DiabloCanyonNPEm Resource

From: Pick, Greg
Sent: Wednesday, November 10, 2010 9:41 AM
To: DiabloCanyonNPEm Resource
Subject: FW: Last Set of files needed electronically
Attachments: One Time Inspection Basis Document Rev A DRAFT.doc; DCL-10-134.pdf

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From: Tan, Miranda [mailto:M1TF@pge.com]
Sent: Monday, November 01, 2010 11:26 AM
To: Pick, Greg
Cc: Grebel, Terence
Subject: RE: Last Set of files needed electronically

Hi Greg,

Two files are attached for One Time Inspection. The first file is requested One Time Inspection Sample Basis Document. The second document is the PG&E letter dated Oct 27, 2010, DCL-10-134, which contains updated One Time Inspection sampling basis. See Page 6, PG&E Supplemental Response to RAI B2.1.16-1. Both files are on IMS under # 206.

Best,
Miranda
805 781 9415

From: Pick, Greg [mailto:Greg.Pick@nrc.gov]
Sent: Saturday, October 30, 2010 10:52 PM
To: Tan, Miranda
Cc: Grebel, Terence
Subject: Last Set of files needed electronically

Other than any previous requests not yet filled below is the last documents needed from my reviews:

<u>One Time</u>

One Time Inspection Sample Basis Document, Revision 0

<u>Inaccessible MV Cables</u>

Letter LRFS-08-172, “Medium Voltage Cables in Scope,” dated October 8, 2009

Letter LRFS-09-002, “Unit 2 load Centers,” dated January 14, 2009

<u>Water Chemistry</u>

Diablo Canyon PWR Primary Chemistry Guidelines – Revision 6

Diablo Canyon PWR Secondary Chemistry Guidelines – Revision 7

Hearing Identifier: DiabloCanyon_LicenseRenewal_NonPublic
Email Number: 2163

Mail Envelope Properties (CA7A6E1C5CB1204FA832458074C4571BFF1493B730)

Subject: FW: Last Set of files needed electronically
Sent Date: 11/10/2010 9:40:37 AM
Received Date: 11/10/2010 9:40:43 AM
From: Pick, Greg

Created By: Greg.Pick@nrc.gov

Recipients:
"DiabloCanyonNPEm Resource" <DiabloCanyonNPEm.Resource@nrc.gov>
Tracking Status: None

Post Office: R4CLSTR01.nrc.gov

Files	**Size**	**Date & Time**
MESSAGE	1343	11/10/2010 9:40:43 AM
One Time Inspection Basis Document Rev A DRAFT.doc	178242	
DCL-10-134.pdf	934363	

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

Diablo Canyon License Renewal
One-Time Inspection Sample Basis Document

Revision 0

Revision	Prepared By/Date	Reviewed By/Date	Approved By/Date

Draft

1.0 Purpose

The Diablo Canyon Power Plant (DCPP) One-Time Inspection Program is designed to provide reasonable assurance that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or structure intended function during the period of extended operation. The program is credited for cases where either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, (b) an aging effect is expected to progress very slowly in the specified environment, but the local environment may be more adverse than that generally expected, or (c) the characteristics of the aging effect include a long incubation period. This program is used for the following:

- To confirm the effectiveness of the Water Chemistry program to manage the loss of material, cracking, and the reduction of heat transfer aging effects for steel, stainless steel, copper alloy, nickel alloy, and aluminum alloy in treated water, steam, and reactor coolant environments.
- To confirm the effectiveness of the Fuel Oil Chemistry program to manage the loss of material aging effect for steel, stainless steel, aluminum, cast iron, and copper alloy in a fuel oil environment.
- To confirm the effectiveness of the Lubricating Oil Analysis program to manage the loss of material and the reduction of heat transfer aging effects for steel, stainless steel, copper alloy, and aluminum alloy in a lubricating oil environment.

2.0 Scope

The DCPP One-Time Inspection aging management program is credited for managing component aging effects/mechanisms as part of DCPP License Renewal to meet the requirements of the License Renewal Rule 10 CFR 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." The following components and aging effects/mechanisms are included in the program:

Piping, piping components, and piping elements - As defined in Table IX.B of NUREG-1801, Volume 2, this general category includes various features of the piping system that are within the scope of license renewal. Examples provided in NUREG-1801 include, but are not limited to, piping, fittings, tubing, flow elements/indicators, demineralizers, nozzles, orifices, flex hoses, pump casings and bowls, safe ends, sight glasses, strainers, thermowells, and valve bodies and bonnets. As it relates to one-time inspections, DCPP has defined piping, piping components, and piping elements to include such items as boiler casings, drip pans, eductors, electric heaters, equipment enclosures, expansion joints, fan housings, filter housings, flame arrestors, flexible connections, flow devices, flow elements, flow venturies, generator frame, heat exchangers*, hoses, liquid detectors, oil separators, piping and fittings, pump casings, resin addition units, restricting orifices, rupture discs, sight glasses, sinks, spargers, spray nozzles, steam traps, strainer bodies, strainer elements, tanks**, thermowells, turbine casings, valve bodies, and water traps.

Other components identified for one-time inspections are not included in the category of piping, piping components, and piping elements such as reactor coolant system and steam generator components as identified in the NUREG-1801, Volume 2, Chapter IV tables.

* - NUREG-1801, Volume 2 table line items for piping, piping components, and piping elements are generally not applied to the heat exchanger component type. However, NUREG-1801, Volume 2 table line items for piping, piping components, and piping elements may be applied to the heat exchanger component type when the material, environment, aging effect/mechanism, and Aging Management Program are not driven by component configuration. Similarly, NUREG-1801, Volume 2 table line items for the heat exchanger component type are generally not applied to piping, piping components, and piping elements. However, NUREG1801, Volume 2 table line items for the heat exchanger component type may be applied to piping, piping components, and piping elements when the material, environment, aging effect/mechanism, and Aging Management Program are not driven by component configuration.

