Pacific Gas and Electric Company®

James M. Welsch
Site Vice President

Diablo Canyon Power Plant
Mail Code 104/6
P. O. Box 56
Avila Beach, CA 93424

805.545.3242
Internal: 691.3242
Fax: 805.545.4884

April 27, 2015

PG&E Letter DCL-15-046

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

10 CFR 50, Appendix I

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
2014 Annual Radiological Environmental Operating Report

Dear Commissioners and Staff:

In accordance with Diablo Canyon Power Plant, Units 1 and 2, Technical Specification 5.6.2, "Annual Radiological Environmental Operating Report," Pacific Gas & Electric Company hereby submits the 2014 Annual Radiological Environmental Operating Report (AREOR). The AREOR contains material consistent with the objectives of the Offsite Dose Calculation Manual, and 10 CFR 50, Appendix I, Sections IV.B.2, IV.B.3, and IV.C.

There are no new or revised regulatory commitments in this report (as defined by NEI 99-04).

If you have any questions regarding this submittal, please contact Mr. Martin Wright at (805) 545-3821.

Sincerely,

James M. Welsch

bnsm/4540/64105149
Enclosure
cc: Diablo Distribution
cc/enc: Larry Allen, Air Pollution Control Officer, San Luis Obispo County Air Pollution Control District
Siva P. Lingam, NRC Project Manager
Penny Borenstein, San Luis Obispo County Health Officer
Marc L. Dapas, NRC Region IV Administrator
Kenneth A Harris Jr., Executive Officer, CRWQCB
Thomas R. Hipschman, NRC Senior Resident
Gonzalo L. Perez, Branch Chief, California Department of Public Health
Executive Officer, San Luis Obispo County Air Pollution Control District

Enclosure
PG&E Letter DCL-15-046

2014 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

2014 Annual Radiological Environmental Operating Report Diablo Canyon Power Plant

January 1, 2014 - December 31, 2014

This page intentionally left blank.

2014 Diablo Canyon Power Plant

ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
(AREOR)
January 1, 2014 - December 31, 2014

Prepared By
Pacific Gas & Electric Company
Diablo Canyon Power Plant

Prepared by: Martin Wright Date: 4/6/15
Martin Wright, DCPP RP Senior Advising Engineer

Reviewed & Approved by: D Shippey Date: 4/6/15
Donnie Shippey, DCPP Radiation Protection Manager (acting)

PG&E Submittal Letter DCL-15-046

This page intentionally left blank.

EXECUTIVE SUMMARY

During the year 2014, a Radiological Environmental Monitoring Program (REMP) was conducted for the Diablo Canyon Power Plant (DCPP) to assess the levels of radiation or radioactivity in the environment. More than 290 environmental samples, 750 air samples, and 1400 thermo luminescent dosimeter (TLD) phosphors were collected over the course of the 2014 REMP monitoring period. Approximately 1742 radionuclide analyses were performed on the environmental samples.

This report contains results from the operational Radiological Environmental Monitoring Program for Diablo Canyon Power Plant compiled for the period January 1, 2014 through December 31, 2014. This program was conducted in accordance with DCPP Program Directive CY2, "Radiological Monitoring and Controls Program," and RP1.ID11, "Environmental Radiological Monitoring Procedure." This report was submitted per DCPP License Technical Specification 5.6.2.

The types of samples (matrix ID) collected for this monitoring period were as follows:

Air Particulate (AP)	Air Cartridges (AC) for iodide monitoring		Carbon-14 (AC14)
Direct Radiation (TLD)	Milk (MK)	Meat (MT)	Vegetation (VG)
Drinking Water (DW)	Ground Water (GW)	Monitor Well (GW)	Surface Water (SW)
Aquatic Vegetation (AV)	Fish (FH)	Mussels (IM)	Sediment (SD)

In 2014, DCPP added routine voluntary supplemental airborne Carbon-14 sampling at stations 0S2 (northwest sector) and 5F1 (San Luis Obispo control).

Diablo Canyon REMP personnel collected environmental samples and shipped them to General Engineering Labs (GEL) located in Charleston, South Carolina. All 2014 REMP environmental lab isotopic sample analyses were performed by GEL.

The ambient direct radiation levels in the DCPP offsite environs did not change and were within the pre-operational range. Historically (since 1979), DCPP has processed environmental TLDs onsite. Beginning in July 2014 (3Q14), DCPP began outsourcing environmental TLD processing to vendor Mirion Technologies in Irvine California.

DCPP began loading of the onsite dry cask Independent Spent Fuel Storage Installation (ISFSI) in June 2009. There were no ISFSI dry cask loading Campaigns in 2014. The ambient direct radiation levels

within the DCPP plant site boundary near the ISFSI were elevated due to dry cask spent fuel storage. An evaluation of direct radiation measurements and member of public occupancy times surrounding the ISFSI indicated all federal criteria for member of public dose limits were conservatively met. The ISFSI had no significant impact on the REMP Environmental TLD station readings within the vicinity of the site boundary (approximately 800 yards from U-1 Containment) and beyond.

