit switches may be used to prevent two-blocking. The system should include two independent travel limit devices of different designs and activated by separate mechanical means. These devices should de-energize the hoist drive motor and the main power supply. The auxiliary hoist, if used for critical lifts, should also be equipped with two independent travel limit switches to prevent two-blocking.

Finding: This requirement was achieved. Attachment A of DCP M-49774 described four separate methods that were employed to prevent two-blocking of the main hoist. The methods included (1) a control circuit upper limit switch, (2) a power circuit upper limit switch, (3) an overload limit switch and (4) a patent pending floating upper block two-block protection system. During the factory acceptance testing, the two-block protection was verified to work as designed on the replacement trolley and hoist.

Documents Reviewed: DCP M-49774, "Safety Analysis Report for P&H SUPERSAFE Single Failure Proof Diablo Canyon Fuel Handling Crane," Attachment A, Revision 1; P&H Procedure 35778-10, "Diablo Canyon Fuel Handling Building Single Failure Proof Trolley Factory Acceptance Test Procedure,"

Category: Crane Design **Topic:** Wire Rope Breaking Strength

Reference: NUREG 0554, Section 4.1

Requirement: The maximum load (including static and inertia forces) on each individual wire rope in the dual reeving system with the maximum critical load attached should not exceed 10% of the manufacturer's published breaking strength.

Finding: This requirement was achieved. The maximum load rating for the main hoist was 125 tons or 250,000 pounds. The main hoist used 8-part reeving. Therefore the stress in each individual wire rope from the maximum load would be 31,250 pounds (250,000/8). The wire rope used on the main hoist was rated for 345,600 pounds. Ten percent of the manufacturer's published breaking stress for the wire rope was 34,560 pounds. Therefore the maximum load on the wire rope at maximum rated load would be 31,250 pounds, which is less that 10 percent of the published breaking strength of 34,560 pounds. The load on the crane could be as high as 138 tons (which is over the rated load) before 10 percent of the manufacturer's published breaking strength would be reached.

Documents Reviewed: Python Power 9S Wire Rope Performance Documentation

---

Category: Crane Inspection **Topic:** Crane Inspection - Periodic

Reference: ASME B30.2; Section 2-2.1.3

Requirement: Cranes in regular use shall be subjected to a periodic crane inspection annually during normal and heavy service, and quarterly during severe service. The periodic inspection includes checking for: a) deformed, cracked or corroded members; b) loose bolts or rivets; c) cracked or worn sheaves and drums; d) worn, cracked or distorted pins, bearings, shafts, gears, and rollers; e) excessive brake system wear; f) load, wind, and other indicators over their full range for any significant inaccuracies; g) gasoline, diesel, electric, or other power plants for improper performance; h) excessive drive chain sprocket wear and chain stretch; i) deterioration of controllers, master switches, contacts, limit switches and pushbutton stations.

Finding: The intent of this requirement was achieved. Procedure MP M-50.3 required inspections on a daily, quarterly and an annual basis. The quarterly inspections required detailed examinations of the crane hook, operating mechanisms and a detailed examination of the wire rope. The annual inspections included the quarterly inspections as well as (1) a check for loose bolts, nuts or rivets; (2) inspection of the structural members; (3) an inspection of the sheaves and drums; (4) a check for wear on the brake systems; (5) lubrication of the bridge, hoist and trolley; (6) an inspection of the hook using magnetic particle; and (7) a check of the electrical apparatus for signs of deterioration.

Documents Reviewed: Procedure MP M-50.3, "Overhead, Gantry and Mobile Crane Inspection, Testing and Maintenance," Revision 14

Category: Crane Inspection **Topic:** Hoist Overload Testing

Reference: NUREG 0554, Section 8.3; NUREG 0612, C-4, (9)

Requirement: If the hoisting system is designed with adequate strength to resist failure during load hang-up, the hoisting system should be tested by securing the load-block-attaching points to a fixed anchor and applying the maximum critical load. Alternately, if a load cell system, a motor current-sensing device, or a mechanical load-limiting device is provided to prevent load hang-up, the device(s) should be tested to verify operability.

Finding: This requirement was achieved. The new single-failure-proof trolley main hoist was tested at the factory using the main hoist overweight relay. When the relay was activated the main hoist could not raise or lower the load.

Documents Reviewed: P&H Procedure 35778-10, "Diablo Canyon Fuel Handling Building Single Failure Proof Trolley Factory Acceptance Test Procedure," Revision 1

Category: Crane Inspection **Topic:** Hook Inspections - Frequent

Reference: ASME B30.10, Sections 10-1.4.2 and 10-1.4.6

Requirement: Hooks shall be inspected monthly during normal service, weekly to monthly during heavy service and daily to weekly during severe service. Hooks shall be inspected for: a) distortion such as bending, twisting or increased throat opening; b) cracks, severe nicks, or gouges; c) damaged or malfunctioning latch (if provided); and d) hook attachment and

securing means. Hooks having any of the following deficiencies shall be removed from service unless a qualified person approves their continue use and initiates corrective action: a) cracks; b) wear exceeding 10% of the original sectional dimension; c) bend or twist exceeding 10 degrees from the plane of an unbent hook; and d) an increase in throat opening of 15% (for hooks without latches).

Finding: The intent of this requirement was achieved. Section 7.1.3 of Procedure MP M-50.3 required that the load hook be inspected prior to use each shift for evidence of deformation, cracking and damaged latches. The results of the daily inspection was required to be documented in the Crane Log. Any defects were required to be reported to the cognizant supervisor.

The hook was also required to be inspected on a quarterly basis in Section 7.2 of Procedure MP M-50.3. The examinations included a check for twisting in the plane of the hook; throat openings more than 15 percent in excess of normal; any cracking; and any wear exceeding 10 percent of original sectional dimensions.

Documents Reviewed: Procedure MP M-50.3, "Overhead, Gantry and Mobile Crane Inspection, Testing and Maintenance," Revision 14

Category: Crane Inspection **Topic:** Welding

Reference: NUREG 0554, Section 2.8; NUREG 0612, C-3 (3)

Requirement: All welding on load-sustaining members shall be in accordance with American Welding Society (AWS) structural welding code AWS D1.1, except as modified by AWS D14.1. All critical welds (joints whose failure could result in a drop of a critical load) should be post weld heat treated in accordance with AWS D1.1, Sub article 3.9. As a substitute for post weld heat treatment of crane structures already built or in operation, the critical welds should be nondestructively examined to ascertain that the weldments are acceptable.

Finding: The intent of this requirement was achieved. The overhead crane in the fuel building at Diablo Canyon had been designed and fabricated to the Specification for Electrical Overhead Traveling Cranes for Steel Mill Service, Association of Iron and Steel Engineers Standard Number 6 (tentative) dated May 1, 1969. All steel members not covered by that standard were designed and fabricated in accordance with the Specification for the Design, Fabrication and Erection of Structural Steel for Buildings by the American Institute of Steel Construction (AISC), dated February 12, 1969. Welding of the structural members had been performed to AWS D.2.0 in lieu of AWS D.14.1. The welding process used for the crane had been reviewed by the Agency during the NUREG 0612 crane correspondence.

The licensee described the process that would have been considered as "common practice" for welding on the A-36 carbon steel components for the crane bridge. Based on the size (thickness) of the bridge carbon steel components pre-heat or post-weld heat treatment would not typically be required. As part of the crane upgrade to single-failure-proof, a 125 percent cold proof load test was conducted. Afterward an inspection was performed of the accessible critical welds. There was no evidence of cracking observed in over 300 linear feet of welds, which provided an indication that appropriate welding techniques had been utilized during construction.

Documents Reviewed: DCPP Units 1 & 2 FSAR Update, Revision 17; Letter from NRC to Philip Crane, "Control of Heavy Loads, NUREG 0612 (Diablo Canyon Unit 1), Dated March 9, 1983; Licensee White Paper, "Fuel Handling Building Crane Critical Weld Inspection Disposition of Inaccessible Welds"

Category: Crane Inspection **Topic:** Wire Rope Inspection - Frequent

Reference: ASME B30.2, Section 2-2.4.1 (a)

Requirement: All ropes should be visually inspected at the start of each shift for: a) distortion of the rope such as kinking, crushing, unstranding, bird caging, main strand displacement, or core protrusion; b) general corrosion; c) broken or cut strands; and d) number, distribution, and type of visible broken wires. When such damage is discovered, the rope shall be removed from service or be given a periodic inspection.

Finding: The intent of this requirement was achieved. Section 7.1.3 of Procedure MP M-50.3 required that the overhead crane hoist cables be examined for excessive wear, broken wires, stretching or twisting, and kinking or bird-caging prior to use each shift that the crane was in use. Section 7.1.4 required that the inspections be documented in the Crane Log.

Documents Reviewed: Procedure MP M-50.3, "Overhead, Gantry and Mobile Crane Inspection, Testing and Maintenance," Revision 14

Category: Crane Inspection **Topic:** Wire Rope Inspection - Periodic

Reference: ASME B30.2, Section 2-2.4.1 (b)

Requirement: Periodic wire rope inspections shall be performed at a frequency established by a qualified person, and whenever gross damage is discovered during a frequent inspection. Periodic inspections shall be performed over the full length of the rope and shall check for: a) distortion of the rope such as kinking, crushing, unstranding, bird caging, main strand displacement, or core protrusion; b) general corrosion; c) broken or cut strands; d) visible broken wires; e) reduction of rope diameter below nominal due to loss of core support, internal or external corrosion, or wear of outside wires; f) severely corroded or broken wires at end connections; and g) severely corroded, cracked, bent, worn, or improperly applied end connections.

Finding: The intent of this requirement was achieved. Procedure MP M-50.3 Section 7.2.5 specified that an inspection of the wire rope was to be conducted quarterly. The criteria specified for the wire rope inspection included (1) wear of 1/3 of the original diameter of the individual wires; (2) kinking, crushing, bird-caging or other damage; (3) reduction from the nominal diameter; (4) 6 randomly distributed broken wires in one rope lay or 3 broken wires in one strand in one lay; (5) evidence of any heat damage; and (6) broken wires at an end connection.

Documents Reviewed: Procedure MP M-50.3, "Overhead, Gantry and Mobile Crane Inspection, Testing and Maintenance," Revision 14

Category: Crane Licensing Basis **Topic:** Crane Support Structure

Reference: Site Licensing Basis

Requirement: The support structure for the building where the dry fuel operations will be conducted shall be designed to maintain its structural integrity under normal operating conditions, seismic events (DBE, OBE, or SSE) and tornados, while sustaining the maximum critical load. The seismic stresses should be transmitted to the foundation through structural steel and/or reinforced concrete without affecting reactor safe shutdown systems.

Finding: This requirement was achieved. Calculation HAPGE-07/07-0511 evaluated the Fuel Handling Building (FHB). A 3-D finite element analysis of the FHB was created that included the design conditions and load combinations that were part of the license basis. The fully loaded crane was included in the building analysis for the load cases that used the largest magnitude seismic spectra consisting of the Hosgri Earthquake and also included the Long Term Seismic Program spectra. The loads generated from the analysis were transferred to the building structure. The model used for the analysis included the minor modifications that were made to the building that consisted of upgrading several of the roof truss members and building connections. Additionally, the analysis concluded that the column anchorage had sufficient capacity to resist all shear and axial loads.

The structural analysis concluded that the fuel handling building would meet the design basis qualifications. The as-built crane weight after the addition of the new single-failure-proof trolley and hoist had been used in the structural analysis. The crane runway girder was found to have sufficient capacity to resist the maximum loads imposed by the Hosgri Earthquake, while lifting the maximum rated crane load.

Documents Reviewed: Calculation HAPGE-07/07-0511, "FHB Design Basis Qualification," Revision 9; Calculation 52.15.7.1.1.15, "Model 1.0 Reconstruction, Benchmarking and Re-Evaluation for S-F-P Upgrade of FHB Crane & Only 2 MPWPs," Revision 4

Category: Crane Licensing Basis **Topic:** NUREG 0612 Phase I & II Letters

Reference: GL 81-07, GL 85-11

Requirement: Generic Letter 81-07 required licensees to evaluate their controls of handling heavy loads and to provide these evaluations to the NRC. Generic Letter 85-11 documented that all licensees had submitted a Phase I and a Phase II report, and further stated that while not a requirement, the NRC encouraged the implementation of any actions the licensee identified in Phase II regarding the handling of heavy loads.

Finding: The intent of this requirement was achieved. The Diablo Canyon Fuel Handling Building Crane was initially installed as non-single-failure proof. Recently, the licensee elected to upgrade the crane to single-failure-proof using a new trolley and hoist fabricated to NOG-1 requirements. An overview of the pertinent correspondence between the licensee and the Agency are described below:

The Phase II review of the control of heavy loads at Diablo Canyon Unit 1 was completed in October 1983. At the time of the review, the Fuel Handling Building crane was not single-failure-proof. As part of the analysis for a crane that is not single-failure-proof, a potential cask drop accident was analyzed. The results of the potential cask drop accident was discussed in the Diablo Canyon Unit 1 NUREG-0612 Submittal. The potential cask drop into the spent fuel pool would result in only localized damage to the

pool and radiological consequences that were well below 10 CFR 100 limits.

The Diablo Canyon Unit 1 NUREG-0612 submittal documented that the cranes had been designed structurally in accordance with the "Specification for Electrical Overhead Traveling Cranes for Steel Mill Service," Association of Iron and Steel Engineers Standard No. 6 dated May 1, 1969, which was recognized by CMAA Specification No. 70 as the appropriate code for class F cranes. Class F cranes contained the most stringent duty requirements. All the structural members not covered by the crane standard were designed and fabricated in accordance with the "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings," by the American Institute of Steel Construction (AISC) dated April 17, 1963, except that the stresses did not exceed 90 percent of the allowable values stated in the AISC Specification.

The letter dated March 9, 1983 and the Diablo Canyon Unit 1 NUREG-0612 Submittal dated September 26, 1984 documented that the welding that had been performed on the cranes had been performed in accordance with AWS D.2.0 rather than AWS D.14.1. This was determined by the NRC to be acceptable based on the standards in place at the time of the crane welding operations.

Documents Reviewed: Diablo Canyon Design Criteria Memorandum (DCM) T-11, "Control of Heavy Loads," Revision 14; "Control of Heavy Loads at Nuclear Power Plants Diablo Canyon Unit 1 (Phase II) Docket 50-275," Dated October 1983; Letter to Mr. Philip Crane from the NRC on Control of Heavy Loads, Dated March 9, 1983; Diablo Canyon Unit 1 NUREG-0612 Submittal, Dated September 26, 1984

Category: Crane Load Testing **Topic:** Cold Proof Testing

Reference: NUREG 0554, Section 2.4; NUREG 0612, C-2 (8)

Requirement: Minimum operating temperatures for the crane should be specified to reduce the possibility of brittle fracture of the ferritic load-carrying members of the crane. The minimum temperature can be determined by: 1) a drop weight test per ASTM E-208, 2) a Charpy test per ASTM A-370 or 3) a 125% cold proof test. If the crane is made of low alloy steel such as ASTM A514, cold proof testing should be done. If cold proof testing is omitted, the default minimum crane operating temperature is 70 degrees F. For crane operation at temperatures below 70 degrees F, cold proof testing must be performed and the ambient temperature at which the testing is conducted becomes the minimum crane operating temperature.

Finding: This requirement was achieved. The licensee decided to perform a 125 percent load test to satisfy the requirement. On April 2, 2009, a cold proof test was conducted for the new 125 ton single-failure-proof crane. The NRC Resident Inspector witnessed the load test. Documentation associated with the cold proof load test in Work Order 68003884 was reviewed by the regional inspector. A Dillion load cell, number 450.74.50 had been used for determining the weight of the test load. The temperature of the structural steel was documented in Procedure PMT 42.14 using thermometer number 1007.01.05.

The crane rated load test was conducted to satisfy the requirements for a cold proof test. The test load used for the crane weighted 154 tons, which was within the specified tolerance allowed by the ASME B30.2 Code for the 125 percent load test. The structural

steel temperature recorded during the test was 59.1 degrees Fahrenheit.

Documents Reviewed: Work Order 68003884, "Mobilize and Set Up Load Test Fixture," Dated March 30, 2009; Procedure PMT 42.14, "Test of the Fuel Handling Building Crane Following Mods Made Per DCP M-49774," Revision 0

Category: Crane Load Testing **Topic:** Dynamic Load Testing

Reference: NUREG 0554, Section 8.2

Requirement: After the 125% static load test, the crane should be given a full performance test with 100% of the maximum critical load attached, for all speeds and motions for which the system is designed. This should include verifying all limiting and safety control devices. The features provided for manual lowering of the load and manual movement of the bridge and trolley during an emergency should be tested with the maximum critical load attached.

Finding: The intent of this requirement was achieved. Following the 125 percent cold proof load test, the licensee utilized a load combination consisting of the HI-TRAC transfer cask, lift yoke, with MPC. The total weight of the dynamic test load was determined to be 221,500 pounds using the load cell on the main hoist. The load was moved along the heavy load paths on both the Unit 1 and Unit 2 areas of the spent fuel pool floor. The licensee had specified a minimum test load of 237,500 pounds be used for the dynamic load test, which was not achieved. The discrepancy was documented in SAPN 50243512. The test load configuration using the HI-TRAC transfer cask was determined to be the maximum test weight that could be safely used to test the crane travel over the heavy load paths and was therefore acceptable. The inspector determined that the dynamic load test achieved the intent of the requirement by using the maximum weight that could be safely moved by the overhead crane to test the crane functions.

The licensee performed a verification of the limiting and safety control devices as part of the fuel handling building crane modifications in Procedure PMT 42.14. The manual operation of the trolley, bridge and hoist were verified as part of Work Order 68003884.

Documents Reviewed: Work Order 68003884, "FHB Crane Optimization," Dated May 26, 2009; Procedure MP M-42-DFS.1, "Dry Run Procedure for FHB Dry Fuel Storage Rigging and Load Handling," Revision 1; Procedure MPT 42.14, "Test of the Fuel Handling Building Crane Following Mods Per DCP M-49774," Revision 0

Category: Crane Load Testing **Topic:** Hook Load Testing

Reference: NUREG 0554, Sect 4.3; ASME B30.10, Sect 10-1.1.2

Requirement: A 200% static load test should be performed for each load-attaching hook. For a duplex (sister) hook, the proof load shall be shared by the two sisters unless the hook is designed for unbalanced loading. Measurements of the geometric configuration of the hooks should be made before and after the test and the acceptance criteria is no permanent increase in throat opening in excess of 0.5% or 0.010 inches (0.25 mm). The load testing should be followed by a nondestructive examination that should consist of volumetric and surface examinations to verify the soundness of fabrication and ensure integrity of the hooks.

Finding: This requirement was achieved. During the licensee equipment check-out, the new fuel handling single-failure-proof crane 125 ton hook would not rotate while under load. The hook was re-machined and load tested to 255.97 and 256.31 tons for the sister hooks and the center pin hole, respectively. Each test was held for a minimum of ten minutes. Following the load test, a magnetic particle examination and a ultrasonic examination were performed. No indications were noted from the examinations.

Documents Reviewed: P&H Procedure 35778-11, "Diablo Canyon Fuel Handling Building Single Failure Proof Trolley Main Hook & Nut Test Procedure," Revision 2

Category: Crane Load Testing **Topic:** Maximum Weight of Canister

Reference: N/A

Requirement: The maximum weight of the transfer cask containing the canister filled with water and fuel (including dynamic loads) that will be lifted by the crane is to be verified to be within the crane's rated capacity.

Finding: This requirement was met. The maximum weight that would be lifted by the overhead crane was the lift of the MPC inside the HI-TRAC full of fuel from the spent fuel pool. The maximum weight documented in Procedure MP M-42-DFS.1 for this lift was 122 tons, which is below the rated load of the crane of 125 tons.

During the initial loading operations the inspectors witnessed the lift of the loaded MPC/HI-TRAC from the spent fuel pool. The maximum load suspended from the crane, including wire rope and load block was approximately 116 tons as measured by the load cell on the crane.

Documents Reviewed: Procedure MP M-42-DFS.1, "Dry Run Procedure for FHB Dry Fuel Storage Rigging and Load Handling," Revision 1

Category: Crane Load Testing **Topic:** NDE Exams Following Cold-Proof Testing

Reference: NUREG 0554, Section 2.4 and 2.6

Requirement: Following the 125% cold-proof testing, a nondestructive examination of the welds whose failure could result in the drop of a critical load should be performed. If any of these weld joint geometries would be susceptible to lamellar tearing, the base metal at the joints should be nondestructively examined. Nondestructive examination of critical areas should be repeated at 4-year intervals or less.

Finding: The intent of this requirement was achieved. Following the crane cold proof load test, the licensee performed a series of non-destructive examinations of the welds which were determined to be critical. The Licensee White Paper documented the following general classes of welds that were considered critical for the crane: 1) main girder flange to web billet welds, 2) main girder to end tie connection fillet welds, 3) bridge end truck welds, 4) main girder butt welds at transition to end tie connections.

A matrix of the inspection results from examination of the critical welds was compiled. Where possible, the licensee performed magnetic particle inspections of the critical welds. Where there was insufficient space available to perform a magnetic particle inspection, the welds would be examined visually. Finally, the licensee documented the

existence of some weld areas that were totally inaccessible for even a visual inspection without major crane disassembly. The licensee documented that no rejectable indications were found in the over 300 linear feet of welds that were inspected as part of the examination.

The licensee generated SAPN 50234407 to document the results of the weld examinations after the cold proof test. The results of the licensee's inspection were discussed by the inspectors with one of the leading agency crane experts. The NRC concluded that the intent of the NUREG 0554 weld examination requirement had been achieved. Although the licensee had not included the requirement for performing the inspection at 4 year intervals in a procedure, SAPN 50233230, Task 6 was initiated to track future weld examinations.