** - Tanks are specifically identified in some NUREG-1801, Volume 2 line item component descriptions. In other instances, tanks are not identified in the NUREG-1801, Volume 2 line item component descriptions and have been included in the general category of piping, piping components, and piping elements.

Loss of Material – Loss of material managed by the One-Time Inspection program can be the result of one or more aging mechanism including general corrosion, pitting corrosion, crevice corrosion, microbiologically influenced corrosion, fouling, and galvanic corrosion. The One-Time Inspection program does not address the loss of material due to selective leaching and flow-accelerated corrosion. The Selective Leaching of Materials program addresses the loss of material due to selective leaching and the Flow-Accelerated Corrosion program addresses the loss of material or “wall thinning” due to flow-accelerated corrosion.

Cracking – Cracking managed by the One-Time Inspection program is the result of the stress corrosion cracking aging mechanism. The One-Time Inspection program does not address cracking due to cyclic loading or irradiation assisted stress corrosion cracking. The ASME Section XI Inservice Inspection, Subsections IWB, IWC, and IWD program addresses cracking due to cyclic loading and the Water Chemistry and PWR Vessel Internals program addresses cracking due to irradiation assisted stress corrosion cracking.

Reduction of Heat Transfer – Reduction of heat transfer managed by the One-Time Inspection program is the result of the fouling aging mechanism. There are no other aging mechanisms associated with the reduction of heat transfer aging

effect.

3.0 Methodology

Program elements include a) Identifying piping and component populations subject to OTI based on common materials and environments, b) Determining the sample size of components to inspect for each material-environment group, c) Selecting piping and components within the material-environment groups for inspection based on service period, plausible aging effects, operating conditions and design margins, d) Conducting one-time inspections of the selected components using ASME Code Section-V NDE inspection techniques appropriate to each inspection e) Acceptance criteria consistent with design codes/standards or ASME Section XI as applicable, and f) Evaluating unacceptable inspection results using the corrective action program.

For the loss of material or cracking aging effects, volumetric examination (UT or RT) will be specified since the inspections involve determining the aging effects/mechanisms on internal surfaces. Visual examination can be substituted for volumetric examination using the requirements provided in Attachment 1 "Inspection Requirements". In this case, Attachment 2 "Component Type / Material / Aging Effect" shall be used to determine the aging mechanisms associated with the inspection location in order to determine the appropriate visual inspection technique required by Attachment 1.

For the reduction of heat transfer due to fouling, visual (VT-3 or equivalent) per Attachment 1 "Inspection Requirements" will be performed.

The One-Time Inspection program can credit periodic inspections performed by programs such as ASME Section XI when inspection techniques, inspector qualifications, and acceptance criteria are as specified in the One-Time inspection program or are more limiting. Any credited inspections shall have occurred no earlier than 10 years (year 2014(Unit 1) or 2015(Unit 2)) prior to the period of extended operation (2024-2025).

Qualified personnel following station procedures that are based on applicable codes and standards, including ASME, and 10 CFR 50, Appendix B, shall perform the inspections.

~~Note: The drawings referenced below have been marked-up to show the recommended sample locations. These mark-ups are included in the Implementation Procedures Mark-up tab of the Program Basis Document binder.~~
~~*From TMI document, will we want to mark up drawings?*~~

A. One-Time Inspection – Treated Water/Steam/Reactor Coolant

The One-Time Inspection program will be used to verify the effectiveness of the Water Chemistry program to manage the loss of material at susceptible locations for the following material/component combinations exposed to a treated water,

steam, or reactor coolant environment in the Auxiliary Building HVAC System, Auxiliary Feedwater System, Auxiliary Steam System, Chemical and Volume Control System, Compressed Air System, Condensate System, Containment HVAC System, Containment Spray System, Cranes and Fuel Handling System, Feedwater System, Liquid Radwaste System, Make-Up Water System, Nuclear Steam Supply System, Reactor Coolant System, Residual Heat Removal System, Safety Injection System, Secondary Sampling System, Solid Radwaste System, Spent Fuel Pooling Cooling System, and Turbine Steam Supply System.

- Carbon steel - flow elements, flow venturies, heat exchanger components, piping and fittings, pump casings, steam generator components, steam traps, strainer bodies, tanks, turbine casings, valve bodies, water traps
- Copper Alloy with 15% Zinc or More - piping and fittings, valves , sight gauges
- Copper Alloy with less than 15% Zinc - piping and fittings, valves, sight gauges
- Ductile Cast Iron - pumps
- Cast Iron - strainers, valves
- Stainless Steel - eductors, filter housings, flow devices, flow elements, flow venturies, fuel elevators, heat exchanger components, metallic hoses, piping and fittings, pumps, piping, casings, resin addition units, restricting orifices, rupture discs, sight glasses, spargers, steam traps, strainer bodies, strainer elements, tanks, thermowells, valve bodies.

The One-Time Inspection program will be used to verify the effectiveness of the Water Chemistry program to manage cracking for the following material/component combinations exposed to a treated water or reactor coolant environment in the Auxiliary Steam System, Chemical and Volume Control System, Component Cooling Water System, Feedwater System, Liquid Radwaste System, Nuclear Steam Supply Sample System, Pressurizer, Secondary Sampling System, Turbine Steam Supply System, Solid Radwaste System, Reactor Coolant System, and Residual Heat Removal System

- Nickel Alloy - sensor element, heat exchanger
- Stainless steel - eductors, expansion joints, flow devices, flow elements, heat exchanger components, piping and fittings, pump casings, resin addition units, restricting orifices, rupture discs, sight glasses, steam traps, strainer bodies, tanks, thermowells, valves , spray

The One-Time Inspection program will be used to verify the effectiveness of the Water Chemistry program to manage the reduction of heat transfer for the following material/component combinations exposed to a treated water environment in the Auxiliary Feedwater System, Component Cooling Water System, Residual Heat Removal System Safety Injection System, Spent Fuel Pool Cooling System, and Containment HVAC.