Groundwater isotopic monitoring was conducted in accordance with the nuclear industry NEI 07-07 Groundwater Protection Initiative (GPI). Concentrations of tritium were detected in three shallow monitoring wells (stations OW1, DY1, and GW1) near the power block. This tritium was evaluated and attributed to rain-washout of gaseous tritium exiting the plant vent system (via an approved isotopic-effluents discharge path). No groundwater tritium has been attributed to DCPP system leaks or spills. It should also be noted that studies of the DCPP site groundwater gradient indicated that any groundwater (subsurface) flow beneath the DCPP power block was not used as a source of drinking water. Due to topography and site characteristics, this groundwater gradient flow discharged into the Pacific Ocean which is approximately 100 yards from the power block.

An Old Steam Generator Storage Facility (OSGSF) long term storage mausoleum was constructed within the DCPP site boundary in 2007 for storage of eight retired DCPP steam generators and two retired DCPP reactor heads. This equipment was placed into this OSGSF on the following dates:

- March 2008 (outage 2R14), four DCPP Unit Two (U-2) Steam Generators
- February 2009 (outage 1R15), four DCPP Unit One (U-1) Steam Generators
- November 2009 (outage 2R15), one DCPP Unit Two (U-2) Reactor (Rx) Head
- October 2010 (outage 1R16), one DCPP Unit One (U-1) Rx Head

This OSGSF did not cause any changes to the ambient direct radiation levels within the DCPP environs during 2014. The OSGSF sumps were inspected quarterly by REMP personnel. These OSGSF sumps have remained empty and dry during 2014.

The results of the 2014 REMP showed no unusual environmental isotopic findings from DCPP site operations.

These results were compared to DCPP preoperational isotopic data and showed no unusual trends. Diablo Canyon site operations had no significant environmental radiological impact on airborne, surface water, drinking water, marine life, aquatic vegetation, terrestrial vegetation, sediment, milk, or meat radioactivity.

TABLE OF CONTENTS

This page intentionally left blank.

LIST OF TABLES

LIST OF FIGURES

This page intentionally left blank.

1.0 INTRODUCTION

Diablo Canyon Power Plant (DCPP) consists of two Westinghouse pressurized water reactors (PWR). Unit 1 began commercial operation in 1985, and Unit 2 began commercial operation in 1986.

Radiological Environmental Monitoring Program (REMP) samples were collected by DCPP REMP personnel and sent to General Engineering Labs (GEL) in Charleston, South Carolina for isotopic analysis.

Fish (except market fish) and ocean sediment samples were collected by contract divers of Tenera Environmental and given to DCPP REMP personnel for shipment to GEL.

Market fish samples were collected by local commercial fishermen and then purchased by DCPP REMP personnel in one of two local fish markets for shipment to GEL.

Direct radiation analyses were conducted by DCPP REMP personnel and analyzed by the DCPP Thermo-luminescent Dosimeter (TLD) Lab from January to June 2014. Beginning in July 2014, environmental TLD analysis was conducted by vendor lab Mirion Technologies in Irvine California.

This AREOR summarizes the findings of the Radiological Environmental Monitoring Program (REMP) conducted by Diablo Canyon Power Plant. The remainder of this AREOR is organized as follows:

Section 2: Provides a description of the overall REMP design. Included is a summary of the requirements for REMP sampling and tables listing routine sampling and TLD monitoring locations with distances from the plant. Tables listing Lower Limit of Detection requirements and Reporting Levels (NRC notification if levels exceeded) are also included.

Section 3: Consists of the summarized data as required by the Radiological Environmental Monitoring Program. The summaries are provided similar to that specified by the NRC Branch Technical Position on Environmental Monitoring.

Section 4: Provides a summary of the results for the samples collected. The performance of the program in meeting the requirements is discussed, and the data acquired during the monitoring period is analyzed. Also included is environmental TLD preoperational data trending.

Section 5: Provides a summary of groundwater monitoring in accordance with the nuclear industry NEI 07-07 Groundwater Protection Initiative.