Documents Reviewed: SAPN 50234407, "FHB Crane Weld Inspection," Dated April 25, 2009; Licensee White Paper, "Fuel Handling Building Crane Critical Weld Inspection Disposition of Inaccessible Welds," SAPN 50233230, "0-AF-140-08 Quadrennial Inspect (50.3)," Dated June 10, 2009

Category: Crane Maintenance **Topic:** Preventive Maintenance Program

Reference: ASME B30.2; Section 2-2.3.1

Requirement: A preventive maintenance program should be established based on the crane manufacturer's or a qualified person's recommendations.

Finding: This requirement was being tracked by the licensee. The inspector reviewed the specific crane maintenance requirements that had been specified by the crane vendor. As the crane was still new and the scheduled maintenance tasks were not needed at the time of the inspection, the licensee had not incorporated the maintenance requirements into procedures or preventative maintenance tasks. The licensee had initiated SAPN 50044807 to track and ensure that the vendor maintenance requirements were incorporated into station procedures and work orders.

Documents Reviewed: SAPN 50044807, "FHB Crane Upgrade PM Review," Dated September 25, 2008; Diablo Canyon Replacement Fuel Handling Building Trolley - CN35778 Operation and Maintenance Manual, Revision 0

Category: Crane Operation **Topic:** Brake Test Prior to Lift

Reference: ASME B30.2, Section 2-3.2.3 (g)

Requirement: The operator shall check the hoist brakes at least once each shift if a load approaching the rated load is to be handled. This shall be done by lifting the load a short distance and applying the brakes.

Finding: This requirement was met. Section 7.1.3.c required the operator to test the main hoist holding brakes by raising the load a few inches and holding the load stationary for a few moments prior to making any lifts. During the initial loading campaign, the inspectors observed the crane operator stop and hold the load for several minutes before starting to lift the HI-TRAC canister.

.

Documents Reviewed: Procedure MP M-50.3, "Overhead, Gantry and Mobile Crane Inspection, Testing and Maintenance," Revision 14

Category: Crane Operation **Topic:** Height Limit During Cask Movement

Reference: N/A

Requirement: For single failure proof cranes, the cask height during movement should be sufficiently high to allow for engaging of the brakes during an uncontrolled descent before the load would impact the floor.

Finding: This requirement was achieved. Calculation 035778-02, Attachment A, documented that the only vertical movement of the load due to a single rope break would be a small stretching of the rope. This stretching was due to the increase of the rope tension from 8 parts to 6 parts resulting in lowering the load approximately 0.165 inches, while the load was being moved in a horizontal direction. This amount of height reduction is considered minimal as the load will normally be carried more than a few inches from the floor to allow for natural deviations that occur in the floor elevation.

Documents Reviewed: Morris Calculation 035778-02, "Diablo Canyon Fuel Handling Building Crane Hoist/Reeving Equipment Calculation," Revision 3

Category: Crane Operation **Topic:** Hoist Limit Switch Tested Each Shift

Reference: ASME B30.2, Section 2-3.2.4 (a)

Requirement: At the beginning of each shift, the operator shall try out the upper limit device of each hoist under no-load. Care shall be exercised. The block shall be inched into the limit or run in at a slow speed.

Finding: This requirement was achieved. Section 7.1.3.c required the operator to test the limit switches with no load on the hook by slowly moving crane to the point where the limit switch will engage and verifying that the switches are functional prior to making any lifts.

Documents Reviewed: Procedure MP M-50.3, "Overhead, Gantry and Mobile Crane Inspection, Testing and Maintenance," Revision 14

Category: Crane Operation **Topic:** Minimum of Two Wraps of Rope

Reference: ASME B30.2, Section 2-3.2.3 (h)

Requirement: The load shall not be lowered below the point where two wraps of rope remain on the each anchorage of the hoisting drum unless a lower-limit device is provided, in which case no less than one wrap shall remain.

Finding: This requirement was achieved. During the licensee's preoperational exercises, the crane load block was lowered within four feet from the lowest point for travel (115 feet elevation). At that point a photo of the main hoist drum indicated that approximately four wraps of rope for each wire rope remained on the drum.

.

Documents Reviewed:

Category: Crane Operation **Topic:** Qualification For Crane Operator

Reference: ASME B30.2, Sections 2-3.1.2 and 2-3.1.6

Requirement: Qualification to operate a cab operated or remote operated crane, requires the operator to pass a written or oral examination and a practical operating examination specific to the type of crane to be operated. In addition, the operator shall: a) have vision of at least 20/30 Snellon in one eye and 20/50 in the other with or without corrective lenses; b) be able to distinguish colors regardless of their position; c) have sufficient hearing capability for the specific operation with or without hearing aids; d) have sufficient strength, endurance, agility, coordination and reaction speed for the specific operation; e) not be subject to seizures, loss of control or dizziness; and f) have normal field of vision and depth perception.

Finding: This requirement was achieved. The licensee's training program provided instructions to the crane operators in Lesson Guide MG0851, which included proper manipulation of the controls of the fuel handling building crane. Following the training provided in Lesson Guide MG0851, the licensee evaluated the crane operators using Job Performance Measure (JPM) MG0851J. Included in the JPM Evaluation Checklist were observations of the crane operator performing proper crane pre-use inspections and crane operation. Attachment 7.8 of Procedure OM14.ID2 contained the medical requirements that the crane operators were required to meet. Each of the medical requirements mentioned above were included along with a method of measuring compliance with the requirement. The

Documents Reviewed: Procedure OM14.ID2, "Medical Examinations," Revision 7; Instructor Lesson Guide and Student Handout MG0851, "Fuel Handling Building Crane Operation," Revision 12; Job Performance Measure MG0851J, "Fuel Handling Building Crane Operation," Revision 11

Category: Drying/Hydro/Helium **Topic:** Cask Preparation

Reference: 72-026, FSAR Section 4.4.1.2.2

Requirement: While in the Fuel Handling Building the transfer cask is restrained to preclude an unanalyzed tip-over. The transfer cask is secured in the Unit 2 cask wash down area seismic restraint structure.

Finding: This requirement was met. During the welding, canister drying and helium backfill operations, the HI-TRAC is restrained in the Cask Washdown Area. Calculation OQE-011 analyzed the stability of the HI-TRAC while being restrained in the Cask Washdown Area. Seismic inputs associated with the Design Earthquake, Double Design Earthquake, Hosgri Earthquake and Long Term Seismic Program were all used in the analysis. In Calculation 52.115.135, the structural components of the seismic restraints and structural support for the HI-TRAC were analyzed. The Calculations concluded that reasonable margin existed for all design elements to ensure that the HI-TRAC will remain stable while located in the Cask Washdown Area under all seismic design conditions.

Documents Reviewed: Calculation OQE-011, "Dynamic Analysis of the Holtec International's HI-TRAC on Cask Washdown Area when Restrained (Holtec Report HI-2063593)," Revision 0; Calculation 52.115.135, "Structural Analysis of the Cask Washdown (CWA) Seismic Restraint (Holtec Report HI-2073705)," Revision 1

Category: Drying/Hydro/Helium **Topic:** Helium Demoisturizer Temperature

Reference: 72-026, Tech Spec SR 3.1.1.1

Requirement: The helium gas temperature exiting the demoisturizer from the MPC cavity must be less than or equal to 21 degrees F for a time period of 30 minutes or longer for the MPC to be sufficiently dry.

Finding: This requirement was met. Section 6.11 of Procedure HPP-1073-300 provided the requirements for achieving the specified helium demoisturizer temperature. The procedure specified that the temperature of the helium exiting the demoisturizer (freeze dryer) as measured on temperature gage TG-2A must be less than 16 degrees F for 30 minutes before the Technical Specification limit was met. To address equipment and calibration uncertainty, the temperature on TG-2A was specified to be less than 16 degrees F on TG-2A instead of the Technical Specification requirement of 21 degrees F. The calibration of TG-2A was reviewed and found to have been calibrated on February 21, 2009. To provide a verification of the temperature reading, a second temperature gage was installed near TG-2A to provide confirmation of the helium exiting temperature. During the licensee demonstration performed on March 24, 2009, the helium temperature exiting the demoisturizer was observed to be below 16 degrees F for greater than 30 minutes.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2; Exelon Certificate of Calibration Number 0010535663, Dated February 23, 2009

Category: Drying/Hydro/Helium **Topic:** Helium Leak Rate

Reference: 72-026, Tech Spec SR 3.1.1.3

Requirement: The total helium leak rate through the MPC lid confinement weld and the drain and vent port welds must be less than or equal to 5.0 E-6 atm-cc/sec (He).

Finding: This requirement was achieved. The licensee demonstrated the helium leak test process during the week of January 27-28, 2009. Procedure MSLT-DSC-HOLTEC allowed a total helium leak rate through the MPC lid confinement weld and the drain and vent port welds that was equal to or less than 5.0 E-6 atm-cc/sec (He), as specified in License Surveillance Requirement 3.1.1.3. The level III leak test inspector demonstrated the ability to detect an indicated leak rate of 1.2 E-8 atm-cc/sec (He) using the MSLD.

The helium leak rate test of the MPC vent and drain port cover plates combined with the lid-to-shell weld was demonstrated to have appropriate test sensitivity and combined leakage acceptance level.

Documents Reviewed: Vacuum Technology Certificate of Calibration 5291-ACAL-COMP-1-43253, Model GPP-7-He-118T-110CC, Serial Number 5291; Procedure MSLT-DSC-HOLTEC, "Helium Mass Spectrometer Leak Test Procedure Dry Fuel Storage Container," Revision DC-0

Category: Drying/Hydro/Helium **Topic:** Helium Purity

Reference: 72-026, FSAR, Section 10.2.2.4

Requirement: To ensure the proper environment is established the helium used in the backfill process shall have a purity of greater than or equal to 99.995 percent..

Finding: This requirement was achieved. The Praxiar Certificate of Analysis documented the percentage of helium as 99.999 percent in the helium 5.0 product. The helium product lot number was H1869140103.

Documents Reviewed: Praxair Certificate of Analysis for PG&E PO 3500838810, Dated May 28, 2009

Category: Drying/Hydro/Helium **Topic:** MPC Helium Backfill

Reference: 72-026, Tech Spec SR 3.1.1.2

Requirement: The MPC helium backfill pressure must be greater than or equal to 29.3 psig and less than or equal to 33.3 psig.

Finding: This requirement was met. Section 6.12 of Procedure HPP-1073-300 provided the instruction for backfilling the MPC with helium. Using Attachment 9.8 "FHD Helium Backfill Pressure Chart," the operator would determine the target helium pressure range based on the temperature of the helium gas being circulated through the MPC. Step 6.12.13 verified that the final helium pressure in the MPC as indicated on pressure gage P-3 met the Technical Specification requirements for the helium temperatures as indicated on temperature gages TG-3 and TG-4 . Temperature gages TG-3 and TG-4 had been calibrated on February 20, 2009 and pressure gage P-3 had been calibrated on March 11, 2009. The helium backfill process was successfully demonstrated to the inspectors on March 24, 2009.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2; Exelon Certificate of Calibration Number 0010534471, Dated February 20, 2009; Exelon Certificate of Calibration Number 0010534477, Dated February 20, 2009; Exelon Certificate of Calibration Number 0010538114, Dated March 11, 2009

Category: Drying/Hydro/Helium **Topic:** MPC Hydro Test

Reference: 72-026, FSAR, Section 5.1.1.2

Requirement: After the MPC lid-to-shell weld is completed, the MPC is filled and a hydrostatic test is performed.

Finding: This requirement was achieved. The hydrostatic test demonstration occurred on March 23, 2009. Section 6.5 of Procedure HPP-1073-300 provided instructions for performing the hydrostatic test on the MPC. The pressure was required to be held between 126 and 130 psig for at least 10 minutes before the visual inspection was performed of the MPC lid-to-shell weld.

The hydrostatic testing process for the Multi-Purpose Canister (MPC) confinement boundary was successfully demonstrated in accordance with the requirements of the ASME Code, Section III, Subsection NB, Article NB-6000, on the completed MPC lid-to-shell weld.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2

Category: Emergency Planning **Topic:** Exercises 1

Reference: 10 CFR 72.32(a)(12)

Requirement: Provisions for conducting semiannual communications checks with offsite response organizations and biennial onsite exercises to test response to simulated emergencies. Radiological / Health Physics, Medical, and Fire drills shall be conducted annually. Semiannual communications checks with offsite response organizations must include the check and update of all necessary telephone numbers.

Finding: This requirement was achieved. The licensee had procedures in place to (1) conduct biennial onsite exercises for simulated emergencies; (2) perform communication checks and phone number verification for offsite response organizations and (3) conduct annual radiological, medical, and fire drills. The licensee's onsite exercises/drills included initiating events that affected the ISFSI.

Documents Reviewed: DCPP Emergency Plan, Volume 11, Revision 4; Procedure EP G-1, "Emergency Classification and Emergency plan Activation," Revision 39

Category: Emergency Planning **Topic:** Exercises 2

Reference: 10 CFR 72.32(a)(12)(ii)

Requirement: Participation of offsite response organizations in biennial exercises, although recommended, is not required. Exercises must use scenarios not known to most exercise participants. The licensee shall critique each exercise using individuals not having direct implementation responsibility for conducting the exercise. Critiques of exercises must evaluate the appropriateness of the plan, emergency procedures, facilities, equipment, training of personnel, and overall effectiveness of the response. Deficiencies found by the critiques must be corrected.

Finding: This intent of this requirement was achieved. The licensee plans to utilize exercise critiques which will be conducted by individuals with adequate expertise. Currently, the licensee intends to use staff that were directly involved during the exercises at the Humboldt Bay ISFSI for review and critique of the Diablo Canyon exercises.

Documents Reviewed: DCPP Emergency Plan, Volume 11, Revision 4; Procedure EP G-1, "Emergency Classification and Emergency plan Activation," Revision 39

Category: Emergency Planning **Topic:** Offsite Emergency Support

Reference: 10 CFR 72.32(a)(15)

Requirement: The applicant's emergency plans shall include a brief description of the arrangements made for requesting and effectively using offsite assistance on site and provisions that exist for using other organizations capable of augmenting the planned onsite response.

Finding: This requirement was achieved. The licensee had current letters of agreement with a local hospital, a local medical center, an ambulance service, a healthcare district, a local fire department, local law enforcement agencies, a helicopter service, and the US Coast Guard. The letters of agreement are reviewed annually. The implementation of ISFSI operations will not alter agreements for support activities.

Documents Reviewed: DCPP Emergency Plan, Volume 11, Revision 4; Letters of Agreement with the United States Coast Guard and local ambulance, police and health care providers, Dated June 18, 2008

Category: Fire Protection **Topic:** Combustibles Materials

Reference: 72-026, FSAR Section 2.2.2.2

Requirement: No combustible materials will be stored within the ISFSI security fence around the ISFSI pads at any time. In addition, prior to any cask operation involving fuel transport, a walk down of the general area and transportation route will be performed to assure that all local combustible materials, including transient combustibles, are controlled in accordance with administrative procedures.

Finding: The intent of this requirement was achieved. The team verified that the Cask Transportation Evaluation Program (CTEP) procedure provided adequate instructions for controlling combustibles near the ISFSI pad and along the cask transporter route. Procedure OM8.ID4, Section 5.5.4, classified the ISFSI fenced area as a "no combustible storage area," a designation that places stringent controls on the introduction and use of combustible materials within that area. As the ISFSI was not yet operational at the time of the inspection, appropriate signs and marking were not yet in place to identify the ISFSI as being a no combustible storage area. The team was informed that the postings/markings would be in place at the appropriate time.

The team was informed that the use of gas powered portable generators and air compressors in the vicinity of the Cask Transfer Facility (CTF) would be kept a minimum of 50 feet away from the CTF entrance.

The team determined that the ISFSI pad area and associated security features had been incorporated into Procedure OM8.ID1, and that fire response pre-plans had been developed for those structures. However, no specific fire pre-plan existed to address fire brigade response to a fire on the cask transporter. While it was noted that the fire pre-plan for the ISFSI pad included a statement regarding the flammable hazards associated with the cask transporter, it was not clear to the team how the fire brigade would know to look at the pre-plan for a fire at the ISFSI facility to determine hazards associated with a fire on the cask transporter which could be located anywhere between plant facilities and the ISFSI pad during cask movement. The inspectors were informed that the DCPP fire brigade had been trained to respond to a fire on the transporter based on instructions in the ISFSI pre-plan. While the instructions in the ISFSI pre-fire plan along with the training were sufficient to address the near term potential threats during transport, DCPP was requested to review the need for a cask transporter fire response plan to address both combustible hazards as well as potential radiological risks associated with the transporter and the circumstances that exist along the transport route .

Documents Reviewed: Procedure DF1.ID3, "Cask Transportation Evaluation Program (CTEP)," DRAFT; Procedure OM8.ID1, "Fire Loss Prevention," Revision 21; Procedure OM8.ID4, "Control of Flammable and Combustible Materials," Revision 17
.

Category: Fire Protection **Topic:** Tanker Trucks

Reference: 72-026, FSAR Section 2.2.2.2

Requirement: During transport operations, standard tanker trucks containing three to four thousand gallons of gasoline, will not be allowed within the owner-controlled area and will be administratively controlled in accordance with the Diablo Canyon ISFSI Technical Specification Cask Transportation Evaluation Program.

Finding: The intent of this requirement was achieved. The team verified that the Cast Transportation Evaluation Program (CTEP) procedure provided adequate controls over such activities as transport path walkdowns for identification of potential hazards and restrictions on parked as well as transient vehicles, including various sized tanker trucks, during cask transport. The team identified a potential issue during discussions with DCPP personnel.

The CTEP procedure stated that 4,000 gallon fuel trucks are not allowed to be within or enter the owner controlled area during cask transport. During discussions with security personnel regarding how they would implement the various vehicle restrictions during cask transport the inspectors learned that security personnel had planned to allow the 4,000 gallon fuel truck to access the site once the cask transporter was headed up the hill to the Cask Transport Facility. However, the team noted that the CTEP and the Diablo Canyon FSAR stated that during transport operations the 4,000 gallon fuel truck was not allowed to be within or enter the owner controlled area. This misunderstanding was cleared up as a result of the discussion. Given that transport operations could take up to three days, the team questioned DCPP personnel as to whether they wanted to restrict fuel deliveries for this long of a period in the event the Part 50 facility needed a fuel delivery. At the conclusion of the inspection the licensee was evaluating if a change to the CTEP and Diablo Canyon FSAR should be made to allow deliveries after the transporter was a sufficient distance away from the fuel truck. This issue is being tracked as Task 7 in SAPN 50232552.

Documents Reviewed: Procedure DF1.ID3, "Cask Transportation Evaluation Program (CTEP)," DRAFT; Procedure DF1.ID4, "Control of Combustibles and Explosives at the ISFSI During Dry Fuel Storage," DRAFT; Calculation PRA01-01, "Risk Assessment of Dry Cask/Spent Fuel Transportation within the DCPP Owner Controlled Area," Revision 5

Category: Fuel Selection/Verification **Topic:** Post Loading Verification

Reference: 72-026, FSAR, Section 5.1.1

Requirement: Fuel assemblies chosen for loading are assigned a specific storage location in the MPC in accordance with the Diablo Canyon ISFSI Technical Specifications. Criteria such as the classification of the assembly, the presence of non-fuel hardware and the use of uniform or regionalized storage are used to determine the acceptable fuel storage locations for each assembly. Records are kept that track the fuel assembly, and nonfuel hardware and its assigned MPC and specific storage location. Videotape (or other visual record) is used during fuel loading operations in the SFP to record fuel assembly and associated nonfuel hardware serial numbers and to provide an independent record of the MPC inventory.

Finding: This requirement was achieved. The licensee revised Procedure PEP R-8G to include

post loading verification of each fuel assembly in the as-loaded location in the MPC basket. The verification was required to be digitally recorded and the results would be independently verified before the canister lid could be placed on the MPC. The independent verification required that the serial numbers for every assembly and fuel insert be clearly visible and match the numbers on the move sheets for the corresponding MPC loading map.

The inspector witnessed the verification process for the first canister to be loaded. Several of the serial numbers on the fuel inserts were not clear and could not be verified during the initial video review. Subsequently, the licensee obtained a different camera and re-performed video inspections of the fuel inserts. During the verification of the fuel loaded into the first MPC, an error was discovered of a fuel insert that had been incorrectly placed into fuel assembly E22. The licensee initiated SAPN 50248487, to evaluate the potential impact of the incorrect fuel insert. The licensee had conservatively bounded the decay heat loading for all the fuel inserts when performing the canister loading calculations. Therefore, the fuel insert was acceptable for loading in the MPC and the serial number discrepancy was documented for the cask records.

Documents Reviewed: Procedure PEP R-8G, "MPC Loading Verification," Revision 0; Procedure TS6.ID2, "Control and Accountability of Special Nuclear Material," Revision 19; SAPN 50232599, "Create process for Post-MPC loading verification,"; Sample of 4 sided video inspections; SAPN 50248487, "Incorrect TP Found in Fuel Assy E22,"

Category: Fuel Verification **Topic:** Classifying Intact Fuel

Reference: 72-026, Tech Spec Definitions

Requirement: An INTACT FUEL ASSEMBLY is a fuel assembly without known or suspected cladding defects greater than pinhole leaks or hairline cracks which can be handled by normal means.

Finding: This requirement was achieved. The licensee’s procedure PEP R-MPC-32 defined the process for classification of fuel for loading into the MPC-32. This included Step (12.1) to remove assemblies that were not intact. The inspector questioned where the definition of "intact" fuel was provided in the procedure. The licensee generated SAPN 50232552 to track the issue and subsequently revised PEP R-MPC-32 to define "intact" fuel assemblies. This definition is consistent with the Technical Specification.

Procedure PEP R-MPC-32 was also revised to define the process for making the determination of whether or not a fuel assembly is "intact." However, the licensee was initially planning to base this determination largely on archival records (VHS tapes). The age and quality of the video records (up to approx 20 years old) may not provide adequate verification of fuel condition prior to loading into the MPC. As such the licensee plans to perform additional visual inspections of the fuel prior to loading to determine if any damage has occurred since removal from the reactor, i.e., as a result of handling/movement in the fuel pool. This preloading visual inspection will occur for assemblies examined more than 1 year prior to loading. PEP R-8G has been revised to reflect additional actions for cask preload visual inspection/assembly condition verification.