- Stainless Steel – heat exchanger components
- Copper Alloy - heat exchanger components
- Carbon Steel - heat exchanger components

Sample Population

Water chemistry programs are generally effective in removing impurities from intermediate and high flow areas. However, water chemistry programs may not be effective in low flow or stagnant areas. One-time inspections of selected components rely on "worse case locations" for susceptible materials in treated water, steam, or reactor coolant environments to confirm the absence of aging effects.

The selected sample for one-time inspection for loss of material will include:

- Two (2) carbon steel pipe sections in stagnant or low flow areas in the Auxiliary Feedwater System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations include:
  - *Line-4292 Between FW-1-193 and FW-1-194 (4" Carbon Steel Pipe, Normally Stagnant)*
  - FW-1(2)-154 Upstream 1" Carbon Steel Drain Piping
  - FW-1(2)-195 Upstream 1" Carbon Steel Drain Piping
- Two (2) carbon steel pipe sections in stagnant or low flow areas in the Feedwater System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT):
  - *FW-1(2)-594 Upstream 1.5" Carbon Steel Piping/ FWH#1 Drains*
  - *Line-551 14" Carbon Steel Pipe / HP FW Heater-1 By-Pass (FAC Points 01T / 01U)*
  - Line-836 12" Carbon Steel Pipe / FW RECIRC TO CONDENSER (i.e. FAC ISO# 68)
- Two (2) carbon steel pipe sections in stagnant or low flow areas in the Condensate System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations include:
  - Line-1284 2" Carbon Steel Pipe
  - Line-978 2" Carbon Steel Pipe Between CND-1-31 and u/s Tee
- Two (2) carbon steel pipe sections in stagnant or low flow areas in the Main Steam System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of

acceptable sample locations include:

- *Line-1065 24" Carbon Steel Between MSSV's / MSSV Header*
- *Line-3414 1.5" Carbon Steel u/s MS-1(2)-4025(Trap Bypass Line)/ MS Lead 4 Drain Header*
- *Line-760, 4" Carbon Steel / AUX FW PP-1 Turbine Steam Supply / Stagnant*

- Two (2) carbon steel pipe sections in stagnant or low flow areas in the Make-Up Water System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations include:

  - *Line -380 10" Carbon Steel (Intermittent Flow) / AUX FW PPS Condensate Suction*
  - Piping u/s MU-1-1556, 2" Carbon Steel / CST 1-1 Drain

- One (1) carbon steel pipe section in stagnant or low flow areas in the Auxiliary Steam System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations include:

  - Line-3935, 2" Carbon Steel Upstream AXS-1(2)-26, Stagnant Line

The inspection of copper alloy with 15% zinc or more, copper alloy with less than 15% zinc, ductile cast iron, low alloy steel, and stainless steel for loss of material is not required since these materials have as good as or better corrosion resistant properties than carbon steel in treated water/steam/reactor coolant environments. The inspection of gray cast iron is not required because with the exception of selective leaching, which is not addressed by the One-Time Inspection program (see the Selective Leaching of Materials program), the loss of material in gray cast iron is equivalent to carbon steel in these environments. Carbon steel piping was selected because the identified carbon steel components (e.g., pump casings, valve bodies, filter housings, etc.) are robust in construction, or, they may not have a defined wall thickness baseline to compare against onetime inspection thickness results.

The selected sample for one-time inspections for stress corrosion cracking will include:

- Two (2) stainless steel pipe sections in a stagnant or low flow area in the Chemical and Volume Control System. The one-time inspection for cracking will be by volumetric examination(UT or RT). Examples of acceptable sample locations:

  - *Line-733, Dilute Boric Acid to Charging Pumps, Stainless Steel 2" Sch 40 Stagnant Line, Heat CHG PPS, Heat Traced*

- *Line-50 Upstream CVCS-1-(2)-8379, 3" Sch 160 Stagnant Line, Alternate Charging Line near Loop-3 Cold Leg*

The inspection of CASS for stress corrosion cracking is not required as stress corrosion cracking in CASS is bounded by stress corrosion cracking in stainless steel.

The selected sample for one-time inspections for the reduction of heat transfer will include:

- One (1) copper alloy heat exchanger/cooler component in the Auxiliary Feedwater System. The one-time inspection for the reduction of heat transfer will be by visual VT-3 inspection (or equivalent) of the water side of the heat exchanger components. Examples of acceptable sample locations include:
  - Auxiliary Feedwater Pump 1(2)-1 Lube Oil Hx.
- One (1) stainless steel heat exchanger in the Chemical and Volume Control System. The one-time inspection for the reduction of heat transfer will be by visual VT-3 inspection (or equivalent) of the treated water side of the heat exchanger components. Examples of acceptable sample locations include:
  - Seal Water Heat Exchanger, SWHE1-1
  - Spent Fuel Pool Cooling HE.

Expansion Criteria

If the inspection of components in these environments detects material loss (wall thickness < 87.5% of pipe nominal wall thickness) or cracking, the inspection results will be evaluated by engineering for acceptability. Engineering will determine the rate at which the material is being lost, or, the rate at which the cracking is progressing. The results will be evaluated against limits such as design minimum wall thickness. Unacceptable results will be documented in the corrective action program. An extent of condition review, which is an integral part of the corrective action program, addresses the need to expand the inspection sample population if appropriate.

If the inspection of components in these environments detects fouling (reduction of heat transfer), the inspection results will be evaluated by engineering for acceptability. Engineering will determine the rate at which fouling is progressing. The results will be evaluated against component heat transfer requirements. Unacceptable results will be documented in the corrective action program. An extent of condition review, which is an integral part of the corrective action program, addresses the need to expand the inspection sample population if appropriate.

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B. One-Time Inspection – Fuel Oil

The One-Time Inspection program will be used to verify the effectiveness of the Fuel Oil Chemistry program to manage the loss of material at susceptible locations for the following material/component combinations exposed to a fuel oil environment in the Diesel Generator System and Diesel Generator Fuel Transfer System.