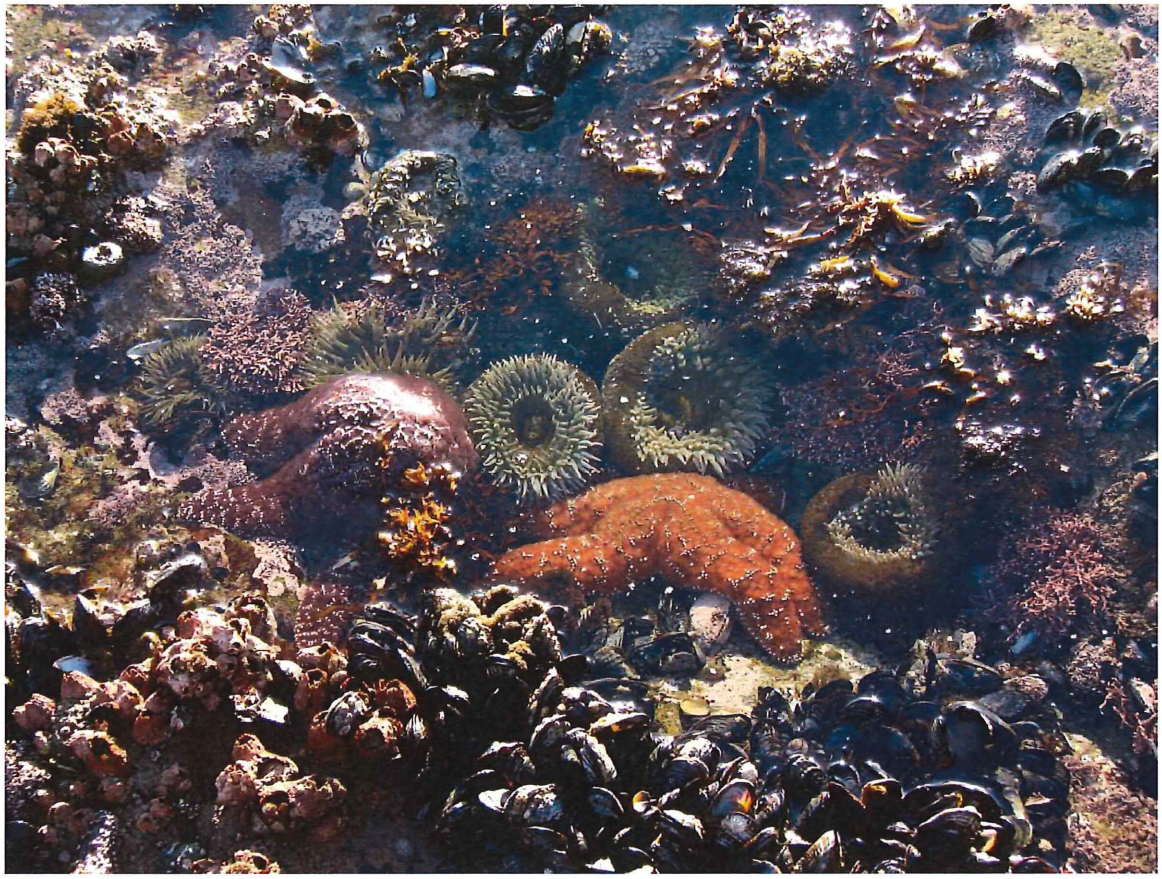
This and previous DCPP AREOR's can be found on the NRC website at: http://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html

DCPP REMP sent replicate split samples of stations 7G1 vegetation (quarterly), 5F2 milk (monthly), 5S2 drinking water (monthly), DW1 drinking water (monthly), OUT seawater (monthly), DCM kelp (quarterly), DCM perch (quarterly), DCM rockfish (quarterly), and DCM ocean sediment (annually) to the California Department of Public Health - Radiologic Health Branch (CDPH-RHB) Laboratory as part of a California State split sampling program.

These split samples were independently analyzed by the CDPH-RHB.

Other pathways independently monitored by the CDPH-RHB were quarterly direct radiation TLD stations (MT1, 1A1, 1C1, 4D1, 5F3, 5S1, 7D1, 7C1, 7F1, and 8S2) and weekly air sampling particulate and I-131 (at stations 5F3 and 7D1).

The general public can access these CDPH-RHB split sampling data results via the internet at: http://www.cdph.ca.gov/programs/Pages/RHB-RadReport.aspx



2.0 PROGRAM DESIGN

The Radiological Environmental Monitoring Program (REMP) for the Diablo Canyon Power Plant (DCPP) was designed with the following specific objectives in mind. These objectives continue to be in force, to varying degrees, throughout facility operation:

- To provide an early indication of the appearance or accumulation of any radioactive material in the environment caused by facility operation. Preoperational data was also used in this comparison.
- To provide assurance to regulatory agencies and the public that the station's environmental impact was known and within anticipated limits.
- To provide standby monitoring capability for rapid assessment of risk to the general public in the event of unanticipated or accidental releases of radioactive material.