The licensee also evaluated and classified certain fuel assemblies as damaged based on industry experience with IGSCC of assembly top nozzles. Action Request A0528280 was reviewed to ensure applicable assemblies were properly characterized as damaged. Furthermore, the characterized assemblies were flagged in CASKWORKS as unacceptable for loading in the MPC-32.

Documents Reviewed: Procedure PEP R-MPC-32, "Determination of Fuel Assemblies Eligible for Storage in MPC-32 Casks," Revision 0; Procedure PEP R-8F, "Fuel Assembly Examinations in the Spent Fuel Pool ," Revision 1; Procedure PEP R-8G, "MPC Loading Verification, Revision 1; Fuel Performance History, Diablo Canyon Unit 1 and Diablo Canyon Unit 2; Action Request A0528280, "Evaluation of INPO E11052, Top Nozzle Separates from Fuel Assembly"; Action Request A0543420, "Early LOPAR Fuel Requires Inspection Prior to Handling"; Action Request A0594631, Degraded Assemblies Require Special handling"; SAPN 50232552, "ISFSI Dry Run #3"; SAPN 50237277, "ISFSI Dry Run #4"

Category: Fuel Verification **Topic:** Contents To Be Stored - 1

Reference: 72-026, Tech Spec 2.1.1.a

Requirement: Intact Fuel Assemblies, Damaged Fuel Assemblies, Fuel Debris, and Nonfuel Hardware meeting the limits specified in Tables 2.1-1 through 2.1.10 may be stored in the SFSC System.

Finding: The intent of this requirement was achieved. Procedure PEP R-MPC-32 satisfied the requirements for selecting fuel assemblies for uniform or regionalized loading patterns for storage of intact fuel assemblies. The Technical Specifications prohibited damaged fuel and fuel debris from being stored in the MPC-32, although the inspector discovered that Procedure PEP R-MPC-32, Revision 0 did not clearly state this restriction. Procedure PEP R-MPC-32 was subsequently revised to clarify the restriction on loading damaged fuel and fuel debris. The procedure was also found to lack clarity for the restriction of non-fuel hardware (control-rod apparatus) to the four central MPC-32 assembly storage locations due to the physical size of the hardware. The issues discovered by the NRC were entered into the licensee corrective action system as SAPN 50232640. The inspector noted that prior to the initial canister loading, the licensee had enhanced the loading procedures to clarify restrictions for loading fuel assemblies containing control rods.

Documents Reviewed: Procedure, PEP R-MPC-32, "Determination of Fuel Assemblies Eligible for Storage in the MPC-32 Casks," Revision 0 and Revision 1

Category: Fuel Verification **Topic:** Contents To Be Stored - 2

Reference: 72-026, Tech Spec 2.1.1.b

Requirement: For MPCs partially loaded with Damaged Fuel Assemblies or Fuel Debris, all remaining Intact Fuel Assemblies in the MPC shall meet the decay heat generation limits for the Damaged Fuel Assemblies. This requirement applies only to uniform loading.

Finding: This requirement was achieved. The licensee only planned to load MPC-32 canisters in the foreseeable future. Therefore, the procedure specified that damaged fuel and fuel debris were prohibited from being stored in the MPC-32 regardless of loading pattern,

consistent with Technical Specifications. Prior to loading any damaged fuel or fuel debris, the licensee would be required to develop additional procedures and procure MPC-24E or MPC-24EF canisters.

Documents Reviewed: Procedure PEP R-MPC-32, "Determination of Fuel Assemblies Eligible for Storage in MPC-32 Casks," Revision 0; Diablo Canyon ISFSI Technical Specifications Table 2.1-4C; SAP Notification 50232640, "Revise PEP R-MPC-32 for non-fuel hardware"

Category: Fuel Verification **Topic:** Fuel Burnup

Reference: 72-026, FSAR Section 1.1

Requirement: Diablo Canyon ISFSI will be limited to a maximum burnup of less than or equal to 45,000 MWD/MTU, (defined in ISG-11 as low burnup fuel).

Finding: This requirement was achieved. Procedure PEP R-MPC-32 and related documents limit fuel selection to those assemblies with burn-ups of 45,000 MWD/MTU or less, as specified in NRC, Division of Spent Fuel Storage and Transportation, Interim Staff Guidance (ISG) 11, Revision 3, and the Diablo Canyon Technical Specifications.

The inspection team identified an apparent discrepancy regarding the limiting value and the uncertainty associated with fuel assembly burn-up determinations. To illustrate, fuel assembly ID G21 had a recorded burn-up of 44,999 MWD/MTU, which was less than the limit of 45,000 MWD/MTU. However, the licensee could not demonstrate that any uncertainty in this value would not result in a burn-up value in excess of Technical Specification limit of 45,000 MWD/MTU for the purposes of determining assembly decay heat. As a result the licensee re-considered the burn-up determinations and methodology for the purpose of calculating decay heat values and revised Procedure PEP R-MPC-32 to incorporate a burn-up multiplier of 5 percent. The burn-up multiplier was conservatively based on criticality analysis Calculation STA-196, which determined that the recorded fuel burn-up contained an uncertainty of up to 4.5 percent from the nominal value. The inspector determined that the use of a 5 percent multiplier was bounding for determining fuel burn-up values used for establishing appropriate assembly decay heat.

The licensee determined that the fuel assembly burn-up values that were applied in other critical cask loading parameter determinations, such as dose assessment and confinement analyses, were conservative. This determination was based on the large inherent conservatisms in the bounding case fuel assembly calculations for the confinement releasable source term. Based on these large inherent conservatisms, the licensee demonstrated to the inspector that application of the same 5 percent uncertainty multiplier to the dose rate and confinement determination calculations was not necessary. The team agreed with this assumption for fuel assemblies with burn-ups of 45,000 MWD/MTU or less, but cautioned that future loadings of higher burn-up fuel, if approved for loading by license amendment, may require application of an uncertainty multiplier to ensure safety limits are not exceeded.

Documents Reviewed: Procedure PEP R-MPC-32, "Determination of Fuel Assemblies Eligible for Storage in MPC-32 Casks," Revision 0; Licensee White Paper, "Compliance with Fuel Burnup Requirements, ISFSI Loading Campaigns 1 and 2," Revised May 2, 2009; Calculation STA-196, "Fuel burn-up Uncertainty for Holtec Analysis," Revision 0; Diablo Canyon

Site Acceptance Test Procedure (Unit 1): CASKWORKS Cask Loading Software; Software Quality Assurance Plan: CASKWORKS Cask Loading Software; Software Quality Assurance Plan (SQA 95-2): TracWorks; Fuel Burnup Uncertainty for HOLTEC Analysis (CF3.ID4); TracWorks fuel accountability database (sample); SAPN 50232642, "Evaluate fuel assembly burnups for MPC load."

Category: Fuel Verification **Topic:** Fuel Misloading

Reference: 72-026, Tech Spec 2.2

Requirement: If any fuel specification or loading conditions of 2.1 are violated, the following actions shall be completed:
1) The affected fuel assemblies shall be placed in a safe condition.
2) Within 24 hours, notify the NRC Operations Center
3) Within 30 days, submit a special report which describes the cause of the violation and actions taken to restore compliance.

Finding: This requirement was achieved. Procedure XI1.ID2 required notification to the NRC Operations Center along with the requirement to submit a special report within the prescribed time frames.

Documents Reviewed: Procedure XI1.ID2, "Regulatory Reporting Requirements & Process," Revision 26; Procedure OP-B-8H, "Spent Fuel Pool Work Instructions," Revision 31

Category: Fuel Verification **Topic:** Regionalized Fuel Loading

Reference: 72-026, Tech Spec 2.1.3

Requirement: Fuel may be stored using regionalized loading in lieu of uniform loading to allow higher heat emitting fuel assemblies to be stored than would otherwise be able to be stored using uniform loading. Figures 2.1-1 through 2.1-3 define the regions for the MPC-24, MPC-24E-24EF; and MPC-32 models, respectively. Fuel assembly burnup, decay heat, and cooling time limits for regionalized loading are specified in Tables 2.1-8 and 2.1-9. In addition, fuel assemblies used in regionalized loading shall meet all other applicable limits specified in Tables 2.1-1 through 2.1-5. Limitations for Nonfuel Hardware to be stored with their associated fuel assemblies are provided in Table 2.1-10.

Finding: This requirement was achieved. The inspector reviewed Procedure PEP R-MPC-32 and found that it satisfied the Technical Specification requirement for regionalized loading patterns. There was some question of the licensee process of determining fuel burnup, which was described in more detail in the topic of "Burnup."

Documents Reviewed: Procedure PEP R-MPC-32, "Determination of Fuel Assemblies Eligible for Storage in MPC-32 Casks," Revision 0; Regionalized fuel loading maps

---

Category: Fuel Verification **Topic:** Uniform Fuel Loading

Reference: 72-026, Tech Spec 2.1.2

Requirement: Fuel assemblies used in uniform or preferential fuel loading shall meet all applicable limits specified in Tables 2.1-1 through 2.1-5. Fuel assembly burnup, decay heat, and cooling time limits for uniform loading are specified in Tables 2.1-6 and 2.1-7. Preferential fuel loading shall be used during uniform loading (i.e. any authorized fuel

assembly in any fuel storage location) whenever fuel assemblies with significantly different post-irradiation cooling times (greater than or equal to 1 year) are to be loaded in the same MPC.

Finding: This requirement was achieved. The inspector reviewed Procedure PEP R-MPC-32 and found that it satisfied the Technical Specification requirement for uniform loading patterns.

Documents Reviewed: Procedure PEP R-MPC-32, "Determination of Fuel Assemblies Eligible for Storage in MPC-32 Casks," Revision 0; Uniform fuel loading maps

---

Category: Heavy Loads **Topic:** Safe Load Paths

Reference: NUREG 0612, Section 5.1.1 (1)

Requirement: Safe load paths should be defined for the movement of heavy loads to minimize the potential for heavy loads, if dropped, to impact irradiated fuel in the reactor vessel and in the spent fuel pool, or to impact safe shutdown equipment. The path should follow, to the extent practical, structural floor members, beams, etc., such that if the load is dropped, the structure is more likely to withstand the impact.

Finding: This requirement was achieved. Procedure MA1.ID14 provided the overall station restrictions for movement of heavy loads using the plant cranes. Instruction Step 5.1.1 of the procedure provided an allowance for heavy load movements over exclusion areas when a detailed procedure had been approved by the Plant Safety Review Committee (PSRC). The licensee used Procedure MP M-42-DFS.1 to control the movement of the HI-TRAC transfer cask and other heavy loads associated with dry fuel storage operations inside the fuel handling building. Attachment 1 of this procedure provided the PSRC approved safe load paths for movement of the dry fuel equipment.

Documents Reviewed: Procedure MA1.ID14, "Plant Crane Operating Restrictions," Revision 18; Procedure MP M-42-DFS.1, "FHB Dry Fuel Storage Rigging and Load Handling," Revision 3

Category: Heavy Loads **Topic:** Transport Route

Reference: 72-026, FSAR Section 4.3.3

Requirement: The underground utilities, valve boxes, catch basins, and concrete pipeways are rated for H-20 highway loadings. None of the water lines or drains to be crossed by the transporter are safety related.

Finding: The intent of this requirement was achieved. The transport path was analyzed by PG&E to ensure that the loads imparted by the transporter would not damage the existing underground utilities. Originally, the transport path had been analyzed for loads equivalent to a H-20 highway loading. Subsequent to the use of the transporter, the licensee discovered that the loads due to the transporter slightly exceeded the H-20 highway loadings that had been used in the calculations. Additional calculations were conducted by the licensee and structural enhancements were added to several of the underground structures to provide additional protection. The transport path was altered to avoid traveling over or next to the affected underground structures. The transporter equipped with a 100 percent simulated load was observed by the inspector to traverse the transport path without damaging the transport route or the underground structures.

Documents Reviewed: Calculation 52.27.100.771, "Load Path Evaluation for HI-TRAC Transporter," Revision 4; Calculation 52.27.100.737, "Stability of Cold Machine Shop Retaining Wall," Revision 1; Calculation 52.27.100.757, "DCPP ISFSI Access Road and Ramps," Revision 1

Category: Heavy Loads **Topic:** Trunnion Initial Load Testing

Reference: FSAR 1014, Section 9.1.2.1

Requirement: The lifting trunnions shall be tested to 300% of the maximum design lifting load (750,000 lbs for the 125 ton transfer cask and 600,000 lbs for the 100 ton transfer cask. The load shall be applied for 10 minutes, after which the accessible parts of the trunnions and trunnion attachment areas shall be visually examined to verify no deformation, distortion or cracking has occurred. Certified material test reports verifying trunnion material mechanical properties meet ASME Code Section II requirements will provide further verification of the trunnion load capacity.

Finding: This requirement was met. The trunnion load test was performed on October 19, 2005 using Holtec Procedure HSP-113. The test load used was 761,991 pounds and the load was held for ten minutes. Following the load test, examinations were performed and documented in report number MTR-05332. No indications of cracking or deformation were identified.

Documents Reviewed: Holtec Procedure HSP-113, "Trunnion Load Test Procedure for HI-TRAC 100 and 125S," Revision 4

Category: Heavy Loads **Topic:** Visual Exam of Lifting Trunnions

Reference: FSAR 1014, Section 9.2.1

Requirement: Prior to each fuel loading, a visual examination in accordance with a written procedure shall be required of the HI-TRAC lifting trunnions. The examination shall inspect for indications of overstress such as cracking, deformation, or wear marks.

Finding: This requirement was met. Procedures MP M-42-DFS.1 and HPP-1073-400 required visual inspections to be performed prior to use for the HI-TRAC lifting trunnions. Procedure M-42-DFS.1, Step 14.7.7.c. required a visual inspection of the trunnions prior to utilizing the fuel handling bridge crane for lifting the transfer cask within the fuel handling building. Procedure HPP-1073-400, Step 6.6.16 required a visual inspection of the trunnions prior to use when planning to utilize the vertical cask transporter for movement outside of the fuel handling building.

Documents Reviewed: Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 4; PG&E Procedure MP M-42-DFS.1, "FHB Dry Fuel Storage Rigging and Load Handling," Revision 3

Category: Loading Operations **Topic:** ISFSI Cask Anchorage

Reference: 72-026, FSAR, Section 5.1.1.3

Requirement: When the Cask is properly located on the ISFSI pad and seated, the 16 anchor studs are threaded into the top of the embedded coupling and pre-tensioned using a stud tensioner. The nuts are tightened in a cross-pattern, roughly 180 degrees apart.

Finding: The intent of this requirement was achieved. Due to the seismic spectra at the Diablo Canyon ISFSI, the HI-STORM 100SA storage overpack, containing a loaded MPC, is anchored to steel embedment plates through the use of pre-tensioned anchor studs. The pre-tensioning generates a large compressive interface force between the base of the cask and the top surface of the steel embedment plate.

Holtec Procedure HPP-1073-200, Step 6.5.47, specified the stud tensioner pressure requirements for the HI-STORM anchor studs of 18,200 - 19,700 psig, which corresponded to an anchor stud tension of 60 - 65 ksi. The Holtec calculation package demonstrated the viability of the anchored HI-STORM storage overpack in the high seismic environment that existed at Diablo Canyon. The calculation was reviewed to determine if the tensioning requirements were adequately analyzed. Discussion with the ISFSI Program Lead indicated that the tensioning requirements used in the seismic calculations were based on tensioning the anchor studs to 60 percent of the material yield stress. Calculation HI-2012618 indicated that the yield stress of the studs was 105 ksi. Therefore, the specified stud tension corresponded to the 60 percent yield stress value of 60 - 65 ksi, used in the calculation..

The procedure also specified that the first four anchor studs were tensioned and threaded in a cross pattern. The remaining anchor studs were tensioned and threaded in a modified cross pattern that completes the nut tightening on studs that are 90 degrees apart. The pattern that was specified met the intent of the FSAR statement in that it avoided uneven loading of the base plate.

Documents Reviewed: Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 2; Holtec Calculation Package HI-2012618, "Seismic Analysis of Anchored HI-STORM 100 Casks at Diablo Canyon ISFSI," Revision 9

Category: Loading Operations **Topic:** Low Profile Transporter

Reference: 72-026, FSAR, Section 5.1.1.2

Requirement: The loaded MPC inside the transfer cask is positioned on and bolted down to the Low Profile Transporter (LPT). The transfer cask and the LPT are then rolled outside of the fuel handling building where the cask transporter can access the transfer cask for the trip to the Cask Transfer Facility.

Finding: This intent of this requirement achieved. The inspector reviewed the seismic calculations associated with the Low Profile Transporter (LPT). Calculation Package HI-2053390 contained the design for the anchorage of the transfer cask bottom flange to the LPT, using eight bolts. The analysis of these bolts concluded that the bolts will resist the lateral seismic force during an earthquake so that the HI-TRAC would remain connected to the LPT. The LPT also had seismic restraints to the track that were embedded in the concrete to keep the LPT from overturning during a seismic event. The LPT seismic analysis included the four earthquake response spectrum that are the design basis for DCPP (Design Earthquake, Double Design Earthquake, Hosgri Earthquake, and the Long-Term Seismic Program) as described in Section 8.2.1.2 of the Diablo Canyon ISFSI FSAR, Revision 2.

.

Documents Reviewed: Holtec International Calculation Package HI-2053390, "Structural Evaluation of the Low Profile Transporter," Revision 4

Category: Loading Operations **Topic:** Missile Protection

Reference: 72-026, FSAR, Section 8.2.2.2.2

Requirement: To avoid the potential of tornado generated missiles, cask transport and transfer operations will not be conducted during severe weather.

Finding: The intent of this requirement was achieved. The Transport Operations Checklist in Procedure DF1.ID3 contained a verification step to check the existing and forecasted atmospheric conditions for the duration of transport operations. The specified limits for wind speed were less than or equal to 35 mph for sustained winds, and less than 70 mph for gusting winds. Additionally, the checklist required that no thunderstorms were forecasted during the expected transport time. The wind speed limits in the checklist would preclude exceeding the design basis missile event during cask transport or transfer operations which was based on a wind speed of 157 mph (Section 8.2.2.2.1, Diablo Canyon ISFSI UFSAR).

Documents Reviewed: Procedure DF1.ID3, "Cask Transport Evaluation Program," Revision 0
Attachment 2, "Transport Operations Checklist," Form 69-21295

Category: Loading Operations **Topic:** Startup Testing

Reference: 72-026, FSAR, Section 9.2.4

Requirement: An overall startup testing program procedure will control the startup tests. Individual startup test procedures will be used to supplement the approved ISFSI operation procedures as required. The startup test procedures will verify the performance of the storage systems and ensure that plant equipment complies with requirements.

Finding: The intent of this requirement was achieved. Attachment 1 to Procedure DF1.DC1 contained the list of the 18 DCPP ISFSI startup tests that were required by DCPP ISFSI FSAR Section 9.2.4.

The 18 startup tests specified were:

(1) Preparing the transfer cask and MPC for movement into the spent fuel pool (SFP).
(2) Moving the transfer cask into the fuel handling building/auxiliary building (FHB/AB), and placement in the Unit 2 seismic restraint structure.
(3) Placing the transfer cask into the SFP and simulating movement of fuel, using a dummy fuel assembly, into the transfer cask.
(4) Removing the transfer cask from the SFP and moving it to the Unit 2 cask washdown area and into the seismic restraint structure.
(5) Decontaminating the transfer cask.
(6) Welding the MPC lid, moisture removal, filling the MPC with helium, MPC cooldown, and lid weld removal. These functions may be performed outside of the FHB/AB for ALARA reasons.
(7) Installing the transfer cask top lid.
(8) Loading the transfer cask onto the Low Profile Transporter using the FHB/AB crane

and removal from the FHB/AB.
(9) Transporting the loaded transfer cask from the FHB/AB to the CTF using the transporter.
(10) Movement of the MPC simulator from the transfer cask into a storage cask at the CTF.
(11) Placing the top lid on a loaded overpack and raising the storage cask out of the CTF using the transporter.
(12) Transporting a loaded overpack from the CTF to the ISFSI pad location.
(13) Positioning and fastening the loaded overpack to the ISFSI pad.
(14) Removing the loaded overpack from the ISFSI pad.
(15) Transporting the loaded overpack from the ISFSI pad to the CTF.
(16) Removing the top lid off a loaded overpack.
(17) Transfer of the MPC simulator from the overpack back into the transfer cask.
(18) Transporting the loaded transfer cask to the FHB/AB using the onsite transporter.

FSAR Section 9.2.4 required that an overall startup testing program procedure control the individual startup tests. Procedure DF1.DC1 for the overall startup test program was issued on May 4, 2009. However, the startup testing for the ISFSI had begun in January 2009. The licensee initially controlled the startup testing through the use of work orders. The work orders were determined to fulfill the intent of Section 9.2.4 since the work orders were being used to verify the performance of the storage system and that the plant equipment complied with the applicable requirements.

At the time of the team inspection the majority of the start-up tests had been demonstrated through work orders. Objective evidence that start-up testing had been performed for start-up test criteria 14-16 was obtained by reviewing the records documenting that the procedural steps had been performed and completed by the Diablo Canyon standard practice of circling the procedure step and drawing a line through it, and/or initialing the step after the step had been completed. The outstanding start-up tests were associated with the final NRC demonstration that would include movement of the transfer cask within the refueling building and placement of a dummy fuel assembly into the MPC, which was completed during the week of June 8-11, 2009.

Documents Reviewed: Procedure DF1.DC1, "Startup Testing for Dry Fuel Storage," Revision 0, Attachment 1, "Startup Testing Required by DCPP ISFSI FSAR Section 9.2.4"

Diablo Canyon Work Order 60009416 -
- Operation # 0100, "ISFSI Dry Run 1 - Welding"
- Operation # 0200, "ISFSI Dry Run 2 - Fluid Ops"
- Operation # 0300, "ISFSI Dry Run 3"
- Operation # 0500, "ISFSI Dry Run 5 - Wet Ops"

Category: Loading Operations **Topic:** Transfer Cask Restraint

Reference: 72-026, FSAR, Section 5.1.1.2

Requirement: The CWA seismic restraint located in Unit 2 is used to restrain the transfer cask during welding operations.