- Carbon Steel - filter housings, piping and fittings, pump casings, tanks, valves, and sight gauges
- Copper Alloy - solenoid valves
- Stainless Steel - flexible hoses, orifices, piping and fittings, tubing expansion joints, and valves
- Cast Iron - Pumps, Sight Gauges

Sample Population

Fuel oil can be a corrosive environment if there should be an intrusion of water during transportation or storage. The prevention of the intrusion of water into the fuel oil supply is accomplished primarily through the Fuel Oil Chemistry program which provides for fuel oil sampling for water and sediment in new fuel, periodic "all level" and "tank bottom" samples, and, provides for periodic draining of fuel oil tanks to minimize the amount of accumulated water and length of contact time. The Fuel Oil Chemistry program also provides for periodic draining, cleaning, and inspection of fuel oil tanks, including UT examination of the tank floor should loss of material be detected. The selected components rely on "worse-case locations" onetime inspections of more susceptible materials to confirm the absence of loss of material in stagnant or low flow areas. The selected sample for one-time inspections for loss of material will include:

- Two (2) carbon steel pipe sections in a stagnant or low flow area in the Diesel Generator System . The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations include:
    - *DEG-1-529, piping upstream, 0.5" carbon steel, Fuel Oil Head Tank Drain.*
- Two (2) carbon steel pipe sections in a stagnant or low flow area in the Diesel Generator Fuel Transfer System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations:
    - *Line-2582 2.5", carbon steel piping sections upstream and downstream of DEG-0-2 at the 79'-11" EL.*
    - *Line-5911 1.5", carbon steel piping upstream DEG-0-1050*

The inspection of copper alloy with 15% zinc or more, copper alloy with less than 15% zinc, and stainless steel is not required because these materials have as good as or better corrosion resistant properties in this environment. Carbon steel piping was selected because the identified carbon steel components (e.g., pump casings, valve bodies, filter housings, etc.) are robust in construction, or, they may not have a defined wall thickness baseline to compare against one-time inspection thickness results.

Expansion Criteria
If the inspection of components in this environment detects material loss (wall thickness < 87.5% of pipe nominal wall thickness), the inspection results will be evaluated by engineering for acceptability. Engineering will determine the rate at which the material is being lost. The results will be evaluated against limits such as design minimum wall thickness. Unacceptable results will be documented in the corrective action program. An extent of condition review, which is an integral part of the corrective action program, addresses the need to expand the inspection sample population if appropriate.

C. One-Time Inspection – Lubricating Oil

Component Population
The One-Time Inspection program will be used to verify the effectiveness of the Lubricating Oil Analysis program to manage the loss of material at susceptible locations for the following material/component combinations exposed to a lubricating oil environment in the Auxiliary Feedwater System, Chemical and Volume Control System, Component Cooling Water System, Control Room HVAC, Diesel Generator System, Liquid Radwaste System, Lube Oil System, and *Safety Injection System*

- Aluminum Alloy - filter housings, valves
- Carbon Steel - filters, pumps, heat exchanger components, tanks, valves, gear box, heaters
- Copper Alloy - heat exchanger components, sight gauges, valves, thermowell, flow indicators
- Cast Iron - filter housings, pumps
- Stainless Steel - valves, strainer, flexible hoses, stainless steel

The One-Time Inspection program will be used to verify the effectiveness of the Lubricating Oil Analysis program to manage the reduction of heat transfer for the following material/component combinations exposed to a lubricating oil environment in the Auxiliary Feedwater System, Chemical and Volume Control System, Component Cooling Water System, Diesel Generator System, and Safety Injection System.

- Carbon Steel - heat exchanger components
- Copper Alloy - heat exchanger components
- Stainless Steel - heat exchanger components

Lubricating oil systems generally do not suffer appreciable degradation by loss of material or the reduction of heat transfer since the lubricating oil environment is not conducive to corrosion mechanisms or fouling. Lubricating oil physical and chemical properties are maintained by the Lubricating Oil Analysis program, which ensures the oil environment in mechanical systems is maintained to the required quality. The program maintains oils system contaminants (primarily water and particulates) within acceptable limits, thereby preserving an environment that is not conducive to loss of material or the reduction of heat transfer. The selected components rely on "worse-case locations" one-time inspections of more susceptible materials to confirm the absence of loss of material in stagnant or low flow areas.

The selected sample for one-time inspections for loss of material will include:

- One (1) copper alloy heat exchanger components in a stagnant or low flow area in the Auxiliary Feed Water System. The one-time inspection will consist of volumetric examination (UT or RT) and/or visual examination. Examples of acceptable sample locations include:
    - Auxiliary Feedwater Pump 1(2)-1 Lube Oil Hx
- One (1) copper alloy heat exchanger components in a stagnant or low flow area in the Chemical and Volume Control System (CCP Lubricating Oil). The one-time inspection will consist of volumetric examination (UT or RT) and/or visual examination. Examples of acceptable sample locations include:
    - Centrifugal Charging Pump Lube Oil Heat Exchanger
- One (1) carbon steel tank in stagnant or low flow area in the Lube Oil System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT) and/or visual examination. Examples of acceptable sample locations include:
    - Component Cooling Water Oil Reservoir 1-1
- Two (2) carbon steel cooler shells in stagnant or low flow area in the Diesel Generator System. The one-time inspection will consist of thickness measurements using volumetric examination (UT or RT). Examples of acceptable sample locations include:
    - *EDG Lube Oil Heat Exchanger (Shell)*

The inspection of aluminum alloy, ductile cast iron, and stainless steel for loss of material is not required since these materials have as good as or better corrosion

resistant properties than steel and copper alloys in lubricating oil environments. The inspection of gray cast iron is not required because with the exception of selective leaching, which is not addressed by the One-Time Inspection program (see the Selective Leaching of Materials program), the loss of material in gray cast iron is equivalent to carbon steel in this environment

The selected sample for one-time inspections for the reduction of heat transfer will include:

- One (1) copper alloy heat exchanger in the Auxiliary Feed Water System. The one-time inspection for the reduction of heat transfer will be by visual VT-3 inspection (or equivalent) of the lube oil side of the heat exchanger components. Examples of acceptable locations include:
    - Auxiliary Feedwater Pump 1(2)-1 Lube Oil Hx
- *One* (1) copper alloy heat exchanger components in the Chemical and Volume Control System. The one-time inspection for the reduction of heat transfer will be by visual VT-3 inspection (or equivalent) of the lube oil side of the heat exchanger components. Examples of acceptable sample locations include:
    - Centrifugal Charging Pump Lube Oil Heat Exchanger
- One (1) copper alloy heat exchanger component in the Closed Cycle Cooling Water System. The one-time inspection for the reduction of heat transfer will be by visual VT-3 inspection (or equivalent) of the lube oil side of the heat exchanger components. Examples of acceptable sample locations include:
    - Component Cooling Water Pump Lube Oil Cooler

Expansion Criteria

If the inspection of components in this environment detects material loss (wall thickness < 87.5% of pipe nominal wall thickness), the inspection results will be evaluated by engineering for acceptability. Engineering will determine the rate at which the material is being lost. The results will be evaluated against limits such as design minimum wall thickness. Unacceptable results will be documented in the corrective action program. An extent of condition review, which is an integral part of the corrective action program, addresses the need to expand the inspection sample population if appropriate.

If the inspection of components in these environments detects fouling (reduction of heat transfer), the inspection results will be evaluated by engineering for acceptability. Engineering will determine the rate at which fouling is progressing. The results will be evaluated against component heat transfer requirements. Unacceptable results will be documented in the corrective action program. An

extent of condition review, which is an integral part of the corrective action program, addresses the need to expand the inspection sample population if appropriate.

4.0 Conclusion

The DCPP One-Time Inspection Program provides reasonable assurance that an aging effect is not occurring, or that the aging effect is occurring slowly enough to not affect the component or structure intended function during the period of extended operation. The program is credited for cases where either (a) an aging effect is not expected to occur but there is insufficient data to completely rule it out, (b) an aging effect is expected to progress very slowly in the specified environment, but the local environment may be more adverse than that generally expected, or (c) the characteristics of the aging effect include a long incubation period.

5.0 References

5.1 10 CFR Part 54, “Requirements for Renewal of Operating Licenses for Nuclear Power Plants”
5.2 NUREG-1800, “Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants”, Revision 1
5.3 NUREG-1801, “Generic Aging Lessons Learned (GALL) Report”, Revision 1

6.0 Attachments

Attachment 1 – Inspection Requirements
Attachment 2 - Component Type / Material / Aging Effect

Draft

Attachment 1- Inspection Requirements

	Parameters Monitored or Inspected And Aging Effects/Mechanisms		
Aging Effect	***Aging Mechanism***	***Parameter Monitored***	***Inspection Method***
Loss of Material	*Crevice Corrosion*	*Wall Thickness*	*Visual (VT-1 or equivalent) and/or Volumetric (RT or UT)*
Loss of Material	*Galvanic Corrosion*	*Wall Thickness*	*Visual (VT-3 or equivalent) and/or Volumetric (RT or UT)*
Loss of Material	*General Corrosion*	*Wall Thickness*	*Visual (VT-3 or equivalent) and/or Volumetric (RT or UT)*
Loss of Material	*MIC*	*Wall Thickness*	*Visual (VT-3 or equivalent) and/or Volumetric (RT or UT)*
Loss of Material	*Pitting Corrosion*	*Wall Thickness*	*Visual (VT-1 or equivalent) and/or Volumetric (RT or UT)*
Loss of Material	*Erosion*	*Wall Thickness*	*N/A for One-Time Inspection. The One-Time Inspection program does not include the loss of material due to erosion.*
Loss of Heat Transfer	*Fouling*	*Tube Fouling*	*Visual (VT-3 or equivalent)*
Cracking	*SCC*	*Cracks*	*Volumetric (RT or UT)*
Loss of Preload	*Thermal Effects, Gasket Creep and Self-loosening*	*Loosening of Components*	*N/A for DCPP One-Time Inspection. Loss of preload is managed by the Bolting Integrity aging management program.*

Draft

Attachment 2-

Draft

Pacific Gas and Electric Company®

James R. Becker
Site Vice President

Diablo Canyon Power Plant
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Avila Beach, CA 93424

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October 27, 2010

PG&E Letter DCL-10-134

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20852

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Response to NRC Letter dated September 28, 2010, Summary of Telephone Conference Call Held on September 2, 2010, Between the U.S. Nuclear Regulatory Commission and Pacific Gas and Electric Company Concerning Responses to Requests for Additional Information Related to the Diablo Canyon Nuclear Power Plant, Units 1 and 2, License Renewal Application

Dear Commissioners and Staff:

By letter dated November 23, 2009, Pacific Gas and Electric Company (PG&E) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for the renewal of Facility Operating Licenses DPR-80 and DPR-82, for Diablo Canyon Power Plant (DCPP) Units 1 and 2, respectively. The application included the license renewal application (LRA) and Applicant's Environmental Report – Operating License Renewal Stage.

By letter dated September 28, 2010, the NRC staff sent a summary of a telephone conference between the NRC and representatives of Pacific Gas and Electric Company held on September 2, 2010. This telephone conference was to obtain clarification on the applicant's response to request for additional information (RAI) submitted to the NRC in letters dated June 3, 2010, July 7, 2010, and August 17, 2010, regarding fire water and One-Time Inspection Aging Management Programs.

PG&E's supplemental information to the RAI response for which the staff requested clarification is provided in Enclosure 1. LRA Amendment 23 resulting from the responses is included in Enclosure 2 showing the changed pages with line-in/line-out annotations. Other follow-up RAIs, determined by the NRC staff to be necessary will be issued separately by a formal letter.

PG&E makes a commitment in revised LRA Table A4-1, License Renewal Commitments, shown in Enclosure 2.