The environmental media selected were based on the critical dose pathways of the radionuclides from the environment to man. They included the following: direct radiation, air, water, fish, ocean sediment, and

invertebrates. Supplemental samples such as algae, kelp, local agricultural crops, recreational beach sand, groundwater, meat, and milk were also collected. The sampling locations were determined by land use, site meteorology, and local demographics. Guidance for this monitoring program was provided by the Radiological Assessment Branch Technical Position on Radiological Environmental Monitoring, Revision 1, November 1979 (NUREG-1301).

The detailed sampling requirements of the REMP were given in Table 2.1 of this report.

Any deviations from the REMP sampling schedule / requirements were documented in section 4.0 of this report.

Data summary tables of REMP sampling for the period were shown in Appendix A of this report.

Direct dose (environmental TLDs) results were shown in Appendix B of this report.

Individual REMP sample isotopic results were shown in Appendix C of this report. Detected concentrations (> MDC) of nuclear power plant related isotopes have been highlighted with yellow background for quick identification by the reader. Naturally occurring isotopes (e.g. NORM) were not highlighted (including gross beta, Be-7, K-40, thorium, radium, radon, lead, etc).

2.1 MONITORING ZONES

The REMP was designed to allow comparison of levels of radioactivity in samples from the areas possibly influenced by DCPP to levels found in areas not influenced by the facility operations. Areas with the potential to be influenced by facility operations were called "indicator" stations. Areas with sufficient distance from the plant that were not likely to be influenced by facility operations were called "control" stations. The distinction between the two zones was based on distance and relative direction from the plant. Analysis of survey data from the two zones aided in determination of site environmental influence. Analysis from the two zones assisted in differentiation between radioactive releases and seasonal variations in the natural environmental background.

2.2 PATHWAYS MONITORED

Direct Radiation

Airborne Radioactivity

Waterborne Pathways

Marine Biological, Beach Sand, and Ocean Sediment

Food Crops

Milk

Meat

2.3 DESCRIPTIONS OF REMP MONITORING

2.3.1 Direct Radiation

Direct ambient radiation was measured at 32 stations in the vicinity of DCPP using Panasonic UD814 TLD badges. The TLD badges had valid element correction factors (ECF), were calibrated using a NIST-traceable caesium-137 source, were annealed prior to placement, and were sealed in watertight packaging. Three TLD badges were placed at each station and each badge contained 3 calcium sulfate phosphors for a total of 9 calcium sulfate phosphors at each station. The 9 phosphors were analyzed and averaged to provide a single station reading. That single reading was converted into an uR/hr doserate dependent on the in-field exposure time period. Then the uR/hr doserate was multiplied by 2190 hours (standard quarter) to allow the station exposure be reported over a standard 90 day quarter. These TLD badges were exchanged and processed on a quarterly basis.

Direct ambient radiation was measured at 8 stations in the vicinity of the Independent Spent Fuel Storage Installation (ISFSI) using Panasonic UD814 TLD badges. The ISFSI TLD badges were processed in the same method described in the previous paragraph .

From January 1st to June 30th of 2014, the Environmental TLD badge packets were prepared and processed by DCPP personnel and the DCPP TLD Lab. In July 2014, DCPP closed it's onsite TLD processing lab and transitioned to an offsite vendor TLD processor (Mirion Technologies in Irvine California). As of

July 2014, the Env TLD badge packets were distributed and collected from the field stations by DCPP REMP personnel and then shipped to Mirion Technologies for processing. Post July 2014; Mirion Technologies performed all annealing, calibration, processing, and exposure reporting of Env TLDs. Control badges accompanied the field badges during shipment and deployment to measure any dose received during transit time periods. Control badge exposure was subtracted from field badge exposure. The location, date, and time of exchange were recorded on a log sheet which accompanied the field badges. Env TLD exposure was reported over a standard 90 day quarter.

DCPP Environmental TLD standard quarter results are measurements of all environmental gamma radiation sources (cosmic, terrestrial, radon, etc) at each station during the deployment period. Transient and lab storage background dose contributions were subtracted prior to reporting.

2.3.2 Airborne Radioactivity

Air particulate and radioiodine sampling were performed weekly at six indicator stations: MT1, 0S2, 1S1, 7D1, 8S1 and 8S2. Air particulate and radioiodine sampling was performed weekly at one control station: 5F1.