Finding: The intent of this requirement was achieved. Holtec Calculation Package HI-2063593

analyzed the stability of the HI-TRAC transfer cask under postulated earthquake loadings during the time that the HI-TRAC was stationed in the CWA. The calculation package demonstrated, by analysis, that the loaded HI-TRAC was suitably restrained under the postulated seismic events at the CWA. Additionally the calculation package demonstrated that the HI-TRAC cask could not move vertically a sufficient amount to lift off the 1-1/4 - inch thick bottom restraint, had no risk of tipping, and provides design inputs for the structural integrity evaluation of the removable restraint structure and the north wall, between the slab restraint and the slab.

There were two acceptance criteria for the analysis of the restraint structure. The first was that the restraint structure shall provide adequate lateral support for the HI-TRAC transfer cask to preclude tip over in the CWA. The second criteria was that the imposed loads or stresses in the various components of the restraint frame including the wall and slab anchors shall not exceed the allowable loads or stresses as specified in DCPP requirements.

The seismic inputs to the calculation used the input time histories for the Design Earthquake, Double Design Earthquake, Hosgri Earthquake, and the Long-Term Seismic Program which are the design basis earthquakes for the DCPP. Separate dynamic simulations were performed for each of these four seismic events.

PG&E had Revision 4 of the Holtec calculation independently reviewed by Enova Engineering Services. The independent technical review concluded that Holtec dynamic analysis of the cask and Cask Washdown Area restraint frame was reasonable and adequate. The Holtec calculation results were used to design the restraint frame components.

Holtec subsequently issued Revision 5 of the calculation because the Diablo Canyon ISFSI Project Engineer determined that the input weight that had been used in the calculation for the HI-TRAC while in the CWA was less than the specified HI-TRAC maximum loading on the CWA floor during MPC closure operations. This maximum weight of the HI-TRAC was determined to be 2.5 percent higher than the weight that had been used in Revision 4 of the calculation. This change caused the forces exerted on the restraint system during postulated seismic events to increase by 2.5 percent. The resultant increase in the forces were evaluated by the DCPP ISFSI Project Engineer and discussed with Holtec and Enova. It was determined that the independent review performed by Enova was not adversely impacted and that the results were still valid due to the small increase in the resultant forces versus the margin that existed due to the robust design of the restraint frame. The conclusions of the ISFSI Project Engineer were included in the revision of the package, which received appropriate PG&E review and approval.

Documents Reviewed: Holtec Calculation Package HI-2063593, "Dynamic Analysis of the HI-TRAC In Cask Washdown Area When Restrained," Revision 5

Category: Loading Operations **Topic:** Transporter Seismic Anchor

Reference: 72-026, FSAR, Section 5.1.1.3

Requirement: At the Cask Transfer Facility (CTF), the cask transporter seismic anchor (TSA) restraints connect the cask transporter to the CTF TSA pads. The TSAs function to prevent the transporter from seismically interacting with the storage cask while in the CTF during the MPC transfer operations.

Finding: The applicable portions of this requirement were achieved. Procedure HPP-1073-400, Steps 6.3.76 -77 required the cask transporter seismic restraints to be fastened to the cask transporter and to the restraint mounting points during the loading process. Likewise Procedure HPP-1073-600, Steps 6.7.40-41 installed the cask transporter restraints to the cask transporter and to the restraint mounting points in the concrete during the unloading procedure.

The work order contained the load test results for the TSA restraints. Performance tests had been conducted on three of the rock anchors holding the TSA restraints. The remaining 13 rock anchors had been proof tested. The test results were contained in WO C0207223, Attachments 9.1 (installation form), 9.2 (performance test data sheet), or 9.3 (proof test data sheet). The results of each installation and performance or proof test had been verified by the quality organization.

Documents Reviewed: Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at DCPP," Revision 2; Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at DCPP," Revision 2; Diablo Canyon Power Plant Work Order C0207223, "Cask Transfer Facility/Rock Anchor Installation"

Category: NDE Certification Exams **Topic:** Level III Exam Waivers

Reference: SNT-TC-1A, Section 8

Requirement: The BASIC AND METHOD examinations may be waived by a valid endorsement on an ASNT NDT Level III certificate. The SPECIFIC examination may be waived by a valid endorsement on an ASNT NDT Level III certificate AND documented evidence of Level III experience including the preparation of NDT procedures to codes, standards, or specifications and the evaluation of test results.

Finding: This requirement was implemented. Procedure GQP-9.0 was the PCI Energy Services written practice for controlling NDE examiner training and qualification. Procedure GQP-9.0 does not provide for examination waivers under any conditions and PCI does not use them.

Documents Reviewed: PCI Procedure GQP-9.0, "Training, Qualification, Examination and Certification of NDE, Inspection and Testing Personnel," Revision 7

Category: NDE Personnel Quals **Topic:** Visual Acuity

Reference: SNT-TC-1A, Section 8.2

Requirement: The NDE examiner should have natural or corrected near-distance acuity in at least one eye capable of reading Jaeger Number 1 at a distance of not less than 12 inches on a standard Jaeger test chart, or capable of perceiving a minimum of 8 on an Ortho-Rater test pattern. This should be verified annually. The NDE examiner should demonstrate the capability of distinguishing and differentiating contrast among colors used in the applicable method. This should be verified every 3 years.

Finding: This requirement was implemented. The PCI Energy Services Vision Examination Report for the Level II examiner performing the visual testing (VT) and liquid penetrant testing (PT) indicated the examiner had met the visual acuity requirements for natural or corrected distance acuity and color differentiation. The visual examination was conducted on July 17, 2008 and was valid for one year.

The Leak Testing Specialists, Inc., (LTS) Visual Acuity Record for the Level III examiner performing the helium leak testing (LT) indicated the examiner had met the visual acuity requirements for natural or corrected distance acuity and color differentiation. The visual examination was conducted on February 4, 2008 and was valid for one year.

Documents Reviewed: PCI Energy Services Vision Examination Report; Leak Testing Specialists, Inc. (LTS) Visual Acuity Record

---

Category: NDE Procedures - HT **Topic:** HMSLD Minimum Sensitivity

Reference: ANSI N14-5, Section 8.4

Requirement: The helium mass spectrometer leak detector (HMSLD) shall have a minimum sensitivity of 1/2 the acceptance leak rate. For example, a package with a leak tight acceptance criteria of 1.0 X 10(-7) ref-cc/sec requires a minimum HMSLD sensitivity of 5.0 X 10(-8) ref-cc/sec. This sensitivity requirement applies to both the hood and detector probe methods. The HMSLD shall be calibrated to a traceable standard.

Finding: This requirement was achieved. The licensee demonstrated that the mass spectrometer leak detector (MSLD) was capable of detecting helium to a sensitivity of 1/2 the acceptance leak rate. License Surveillance Requirement 3.1.1.3 specified that the total helium leak rate that was permitted through the MPC lid confinement weld combined with the drain and vent port welds were to be equal to or less than 5.0 E-6 atm-cc/sec (He). The level III leak test inspector detected an indicated leak rate of 1.12 E-8 atm-cc/sec (He) using the MSLD during the demonstration held on January 27-28, 2009. The Accu-Flow calibrated leak, serial number 5291, was used during the welding demonstration which had a calibrated leak of 1.52 E-7 atm-cc/sec (He). The total MPC helium leak rate measured during the fist canister loading on June 20, 2009, was 2 E-9 atm-cc/sec (He).

Documents Reviewed: Vacuum Technology Certificate of Calibration 5291-ACAL-COMP-1-43253, Model GPP-7-He-118T-110CC, Serial Number 5291; Procedure MSLT-DSC-HOLTEC, "Helium Mass Spectrometer Leak Test Procedure Dry Fuel Storage Container," Revision DC-0; Attachment 9.1 of Procedure PEP DF-9, "Loading Campaign Liaison Worksheet," Dated June 20, 2009

Category: NDE Procedures - PT **Topic:** Acceptance Criteria

Reference: ASME Section III, Article NB-5352

Requirement: Only indications with major dimensions greater than 1/16 inch should be considered relevant. The following relevant indications are unacceptable: (1) any cracks or linear indications. Linear indications have a length at least 3 times greater than the width; (2) rounded indications with dimensions greater than 3/16 inch (4.8 mm); (3) more than

four rounded indications in a line, separated by 1/16 inch (1.6 mm) or less edge to edge; and (4) more than ten rounded indications in any 6 square inch area in the most unfavorable location relative to the indications being evaluated.

Finding: This requirement was achieved. Appendix A of Procedure GQP-9.2 addressed the ASME acceptance criteria. Specifically, Section 2.0 included the acceptance criteria for welds meeting the ASME Section III, Subsection NB criteria.

Documents Reviewed: PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding, (50 - 300 degrees F)," Revision 3

Category: NDE Procedures - PT **Topic:** Contaminants

Reference: ASME Section V, Article 6, T-641

Requirement: The user shall obtain certification of contaminant content for all liquid penetrant materials used on austenitic stainless steels. The certifications shall include the manufacturers batch number and sample results. Sub-article T-641(b) limits the total halogen (chlorine plus fluorine) content of each agent (penetrant, cleaner and developer) to 1.0 weight percent (wt.%) when used on austenitic stainless steels.

Finding: This requirement was achieved. The inspector reviewed the Sherwin certifications for the following products and determined that the materials met the specified requirements:

DURO-CHEK, KO-19- Cleaner, Batch # 514-H56
DURO-CHEK, KO-17-Penetrant, Batch # 313-C54
DURO-CHEK, D350-Developer, Batch 527-B71

Documents Reviewed: Sherwin Certification Documentation; PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding," Revision 3

Category: NDE Procedures - PT **Topic:** Final Interpretation

Reference: ASME Section V, Article 6, T-676.1

Requirement: Final interpretation shall be made after allowing the penetrant to bleed-out for 7 to 60 minutes under standard temperatures (50 and 125 degrees F). The 7 to 60 minute clock starts immediately after application of a dry developer. For wet developer, the clock starts when the coating is dry.

Finding: The requirement was achieved. During the welding demonstration, the inspectors witnessed the performance of the final weld interpretation which met the above stated requirements.

Documents Reviewed: PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding," Revision 3

Category: NDE Procedures - PT **Topic:** Light Intensity

Reference: ASME Section V, Article 6, T-676.3

Requirement: For color contrast penetrants, a minimum light intensity of 50 foot-candles (500 lux) is

required to ensure adequate sensitivity during examination and evaluation of indications.

Finding: This requirement was achieved. The inspector determined that Procedure GQP-9.2 exceeded the above stipulation by requiring a minimum light intensity of 100 foot candles during the examination. The examiner used light meter PCI-1612273, which was determined to be within the specified calibration frequency at the time of the demonstration (Calibrated on February 16, 2008 with a calibration due date of February 16, 2009). The light measured during the welding demonstration was observed to be in excess of 100 foot candles.

Documents Reviewed: PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding (50 - 300 degrees F)," Revision 3; Exelon Certificate of Calibration Number 0010484346, Dated February 18, 2008

Category: NDE Procedures - PT **Topic:** Minimum Elements

Reference: ASME Section V, Article 6, T-621

Requirement: Each liquid penetrant (PT) procedure shall include the: (1) materials, shapes or sizes to be examined; (2) type of each penetrant, remover, emulsifier, and developer; (3) pre-examination cleaning and drying, including the cleaning materials used and minimum time allowed for drying; (4) applying the penetrant, the length of time the penetrant will remain on the surface (dwell time), and the temperature of the surface during examination; (5) removing excess penetrant and drying the surface before applying the developer; (6) length of developing time before interpretation; and (7) post-examination cleaning.

Finding: This requirement was met. The inspectors observed the PCI Level II examiner perform the dye penetrant examination on the root pass weld and first weld layer. The results of the examination were documented in Attachment 1 of Procedure PI-CNSTR-T-OP-320. Procedure GQP-9.2, Section 2.0 addressed the material shapes and sizes to be examined and Section 7.0 addressed the type of penetrant, remover, emulsifier, and developer to be used. The remaining PT requirements were addressed in Procedure GQP-9.2, Section 9, "Processing Parameter/Technique."

Documents Reviewed: PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding," Revision 3; PCI Procedure PI-CNSTR-T-OP-320, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2

Category: NDE Procedures - PT **Topic:** Non Standard Temperature

Reference: ASME Section V, Article 6, T-653

Requirement: When performing liquid penetrant examinations outside the range of 50 to 125 degrees F, the examiner may use a standard temperature procedure or a non-standard temperature procedure. In either case, the examination procedure requires qualification at the proposed higher or lower temperature. This shall require the use of a quench cracked aluminum block, also designated as a liquid penetrant comparator block.

Finding: This requirement was achieved. Procedure GQP-9.2 was used for both Low and Hi temperature liquid penetrant examinations (50 to 300 degrees F). The D-100 developer

was rated for 50 to 250 degrees F and the D350 developer was rated for 175 to 300 degrees F.

Procedure GQP-9.2 had been approved by the PCI Level III examiner and it was also noted that the Holtec Level III examiner had approved the procedure.

Documents Reviewed: PCI Procedure GQP-9.2 "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding, (50 -300 degrees F)," Revision 3

Category: NDE Procedures - PT **Topic:** Permanent Record

Reference: 72-026, FSAR Table 3.4-6

Requirement: The inspection process, including findings (indications), shall be made a permanent part of the user's records by video, photographic, or other means which provide an equivalent retrievable record of weld integrity. The video or photographic records should be taken during the final interpretation period.

Finding: This requirement was met. PCI Procedure PI-CNSTR-T-OP-230, Step 9.1.35 required that the final weld PT be documented on Exhibit 1 of Procedure GQP-9.2. This form would be incorporated into the final document package for the canister and be retrievable along with the other permanent records. This was an acceptable method to document findings associated with the PT examinations of the weld surface.

Documents Reviewed: PCI General Quality Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding (50 - 300 Degrees F)," Revision 3; PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2

Category: NDE Procedures - PT **Topic:** Removing Excess Penetrant

Reference: ASME Section V, Article 6, T-673.3

Requirement: Excess solvent removable penetrants shall be removed by wiping with a cloth or absorbent paper until most traces of the penetrant have been removed. The remaining traces shall be removed by lightly wiping the surface with a cloth or absorbent paper moistened with solvent. Care shall be taken to avoid the use of excess solvent.

Finding: This intent of this requirement was achieved. During the performance of the dye penetrant process the inspector observed the PT examiner removing the excess Solvent(KO-19)/remover with a water saturated cloth, which was allowed by Procedure GQP-9.2. The inspector contacted the Laboratory Director of Sherwin NDE products, who stated that because the Sherwin NDE products are water soluble the method used by PCI was considered satisfactory and would not adversely affect the performance of the process.

Documents Reviewed: PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding," Revision 3.

.

Category: NDE Procedures - PT **Topic:** Surface Preparation

Reference: ASME Section V, Article 6, T-642 (b)

Requirement: Prior to each liquid penetrant examination, the surface to be examined and all adjacent areas within one inch must be dry and clean.

Finding: This requirement was achieved. Procedure GQP-9.2, Section 9.1.1 required that the surface to be examined and all adjacent areas with one inch be dry and clean prior to performing each liquid penetrant examination.

Documents Reviewed: PCI Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding, (50 - 300 degrees F)," Revision 3

Category: NDE Procedures - VT **Topic:** Eye Position and Lighting

Reference: ASME Section V, Article 9, T-952

Requirement: Direct visual examinations shall be conducted with the eye within 24" (610 mm) of the surface, at an angle not less than 30 degrees. The light intensity must be at least 100 foot-candles (2001 edition). The light intensity must be at least 15 foot-candles for general examination and 50 foot-candles for the detection and study of small anomalies (1995 edition).

Finding: This requirement was achieved. Sections 4.1 and 6.2 of Procedure GQP-9.6 specified that direct visual examination would be within 24 inches of the surface at an angle not less than 30 degrees. The light in the inspection area was required to be a minimum of 100 foot-candles.

Documents Reviewed: PCI Procedure GQP-9.6, "Visual Examination of Welds," Revision 8

Category: NDE Procedures - VT **Topic:** Procedure Requalification

Reference: ASME Section V, Article 9, T-921.2

Requirement: Whenever a change is made to the following essential variables in a VT Examination procedure, the procedure must be requalified: (1) technique used; (2) surface conditions; (3) direct or indirect viewing method; (4) special illumination; (5) personnel qualifications; (6) procedure qualification reference.

Finding: This requirement was met. Procedure GQP-9.6, Section 6.4 contained the acceptable code requirements and the methodology to define when the VT procedure needed to be requalified.

Documents Reviewed: PCI Procedure GQP-9.6, "Visual Examination of Welds", Revision 8;

Category: NDE Procedures - VT **Topic:** Procedure Validation

Reference: ASME Section V, Article 9, T-941

Requirement: The visual testing (VT) procedure shall contain, or reference, a report of what method was used to demonstrate that the examination procedure was adequate. In general, a fine line 1/32 inch (0.8 mm) or less in width, an artificial imperfection or a simulated condition, located on the surface or a similar surface to that to be examined, may be considered as a method for procedure demonstration. The condition or artificial

imperfection should be in the least discernible location on the area surface to be examined to validate the procedure.

Finding: This requirement was achieved. Section 6.3 of Procedure GQP-9.6 specified that resolution of a 1/32-inch or less black line on an 18 percent neutral gray card located in the least discernible location on the surface to be examined qualified the procedure.

Documents Reviewed: PCI Procedure GQP-9.6, "Visual Examination of Welds", Revision 8

Category: Pressure Testing **Topic:** Pressure Gauge Calibration

Reference: ASME Section III, Article NB-6413

Requirement: All test gauges shall be calibrated against a standard dead weight tester or a calibrated master gauge. The gauges shall be calibrated before each test or series of tests. A series of tests is that group of tests using the same pressure test gauge or gauges, which is conducted at the same site within a period not exceeding 2 weeks.

Finding: The intent of this requirement was achieved. Procedure HPP-1073-300 contained a note which specifically annotated that the frequency for calibration of the pressure gage used for the ASME hydrostatic test shall not exceed 2 weeks. This note was inserted in the portion of the procedure where the calibration of each gage to be used during the loading campaign was to be listed.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2

Category: Pressure Testing **Topic:** Pressure Gauge Ranges

Reference: ASME Section III, Article NB-6412

Requirement: Analog type indicating pressure gauges used in testing shall be graduated over a range not less than 1.5 times nor more than 4 times the test pressure. Digital type pressure gauges may be used without range restriction, provided the combined error due to calibration and readability does not exceed 1 percent of test pressure.

Finding: This requirement was achieved prior to canister loading operations. During the preoperational demonstration the inspectors noted that the gage that was planned for use had been calibrated, however the tolerance was listed as plus/minus two percent of full scale, which exceeded one percent of the test pressure. The licensee captured this minor discrepancy in SAPN 50216916. Prior to the initial loading, new gages were obtained and calibrated, that were within the required range.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2; Exelon Certificate of Calibration Certificate Number 0010538114, Dated March 11, 2009

Category: Procedures & Tech Specs **Topic:** Annular Gap

Reference: 72-026, Tech Spec 5.1.3.b

Requirement: The MPC loading and unloading program must verify the maintenance of the water in the annular gap between the loaded MPC and the Transfer Cask during MPC moisture removal operations (loading) or MPC refloodiing operations (unloading).

Finding: The intent of this requirement was met. A discussion was held with the Spent Fuel Storage and Transportation Staff over the meaning of this requirement. During the loading operations, the licensee can use either vacuum drying or the Forced Helium Dehydration (FHD) system to remove the moisture from the MPC prior to the helium back fill operations. To protect the fuel cladding during the vacuum drying operations, the water in the annular gap is maintained for heat transfer. During the use of the FHD system, the water in the annular gap is removed to avoid boiling and maintain heat transfer since the temperature of the helium that is used to transfer heat and remove the moisture is approximately 450 degrees F. However, as described in ISG-11, the temperature of the helium gas during the FHD operations is well below the temperature limit of 752 degrees F, which should not be exceeded to protect the fuel cladding.

The Staff determined that the wording of the Technical Specification was ambiguous as to whether water should be in the annular gap, however the introduction paragraph clearly referenced the FSAR Section 10.2 requirements. Section 10.2 of the FSAR clearly provided directions to drain the annular gap during FHD operations and maintain water in the annular gap during the vacuum drying operations and during the unloading operation prior to removal of the inert environment in the MPC cavity.

The licensee demonstrated the use of the FHD system during the loading process. The annulus area was to be dry during the use of the FHD system. During the unloading process, the annulus is filled with water. Therefore the licensee meets the intent of the Technical Specification.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2; Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 0

Category: Procedures & Tech Specs **Topic:** Cask Handling Temperatures

Reference: 72-026, Tech Spec 5.1.3.a

Requirement: Verify that no transfer cask handling operations are allowed at environmental temperatures below 0 degrees F.

Finding: This requirement was achieved. Procedure DF1.ID3, Attachment 2, Form 69-21295, "Transport Operations Checklist," contained the requirement that before transport operations could begin the ambient temperature must be greater than or equal to 0 degrees F, as indicated by the plant's weather station. This requirement was verified by the transport operations support staff before starting transport operations.

Documents Reviewed: DCPP Procedure DF1.ID3, "Cask Transport Evaluation Program," Revision 0

Category: Procedures & Tech Specs **Topic:** Cask Transportation Program

Reference: 72-026, Tech Spec 5.1.5

Requirement: The Cask Transportation Evaluation Program will evaluate and control the transportation of loaded MPCs between the fuel building and the CTF and the ISFSI storage pads. Included in the program will be pre-transport evaluation and control of the transportation route surface conditions, onsite hazards along the route, security, transporter control

functions, CTF equipment operability and auxiliary cooling capabilities for the cask.