If you have any questions regarding this response, please contact
Mr. Terence L. Grebel, License Renewal Project Manager, at (805) 545-4160.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on October 27, 2010.

Sincerely,

James R. Becker
Site Vice President

TLG/50347222
Enclosures
cc: Diablo Distribution
cc/enc: Elmo E. Collins, NRC Region IV Regional Administrator
Nathanial Ferrer, NRC Project Manager, License Renewal
Kimberly J. Green, NRC Project Manager, License Renewal
Fred Lyon, NRC Project Manager, Office of Nuclear Reactor Regulation
Michael S. Peck, NRC Senior Resident Inspector
Alan B. Wang, NRC Project Manager, License Renewal

**PG&E Response to NRC Letter dated September 28, 2010,
Summary of Telephone Conference Call Held on September 2, 2010,
Concerning Responses to Requests for Additional Information (Set 1, 4, and 12)
Related to the Diablo Canyon License Renewal Application**

RAI B2.1.13-2

In its June 3, 2010, response to RAI B2.1.13-2, the applicant provided details of the basis for maintaining the 18-month inspection frequency for Fire Water System Program. However, the staff was unclear how the operating experience was applied as part of the basis for the inspection frequency.

Discussion:

PG&E agreed to supplement its response to RAI B2.1.13-2 to clarify how operating experience was considered as part of the basis for the 18-month inspection frequency.

PG&E Supplemental Response to Question B2.1.13-2

PG&E letter DCL-10-057 dated June 3, 2010, provided a response to NRC Request for Additional Information (RAI) B2.1.13-2. The response to this RAI revises/supplements the previously provided information on inspection frequency for above grade fire water piping and below grade fire water piping.

Above grade Diablo Canyon Power Plant (DCPP) fire water piping is visually inspected for early indications of aging effects (such as material wastage, pitting, blistering, or porosity) on an 18-month frequency. In addition, the firewater yard loop and underground feeds are flushed semi-annually. The flowing water removes accumulated debris and/or sediment which can be indicative of internal pipe aging. The firewater system is flow tested at least every three years in order to verify firewater system design and National Fire Protection Association test requirements.

These testing frequencies are performed to satisfy DCPP equipment control guidelines (ECGs), which were relocated from the DCPP Technical Specifications. Per License Amendments 74 and 75 for Units 1 and 2, respectively, NRC approved DCPP's request to relocate the fire protection Technical Specifications and associated bases to the ECGs. Therefore, DCPP's testing frequencies are in compliance with the licensing basis previously approved by NRC.

Plant procedures require that any degradation observed during inspection activities be entered into the corrective action program. As discussed in License Renewal Application Section B2.1.13, several examples of degradation or corrosion of fire water system including through wall leaks have occurred. These deficiencies were promptly

corrected and did not affect the fire water system intended function. Corrective actions and preventive measures have been developed in response to plant-specific operating experience on firewater components to ensure their license renewal intended function is maintained. DCPP corrective actions taken to resolve above grade firewater piping/hydrant leakage operating experience include piping replacement with current design specified materials; for example, ductile iron replaces cast iron pipe, polyvinyl chloride pipe replaces asbestos cement pipe, and new fire hydrants installed when degradation is identified. Planned buried pipe replacement will evaluate use of cathodic protection based on pipe and soil excavation findings.

The plant specific visual inspection interval is determined by engineering evaluation of the fire protection piping to ensure that degradation is detected before the loss of intended function. As discussed above, the current DCPP above grade firewater piping visual inspection frequency is 18 months. The ability of the fire water system to perform its intended function is periodically reviewed as part of plant health review process. In accordance with NUREG-1801, XI.M27, Fire Water System, the above grade visual inspection frequency is evaluated in response to plant specific and industrial operating experience to ensure this frequency is adequate for the fire water system above grade piping to perform its intended function.

PG&E is currently revising the Buried and Underground Piping and Tanks Program as part of its response to the NRC's RAI Set 29, RAI B2.1.18-2 (Follow-up). This response will also address below grade fire water piping inspections and frequencies. This response will be submitted no later then November 30, 2010.

RAI B2.1.13-4

In its August 17, 2010, response to RAI B2.1.13-4, the applicant provided details of the methodology and inspection techniques used for the firewater tank. However, the staff was unclear if the underside of the tank was accessible for the inspections described.

Discussion:

PG&E agreed to supplement its response to RAI B2.1.13-4 to clarify how the underside of firewater tank will be inspected.

PG&E Supplemental Response to Question B2.1.13-4

The underside of the firewater tank is inaccessible for visual inspection. PG&E routinely performs visual inspections of the firewater tank internals, as stated previously in PG&E Letter DCL-10-101 dated August 17, 2010. Recent dive inspections have found the firewater tank bottom to be in good condition. PG&E is currently scheduled to refurbish the firewater tank in 2011. The tank refurbishment will perform ultrasonic thickness (UT) thickness measurements of the firewater tank bottom. PG&E will evaluate UT measurement results and take appropriate corrective action to manage aging effects.

PG&E will perform an additional one-time UT examination of the tank bottom during the 10 years period prior to entering the period of extended operation to confirm its integrity. License Renewal Application (LRA) Table A4-1 has been revised to state that PG&E will perform a one-time inspection of the firewater tank bottom using non-intrusive volumetric examination technique. LRA Section B2.1.13 has been revised to clarify that the Fire Water System Aging Management Program will be used to manage the overall aging of the fire water tank. LRA Section B2.1.16, One-time Inspection, has been revised to include a one-time inspection of the firewater tank bottom using nonintrusive volumetric examination technique prior to the period of extended operation. See revised LRA Sections A1.13, A1.16, Table A4-1, B2.1.13, and B2.1.16 in Enclosure 2.

RAI B2.1.16-1

In its July 7, 2010, response to RAI B2.1.16-1, the applicant provided details of the sampling procedure that will be used for the One-Time Inspection Program. However, the staff was unclear on the basis for the sampling sizes selected for the various aging effects.