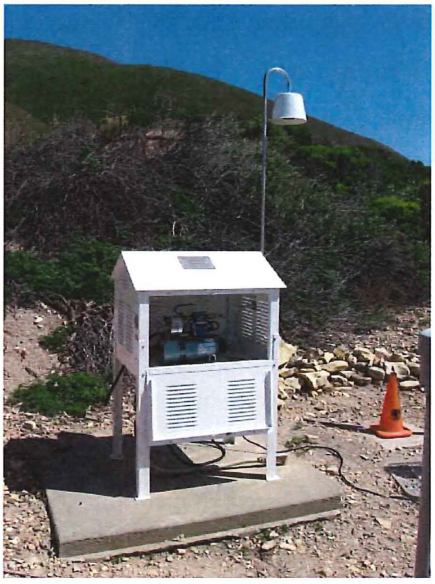
Constant flow air samplers (F&J model DF-1) were used to draw air through paper filters to collect air particulates and through triethylenediamine (TEDA) impregnated charcoal cartridges to collect radioiodine. The air sampling flow rate was conducted at approximately 2.55 cubic meters per hour. The air sampling collection filters were located approximately seven feet above the ground. The sample volumes were determined by F&J Corporation model DF-1 flow meters (corrected to standard temperature and pressure, STP) which were installed downstream of the sample filters. At the end of the weekly sampling period, the particulate filter and TEDA charcoal cartridge were collected. All necessary data regarding the air volume readings, flow rate, sampler time on / off, date of collection, and sampler station location were recorded and submitted to GEL along with the filter samples for isotopic analysis.

Approximately 72 hours after sampling (to allow for radon and thoron daughter decay), the particulate filter papers collected from the field were placed on

individual planchets and counted for gross beta activity in a low background, thin window gas proportional counter.

Quarterly gamma spectroscopy isotopic analysis was performed on composites of the filters (by station) to determine the activity concentration of gamma emitting isotopes. The quarterly composite sample time is reported at the midpoint of the quarter monitored.

Due to the short half-life of Iodine-131, each station weekly TEDA impregnated charcoal cartridge was counted for gamma spectroscopy isotopic analysis to determine the radioiodine concentration.



2.3.3 Airborne Carbon-14

Air Carbon-14 (C-14) sampling was performed weekly at station 8S1 throughout 2014. Air C-14 sampling was added to stations 0S2 and 5F1 on 8/7/14 and continued through the rest of the year. DCPP REMP now has continuous supplemental C-14 air sampling at 0S2 (northwest sector), 8S1 (southeast sector), and 5F1 (control station in San Luis Obispo).

General Engineering Labs (GEL) and DCPP REMP worked together to develop a method for sampling environmental airborne inorganic C-14. Inorganic C-14 (as CO_2) is the primary exposure pathway to man via photosynthesis in plants. A

constant flow air sampler was used to draw air through a solid phase carbon sensitive sorbent cartridge. The air sampler was set at a flow rate of 1.0 standard liter per minute. The air sample filter cartridge head was located approximately seven feet above the ground. At the end of the weekly sampling period, the filter cartridge was collected. All necessary data regarding the air volume, flow rate, sampler time on / off, date of collection, and sampler station location were recorded and submitted to GEL along with the sample filter for C-14 analysis. At GEL, a suitable portion of the solid sorbent material was processed through a method utilizing wet oxidation to remove volatile CO_2 from the media in a closed distillation system. Once removed from the media, C-14 as carbon dioxide was sparged through a dilute acid solution for trapping any tritiated water present in the sample. After sparging through dilute acid, the CO_2 was trapped in a sorbing solution which was added to liquid scintillation cocktail and finally counted in a liquid scintillation counter. It should be noted that C-14 results in Appendix C are reported in uCi/cubic meter. This method met the following specifications:

- Validated to retain 99.9% of inorganic C-14 in air
- Validated at collection rates of approximately 1.0 liter per minute
- Validated for total collection capacity over a 1 week sampling interval
- Accurate analysis of C-14 over a wide range of concentrations
- Methodology free from interference by other radionuclides
- Detection capability of approximately 0.8 pCi (8E-7 uCi) per cubic meter

2.3.4 Waterborne

Water samples (drinking water, surface water, monitor wells, and groundwater) were collected at the frequencies shown in Table 2.1

Ocean surface water samples were collected at Diablo Cove (station DCM), Rattlesnake Canyon (station 7C2), and at the plant Outfall (station OUT).

Drinking water samples were collected from Diablo Creek Weir (station 5S2), Diablo Creek Outlet (station WN2), Blanchard Spring (station 1A2), and from the DCPP drinking water system (station DW1). San Luis Obispo (SLO) city

drinking water was also collected from a control station located at 4325 South Higuera Street, Offsite Emergency Lab (station OEL) in SLO.

Supplemental groundwater samples were collected from Water Well 02 (WW2) and DCSF96-1 (8S3).

Supplemental on-site monitoring well samples were collected from french drain systems labeled Observation Well 01 (OW1), Observation Well 02 (OW2), and Drywell 115 (DY1). These shallow French drain well systems were located in close proximity to the facility power block structures and within the protected area.

Two new on-site monitoring wells were installed in December 2011 as part of the industry Groundwater Protection Initiative (GPI). Isotopic sampling of these wells was initiated in 2012. These two new onsite wells were downgradient of the power block and located along the west side of the power block. These two new monitoring wells were labeled Groundwater 1 (GW1) and Groundwater 2 (GW2).