Finding: The intent of this requirement was achieved. The team verified that the Cask Transportation Evaluation Program (CTEP) procedure provided adequate controls over such activities as transport path walkdowns for identification of potential hazards and restrictions on parked as well as transient vehicles, including various sized tanker trucks, during cask transport activities. The team identified an issue during the document review that involved Calculation PRA01-01.

Calculation PRA01-01 listed several assumptions, with regard to certain administrative controls that would be implemented in the appropriate procedures, and indicated tracking through Action Request (AR) A0524878. The team reviewed the referenced AR and noted that several of the assumptions had not been captured in the AR or in its successor SAPN (50032631). Diablo Canyon entered SAPN 50233760 into the Diablo Canyon corrective action program to document the issue, investigate generic implications and to track resolution. The missed assumptions were added as Task 7 to SAPN 50032631 and the team verified that they were subsequently incorporated into procedures DF1.ID3 and DF1.ID4.

Documents Reviewed: Procedure DF1.ID3, "Cask Transportation Evaluation Program (CTEP)," DRAFT; Procedure DF1.ID4, "Control of Combustibles and Explosives at the ISFSI During Dry Fuel Storage," DRAFT; Calculation PRA01-01, "Risk Assessment of Dry Cask/Spent Fuel Transportation within the DCPP Owner Controlled Area," Revision 5

Category: Procedures & Tech Specs **Topic:** Cask Transporter Design

Reference: 72-026, Tech Spec 4.3.1.c

Requirement: The cask transporter shall be inspected, maintained, operated and tested in accordance with the requirements of NUREG-0612.

Finding: This requirement was achieved. An inspection was performed of the fabrication and initial testing of the transporter at Lift Systems, Inc. located in Moline, Illinois on January 22-26, 2007 (ML070400122). In December 2007, the inclined functional test of the transporter was conducted at Diablo Canyon. The inspectors witnessed the inclined functional test and reviewed the documentation of the load tests that had been conducted at the factory. The results of this inspection were documented in the Resident Inspector's quarterly report dated February 5, 2008 (ML080360630). An open item remained relative to how the licensee would perform frequent and periodic inspections of the transporter, similar to the requirements contained in Chapter 2-2 of ASME B30.2, "Overhead and Gantry Cranes."

Diablo Canyon provided Revision 5 to the Diablo Canyon Transporter Manual, which included both frequent and periodic inspection requirements for the transporter. The requirements for frequent inspections (preoperational) included an inspection of the overall condition, evidence of cracks or excessive rusting on structural members or welds, condition of tracks, and the condition of the lift links. The annual (periodic) inspection included an inspection for cracks or rusting on structural members or welds, base metal deformation, a visual inspection of selected welds, dimensional checks of the lift links and the inspection of the MPC downloader system.

This transporter was also used at Humboldt Bay for dry fuel cask loading operations as documented in the ISFSI inspection report (ML082600729). During the preoperational demonstrations at Humboldt Bay, cracks were discovered in several welds associated with the carriage section, which were classified as Not-Important-To-Safety (NITS). Repairs were made to the welds by the vendor and a root cause was preformed. The root cause determined that even though the welding preheat met the AWS Code requirements, it was insufficient for portions of the thinner NITS material being welded. The root cause acknowledged that the Important-To-Safety (ITS) welds were preheated to a higher temperature and had not experienced any cracking. The root cause concluded that the ITS portions of the VCT were unaffected. Additional NDE had been performed on the ITS welds after completion that confirmed the welds were unaffected. The root cause of the cracking was determined to be associated with the weld joint configuration that had been specified for the base material and the lack of additional preheat.

The weld cracks were found in an area that was not critical and would not have lead to a dropped load. To ensure that the weld cracking condition did not affect the use of the transporter during cask loading operations, a visual inspection is performed before each use to check for any evidence of cracks. Additionally, an annual inspection is performed of selected welds to ensure that the weld cracks do not reoccur.

Documents Reviewed: Holtec Project Procedure HPP-1073-6, "VCT Factory Test Procedure," Revision 2; Holtec Project Procedure HPP-1073-6, "VCT Factory Test Procedure," Revision 3; Everett Shipyard SS MPC Dummy Training Weight Equipment No. 505 Certified Weight; Holtec Standard Procedure HSP-187, "Interface Procedure For Manufacturing of ITS B Transporters at Lift Systems," Revision 3; Diablo Canyon Transporter Manual, Revision 0; Diablo Canyon Transporter Manual, Revision 5;

Category: Procedures & Tech Specs **Topic:** Dissolved Boron Concentration

Reference: 72-026, Tech Spec LCO 3.2.1

Requirement: The dissolved boron concentration in the water of the MPC cavity shall meet one of the following requirements:
a. Boron greater than or equal to 2000 ppmb, for all MPCs with one or more fuel assemblies having initial enrichment of less than or equal to 4.1 wt% U235.
b. Boron greater than or equal to 2000 ppmb, for MPC24/24E/24EF with one or more fuel assemblies having initial enrichment of greater than 4.1 and less than or equal to 5.0%wt U235.
c. Boron greater than or equal to 2600 ppmb, for MPC 32 with one or more fuel assemblies having initial enrichment of greater than 4.1 and less than or equal to 5.0 wt% U235.

Finding: This requirement was achieved. The licensee only planned to load MPC-32 canisters for the foreseeable future. Therefore the boron requirement limits were specified for the MPC-32 canisters. Procedure HPP-1072-200, Step 5.1.1 included the boron limits specified in (a) and (c) above for the minimum boron requirements. To show that the boron limits were achieved, the licensee sampled the water from the MPC and obtained the boron concentrations in ppm.
.

Documents Reviewed: Procedure HPP-1073-200, "Procedure for MPC loading at Diablo Canyon Power Plant," Revision 1

Category: Procedures & Tech Specs **Topic:** Inspection of Vent Screens

Reference: FSAR 1014, Table 9.2.1

Requirement: The Overpack inlet and outlet screens require a monthly inspection for damage, holes, and other deficiencies.

Finding: This requirement was achieved. Procedure MP M-42-DFS.4 was reviewed and found to contain the requirements to perform the monthly inspection of the vent screens. The lower and upper vent screens were inspected to verify that the screens were installed, that the screens were intact (free of holes or tears), and that all four of the mounting fasteners were in place. The procedure contained a verification step to ensure that the acceptance criteria are met and that the documentation is in place.

Documents Reviewed: Diablo Canyon Power Plant, Mechanical Maintenance Procedure, MP M-42-DFS.4, "HI-STORM Monthly Inspections," Revision 0;

Category: Procedures & Tech Specs **Topic:** ISFSI Operations Program

Reference: 72-026, Tech Spec 5.1.4

Requirement: The ISFSI Operations Program will implement the Diablo Canyon ISFSI SAR requirements for ISFSI operations. Included in the program will be a) the cask storage locations, b) the design features mentioned in Section 4.0 and design basis ISFSI pad parameters consistent with the Diablo Canyon ISFSI SAR analysis, and c) the condition of the ISFSI pad anchor bolt surface coatings exposed directly to the elements.

Finding: The intent of this requirement was achieved. The licensee did not have a single procedure or program to fully implement the Technical Specification 5.1.4 requirement. Instead the licensee had several procedures, specifications and design change packages that implemented the various requirements specified by the Technical Specification.

Documents Reviewed: Procedure DF1.ID1, "Dry Fuel Management Program," Revision 0; Specification Number 10055-C-NPG, "Specification for the Construction of an Independent Spent Fuel Storage Installation (ISFSI) for Diablo Canyon Power Plants, Units 1 and 2," Revision 0; Procedure HPP-1073-400, "Procedure for MPC Transport at DCPP," Revision 3; Procedure CF7.ID4, "Processing of Documents Received from Suppliers," Revision 9; Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 5: Procedure PEP DF-12, "HI-STORM Annual Inspection," Revision 0; Holtec International Report HI-2002501, "Conformed Specification for the PG&E Vertical Cask Transporter," Revision 11;

Category: Procedures & Tech Specs **Topic:** Loading & Unloading Program

Reference: 72-026, Tech Spec 5.1.3

Requirement: A program shall be established and maintained to implement Diablo Canyon ISFSI Section 10.2 requirements for loading and unloading fuel and components into/from MPCs, and preparing the MPCs for storage. The requirements of the program shall be complete prior to removing the MPC from the fuel building/auxiliary building. This

program will control limits, surveillances, compensatory measures and appropriate completion times to assure the integrity of the fuel cladding at all times in preparation of and during LOADING, UNLOADING or TRANSPORT OPERATIONS, as applicable.

Finding: The intent of this requirement was achieved. The licensee did not have a single procedure or program to fully implement the Technical Specification 5.1.3 requirement. Instead the licensee had several procedures, specifications and design change packages that implemented the various requirements specified by the Technical Specification.

Documents Reviewed: Procedure DF1.ID3, "Cask Transporter Evaluation Program," Revision 0; Procedure HPP-1073-300, "Procedure for Drying, Backfill, and Sealing the MPC at DCPP," Revision 4; Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 5; Procedure HPP-1073-200, "Procedure for MPC Loading at Diablo Canyon Power Plant," Revision 4; Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 3

Category: Procedures & Tech Specs **Topic:** MPC Helium Exit Temperature

Reference: 72-026, Tech Spec SR 3.1.3

Requirement: During unloading operations, verify that the MPC helium exit temperature is less than or equal 200 degrees prior to re-flooding the canister.

Finding: This requirement was met. The temperature of the helium inside the MPC is initially obtained during the gas sampling in Step 6.14.5, of Procedure HPP-1073-600. If the helium gas is less than 180 degrees F, internal cooling of the MPC is not required. If cooling of the MPC helium gas temperature is required, the Forced Helium Dehydrator (FHD) is used to circulate the helium and remove the heat from the MPC until the helium gas temperature as read on TG-3 is less than 190 degrees F. By specifying helium gas temperatures of 180 and 190 degrees F, the temperatures inside the MPC will be below boiling and would prevent flashing as water is introduced into the MPC.

Documents Reviewed: Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 2

Category: Procedures & Tech Specs **Topic:** Radioactive Effluent Control Program

Reference: 72-026, Tech Spec 5.1.2

Requirement: The Radioactive Effluent Control Program shall be established and maintained to:
a. Implement the requirements of 10 CFR 72.44(d) or 72.126, as appropriate
b. Provide limits on surface contamination of the Transfer Cask and verification of meeting those limits prior to removal of a loaded Transfer Cask from the fuel handling building.
c. Provide MPC leakage rate limits and verification of meeting those limits prior to removal of a loaded Transfer Cask from the fuel handling building.
d. Provide an effluent monitoring program, as appropriate, if the surface contamination limits are greater than the values specified in Reg Guide 1.86; or if the leakage rate limits are greater than the values specified as "Leaktight" in ANSI N14.5-1977.

Finding: This requirement was achieved. Diablo Canyon Power Plant (DCPP) had established a program to implement the requirements of 10 CFR 72.44 (d) and 72.126 as outlined in the Nuclear Power Group Program Directive for Radiation Protection and further

detailed in the Procedure RPI.ID1. The Environmental Monitoring Program addressed monitoring for direct radiation, airborne radioiodine, airborne particulate and food products. Attachment 8.1 to RPI.ID11 provided information on the location of DCPP on-site environmental monitoring stations. To limit release to the environment, limits on surface contamination on the transfer cask were specified in the HI-TRAC Decontamination Procedure. The inspector verified compliance with the contamination limits by reviewing the measured values obtained during loading of the first cask. The environmental impact was also limited by ensuring compliance with leak rate requirements in Procedure MSLT-DSC-HOLTEC.

Documents Reviewed: Nuclear Power Group Programs Directive, Radiation Protection, RPI, Revision 6; Procedure RPI.ID1, "Requirements for the ALARA Program," Revision 5; Procedure RP1.ID11, "Environmental Radiological Monitoring," Revision 9; Procedure RP-UFSP-RPI-3, RCP D-610, "HI-TRAC Decontamination Procedure," Revision 15; Contamination Levels from the HI-TRAC first cask loading; Procedure MSLT-DSC-HOLTEC, "Helium Mass Spectrometer Leak Test Procedure Dry Fuel Storage Container," Revision DC-0

Category: Procedures & Tech Specs **Topic:** Reflooding Water Temperature

Reference: 72-026, Tech Spec 5.1.3.i

Requirement: During the MPC re-flooding operation, the SFSC unloading program must verify that the helium exit temperature is such that the water flashing does not occur.

Finding: This requirement was achieved. Section 6.17 of Procedure HPP-1073-600 contained instructions for controlling the temperature of the helium gas inside the MPC during the unloading process. Before the unloading process was started, a sample of the helium gas inside the MPC was obtained in Step 6.14.5, to determine if fuel failure had occurred and the temperature of the helium gas. If the temperature of the helium gas was less than 180 degrees F, internal cooling of the MPC was not required. If cooling of the MPC helium gas was required, the Forced Helium Dehydrator (FHD) was used to circulate the helium and remove the excess heat from the MPC until the helium gas temperature, as read on TG-3, was less than 190 degrees F. By specifying that the helium gas temperatures must be between 180 and 190 degrees F, the temperatures inside the MPC would be below boiling and would prevent flashing as water was introduced into the MPC.

Documents Reviewed: Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 0

Category: Procedures & Tech Specs **Topic:** SFSC Heat Removal

Reference: 72-026, Tech Spec SR 3.1.2.1

Requirement: Verify all SFSC inlet and outlet air duct screens are free of blockage.

Finding: This requirement was achieved. Procedure STP M-236, included the requirement for daily inspection of the HI-STORM vent inlet and outlet screens to verify that the vents were free of blockage. The individuals that perform the daily inspection were required to sign, date, and record the time that the inspection had been completed.

.

Documents Reviewed: Procedure STP M-236, "Independent Spent Fuel System Installation (ISFSI) Cask Cooling Vents," Revision 0

Category: Procedures & Tech Specs **Topic:** Time Limit in CTF

Reference: 72-026, Tech Spec LCO 3.1.4

Requirement: The Spent Fuel Storage Cask shall not be in the CTF for greater than 22 hours.

Finding: This requirement was achieved. Step 6.4.13 of Procedure HPP-1073-400 identified the Technical Specification time limit of 22 hours that the loaded MPC/ HI-STORM could be located in the Cask Transfer Facility (CTF) and implemented the requirement to monitor the time limit. Step 6.4.14 identified the surveillance requirements necessary to ensure that the MPC/HI-STORM (Attachment 9.17 of the Procedure) did not exceed the Technical Specification time limit and specified that at fifteen hours, the PG&E liaison must start contingency measures to avoid violation of Technical Specification LCO 3.1.4.1.

During the heavy loads demonstration, the hydraulic unit used for lifting the HI-STORM from the CTF on the cask transporter malfunctioned. The licensee did not have a spare hydraulic unit available at the time of the demonstration, although the licensee had identified the unit as a necessary spare to have on site. To provide defense in depth for this issue, the licensee purchased a stand alone external power unit, that could be attached to the cask transporter and used to lift or lower the HI-STORM from the CTF. The successful use of this external power unit was demonstrated to the inspectors during the week of June 8-11, 2009.

Documents Reviewed: Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 2; Procedure PEP DF-14, "Cask Transporter EPU Operation," Revision 0

Category: Procedures & Tech Specs **Topic:** Time to Boil

Reference: 72-026, Tech Spec 5.1.3.c

Requirement: The water temperature of a water filled or partially filled loaded MPC shall be shown by analysis to be less than boiling at all times.

Finding: This requirement was achieved. The time to boil time clock was used during the loading and unloading processes. In the unloading process, Step 6.18.3 of Procedure HPP-1073-600 calculated the time to boil clock after the MPC was reflooded. During the loading process, the time to boil clock was tracked in Procedure HPP-1073-300 and HPP-1073-200. Procedure HPP-1073-300 tracked the time to boil clock until the completion of the water removal from the MPC during the blowdown process recorded in Step 6.9.15. Should the time limit be approached for the time to boil clock, the licensee was required to recirculate water through the MPC. Attachment 9.2 of Procedure HPP-1073-300 provided directions for how to recirculate the water and how to recalculate the time to boil clock.

To establish that the calculation used for the time to boil clock in the Diablo Canyon loading and unloading processes were bounding, Holtec furnished a letter to Pacific Gas

& Electric, Dated March 20, 2009.

Documents Reviewed: Holtec Procedure HPP-1073-300, "Procedure for MPC Sealing, Drying, & Backfilling at DCPP," Revision 2; Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 0; Letter from Holtec International to Pacific Gas & Electric, Dated March 20, 2009; Holtec Procedure HPP-1073-200, "Procedure for MPC Loading at Diablo Canyon Power Plant," Revision 1

Category: Procedures & Tech Specs **Topic:** Transporter Fuel Tank

Reference: 72-026, Tech Spec 4.3.1.b

Requirement: The cask transporter fuel tank shall not contain greater than 50 gallons of diesel at any time.

Finding: This requirement was achieved. The design specification required that "the fuel tank that provides fuel for all onboard power shall have a capacity of 45 gallons of diesel fuel."

The checklist in Procedure DF1.ID3 required a verification that the Transporter fuel tank or any mobile crane used at the ISFSI/CTF does not contain more than 50 gallons of diesel fuel. Other items in the checklists required verification that other combustible and flammable materials (such as transient combustibles, fuel tanks, and gas cylinders) or operations (hydrogen storage, fuel tanker and vehicle movement, gas cylinders) were removed or controlled outside of the protected area. Within the protected area, existing combustible controls met this requirement for control of flammable material hazards.

Procedure DF1.ID4, contained requirements for control of combustible and explosive hazards once dry fuel was stored on the ISFSI pad. These include controls on movement of the plant's fuel trucks past the ISFSI, movement of other vehicles within 175 feet of the ISFSI, the transportation of compressed gas bottles past the ISFSI, and controlling growth of vegetation around the ISFSI.

Documents Reviewed: Holtec Design Specification HI-2002501, "Functional Specification for the Diablo Canyon Cask Transporter," Revision 10; Procedure DF1.ID3, "Cask Transport Evaluation Program," Revision 0, Attachment 2, "Transport Operations Checklist,"; Procedure DF1.ID4, "Control of Combustibles and Explosives at the ISFSI During Dry Fuel Storage," Revision 0

Category: Procedures & Tech Specs **Topic:** TS Bases Control Program

Reference: 72-026, Tech Spec 5.1.1

Requirement: The Technical Specifications (TS) Bases Control Program shall be established, implemented, and maintained. Changes to the TS Bases shall be made under appropriate administrative controls and reviews. Changes to the TS Bases may be made without prior NRC approval in accordance with the criteria in 10 CFR 72.48. The TS Bases Control Program shall contain provisions to ensure that the TS Bases are maintained consistent with the Diablo Canyon ISFSI SAR.

Finding: This requirement was achieved. Procedure XI3.ID6 was reviewed and determined to contain adequate controls and instructions to address the Technical Specification 5.1.1 requirement to control changes to the Technical Specification Bases.

Documents Reviewed: Procedure XI3.ID6, "Technical Specification Bases Control Program," Revision 2

Category: Quality Assurance **Topic:** Cask System Annual Maintenance

Reference: FSAR 1014, Table 9.2.1

Requirement: The following cask system maintenance shall be performed annually (or prior to use if out of service for greater than 1 year);
- overpack external surface visual examination
- load testing of the transfer cask trunnions
- transfer cask shield tank pressure relief valve calibration
- transfer cask internal and external visual inspection for compliance with design drawings
- transfer cask and overpack visual inspection of identification markings

Finding: This requirement was achieved. Procedure PEP DF-13 provided the requirements for the HI-TRAC 125D and HI-STORM pre-use and annual inspections as described in the ISFSI FSAR and the HI-STORM 100 FSAR. The procedure was verified to address the following required cask system maintenance activities:

- overpack external surface visual examinations (Sections 6.2, 12.5 and 12.9)
- transfer cask trunnion testing; satisfied by NDE inspection (Section 12.2)
- transfer cask shield tank relief valve calibration (Section 12.2.2)
- transfer cask internal/external inspection for compliance with design drawings (Section 6.1)
- transfer cask visual inspection of identification markings (Section 12.2.13)

Documents Reviewed: Procedure PEP DF-13, "HI-TRAC Annual/Pre-campaign Inspection," Revision 0

Category: Quality Assurance **Topic:** Control of Measuring and Test Equipment

Reference: 10 CFR 72.164

Requirement: The licensee shall establish measures to ensure that tools, gauges, instruments and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated, and adjusted at specific periods to maintain accuracy within necessary limits.

Finding: This requirement was achieved. The team determined that the above procedure implement controls on procurement, use, and calibration of M&TE used at the DCPP. It also placed controls on use of vendor supplied M&TE through Section 1.3 that stated "M&TE used and controlled in accordance with the company's approved vendor program is exempt from the requirements of this procedure." As Holtec is an approved vendor, M&TE used by them to support ISFSI activities was exempt. However, Holtec's M&TE is subject to the requirements of their NRC-approved QA Program with regard to procurement, use and calibration. DCPP has not identified any equipment specific to ISFSI activities other than stock M&TE such as gauges or torque wrenches that could be checked out and used to support ISFSI activities. Any such M&TE is controlled through the DCPP M&TE program as described in the above procedure. The team reviewed calibration records for Holtec supplied M&TE and did not identify any concerns.

Documents Reviewed: Procedure MA2.ID1, "Use and Control of Measuring and Test Equipment (M&TE)," Revision 10

Category: Quality Assurance **Topic:** Corrective Actions

Reference: 10 CFR 72.172

Requirement: The licensee shall establish measures to ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures must ensure that the cause of the condition is determined and corrective action taken to preclude repetition. This must be documented and reported to appropriate levels of management.

Finding: The intent of this requirement was met. The team determined that ISFSI related issues were being entered into the licensee corrective action program and tracked through to resolution using Procedure OM7.ID1. The team reviewed a sampling of open and closed items in the licensee corrective action program that used the SAPN system and determined that, overall, corrective actions were appropriate to the issues identified.