Discussion:

PG&E agreed to supplement its response to RAI B2.1.16-1 to provide additional information on the basis for the sampling size and criteria for the program.

PG&E Supplemental Response to Question B2.1.16-1

PG&E letter DCL-10-073 dated June 7, 2010, provided a response to NRC Request for Additional Information (RAI) B2.1.16-1. The basis for the sampling size and criteria for the program are noted below.

One-Time Inspection - Water Chemistry

The Diablo Canyon Power Plant (DCPP) One-Time Inspection (OTI) Program will verify the effectiveness of the Water Chemistry Program at managing material loss by identifying a population for each in-scope system based on the most susceptible material within the system (i.e. carbon steel in feedwater system, stainless steel in chemical and volume control system) at stagnant locations where the full effect of a Water Chemistry Program may not be achieved. A sample of 10 percent of the stagnant locations, with the most susceptible material type suitable for ultrasonic thickness examination will be selected for each in-scope system per unit. The OTI Program will take credit for volumetric examinations performed under other Aging Management Program (AMP), such as flow-accelerated corrosion, when the above criteria is met and the exams are performed within the 10 years prior to the period of extended operation.

The DCPP OTI Program will verify the effectiveness of the Water Chemistry Program at managing cracking of stainless steel with temperatures greater than 140°F by identifying the population of components within in-scope systems that are at stagnant locations where the full benefit of effective Water Chemistry Program may not be achieved. A sample of 10 percent of this population of stainless steel greater than 140°F in stagnant to low flow locations will be inspected using ultrasonic techniques appropriate to detect cracking. The OTI Program will take credit for volumetric examinations performed under other AMPs, such as Class 1 small bore and in service inspection, when the above criteria is met and the exams are performed within the 10 years prior to the period of extended operation. In addition to the 10 percent sample of stainless steel greater than 140°F in stagnant locations, DCPP OTI Program will

perform 100 percent eddy current testing of stainless steel tubes in one nonregenerative heat exchanger.

The DCPP OTI Program will verify the effectiveness of the Water Chemistry Program at managing fouling of heat exchanger tubes exposed to treated water by performing a visual examination of one heat exchanger per in-scope system, function, and material/environment combination per unit. Consideration of inspectability and radiological concerns will factor into selecting heat exchangers for this sample.

One-Time Inspection - Fuel Oil Chemistry

The DCPP OTI Program will verify the effectiveness of the Fuel Chemistry Program at managing material loss by identifying a population of components within the diesel generator system (DG) and DG fuel transfer system, which are stagnant at lower elevations that may permit the accumulation of water. A sample of 10 percent of carbon steel piping components identified in the DG system for each diesel as being stagnant and at a an elevation that would permit water accumulation will be examined using volumetric nondestructive examination techniques. In addition to the piping sample, stainless steel fuel oil priming tank bottoms will be volumetrically examined and carbon steel fuel oil day tanks that permit access to the inside surface of the tank bottom will be volumetrically examined to the extent accessible. A sample of 10 percent of carbon steel piping components identified in the DG fuel transfer system for each unit will be volumetrically inspected within the 10 years prior to the period of extended operation.

One-Time Inspection - Lubricating Oil Analysis

The DCPP OTI Program will verify the effectiveness of the Lubricating Oil Analysis Program at managing material loss by performing volumetric or visual examinations of one heat exchanger per in-scope system and function per unit. For example, one copper alloy centrifugal charging pump lube oil cooler per unit out of a population of two coolers per unit will be examined. This sample selection would include aluminum, copper alloy, and carbon steel heat exchanger shells.

LRA Amendment 23

LRA Section	RAI
A1.13	B2.1.13-4
A1.16	B2.1.13-4
B2.1.13	B2.1.13-4
B2.1.16	B2.1.13-4
Table A4-1	B2.1.13-4

A1.13 Fire Water System

The Fire Water System program manages loss of material due to corrosion, MIC, or biofouling for water-based fire protection systems. Internal and external inspections and tests of fire protection equipment are performed considering applicable National Fire Protection Association (NFPA) codes and standards. The fire water system is managed by performing routine preventive maintenance, inspections, and testing; operator rounds, performance monitoring, and reliance on the corrective action program; and system improvements to address aging and obsolescence issues.

The Fire Water System program conducts a water flow test through each open spray nozzle to verify that deluge systems provide full coverage of the equipment it protects. Either periodic non-intrusive volumetric examinations or visual inspections will be performed on firewater piping. Non-intrusive volumetric examinations would detect loss of material due to corrosion, and would confirm wall thickness is within acceptable limits so that aging will be detected before the loss of intended function. Visual inspections would evaluate (1) wall thickness as it applies to avoidance of catastrophic failure, and (2) the inner diameter of the piping as it applies to the design flow of the fire protection system. The volumetric examination technique employed will be one that is generally accepted in the industry, such as ultrasonic or eddy current.

Inspections of the firewater tank will be performed to detect loss of material.

A1.16 One-Time Inspection

The One-Time Inspection program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (A1.2), *Fire Water System program (A1.13),* Fuel Oil Chemistry program (A1.14), and Lubricating Oil Analysis program (A1.23). The aging effects to be evaluated by the One-Time Inspection program are loss of material, cracking, and reduction of heat transfer. The One-Time Inspection program determines non-destructive examination sample size for each material-environment group using an engineered sampling technique for each material-environment group based on criteria such as the longest service period, most severe operating conditions, lowest design margins, lowest or stagnant flow conditions, high flow conditions, and highest temperature. The One-Time Inspection program evaluates unacceptable inspection results using the corrective action program.

This new program will be implemented and completed during the 10-year period prior to the period of extended operation. Industry and plant-specific operating experience will be evaluated in the development and implementation of this program.

B2.1.13 Fire Water System

Program Description

The Fire Water System program manages loss of material due to corrosion, MIC, or biofouling for water-based fire protection systems. Internal and external inspections and tests of fire protection equipment are performed in accordance with applicable National Fire Protection Association (NFPA) codes and standards. The fire water system is managed by performing routine preventive maintenance, inspections, and testing; operator rounds, performance monitoring, and reliance on the corrective action program; and system improvements to address aging and obsolescence issues.