After collection, the samples were securely sealed and labeled with sample type, station ID, date, time of collection, person performing the collection and sent to GEL for analysis.

2.3.5 Marine Biological, Beach Sand, and Ocean Sediment

The REMP required sampling of rockfish (genus Sebastes), perch (family Embiotocidae), mussels (genus Mytilus), and ocean sediment from indicator station DCM and control station 7C2.

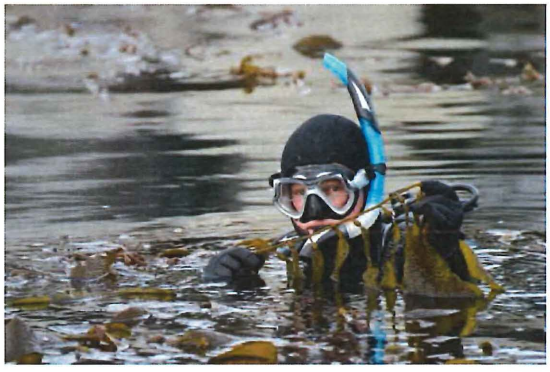
All other marine samples collected were considered supplemental. These supplemental marine samples included the following: intertidal algae, intertidal mussels, kelp, rockfish, perch, beach sand, and market fish. The intertidal samples were collected by DCPP personnel during low tidal conditions. Kelp was collected quarterly by DCPP personnel from the offshore kelp bed in the vicinity of the site.

Quarterly samples of fish and an annual sample of ocean sediments were collected from the plant environs by contracted divers (TENERA Environmental). The Tenera divers fillet the fish and leave a small portion of skin for identification.

Beach sand was collected by DCPP personnel between the high and low tide boundaries at nearby recreational beaches.

Market Fish caught locally by commercial fishermen were purchased from two local fish markets (Avila Beach Pier-7D3 and Morro Bay-2F1).

All samples were subject to unavailability due to seasonal fluctuations or unfavorable sampling conditions. The above samples were sealed in plastic bags immediately upon collection. In-shell mussels were sent to GEL where GEL personnel removed the meat & internal organs for analysis. Only edible portions of the fish were analyzed (fish fillets). The samples were labeled with sample type, station ID, date, time of collection, and the individual who performed collection. The samples were then frozen (to prevent spoilage odor) before they were sent to GEL for analysis.



2.3.6 Food Crops

The REMP required broadleaf food vegetation collected in the nearest off-site locations of the highest calculated annual average ground level D/Q (dispersion parameter) within 5 miles. There was no broadleaf food vegetation available that satisfied this requirement. Because these food products were unavailable, the DCPP REMP conducted additional weekly air sampling in the SE (station 8S2) and NNW (station 1S1) sectors.

Additional representative samples of food crops (in season) were collected monthly from supplemental stations: Cal Poly Farm (5F2), Kawaoka Farm in Arroyo Grande (7G1), Mello Farm (7C1) along the DCPP site access road, and quarterly from local gardens (3C1, 6C1, and 7E1).

The vegetation samples at 5F2, 7G1, 7C1, 3C1, and 7E1 were collected by DCPP personnel and sealed immediately in plastic bags. The quarterly garden vegetation sample at 6C1 was provided to DCPP personnel by the land occupant (due to property access difficulty and privacy).

The samples were labeled with sample type, station ID, collection date, collection time, and the individual who performed collection. The samples were normally frozen before they were sent to GEL for analysis (to prevent spoilage odor).

2.3.7 Milk

There were no animals within the 5 mile vicinity of the plant utilized for milk consumption by humans. However, supplemental samples of cow milk were collected monthly from Cal Poly Farm (5F2) which was approximately 13 miles from DCPP.

Two 1-gallon plastic containers of milk were collected each sampling period by DCPP personnel. Forty grams of sodium bisulfite preservative were added to each gallon of milk sample. The containers were sealed and shaken thoroughly to distribute the preservative. The containers were labeled with sample type, station ID, collection date, collection time, and the individual who performed collection. The samples were then express-shipped (due to the short half-life of I-131) to GEL for analysis.

2.3.8 Meat

Prior to 2014, a rancher routinely grazed (free range, grass fed) cattle within three miles of the site boundary between the northwest to east sectors (clockwise). This livestock meat would then be offered at local farmer's markets and private distribution. Because it was possible for this vendor to provide an individual's sole-source of annual meat consumption, this meat sampling was included in the REMP. During 2014, this rancher did not allow his cattle to graze around DCPP due to the ongoing drought in California. These cattle remained at the Cayucos ranch during the entire 2014 year. To maintain data collection and trending from this meat source, REMP personnel obtained commercially packaged meat samples directly from the land owner. Gamma spec and total strontium 89/90 analyses were performed on the meat.