The team identified one observation during the review dealing with the processing of SAPN 50035144. This SAPN involved a review of a FSAR requirement to use the maintenance rule for periodic monitoring of ISFSI structures. In the resolution to the SAPN, it was stated that ISFSI specific reviews would not be covered under the maintenance rule. However, the SAPN was assessed to be incomplete by the team because it had not identified that a 72.48 evaluation would need to be performed to support the resolution, since the Diablo Canyon ISFSI FSAR discussed some of the monitoring requirements as being performed under the maintenance rule. The licensee entered this observation into their corrective action system as SAPN 50035144, task number 3.

Documents Reviewed: Procedure OM7.ID1, "Problem Identification and Resolution," Revision 30

Category: Quality Assurance **Topic:** Instructions, Procedures & Drawings

Reference: 10 CFR 72.150

Requirement: The licensee shall prescribe activities affecting quality by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall require that these instructions, procedures, and drawings be followed. The instructions, procedures, and drawings must include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

Finding: This requirement was not fully implemented and a Non-Cited Violation (NCV) has been identified due to the licensee failure to provide adequate instructions in Procedure TS3.ID2 to ensure that operational commitments assumed in the Licensing Basis Impact Evaluations (LBIEs) were captured and included in appropriate procedures.

During the inspection of the licensee's 10 CFR 72.48 process, a review was conducted of the Licensing Basis Impact Evaluation (LBIE) documents that had been prepared by the licensee. Overall, the LBIE documents were determined to meet the requirements of 10 CFR 72.48. However, the inspectors found several instances where the licensee included operational commitments in the LBIE documents, which were not being tracked for implementation in applicable operating or administrative procedures.

Specifically, during the review of LBIE 2008-017 and 019, the inspector discovered specific assumptions by the licensee as part of the operating requirements that were not included in the operating procedures nor were the issues being captured to ensure that appropriate actions were taken. Further, Procedure TS3.ID2 did not provide any instructions to the LBIE preparers on how to capture the issues or what actions were necessary to ensure that the assumptions were valid.

The following statements were identified as not having been implemented in the applicable procedures:

"The actual VCT design provides for an on board 45 gallon diesel fuel tank and a catch pan that is designed to catch and divert any leakage away from the CTF through a hose connection on the pan. Connection of a hose to the catch pan while the VCT is stationary over the CTF will be controlled by administrative procedures." (LBIE 2008-017)

"To meet the 22-hour removal requirements operating procedures will require that load capable and qualified cranes be on-site in the area of the CTF during fuel transport and transfer operations." (LBIE 2008-017)

"PG&E will proceduralize each of these activities requiring that these lifts be made directly with no interim steps and if, during these activities, there is a delay of more than a few minutes, the load will be immediately lowered to contact the surface or raised within the VCT and the seismic strap secured in place." (LBIE 2008-019)

10 CFR 72.150 required the licensee to prescribe activities affecting quality by documented instructions and procedures appropriate to the circumstance and require that the instructions and procedures be followed. Contrary to this, the licensee failed to provide instructions to ensure that operational commitments assumed by the licensee in the Licensing Basis Impact Evaluations were included in procedures. The licensee entered the issue into their corrective action program as SAPN 50237790. This Severity level IV violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 72-26/0901-01).

Documents Reviewed: Procedure TS3.ID2, "Licensing Basis Impact Evaluations, (LBIEs)," Revision 24; LBIE Numbers 2008-13 through 18; LBIE Screens dated September 14, 2005 and January 19, 2006

Category: Quality Assurance **Topic:** Nonconforming Components

Reference: 10 CFR 72.170

Requirement: The licensee shall establish measures to control materials, parts, or components that do not conform to their requirements in order to prevent their inadvertent use or installation. Nonconforming items must be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures.

Finding: This requirement was not fully implemented and a Non-Cited Violation (NCV) has been identified due to licensee failure to prevent the use of a nonconforming piece of

equipment in an important-to-safety application. A summary of the event is provided in the following paragraphs:

In January 2008, an indention was accidently made in the outside of the HI-TRAC transfer cask by contact with the driver side bumper of the vertical cask transporter. The Holtec Supplier Manufacturer Deviation Report (SMDR) 1693 described the dent as being a maximum of one inch deep. An analysis was performed and the dry cask vendor determined that the HI-TRAC transfer cask could be "used as is," using a 72.48 evaluation. It was concluded that the structural integrity of the HI-TRAC was not challenged by the dent. The only consequence of the dent was determined to be a slight increase in the localized radiological dose rate due to the one inch reduction in shielding that was provided by the HI-TRAC water jacket.

The licensee reported that initial plans had been to repair the dent to the side of the HI-TRAC even though the dry cask vendor had determined that the equipment could have been "used as is." After additional evaluations had been completed, the licensee determined that the most effective course of action was to use the HI-TRAC with the existing dent. The licensee determined that there was a high possibility that any repairs to the HI-TRAC would create an issue that was more detrimental to the HI-TRAC than the small dent. According to interviews, the HI-TRAC had not been tagged or identified as being in a non-conforming condition by the dry cask vendor or the licensee after the dent had occurred.

During a review of open vendor documentation prior to loading the canister, the licensee discovered that the acceptance of the dent in the side of the HI-TRAC had never been evaluated and accepted by PG&E in accordance with the requirements of 10 CFR 72.48. This discovery was documented in SAPN 50248337 on June 15, 2009. The licensee prepared LBIE 2009-016 to evaluate the "use as is" disposition of the dent in the side of the HI-TRAC. The licensee incorrectly placed a restraint on the use of the HI-TRAC cask to impose a restriction to not drain the water from the MPC until the LBIE was approved by the Plant Safety Review Committee. The licensee failed to recognize that the HI-TRAC was in a non-conforming condition and the use of the HI-TRAC in this condition was a violation of 10 CFR 72.170.

After the inspectors brought the issue to the attention of the licensee, the plant staff promptly completed the 10 CFR 72.48 screen for use of the HI-TRAC, which was subsequently reviewed and approved by the Plant Safety Review Committee. The LBIE review and acceptance was completed before any additional radiological dose consequences occurred.

10 CFR 72.170 required the licensee to establish measures to control materials and components that do not conform in order to prevent their inadvertent use. Contrary to this, the licensee had not controlled the use of the HI-TRAC transfer cask to prevent inadvertent use after identification of the nonconforming indentation on the side of the cask. The licensee entered the issue into their corrective action program as SAPN 50249084. This Severity level IV violation is being treated as a Non-Cited Violation, consistent with Section VI.A of the NRC Enforcement Policy (NCV 72-26/0901-02).

Documents Reviewed: SAPN 50248337, "ISFSI Transfer Cask," Dated June 15, 2009; Holtec Supplier Manufacturing Deviation Report (SMDR) 1693, Dated January 31, 2008; LBIE 2009-016, "HI-TRAC Dent on Surface of Water Jacket," Revision 0 and 2; SAPN 50249084, "ISFSI Transfer Cask," Dated June 18, 2009

Category: Quality Assurance **Topic:** QA Audits

Reference: 10 CFR 72.176

Requirement: The licensee shall carry out a comprehensive system of planned and periodic audits to verify compliance with all aspects of the QA program and to determine the effectiveness of the program.

Finding: This requirement was achieved. The team reviewed the Group Master Internal and External Audit and Review plan and determined that ISFSI activities were factored into the audit program. The team also reviewed the DCPP Quality Assurance Plan and determined that it also incorporated ISFSI activities within the scope of QA controls. The team reviewed numerous surveillances performed by DCPP auditors at the cask vendor fabrication facility. No concerns were identified.

Documents Reviewed: Various supplier surveillance forms and QA audit schedule

---

Category: Radiological **Topic:** ALARA

Reference: 10 CFR 72.104(b)

Requirement: Operational restrictions must be established to meet as low as is reasonably achievable objectives for radioactive materials in effluents and direct radiation levels associated with ISFSI operations

Finding: This requirement was achieved. The DCPP ALARA program was found to be implemented through plans, administrative procedures, numerous working level procedures and guidance documents. The Used Fuel Storage Project Radiation Protection ALARA Plan contained exposure estimates developed from benchmarking other sites that had already conducted spent fuel loading campaigns utilizing similar dry cask storage systems.

The ALARA plan set the project exposure goals at 90 percent of the estimated exposure. The estimated exposure was based on the scope of the current project, past industry experience and anticipated radiological conditions at Diablo Canyon. The final dry storage work area layout was designed to minimize exposures to the workers, which included additional lead shielding around the cask washdown area. The ISFSI was located a long distance from on-site buildings to reduce exposure to site personnel, while being located centrally to the PG&E owner controlled property to limit off-site exposures.

Documents Reviewed: DCPP Used Fuel Storage Project Radiation Protection ALARA Plan; Procedure RPI.ID1, "Requirements for the ALARA Program," Revision 5; Procedure RPI.ID2, "Use and Control of Temporary Radiation Shielding," Revision 9; Procedure RCP D-200, "Writing Radiation Work Permits and ALARA Planning," Revision 45
.

Category: Radiological **Topic:** Criticality Monitoring

Reference: 10 CFR 72.124(c)

Requirement: A criticality monitoring system shall be maintained in each area where special nuclear material is handled, used, or stored which will energize clearly audible alarm signals if accidental criticality occurs. Underwater monitoring is not required when special nuclear material is handled or stored beneath water shielding. Monitoring of dry storage areas where special nuclear material is packaged in its stored configuration is not required. The NRC granted an exemption from the criticality requirements of 10 CFR 50.68(b)(1) during loading, unloading and handling of the MPC in the DCPP SFP.

The NRC has defined "packaged" to begin when the canister lid is seal welded.

Finding: This requirement was achieved. DCPP utilized the Area Radiation Monitoring System for detection of criticality as described in Chapter 9, Auxiliary Systems of the DCPP Units 1 and 2 FSAR. The Area Radiation Monitoring System provided personnel protection and general surveillance of the spent fuel pool area through continuous monitoring with direct readout and high radiation level alarms available both locally and in the control room. The permanently installed monitors were supplemented by portable monitor systems and radiation protection coverage as applicable. Additionally, portable radiation monitors were placed in the cask washdown area to provide for personnel protection and general surveillance of the area.

Documents Reviewed: DCPP Units 1 and 2, Final Safety Analysis Report Update, Dated October 18, 2008; DCPP ISFSI FSAR Update, Revision 2, June 2008; DCPP Emergency Plan, Revision 4, Change 12, Section 7.3.3, Criticality Signal

---

Category: Radiological **Topic:** Dose Rate Survey - Transfer Cask

Reference: 72-026, Tech Spec 5.1.3.g.

Requirement: Verify that the surface dose rates on the TRANSFER CASK are adequate to assure proper loading and consistency with the offsite dose analysis.

Finding: This requirement was achieved. The licensee had determined the site specific dose rates for the HI-TRAC cask. Prior to cask loading activities, the licensee estimated expected neutron and gamma dose rates using isotopic inventories for a design basis fuel assembly with burnup of 55,000 MWD/MTU, five year cooling and an initial enrichment of four percent. Neutron and gamma source terms and quantity of radionuclides were calculated utilizing the SAS2H and ORIGEN-S modules of the SCALE system of computer codes. The locations to perform the dose rate surveys were shown in Figures 7.3-1 and 7.3-2 of the DCPP FSAR. The expected dose rates at the surface and at one meter were presented in Tables 7.3-1 and 7.3-2 of the DCPP FSAR. The radiation survey was conducted on the outside of the HI-TRAC at indicated radiation survey points prior to removal from the fuel handling building.

Documents Reviewed: Radiation and Contamination Survey Form, FSAR Survey on HI-TRAC, Survey 5078; Radiation Protection Project Task Guide RP-USFP-RPI-4, "Used Fuel MPC Closure," Revision 0; Radiation Protection Project Task Guide RP-UFSP-RPI-5, "Cask Movement and Stack-up and Transfer to ISFSI," Revision 0.

Category: Radiological **Topic:** Overpack Dose Rates

Reference: 72-026, FSAR, Section 7.3.2.1, Table 7.3-1

Requirement: The surface and one meter dose rates for the HI-STORM overpack with an MPC-32 canister and bounding design basis fuel are shown in Table 7.3-1 of the FSAR. The dose rates measured on the exterior of the HI-STORM overpacks should be below the values provided in the table.

Finding: This requirement was achieved. Survey data from Survey Number 5130 indicated that the maximum dose rates for the HI-STORM were acceptable. Task Guides RP-USFP-RPI-5 provided guidance to ensure that the limits specified in Table 7.3-1 of the ISFSI FSAR were not exceeded. The Task Guide also required a stop work and notification of DCPP supervision should these limits be exceeded. Surveys were made at locations indicated in the Diablo Canyon FSAR as directed in Task Guide RP-UFSP-RPI-5.

Documents Reviewed: Radiation and Contamination Survey Form, FSAR Survey of HI-STORM, Survey Number 5130; Radiation Project Task Guide RP-USFP-RPI-5, "Cask Movement Stack-up and Transfer to ISFSI," Revision 0; Diablo Canyon ISFSI FSAR Update, Revision 2; Radiation Project Task Guide RP-UFSP-RPI-5, "HI-STORM Survey Targets," Revision 0

Category: Radiological **Topic:** Radioactive Materials

Reference: 10 CFR 72.104(a)

Requirement: During normal operations and anticipated occurrences, the annual dose equivalent to any real individual who is located beyond the controlled area must not exceed 25 mrem to the whole body, 75 mrem to the thyroid and 25 mrem to any other critical organ.

Finding: This requirement was achieved. The restricted area fence surrounding the ISFSI was located such that the dose rate at the fence line was calculated to be less than 2 mrem in any one hour in accordance with 10 CFR 20. The dose rate attributable to the ISFSI taken at the nearest normally occupied on-site facility (makeup water facility) was calculated to be 0.51 mrem/hr while the estimated dose rate at the power plant was 0.022 mrem/hr. Both limits were well below the specified limits for radiation workers. Table 7.5-4 of the ISFSI FSAR listed the anticipated annual dose exposures at the site boundary and to the nearest resident, which demonstrated that Diablo Canyon would meet 10 CFR 72.104 requirements. Continued compliance with annual dose limits would be demonstrated through the DCPP environmental monitoring program. The inspector toured the areas surrounding the ISFSI pad and determined that the placement of the Environmental TLDs would effectively monitor, record and trend the radiological doses in all directions surrounding the ISFSI. The licensee Included TLDs on four radiation detection phantoms at the restricted area boundary for recording the contribution of neutrons. TLDs had been positioned prior to storing any loaded canisters at the ISFSI, which would provide accurate background exposure dose rates which would assist in the assessment of the ISFSI contribution to the overall exposure rates.

Documents Reviewed: Diablo Canyon ISFSI FSAR Update, Revision 2, Chapter 7; Procedure RP1.ID11, "Environmental Radiological Monitoring," Revision 9

Category: Radiological **Topic:** Transfer Cask Surface Contamination Limit

Reference: 72-026, Tech Spec 5.1.2.b

Requirement: Provide limits on surface contamination of the TRANSFER CASK and verification of meeting those limits prior to removal of a loaded TRANSFER CASK from the fuel handling/auxiliary building.

Finding: The requirements were achieved. The limits for loose contamination on the HI-TRAC cask were specified in Procedure RCP D-610. If the release criteria specified in RP-USFP-RPI-4 was not achieved, an authorization from radiation protection supervision was required for release of the HI-TRAC. A contamination survey was conducted on the outside of the HI-TRAC at designated radiation survey points, the HI-TRAC/MPC annulus area and the area around the bolt holes prior to removal from the fuel handling building. The contamination survey forms associated with the initial canister loading indicated no detectable loose contamination. Another survey was completed of the HI-TRAC prior to release from the RCA with a result of no detectable loose contamination. Gamma isotopic analysis of water drained from the annulus showed no measured activity in the sample. Data on minimal detectable activity levels was also supplied.

Documents Reviewed: Procedure RCP D-610, "Diablo Canyon Power Plant Radiation Control," Revision 15; Radiation Protection Project Task Guide RP-UFSP-RPI-4, "Used Fuel MCC Closure," Revision 0; Contamination Survey of MPC and HI-TRAC, Survey 5036; Contamination Survey of HI-TRAC for release from RCA, Survey 5086; Dry Fuel Storage Liquid Sampling, DCPP Form 69-21366, Annulus Drain, Dated June 18, 2009

Category: Records **Topic:** Material Balance, Inventory, and Records

Reference: 10 CFR 72.72(a)

Requirement: Each licensee shall keep records showing the receipt, inventory (including location), disposal, acquisition, and transfer of all SNM with quantities specified in 10 CFR 74.13(a)(1).

Finding: The intent of this requirement was achieved. Procedure TS6.ID2 provided the accountability requirements for the transfer of the spent fuel from the operating units to the ISFSI. The requirements included a record of the fuel selected, date transferred, fuel location within the MPC, and location of the MPC on the ISFSI pad. The inspector identified that the quantity of the special nuclear material per cask was not addressed in Procedure TS6.ID2. This quantity is required to be included in the annual inventory report in accordance with 10 CFR 72.72.a requirements. The licensee initiated SAPN 50238479 to improve their accountability process to include the quantity of special nuclear material per cask prior to their next annual inventory report.

Documents Reviewed: PG&E Procedure TS6.ID2, "Control and Accountability of Special Nuclear Material," Revision 19; SAPN 50238479

Category: Records **Topic:** Physical Inventory

Reference: 10 CFR 72.72(b)

Requirement: Each licensee shall conduct a physical inventory of all spent fuel, high-level radioactive waste, and reactor-related GTCC waste containing special nuclear material meeting the requirements in paragraph (a) of this section at intervals not to exceed 12 months unless otherwise directed by the Commission. The licensee shall retain a copy of the current inventory as a record until the Commission terminates the licensee.

Finding: The intent of this requirement was met. PG&E Procedure TS6.ID2 Step 6.2 required accountability records for all fuel assemblies transferred to, stored at, or removed from the ISFSI. The licensee planned to provide an annual report of the spent fuel stored at the ISFSI. Procedure TS6.ID2 required that the records be retained for a period of five years after the fuel is transferred out of the ISFSI.

Documents Reviewed: PG&E Procedure TS6.ID2, "Control and Accountability of Special Nuclear Material," Revision 19

Category: Safety Reviews **Topic:** Changes, Tests, and Experiments

Reference: 10 CFR 72.48(c)(1)

Requirement: A licensee can make changes to their facility or storage cask design if certain criteria are met as listed in 10 CFR 72.48.

Finding: The intent of this requirement was achieved. The team reviewed Procedure TS3.ID2 and several of the 10 CFR 72.48 reviews/screens that had been performed by the licensee. The licensee used a single process to govern the performance of the 10 CFR 72.48 and 10 CFR 50.59 reviews, which was called the Licensing Basis Impact Evaluation (LBIE). Based on the review of the LBIE procedure and several LBIEs, the team identified two observations and one finding.

The first observation was that the LBIE procedure did not contain a provision to ensure that the requirements of 10 CFR 72.48 (d)(6)(ii) which specified that any changes to a spent fuel storage cask design made by a specific licensee (DCPP in this case) be provided to the certificate holder within 60 days of implementing the change. Diablo Canyon's practice, up to the time of the inspection, was to have Holtec review all cask design changes, therefore all changes had been provided to the certificate holder. The licensee stated they would review the LBIE procedure and either incorporate the reporting requirement into the procedure or place an administrative restriction that prohibited DCPP from performing any 72.48 evaluations that alter the cask design.

The second observation involved the manner in which Diablo Canyon personnel had been qualified to perform 72.48 screening and evaluations. The team determined the licensee had authorized all DCPP personnel who were qualified to perform 50.59 screenings and evaluations to summarily be qualified to perform 72.48 screenings and evaluations using an e-mail message that dated January 13, 2006. The basis for the authorization was the belief that the 72.48 screening and evaluation process was exactly the same as that used for 50.59 regulatory reviews. No additional or specific training had been provided to these personnel on ISFSI and dry cask storage systems technology, operations, or licensing basis documents. The team expressed its concern that, while the 72.48 and 50.59 processes are identical with regard to the screening and evaluation questions, individuals performing 72.48 screenings and evaluations require an underlying understanding of the subject matter to properly answer the screening questions or to perform any required evaluations. The team did not identify any technically deficient screenings or evaluations during the inspection due in part to the fact that only a small group of individuals associated with the ISFSI project at DCPP actually performed 72.48 screenings and evaluations. However, the method used to qualify station personnel allowed a much larger group of personnel to potentially perform 72.48 screenings and

evaluations. DCPP management informed the inspectors that they planned to restrict the list of qualified personnel allowed to perform 72.48 regulatory reviews as well as providing additional specific training.

The inspectors reviewed the LBIE documents that had been prepared by the licensee. The LBIE documents were determined to meet the requirements of 10 CFR 72.48 requirements. However, the licensee included operational commitments in several of the LBIE documents, which were not being tracked for implementation in applicable operating or administrative procedures. The details associated with this finding are fully described in the Quality Assurance Category, under the Topic of Instructions, Procedures & Drawings.

Documents Reviewed: Procedure TS3.ID2, "Licensing Basis Impact Evaluations, (LBIEs)," Revision 24; LBIE Numbers 2008-13 through 18; LBIE Screens dated September 14, 2005 and January 19, 2006

Category: Slings **Topic:** Sling Heavy Load Requirements

Reference: NUREG 0612, Section 5.1.6 (1) (b)

Requirement: Dual or redundant slings should be used such that a single component failure or malfunction in the sling will not result in an uncontrolled lowering of the load, OR the load rating of the sling should be twice the sum of the static and dynamic loads.

Finding: This requirement was met. There were four major lifts made with slings during the loading process. The downloading/uploading of the MPC into the HI-STORM required use of two round synthetic slings, each of which were 44 feet long and six inches in diameter with a vertical capacity of 105,000 pounds. As required by ASME B 30.9, each sling also had a minimum design factor of five. The maximum weight of the loaded MPC was 90,000 pounds, therefore one sling would be sufficient to keep the MPC from an uncontrolled descent if the other sling experienced a failure.

The rigging for the HI-STORM Lid required the use of four slings for the lift. Each sling was rated for a vertical capacity of 20,000 pounds. The maximum weight of the HI-STORM Lid was 23,963 pounds; therefore three of the slings would be sufficient to keep the HI-STORM lid from an uncontrolled descent if one sling experienced a failure.