The following are activities performed by the Fire Water System program:

Testing:

A fire water system flow test is performed at least every three years in accordance with plant procedures meeting requirements of NFPA 25. Hydraulic pump curves are obtained and compared with baseline curves to determine operability. During the Fire Water System flow test, parameters directly monitored are static pressure and velocity head.

The Fire Water System program conducts a water flow test through each open spray nozzle to verify that deluge systems provide full coverage of the equipment it protects. The Fire Water System program will be enhanced so sprinkler heads in service for 50 years will be replaced or representative samples from one or more sample areas will be tested in accordance with NFPA 25. Test procedures will be repeated at 10-year intervals during the period of extended operation, for sprinklers that were not replaced prior to being in service for 50 years to ensure that signs of degradation, such as corrosion, are detected prior to the loss of intended function.

The Fire Water System program conducts a water flow test through each open spray nozzle of the transformer deluge system periodically to verify that each nozzle is unobstructed. Water is flowed through the test valves of the deluge system periodically to ensure freedom from blockage.

Fire water is flowed from the Raw Water Storage Reservoir periodically to verify the system piping is capable of delivering the design flow rate.

The portable diesel driven fire pumps are tested periodically under full load/full flow conditions.

DCPP performs a hydrostatic test of its indoor fire hoses at least every three years, while outdoor fire hoses are tested at least annually. Fire hoses that are inaccessible during normal plant operations are tested every refueling outage.

Inspections:

Either periodic non-intrusive volumetric examinations or visual inspections will be performed on firewater piping. Non-intrusive volumetric examinations would detect loss of material due to corrosion, and would confirm wall thickness is within acceptable limits so that aging will be detected before the loss of intended function. Visual inspections would evaluate (1) wall thickness as it applies to avoidance of catastrophic failure, and (2) the inner diameter of the piping as it applies to the design flow of the fire protection system. The volumetric examination technique employed will be one that is generally accepted in the industry, such as ultrasonic or eddy current.

The Fire Water System program performs periodic visual inspections of main fire system piping, yard loop fire hydrants, hose reel headers, hose stations, portable diesel driven fire pump hoses, fire hoses, gaskets, water spray headers, sprinkler system headers, water spray nozzles, ~~and~~ sprinkler heads*, and tank* to verify they are free of significant corrosion, foreign materials, biofouling, and physical damage. *Tank internal inspection is performed by divers using video and the tank is cleaned as needed at five year frequency. A one-time UT examination of the fire water tank bottom will be performed as part of the One-Time Inspection aging management program, LRA Section B2.1.16.*

DCPP performs a visual inspection of its indoor hose station gaskets once every 18 months, except hose stations in high radiation areas and the containment buildings which are tested during refueling outages. This inspection ensures that the gaskets have a satisfactory fit with no defects.

Fire detection instruments located in safety related power block structures, which are accessible during plant operation, are demonstrated to be operable at least once per six months by testing and surveillance activities. For fire detection instruments located in safety related power block structures which are not accessible during plant operation, operability is demonstrated during each cold shutdown exceeding 24 hours, unless performed in the last six months.

B2.1.16 One-Time Inspection

Program Description

The One-Time Inspection (OTI) program conducts one-time inspections of plant system piping and components to verify the effectiveness of the Water Chemistry program (B2.1.2), *Fire Water System program (B2.1.13),* Fuel Oil Chemistry program (B2.1.14), and Lubricating Oil Analysis program (B2.1.23). The aging effects to be evaluated by the One-Time Inspection program are loss of material, cracking, and reduction of heat transfer.

The DCPP OTI Program is a new program that will be implemented by DCPP prior to the period of extended operation. The DCPP OTI Program provides measures for detecting the aging effects prior to loss of intended function, but does not prevent degradation due to aging effects.

Plant system piping and components identified in the OTI procedure will be subject to OTI using inspection personnel qualified consistent with the ASME Section XI Code and 10 CFR 50, Appendix B. These inspection personnel will follow American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code, Section V, Nondestructive Examination (NDE), using NDE techniques appropriate to each inspection. NDE acceptance criteria will be consistent with the design codes/standards or ASME Section XI as applicable to the component for each one-time inspection.

Inspection sample sizes will be determined based on an assessment of materials of fabrication, environment, plausible aging effects and mechanisms, and operating experience. The OTI program determines NDE sample size for each material-environment group using an engineered sampling technique for each material-environment group based on criteria such as the longest service period, most severe operating conditions, lowest design margins, lowest or stagnant flow conditions, high flow conditions, and highest temperature. Component selection will be performed by the system engineer or other knowledgeable personnel. When evidence of an aging effect is revealed by a one-time inspection, the engineering evaluation of the inspection results would identify appropriate corrective actions.

The OTI inspections will be performed during the 10 years prior to the period of extended operation. All one-time inspections will be completed prior to the period of extended operation. Completion of the OTI Program in this time period will ensure that confirmation of the absence of aging effects is based upon inspection of components that have aged for at least 30 years.

Major elements of the DCPP OTI Program will include:

a) Identifying piping and component populations subject to OTI based on common materials and environments,

b) Determining the sample size of components to inspect for each material-environment group,

c) Selecting piping and components within the material-environment groups for inspection based on service period, plausible aging effects, operating conditions and design margins,

d) Conducting one-time inspections of the selected components using ASME Code Section V NDE inspection techniques and acceptance criteria effective in detecting aging effects of interest,

e) An one time UT examination of the firewater tank bottom will be performed.

~~e~~*f*) Evaluating unacceptable inspection results using the corrective action program.

Table A4-1 License Renewal Commitments

Item #	Commitment	LRA Section	Implementation Schedule
51	***A one time UT examination of the firewater tank bottom will be performed as part of the One-Time Inspection aging management program, LRA Section B2.1.16.***	***B2.1.16***	***During the 10 years prior to the period of extended operation***