Control station free range, grass fed meat sampling was conducted of ranches outside the influence of DCPP. This meat was purchased by REMP personnel from the Whole Foods Market in SLO. The control station meat consisted of Hearst Ranch meat which is located approximately 37 miles north of the DCPP site or SunFed Ranch which raises cattle in the foothills of Sacramento Valley and the rangeland of the Klamath Basin between Mt Shasta and Crater Lake. This REMP station code was CCM (Control Cow Meat) and provided a control location far from the site.

Property owners could hunt deer and wild pig (in season) within 5 miles of the site boundary. The REMP could not obtain deer meat samples from these property owners (voluntary participation) in 2014. Gamma spec and strontium analyses were performed on the deer meat if provided.

The meat was initially packaged by the livestock owners or commercial processes. The meat was purchased at local grocery stores or turned over to REMP personnel by the land owners. The unopened packages were then separated by species and placed into large over-pack zip-lock bags. Each bag was labeled with sample type, station ID, collection date, collection time, and the individual who performed the collection. The samples were then frozen and sent to GEL for isotopic analysis.

This page intentionally left blank.

TABLE 2.1:
Radiological Environmental Monitoring Program

Exposure Pathway and/or Sample Type	Number of Representative Samples and Sample Locations[1]	Sampling Stations	Collection Frequency	Type of Analysis	Required or Supplemental
1. Direct Radiation[2]	Thirty-two routine monitoring stations containing thermo luminescent dosimeters (TLDs) such that at least two (2) phosphors are present at each station, placed as follows:				
	An inner ring of stations, one in each terrestrial meteorological sector in the general area of the SITE BOUNDARY;	0S1, 0S2, WN1, 1S1, 2S1, 3S1, 4S1, 5S1, 6S1, 7S1, 8S1, 9S1, 8S2, 5S3, and MT1	Quarterly	Gamma Dose	Required
	An outer ring of stations, one in each terrestrial meteorological sector in the 2.5 to 14 km range from the site; and	0B1, 1A1, 1C1, 2D1, 3D1, 4C1, 5C1, 6D1, and 7C1	Quarterly	Gamma Dose	Required
	One or two areas to serve as control stations; and	2F2, 4D1, 5F1	Quarterly	Gamma Dose	Required
	The balance of the stations to be placed in special interest areas such as population centers, nearby residences, or schools.	5F3, 7D1, 7D2, 7F1, and 7G2	Quarterly	Gamma Dose	Required
	A minimum of four stations around the ISFSI	IS1, IS2, IS3, IS4, IS5, IS6, IS7, IS8	Quarterly	Gamma Dose	Required
2. Airborne Radioiodine	Samples from $\geq$ 4 stations:				
	Three samples from close to the three SITE BOUNDARY locations (0S2, 8S1, & MT1) in different sectors.	0S2, 8S1, and MT1	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	I-131 analysis	Required
	One sample from the vicinity of a community having the highest calculated annual average ground level D/Q.	7D1	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	I-131 analysis	Required
	If food products are unavailable, additional air sampling will be done in the NNW (station 1S1) and SE (Station 8S2) sectors.	1S1 & 8S2	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	I-131 analysis	Required
	One sample from a control location.	5F1	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	I-131 analysis	Required

Table 2.1 (continued)

Exposure Pathway and/or Sample Type	Number of Representative Samples and Sample Locations[1]	Sampling Stations	Collection Frequency	Type of Analysis	Required or Supplemental
3. Airborne Particulate	Samples from ≥ 4 stations:				
	Three samples from close to the three SITE BOUNDARY locations (0S2, 8S1, & MT1) in different sectors.	0S2, 8S1, and MT1	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Weekly gross beta radioactivity analysis following filter change[3]. Quarterly gamma isotopic analysis[4] of composite consisting of approx 12 filters (by location).	Required
	One sample from the vicinity of a community having the highest calculated annual average ground level D/Q.	7D1	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Weekly gross beta radioactivity analysis following filter change[3]. Quarterly gamma isotopic analysis[4] of composite consisting of approx 12 filters (by location).	Required
	If food products are unavailable, additional air sampling will be done in the NNW (station 1S1) and SE (Station 8S2) sectors.	1S1 & 8S2	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Weekly gross beta radioactivity analysis following filter change[3]. Quarterly gamma isotopic analysis[4] of composite consisting of approx 12 filters (by location).	Required
	One sample from a control location.	5F1	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	Weekly gross beta radioactivity analysis following filter change[3]. Quarterly gamma isotopic analysis[4] of composite consisting of approx 12 filters (by location).	Required
4. Airborne Carbon-14					
	Samples from 3 stations: One sample from each of the NW and SE sectors close to the site (0S2 and 8S1). One sample used as a control station (5F1).	0S2,8S1 5F1 (control)	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	C-14 analysis	Supplemental