The rigging for the MPC lid required the use of four wire rope slings, each with a vertical capacity of 17,000 pounds. The maximum weight of the MPC Lid was 10,000 pounds; therefore three of the slings would be sufficient to keep the MPC Lid from an uncontrolled descent if one sling experienced a failure.

The rigging for the mating device with HI-TRAC Pool Lid required the use of four slings, each with a vertical capacity of 20,000 pounds. The maximum weight of the mating device with HI-TRAC Pool Lid was 26,900 pounds; therefore three of the slings would be sufficient to keep the mating device with the HI-TRAC lid from an uncontrolled descent if one sling experienced a failure.

The rigging for the HI-STORM required the use of four slings, each with a vertical capacity of 220,000 pounds when used in a basket configuration. The maximum weight

of the HI-STORM was 360,000 pounds; therefore three of the slings would be sufficient to keep the HI-STORM from an uncontrolled descent if one sling experienced a failure.

Documents Reviewed: Documents Reviewed: HI-STORM FSAR Table 8.1.2, Revision 17; Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 3; Holtec Procedure HPP-1073-900, "Procedure for MPC Preparation at Diablo Canyon Power Plant," Revision 2

Category: Slings **Topic:** Sling Inspections - Frequent

Reference: ASME B30.9, Section 9-6.9.2

Requirement: A visual inspection for damage shall be performed each day or shift the sling is used.

Finding: This requirement was met. Procedure MA1.ID11 governed rigging inside the fuel handling building and provided directions to use qualified riggers to inspect the slings per ANSI B30.9-1971, which including a visual inspection of the slings prior to use. For work outside the fuel handling building, including the Cask Transfer Facility (CTF), the riggers were trained per Holtec Lesson Plan LP-HOL-DCPP-002, which prescribed the daily inspection of the slings prior to use. The inspector observed the qualified riggers performing the frequent sling inspections prior to use during the heavy loads lifting demonstrations and portions of the initial cask loading activities.

Documents Reviewed: Documents Reviewed: PG&E Procedure MA1.ID11, "Rigging and Load Handling," Revision 10; Holtec Lesson Plan LP-HOL-DCPP-002, "Dry Storage System Load Handling For Diablo Canyon," Revision 0

Category: Slings **Topic:** Sling Inspections - Periodic

Reference: ASME B30.9, Section 9-6.9.3

Requirement: A complete inspection for damage to the sling shall be conducted at intervals not to exceed one year for normal service, monthly to quarterly for severe service, or as recommended by a qualified person for special service. Each sling component shall be exposed and all surfaces examined. Periodic inspections require written records documenting the condition of the sling.

Finding: This requirement was achieved. Section 5.2.7 required that wire rope, synthetic slings and chain falls be inspected on an annual basis by journeymen that are qualified in rigging. The sling inspection results were placed in the rigging equipment database that was maintained by the licensee.

Documents Reviewed: Procedure MA1.ID11, "Rigging and Load Handling," Revision 10

Category: Slings **Topic:** Sling Temperature Limits

Reference: ASME B30.9, Section 9-6.8.1

Requirement: Synthetic slings shall not be used in contact with objects that exceed the temperature limit of the sling.

Finding: This requirement was met. The only dry fuel component that could exceed the maximum temperature rating of the slings was the MPC. The licensee purchased Sparker Eater Slings for downloading and uploading the MPC. The Slings were rated to

305 degrees F. Upon questioning by the inspectors, the dry cask vendor provided the maximum possible temperature that could be expected on the surface of the MPC was 400 degrees F. The heat loads that were currently being loaded by the licensee, would not be expected to have a maximum heat load over 305 degrees F. However, to ensure that slings of the appropriate temperature rating were used, the licensee added caution statements to both the loading and unloading procedures to measure the MPC temperature prior to sling use.

Documents Reviewed: Documents Reviewed: Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision. 3; Holtec Procedure HPP-1073-600 "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 5

Category: Slings **Topic:** Sling User Training

Reference: ASME B30.9, Section 9-6.1

Requirement: Sling users shall be trained in the selection, inspection, cautions to personnel, effects of environment and rigging practices.

Finding: Finding: This requirement was met. The PG&E and Holtec Lesson Plans provided training to the riggers for proper use of the slings and inspection requirements. Discussions with the riggers provided assurance that the riggers were familiar with the type of slings used, selection of slings, and work practices to properly utilize the slings.

Documents Reviewed: Documents Reviewed: PG&E Training MG0801, "Basic Rigging Fundamental Qualification Program," Revision 20; Holtec Lesson Plan LP-HOL-DCPP-002, "Dry Storage System Load Handling For Diablo Canyon," Revision 0;

Category: Special Lifting Devices **Topic:** Acceptance Testing - Critical Loads

Reference: ANSI N14.6, Section 6.3.1

Requirement: Prior to initial use, special lifting devices used for lifting a critical load using a single path hoisting system shall be subjected to a load test equal to 300% of the maximum service load. If the special lifting device design is such that while handling the critical load, a single component failure or malfunction would not result in an uncontrolled load, the load test shall be equal to 150% of the maximum service load. After sustaining the load for a period of not less than 10 minutes, critical areas, including load bearing welds, shall be subjected to nondestructive testing using liquid penetrant or magnetic particle examination.

Finding: This requirement was met. The licensee provided documentation that the HI-STORM lift brackets, HI-TRAC lift links, MPC lift cleats, and HI-TRAC trunnions, which are all used for lifting a critical load using a single path hoisting arrangement, had been subjected to a load test equal to 300% of the maximum service load for a ten minute period. Following the load test, each special lifting device (SLD) underwent non-destructive examination (NDE) with satisfactory results. The load test of the MPC lift cleats and associated NDE was performed by US Tool & Die, Inc. and documented on data record DP 0411-007. The MPC lift cleat rated capacity was 45,000 pounds. Both lift cleats were proof tested to 135,000 pounds on August 16, 2006. The HI-STORM lift bracket load test and NDE was performed through Holtec Procedure HPP 1073-7. Each of the HI-STORM lift brackets capacity was rated at 180,000 pounds. Each of the HI-

STORM lift brackets were load tested to 588,880 pounds on September 23, 2007. The HI-TRAC trunnions were load tested and NDE was performed in accordance with Holtec Procedure HSP-113. The HI-TRAC trunnions had a rated capacity of 250,000 pounds and were proof tested to 761,991 pounds on October 19, 2005. The HI-TRAC lift yoke was load tested and NDE performed in accordance with Holtec Procedure HPP 1073-10. The HI-TRAC lift yoke had a rated capacity of 240,000 pounds and was load tested to 727,440 pounds on September 9, 2007.

Documents Reviewed: Holtec Purchase Specification PS-1209, "Purchase Specification for the MPC Lift Cleat," Revision 5; Holtec Purchase Specification PS-5060, "Purchase Specification for Diablo HI-STORM Lift Bracket/HI-TRAC Lift Link," Revision 3; Holtec Procedure HSP-113, "Trunnion Load Test Procedure for HI-TRAC 100 and 125S," Revision 4; Holtec Procedure HPP-1073-7, "Diablo Canyon HI-STORM Lifting Bracket System Load Test Procedure," Revision 1; Holtec Procedure HPP: 1073-10, "Diablo Canyon Lift Yoke Load Test Procedure," Revision 2; US Tool & Die, Inc. Data Record DP 0411-007

Category: Special Lifting Devices **Topic:** Annual Testing 1

Reference: ANSI N14.6, Section 5.3.1 and 6.3.1

Requirement: Annually, not to exceed 14 months, special lifting devices and special lifting devices for lifting critical loads that use a dual load path system shall be subjected to either of the following: 1) a load test equal to 150% of the maximum service load. After sustaining the load for a period of not less than 10 minutes, critical areas, including load-bearing welds, shall be subjected to visual inspection for defects and all components shall be inspected for permanent deformation; OR 2) In cases where surface cleanliness and conditions permit, the load testing may be omitted and dimensional testing, visual inspection and nondestructive testing of major load-carrying welds and critical areas shall suffice.

Finding: This intent of this requirement was met. The downloading/uploading of the MPC into the HI-STORM was considered as a dual load path. Under PG&E Work Order 68005382, the licensee performed a 150 percent MPC downloader proof test that utilized 67.5 tons (135,000 pounds) for ten minutes (90,000 pounds was the maximum rated MPC load). The most recent load test had been satisfactorily performed on June 6, 2009. The Technical Manual for the transporter included requirements for visual inspections of the load carrying members as well as for the annual load test requirements.

Documents Reviewed: Diablo Canyon Work Order 68005382, "2009 ISFSI Transporter Annual Inspection"; SAPN 50247069, "Update ISFSI SLD's in PM Program," Lift Systems Technical Manual for CT201067, Revision 2; Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 3

Category: Special Lifting Devices **Topic:** Annual Testing 2

Reference: ANSI N14.6, Section 6.3.1

Requirement: Annually, not to exceed 14 months, special lifting devices used to lift critical loads with a single load path shall be subjected to either of the following: 1) a load test equal to 300% of the maximum service load. After sustaining the load for a period of not less

than 10 minutes, critical areas, including load-bearing welds, shall be subjected to visual inspection for defects and all components shall be inspected for permanent deformation; OR 2) In cases where surface cleanliness and conditions permit, the load testing may be omitted and dimensional testing, visual inspection and nondestructive testing of major load-carrying welds and critical areas shall suffice.

Finding: This intent of this requirement was met. The load tests or visual examinations required by ANSI N14.6 had been performed by the licensee within the past 12 months. Procedure HPP-1073-400, Section 4.16 included the requirement to verify that the special lifting devices (SLDs) including the lift yoke, HI-TRAC trunnions, MPC lift cleats, down-loading portion of the VCT and the HI-STORM lift brackets were certified prior to use. To ensure that subsequent annual inspections were performed for the SLDs in accordance with the requirements of ANSI N14.6, the licensee initiated SAPN 50247069 into their corrective action system.

Documents Reviewed: Diablo Canyon Order Work Order 68005382, "2009 ISFSI Transporter Annual Inspection," SAPN 50247069, "Update ISFSI SLD's in PM Program," Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 3; Special Lifting Device Certification Record MPC Lift Cleats, Dated April 23, 2009; Special Lifting Device Certification Record HI-STORM Lifting Bracket, Dated April 30, 2009; Special Lifting Device Certification Record HI-TRAC Trunnions, Dated April 30, 2009; Special Lifting Device Certification Record Lift Yoke, Dated April 30, 2009;

Category: Special Lifting Devices **Topic:** Inspection Prior to Use

Reference: ANSI N14.6, Sections 5.3.6; 5.3.7

Requirement: Special lifting devices shall be visually inspected by operating personnel prior to each use, for indications of damage or deformation.

Special lifting devices shall be visually inspected by maintenance or other non-operating personnel at intervals not to exceed three months, for indications of damage or deformation.

Finding: This requirement was met. Holtec Procedures HPP-1073-200/400/600 and PG&E Procedure MP M-42-DFS.1 included requirements for performing a visual inspection of the special lifting devices (SLDs) prior to performing the lifts which utilized the SLDs. The procedure included instructions to perform an inspection for surface deformation, abnormal wear/tear, damage, and loose fasteners.

Documents Reviewed: Holtec Procedure HPP-1073-200, "Procedure for MPC Loading at Diablo Canyon Power Plant," Revision 4; Holtec Procedure HPP-1073-400, "Procedure for MPC Transport at Diablo Canyon Power Plant," Revision 4; Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 5; Procedure MP M-42-DFS.1, "FHB Dry Fuel Storage Rigging and Load Handling," Revision 3

Category: Special Lifting Devices **Topic:** Stress Design Factors - Critical Load

Reference: ANSI N14.6, Sections 6.2

Requirement: The special lifting device used to lift a Critical Load shall either (1) have all the load

bearing members with twice the normal stress design factors (6 for material yield and 10 for material ultimate strength) for handling the critical load or (2) use a dual load path system such that two separate and distinct load paths are provided in the event that one path fails, the second path will continue to hold the load for transport to a set down area.

Finding: This requirement was met. The inspector reviewed several of the cask components for compliance with the stated ANSI N14.6 requirements. Holtec Procedure PS-1209 Step 9.5.1.1 and 9.5.1.2 required the MPC Lift Cleat to be designed to a stress factor of six for the material yield and ten for material ultimate strength. Holtec Procedure PS-5060, Step 9.4 required the components to the HI-STORM Lift Brackets/HI-TRAC Lift Links to be designed to a stress factor of six for the material yield and ten for material ultimate strength. The HI-STORM FSAR requires the trunnion of the HI-TRAC to be designed to a stress factor of six for the material yield and ten for material ultimate strength. Inspector reviewed the certificates of compliance for the MPC Lift Cleat, HI-STORM Lift Brackets/HI-TRAC Lift Links and verified that the components had been fabricated to the correct stress design factors.

Documents Reviewed: Holtec Procedure PS-1209, "Purchase Specification for the MPC Lift Cleat," Revision 5; Holtec Procedure PS-5060, "Purchase Specification for Diablo HI-STORM Lift Bracket/HI-TRAC Lift Link," Revision 3; HI-STORM FSAR Report HI-2002444, Appendix 3.E, "Lifting Trunnion Stress Analysis for HI-TRAC," Revision 17

Category: Specific License **Topic:** Cask Movement in Power Plant

Reference: SNM-2511, Condition 13

Requirement: Fuel and cask movement and handling activities that are to be performed in the Diablo Canyon Power Plant Fuel Handling Building/Auxiliary Building will be governed by the requirements of the Diablo Canyon Power Plant, Units 1 & 2 Operating Licenses and associated Technical Specifications.

Finding: This requirement was achieved. The licensee in preparation for the loading spent fuel into dry storage submitted a license amendment request in April 2002. The license amendment that was approved by the NRC on September 26, 2003 authorized the handling and loading of Holtec dry cask storage components in the 10 CFR Part 50 facility using the modified non-single-failure proof crane.

Subsequent to the license amendment, the licensee determined that the upgrade of the crane to a single-failure-proof trolley and hoist would be prudent. To support the crane upgrade several design change packages were developed dealing with the crane and the supporting structure. The licensee evaluated both the supporting structure and the crane modifications as part of the crane upgrade.

DCP M-49774 implemented the new single-failure-proof trolley and main hoist. A review of the changes associated with the crane upgrade were included in the LBIE. Several changes were implemented to the structural steel supporting the crane including removal of two of the four movable partition walls under DCP M-49774, and the evaluation of the additional weight imposed by the new single-failure-proof trolley. Attachment A of the DCP included a matrix of the requirements of NUREG 0554 and how each of the requirements were being met by the new single-failure-proof trolley and main hoist. The licensee prepared additional design change packages and calculations to

address other changes to the crane and/or supporting structure.

The LBIE associated with DCP N-49773 reviewed the changes to the NRC approved Part 50 and 72 licenses. Part 50 design change packages that were addressed in this LBIE included DCP M-49774, "FHB Crane Single Failure Proof Upgrade, DCP C-49958, "SFP Transfer Cask Restraint Cup", DCP C-50911, "Cask Washdown Area Seismic Restraining," and DCP C-50882, "Low Profile Transporter (LPT) Track System."

The inspectors reviewed portions of the modification packages along with the LBIEs associated with the changes. No discrepancies were identified.

Documents Reviewed: LBIE Screen for DCP M-49774, "Fuel Handling Building Crane Single-Failure-Proof Upgrade," Revision 1; Diablo Canyon Nuclear Power Plant License Amendments 162 and 163; LBIE Screen Dry Fuel Storage / DCP 1000000050 (N-49773), Revision 0

Category: Specific License **Topic:** Record Storage Requirements

Reference: SNM-2511, Condition 16

Requirement: The licensee is exempted from the provisions of 10 CFR 72.72(d), with respect to maintaining a duplicate set of spent fuel records. The licensee may maintain records of spent fuel and high level radioactive waste in storage either in duplicate, as required by 10 CFR 72.72(d), or alternately, a single set of records may be maintained at a records storage facility that satisfies the standards of ANSI N45.2.9-1974.

Finding: This requirement was met. The inspectors reviewed the record keeping process in use at Diablo Canyon. The licensee scanned all the records generated on site. The special nuclear material records were kept in the special nuclear material accounting database. In addition to the electronic copy stored locally, the database is backed up daily to two different site servers in Fairfield, CA and San Francisco, CA to provide dual and redundant record keeping.
.

Documents Reviewed: PG&E Procedure TS6.ID2, "Control and Accountability of Special Nuclear Material," Revision 19

Category: Training **Topic:** Certification of Personnel

Reference: 10 CFR 72.190

Requirement: Operations of equipment and controls that have been identified as important to safety in the SAR and in the license must be limited to trained and certified personnel or be under the direct visual supervision of an individual with training and certification in the operation. Supervisory personnel who personally direct the operation of equipment and controls that are important to safety must also be certified in such operations.

Finding: This requirement was achieved. The Diablo Canyon ISFSI training and certification program met the requirements of 10 CFR 72.190. The program included Job Performance Measures (JPMs) to evaluate the competence of the trainees during performance of the assigned tasks.

Personnel qualifications for those operating equipment and controls considered important to safety were outlined in the Diablo Canyon ISFSI FSAR. Training Profiles for DCPP Fuel Handlers, reactor operators, senior reactor operators and refueling FHB supervisor were reviewed by the inspector. Spent fuel pool work instructions required training for all personnel performing critical work activities. The supplemental training developed as part of the ISFSI qualifications included training modules that followed the Systematic Approach to Training process. Before an individual was considered to be qualified for the applicable application, the individual had to successfully complete all training requirements, which included a passing exam score and demonstration of competence via job performance measures. The DCPP Standards Handbook required that each individual's qualifications be checked daily, prior to beginning the work activities using resources such as the Training and Qualification Tracker. In addition, the used fuel storage manager approved the qualifications of contract personnel before they were allowed to perform important to safety work activities.

Documents Reviewed: Diablo Canyon ISFSI FSAR Update, Revision 2; Procedure No. OP B-84, "Spent Fuel Pool Work Instructions," Revision 31; Diablo Canyon Power Plant Site Standards Handbook, 2008-2009 Edition; Documentation of Holtec Support Task Qualification, Jearl Strickland to Dave Burns, Learning Services, Dated April 15, 2009.

Category: Training **Topic:** Health Requirement for Certified Personnel

Reference: 10 CFR 72.194

Requirement: The physical condition and the general health of personnel certified for the operation of equipment and controls that are important to safety must not be such as might cause operational errors that could endanger other in plant personnel or the public health and safety. Any condition that might cause impaired judgment or motor coordination must be considered in the selection of personnel for activities that are important to safety. These conditions need not categorically disqualify a person if appropriate provisions are made to accommodate such defect.

Finding: The requirements of 10 CFR 72.194 for the general health and physical condition of personnel certified for the operation of equipment and controls important to safety were being met. PG&E directives on personnel health and fitness and conduct of medical examinations were reviewed. The inspector also reviewed selected records of PG&E fuel handlers and supervisory personnel. Criteria included visual acuity, hearing, stress and pulmonary exams. Exams were found to comply with the requirements of ANSI/ANS-3.4-1966. Also reviewed were medical records for initial certification of the Holtec individuals, which had been examined to include physical instructions for medical examination of crane operators. Of the files reviewed, no individuals required special provisions to meet requirements other than corrective lenses.

Documents Reviewed: 10 CFR 72.194, Physical Requirements; NPG Program Directive OM 14, "Personnel Health and Fitness," Revision 2A; NPG Procedure, OM 14.ID2, "Medical Examinations," Revision 7; ANSI/ANS-3.4-1966, Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants, Reaffirmed 2002; Physician Instruction for Medical Examination, National Commission for the Certification of Crane Operators, Revision 3, 2009.

Category: Training **Topic:** NRC Approved Training Program

Reference: 10 CFR 72.44(b)(4)

Requirement: The licensee shall have a training program in effect that covers the training and certification of personnel that meet the requirements of subpart I before the licensee receives spent fuel at the ISFSI

Finding: This requirement was achieved. The ISFSI FSAR prescribed personnel qualification requirements for PG&E employees and contractors performing important to safety activities associated with the Diablo Canyon ISFSI. The ISFSI specialists were trained and qualified in accordance with requirements outlined in the ISFSI Training and Qualification Program. The program for fuel handlers, reactor operators, senior reactor operators, radiological protection organization personnel and managers were incorporated as a continuing education requirement in existing NRC approved training programs. The primary contractor utilized an established program for their employees that was based on experience gained at other nuclear sites, coupled with DCPP site specific requirements. Operation of equipment important to safety was limited to workers who had completed certification requirements. Those who have not completed certification requirements were allowed to work under direct supervision of a trained and qualified person.

Documents Reviewed: Diablo Canyon ISFSI FSAR Update, Revision 2; Procedure TQ1.DC26OSFSO, "Training and Qualification Program," Revision 0

Category: Training **Topic:** Training Program

Reference: 72-026, FSAR, Section 9.3

Requirement: Supplemental ISFSI training is provided to operations, maintenance, security, and emergency planning personnel who are assigned duties associated with the ISFSI. The supplemental training includes modules developed using the Systematic Approach to Training (SAT) process to require a comprehensive site-specific training, assessment and qualification (including periodic requalification) program for the operation and maintenance of the ISFSI..

Finding: The DCPP Training and Qualification Program outlined the requirements for personnel assigned duties associated with ISFSI activities to include supervisory staff. The prescribed program followed the systematic approach to training beginning with fundamentals and extending to job performance demonstrations. The training matrix provided on a named basis requirements to achieve PG&E qualification, Holtec qualification and Holtec certification. The inspector reviewed the instructor lesson guide for the fundamentals course for DCPP senior managers and attended the class for continuing training for licensed personnel. Information provided in these courses was developed and presented professionally and student participation was encouraged. Also reviewed were qualification cards, lesson plans, examination examples and performance standards for Holtec personnel. All were found to be satisfactory. Job performance measures were utilized where applicable to evaluate the competence in performance of a task. Competence of a trainee was evaluated by qualified evaluators. The Program allowed evaluators to be qualified through an approved vendor program. Final responsibility for review and approval of the training and qualification of personnel rested with the Used Fuel Project Manager.

Documents Reviewed: Procedure TQI.DC26, "ISFSI Training and Qualification Program," Revision 0; Course Number ISFSI/101, "ISFSI Fundamentals for Senior Management Instructor Lesson Guide," Dated April 24, 2009; Procedure HPP-1073-1000, "Development and Implementation of Holtec ISFSI Training Program at DCPP," Revision 0; ISFSI Session 08-07, Course Number R 08, Topic R 087, "Continuing Training for Licensed Personnel," Dated April 1, 2009

Category: Unloading Operations **Topic:** Canister Gas Sampling

Reference: 72-026, FSAR Section 5.1.1.4

Requirement: During unloading of a cask, gas sampling is performed to assess the condition of the fuel assembly cladding.

Finding: The intent of this requirement was met. Section 6.13 of Procedure HPP-1073-600 contained steps to obtain a sample of the helium gas from inside the MPC during the canister unloading process. At the time of the demonstration, the licensee had not fully considered the potential radiological dose rate that could be generated by the gas sample bottle, if the fuel assemblies were leaking radioactive gases. The licensee subsequently included a note in the unloading procedure to alert radiation protection personnel to determine the worst case radiological scenario based on the fuel that was in the canister before starting to collect the gas sample so that adequate shielding would be available. The gas sampling process was demonstrated to the inspectors on March 25, 2009. Adequate controls were included in Procedure HPP-1073-600 to route any radioactive gas from the MPC through properly monitored and controlled pathways.

Documents Reviewed: Holtec Procedure HPP-1073-600, "Procedure for MPC Unloading at Diablo Canyon Power Plant," Revision 0 and Revision 5

Category: Weld Testing **Topic:** Closure Ring Weld PT

Reference: 72-026, FSAR Table 3.4-6

Requirement: A liquid penetrant (PT) examination is required on the root and final pass on the closure ring radial welds, the ring-to-shell welds, and the ring-to-lid welds. The PT examination shall be performed in accordance with NB-5245. NB-5245 limits the increments of examination to the lesser of one half the maximum welded joint dimension parallel to the center line of the connection or 1/2 inch (13 mm).

Finding: This requirement was achieved. Procedure GQP-9.2 included requirements to clean an additional one inch of the base metal on each side of the weld and apply the penetrant/developer for an overlap of one-half inch on each side of the weld. Section 9.7.2 required that as least one-half inch of the base metal adjacent to each side of the weld be included in the examination. Appendix A of Procedure GQP-9.2 included the acceptance standards in accordance with the requirements of ASME Section III, Subsection NB.

Procedure PI-CNSTR-T-OP-230 specified that if a root pass was required, an additional PT of the weld was necessary. If the weld could be completed in a single pass, then the root weld pass PT was not required. This meets the requirements contained on the canister drawings.

Documents Reviewed: PCI General Quality Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding (50 - 300 Degrees F)," Revision 3; PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2

Category: Weld Testing **Topic:** Closure Ring Weld VT

Reference: 72-026, FSAR Figure 4.2-13

Requirement: The exterior radial weld of the MPC closure ring is specified to be a 1/8 inch fillet weld.

Finding: This requirement was not initially achieved, but was corrected prior to the initial cask loading. The fillet weld on the exterior radial portion of the MPC closure ring was required to have a throat dimension of 1/8 inch. During the welding demonstration, the inspector questioned the welders how the size of the exterior radial weld on the MPC closure ring was being measured, since standard fillet weld gages could not be used based on the weld joint configuration. This was due to the small amount of perpendicular space available on the weld joint, after the completion of the fillet weld. The licensee initiated SAPN 50200911 into their corrective action system to document the question.

To resolve the issue, the welding vendor developed a modified type of fillet gage tool. The base of the tool rested on the top of the horizontal section of the closure ring. A vertical component of the tool could be adjusted downward to demonstrate that a minimum of 1/8 fillet weld was present. Step 9.7.17 of Procedure PI-CNSTR-T-OP-230 was revised to require that the fillet weld be measured using the modified style of fillet gage.

Documents Reviewed: Welding Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 4; Diablo Canyon FSAR, Figure 4.2-13, MPC-32 Assembly

---

Category: Weld Testing **Topic:** Lid-To-Shell Weld PT

Reference: 72-026, FSAR Table 3.4-6

Requirement: Only UT or multi-layer liquid penetrant (PT) examination is permitted on the lid-to-shell weld. If PT alone is used, at a minimum, it will include the root and final weld layers and each approximately 3/8 inch of weld depth.

Finding: This intent of this requirement was achieved. Procedure PI-CNSTR-T-OP-230 contained instructions to perform a visual examination of the lid-to-shell root pass per ASME Section III, Subsection NF and a PT of the weld in accordance with ASME Section III, Subsection NB. Measurements were made of the depth of the root pass and additional measurements were made of the subsequent weld layers. This information was recorded in Attachment 3, "Weld Deposit Dimension Record." The depth of the weld layer was limited to less than or equal to 3/8 of an inch between the PT examinations.

During the welding demonstration the licensee used a dial caliper to measure the depth of each weld layer. The licensee was observed measuring the depth of the weld using feeler gages to bridge across the canister shell to the canister lid. The thickness of the feeler gages was assumed to be the thickness indicated on the gage. However, the

inspectors noted that the thickness stamped on the gage is only for the end of the gage and not for the middle of the gage, which was being used as a base for the caliper measurement. Additionally, the inspectors noted that the elevation of the canister shell and the canister lid was not constant and would provide inaccurate readings. The licensee initiated Field Nonconformance Report 1073-02 to document the deficiency.

Prior to the welding of the first loaded canister, the welding contractor implemented a revised method to measure the depth of each weld layer. The base of the measurement tool was positioned on the MPC lid, thereby eliminating the potential error introduced by bridging across between the shell and the lid.

Documents Reviewed: PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2; PCI Energy Certificate of Calibration for Gage QDC-06-23, Dated June 16, 2008

Category: Weld Testing **Topic:** Vent and Drain Port Cover Plate Weld PT

Reference: 72-026, FSAR Table 3.4-6

Requirement: A liquid penetrant (PT) examination is required on the root (if more than one weld pass is required) and the final pass on the vent and drain port cover plate welds. The PT examination shall be performed in accordance with NB-5245. NB-5245 limits the increments of examination to the lesser of one half the maximum welded joint dimension parallel to the center line of the connection or 1/2 inch (13 mm).

Finding: This requirement was achieved. Procedure GQP-9.2 included requirements to clean an additional 1 inch of the base metal on each side of the weld and apply the penetrant/developer for an overlap of one-half inch on each side of the weld. Section 9.7.2 required that as least one-half inch of the base metal adjacent to each side of the weld be included in the examination. Appendix A of Procedure GQP-9.2 included the acceptance standards in accordance with the requirements of ASME Section III, Subsection NB.

Procedure PI-CNSTR-T-OP-230 specified that if a root pass was required, an additional PT of the weld was necessary. If the weld could be completed in a single pass, then the root weld pass PT was not required. This meets the PT requirements contained on the canister drawings.

Documents Reviewed: PCI General Quality Procedure GQP-9.2, "High Temperature Liquid Penetrant Examination and Acceptance Standards for Welds, Base Materials and Cladding (50 - 300 Degrees F)," Revision 3; PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2

Category: Welding **Topic:** Combustible Gas

Reference: 72-026, FSAR, Section 5.1.1.2

Requirement: Appropriate monitoring for combustible gas concentrations shall be performed prior to, and during MPC lid welding operations. In addition, the space below the MPC lid shall be exhausted or purged with inert gas prior to, and during, MPC lid welding operations to provide additional assurance that explosive gas mixtures will not develop in this space.

Finding: The intent of this requirement was achieved during the welding demonstration. PCI Procedure PI-CNSTR-T-OP-230, provided specific instructions of how to monitor for hydrogen gas during the welding process. The space beneath the MPC lid was required to be purged with an inert gas one hour prior to welding/grinding operations and monitored. The combustible gas readings and hydrogen flow rate were required to be taken at intervals of 30 minutes. If the hydrogen gas concentration reached two percent (50 percent of the lower explosive limit), the welding and grinding operations would be stopped and would not resume until the explosive gas concentration was less than 25 percent of the lower explosive limit.

The hydrogen monitoring process was demonstrated during the welding demonstration performed January 27-28, 2009. A log was being maintained of the hydrogen monitor readings and of the argon purge flow during the welding operations. During the demonstration, a hydrogen source was placed beneath the MPC lid and the hydrogen meter detected the hydrogen. An unexpected event occurred during the demonstration and the individual that was responsible for monitoring and logging the hydrogen monitor did not record the readings on 30 minute intervals as required by the procedure. Holtec Field Nonconformance Report 1073-01 was initiated to document and correct the deficiency.

Documents Reviewed: PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2

Category: Welding **Topic:** Weld Grinding and Machining

Reference: 72-026, FSAR Figure 4.2-13

Requirement: Grinding and machining operations on the canister confinement boundary shall be controlled through written and approved procedures and quality assurance oversight to ensure grinding and machining operations do not reduce base metal wall thicknesses of the confinement boundary beyond that allowed per the design drawings.

Finding: This intent of this requirement was achieved. During the welding demonstration no repairs to the canister base metal were necessary. The governing procedure for the welding operations was PCI Procedure PI-CNSTR-T-OP-230, which included Attachment 12 to record and document any necessary weld repairs. Procedure PI-CNSTR-T-OP-230 referenced PCI Energy Services, Welding Control Procedure WCP-5, Latest Revision, Weld and Base Metal Repair.

Procedure WCP-5 was reviewed and found to provide instructions for repair of base metal material, including limitations on depth of defect and the requirement to perform a PT or MT of the repaired area after repair.

Documents Reviewed: PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2; PCI Energy Services, Welding Control Procedure WP-5, "Weld and Base Metal Repair," Revision 5

Category: Welding Materials **Topic:** Minimum Delta Ferrite Content

Reference: ASME III, Article NB-2433; Reg Guide 1.31

Requirement: A delta ferrite determination must be made for A-No.8 consumable inserts, bare electrode, rod, or wire filler metal. Exceptions: 1) A-No.8 metal used for weld metal cladding; 2) SFA-5.4 and SFA-5.9 metal; 3) Type 16-8-2 metal. The minimum acceptable delta ferrite content is 5 FN and it must be stated in the certification records.

Finding: This requirement was implemented. PCI was utilizing .035 ER308/308L weld wire for the demonstrations labeled as PCI 3514. Documentation was available from Arcos that the spools of 0.035" ER308/308L welding wire labeled as PCI 3514 contained a delta ferrite content of 8 FN.

Documents Reviewed: Arcos Industries Certified Material Test Report dated May 19, 2006;

Category: Welding Personnel Quals **Topic:** Expiration

Reference: ASME Section IX, Part QW-322.1

Requirement: The performance qualification of a welder or welding operator, for any process, shall expire when he has not welded with that process for six months or more.

Finding: This requirement was achieved. Procedure PCI-WCP-2, Section 7.11.8 specified that a welder's or welding operator's qualification would expire if the individual had not welded with that process for six months or more. The Welder Maintenance Log (WML) records were reviewed by the inspector for the three welders present during the welding demonstration. The WML records indicated that the welders met the above requirements.

Documents Reviewed: Procedure PCI-WCP-2, "Welder / Welding Operators Performance Qualification," Revision 11 and the Welder Maintenance Log (WML)

Category: Welding Personnel Quals **Topic:** Welder Performance Qualification (WPQ)

Reference: ASME Section IX, Parts QW-301.4, 356, 452.1, 6

Requirement: The record of welder performance qualification (WPQ) tests shall include the essential variables listed in QW-350, the type of test and test results, and the ranges qualified in accordance with QW-452. The essential variables for manual GTAW welding are: (1) Backing; (2) Base metal P-number; (3) Filler metal F number; (4) Consumable inserts; (5) Filler metal form; (6) Maximum weld deposit thickness; (7) Welding positions; (8) Welding progression; (9) inert gas backing; and (10) Current type and polarity. Two side bend tests are required for groove weld test coupons 3/8 inch thick or greater. Groove weld tests qualify fillet welds.

Finding: This requirement was implemented. PCI had supplied three welders to the Diablo Canyon ISFSI project. All three were qualified for the machine Gas Tungsten Arc Weld (GTAW) process and two of the three were qualified for manual GTAW welding.

The Welder Performance Qualification (WPQ) Records for the two welders qualified for manual GTAW welding were reviewed. The welder performance qualification tests contained all the essential variables required by ASME Section IX for manual GTAW welding. Radiography and side bend tests were used to qualify the welds.

Documents Reviewed: PCI Energy Services ASME Section IX Welder Performance Qualification (WPQ) Records

---

Category: Welding Personnel Quals **Topic:** Welding Operator Performance Qualification

Reference: ASME Section IX, Parts QW-301.4, 361.2, 452.1, 6

Requirement: The record of welding operator performance qualification (WOPQ) tests shall include the essential variables listed in QW-360, the type of test and test results, and the ranges qualified in accordance with QW-452. The essential variables for machine welding are: (1) welding process; (2) direct or remote visual control; (3) automatic arc voltage control (GTAW); (4) automatic joint tracking; (5) position qualified; (6) consumable inserts; (7) backing; and (8) single or multiple passes per side. Two side bend tests are required for groove weld test coupons 3/8 inch thick or greater. Groove weld tests qualify fillet welds.

Finding: This requirement was implemented. PCI had supplied three welders for the Diablo Canyon ISFSI demonstration. All three were qualified for machine GTAW welding and two of the three were qualified for manual GTAW welding.

The Welder Performance Qualification (WPQ) Records for the three welders qualified for machine GTAW welding were reviewed. The welder performance qualification tests contained all the essential variables required by ASME Section IX for machine GTAW welding. Radiography and side bend tests were used to qualify the welds.

Documents Reviewed: PCI Energy Services ASME Section IX Welder Performance Qualification (WPQ) Records

---

Category: Welding Procedures **Topic:** Governing Code Years

Reference: 72-026, Tech Spec 4.2

Requirement: All references to the ASME Code are to the 1995 Edition with 1996 and 1997 addenda.

Finding: This requirement was met. The inspectors were provided certificates for the weld wire in use during the demonstration. The documentation indicated that the wire had been purchased to meet the requirements of ASME Section III, 2004 Edition through 2005 Addenda. A certificate of conformance from PCI reconciled the weld wire to ASME Section III, 1995 Edition, including the 1996 and 1997 Addenda.

PCI Procedure PI-CNSTR-T-OP-230, Section 7.1.4 clearly stated that the weld filler material must comply with ASME Section III, Subsection NB, 1995 Edition, with the 1996 and 1997 Addenda. Additionally, Section 7.1.1 also sated that the MPC shell, lid, rings, drain and vent port covers must comply with ASME Section II, 1995 Edition through 1997 Addenda. Procedure Prerequisite 8.4 required that the PCI Quality Control Inspector verify that the materials met the correct ASME Code Years or a reconciliation had been performed.

Documents Reviewed: PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2; PCI Energy Services Certificate of Conformance No. 900970-02 dated September 20, 2004;
Weldstar Certificate of Compliance dated August 16, 2006; Arcos Industries Certified Material Test Report dated May 19, 2006
.

Category: Welding Procedures **Topic:** GTAW Essential Variables

Reference: ASME Section IX, Part QW-256

Requirement: The welding procedure specification (WPS) for Gas Tungsten Arc Welding (GTAW) shall describe the following essential variables: (1) Base metal thickness range; (2) Base metal P number; (3) Filler metal F number; (4) Filler metal A number; (5) Filler metal product form (flux, metal, powder); (6) Maximum weld deposit thickness; (7) Minimum preheat temperature; (8) PWHT conditions; (9) Shielding gas mixture; and (10) Trailing Shielding gas mixture and flow rate.

Finding: This requirement was achieved. The inspector reviewed the WPS and determined that the required GTAW essential variables were adequately addressed.

Documents Reviewed: WPS for 8MC-GTAW1, Revision 10

Category: Welding Procedures **Topic:** GTAW Non Essential Variables (1-14)

Reference: ASME Section IX, Part QW-256

Requirement: The welding procedure specification for Gas Tungsten Arc Welding (GTAW) must describe the following non-essential variables: (1) Joint design; (2) Backing; (3) Backing material; (4) Root spacing; (5) Retainers; (6) Filler metal size; (7) Consumable inserts; (8) Filler metal SFA specification number; (9) Filler metal AWS classification number; (10) Welding positions; (11) Welding progression; (12) Trailing Shielding gas composition and flow rate; (13) Pulsing current; (14) Current type and polarity;

Finding: This requirement was achieved. The inspector reviewed the Welding Procedure Specification and determined that the required GTAW non essential variables were adequately addressed.

Documents Reviewed: PCI WPS for 8MC-GTAW1, Revision 11,

Category: Welding Procedures **Topic:** GTAW Non Essential Variables (15-27)

Reference: ASME Section IX, Part QW-256

Requirement: The welding procedure specification for Gas Tungsten Arc Welding (GTAW) must also describe the following non-essential variables: (15) Amperage range; (16) Voltage range; (17) Tungsten size; (18) String or weave bead; (19) Orifice or gas cup size; (20) Method of initial and interpass cleaning; (21) Method of back gouging; (22) Oscillation width; (23) Multiple or single pass per side; (24) Multiple or single electrodes; (25) Electrode spacing; (26) Travel mode and speed; and (27) Peening.

Finding: The requirement was met. The inspector reviewed the Welding Procedure Specification for 8MC-GTAW Rev. 11 and determined that it complied with the ASME Code requirements.

Documents Reviewed: PCI WPS for 8 MC-GTAW, ASME Section IX Procedure Specification, Revision 11

Category: Welding Procedures **Topic:** GTAW Supplementary Essential Variables

Reference: ASME Section IX, Part QW-256

Requirement: The welding procedure specification for Gas Tungsten Arc Welding (GTAW) must

describe the following supplementary essential variables, when required: (1) Base metal group number; (2) Base metal thickness range; (3) Welding positions; (4) Maximum interpass temperature; (5) PWHT conditions; (6) Current type and polarity); (7) Multiple or single pass per side; and (8) Multiple or single electrodes.

Finding: This requirement was achieved. The inspector reviewed the WPS and determined that the required GTAW supplementary essential variables were adequately addressed.

Documents Reviewed: PCI WPS for 8MC-GTAW, Revision 11

Category: Welding Procedures **Topic:** Procedure Qualification Record (PQR)

Reference: ASME Section IX, Part QW-200.2

Requirement: Each manufacturer or contractor shall prepare a Procedure Qualification Record (PQR) for each procedure. The completed PQR shall document all essential and, when required, all supplementary essential variables of QW-250 through QW-280 for each welding process used during the welding of the test coupon. Non essential variables may be documented at the contractor's option. The PQR shall be certified accurate by the manufacturer or contractor.

Finding: This requirement was achieved. The applicable documents associated with the PQR had been approved by the PCI Principle Welding Engineer, the PCI QA Manager and Holtec. The inspector reviewed the PQR and determined that it met the ASME Code requirements stated above.

Documents Reviewed: PCI WPS for 8 MC-GTAW, ASME Section IX Procedure Specification, Revision 11; PCI Procedure, PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2; PQR-046R/3, Procedure Qualification Record; PQR-062R/3, Procedure Qualification Record; PQR-600R/4, Procedure Qualification Record

---

Category: Welding Procedures **Topic:** Tack Welds

Reference: ASME Section III, Article NB-4231.1

Requirement: Tack welds used to secure alignment shall either be removed completely when they have served their purpose, or their stopping and starting ends shall be properly prepared by grinding or other suitable means so that they may be satisfactorily incorporated into the final weld. When tack welds are to become part of the finished weld, they shall be visually examined and defective tack welds shall be removed.

Finding: This requirement was achieved. The Inspector witnessed that the welders were observing this requirement during the welding demonstration. Procedure PI-CNSTR-OP-230, Steps 9.1.7 through 9.1.16 provided direction to the welders of how to prepare the tacks to meet the ASME Code requirements.

Documents Reviewed: PCI Procedure PI-CNSTR-OP-230, Rev.2, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2,

---

Category: Welding Procedures **Topic:** Weld Repairs - Surface Defects

Reference: ASME Section III, Article NB-4452; NB-2538.c

Requirement: Surface defects may be removed by grinding or machining without weldout provided the

minimum section thickness is maintained, the depression is blended and liquid penetrant testing is performed to ensure the defect is removed.

Areas ground to remove oxide scale or other mechanically caused impressions for appearance or to facilitate proper ultrasonic testing need not be examined by the magnetic particle or liquid penetrant test method.

Finding: This requirement was achieved. Procedure PI-CNSTR-T-OP-230, Section 7.2.3 specified that repairs to welds were to be performed in accordance with ASME III, Subsection NB, Article NB-4450. The repairs were required to be documented on Attachment 12, "PCI Energy Services Weld Repair Data Sheet."

Documents Reviewed: PCI Procedure PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2; PCI General Welding Standard GWS-1, "ASME Applications," Revision 4;

Category: Welding Procedures **Topic:** Welding Procedure Specification (WPS)

Reference: Section IX, Part QW-200.1

Requirement: Each manufacturer or contractor shall prepare written Welding Procedure Specifications for making production welds to code requirements. Welding Procedure Specifications shall include the essential, non-essential, and (when required) supplementary essential variables for each welding process. The variables are listed in QW-250 through QW-280 and are defined in Article IV, Welding Data.

Finding: This requirement was achieved. The applicable documents associated with the WPS had been approved by the PCI Principle Welding Engineer, the PCI QA Manager and Holtec. The inspector reviewed the WPS and determined that it met the ASME Code requirements stated above.

Documents Reviewed: PCI WPS for 8MC-GTAW, ASME Section IX Procedure Specification, Revision 11 PCI Procedure, PI-CNSTR-T-OP-230, "Closure Welding of Multi-Purpose Canisters at Diablo Canyon," Revision 2; PQR-046R/3, Procedure Qualification Record; PQR-062R/3, Procedure Qualification Record; PQR-600R/4, Procedure Qualification Record