Table 2.1 (continued)

Exposure Pathway and/or Sample Type	Number of Representative Samples and Sample Locations[1]	Sampling Stations	Collection Frequency	Type of Analysis	Required or Supplemental
5. Waterborne					
a. Surface Ocean Water	One sample from the plant Outfall, Diablo Cove, and an area not influenced by plant discharge.	OUT, DCM, and 7C2	Monthly (grab sample)	Gamma isotopic[4] and tritium analysis.	Required
	One sample from the plant Outfall, Diablo Cove, and an area not influenced by plant discharge.	OUT, DCM, and 7C2	Quarterly (grab sample)	Gross Beta, Total Sr 89/90, Fe-55, and Ni-63	Supplemental
b. Drinking Water	One sample from the plant drinking water, one sample from Diablo Creek (upstream of plant), and one control sample.	DW1 and 5S2 OEL (control)	Monthly (grab sample)	Gamma isotopic[4], I-131, and tritium analysis.	Required
	One sample from the plant drinking water, one sample from Diablo Creek (upstream of plant), and one control sample.	DW1 and 5S2 OEL (control)	Quarterly (grab sample)	Gross Beta, Total Sr 89/90, Fe-55, and Ni-63	Supplemental
	One sample from Diablo Creek (downstream of plant) and one sample from Blanchard Spring.	WN2 and 1A2	Quarterly (grab sample)	Gamma isotopic[4], tritium, I-131, gross beta, Total Sr 89/90, Fe-55, and Ni-63	Supplemental
c. Groundwater	One sample from wells located under or downgradient from the plant power block.	OW1, OW2, DY1, GW1, and GW2	Quarterly (grab sample, when available)	Gamma isotopic[4], tritium, gross beta, Total Sr 89/90, Fe-55, and Ni-63	Supplemental
	One sample from a well located outside the plant power block (control sample).	WW2, 8S3	Quarterly (grab sample, when available)	Gamma isotopic[4], tritium, gross beta, Total Sr 89/90, Fe-55, and Ni-63	Supplemental
d. Sediment	One sample of offshore ocean sediment from Diablo Cove and Rattlesnake Canyon.	DCM and 7C2	Annual (grab sample)	Gamma isotopic[4]	Required
	One sample of offshore ocean sediment from Diablo Cove and Rattlesnake Canyon.	DCM and 7C2	Annual (grab sample)	Total Sr 89/90, Fe-55, and Ni-63	Supplemental
	One sample from each of five local recreational beaches.	AVA, MDO, PMO, CYA, and CBA	Semi- Annual (grab sample)	Gamma isotopic[4], Total Sr 89/90, Fe-55, and Ni-63	Supplemental
e. Marine Flora	One sample of kelp	DCM, PON, POS, and 7C2	Quarterly (when available)	Gamma isotopic[4]	Supplemental
	One sample of intertidal algae	DCM and 7C2	Quarterly (when available)	Gamma isotopic[4]	Supplemental

Table 2.1 (continued)

Exposure Pathway and/or Sample Type	Number of Representative Samples and Sample Locations[1]	Sampling Stations	Collection Frequency	Type of Analysis	Required or Supplemental
6. Ingestion					
a. Milk	Samples from milking animals in three locations within 5 km distance having the highest dose potential. If there are none, then one sample from milking animals in each of three areas between 5 to 8 km distance where doses are calculated to be greater than 1 mrem per year. One sample from milking animals at a control location 15 to 30 km distant and in the least prevalent wind direction. **NOTE:** The sample (5F2) should be taken monthly even if there are no indicator samples available.	5F2	Semimonthly when animals are on pasture; monthly at other times.	Gamma isotopic[4] and I-131 analysis.	Supplemental
b. Fish and Invertebrates	One sample of rock fish (family Sebastes) and one sample of perch (family Embiotocidae)	DCM and 7C2	Quarterly (grab sample)	Gamma isotopic[4] analysis on edible portions of each sample.	Required
	One sample of rock fish (family Sebastes) and one sample of perch (family Embiotocidae)	PON and POS	Quarterly (grab sample)	Gamma isotopic[4] analysis on edible portions of each sample.	Supplemental
	One sample of mussel (family Mytilus)	DCM and 7C2	Quarterly (grab sample)	Gamma isotopic[4] analysis on edible portions of each sample.	Required
	One sample of mussel (family Mytilus)	PON	Annual (grab sample)	Gamma isotopic[4] analysis on edible portions of each sample.	Supplemental
	One sample of mussel (family Mytilus)	POS	Quarterly (grab sample)	Gamma isotopic[4] analysis on edible portions of each sample.	Supplemental
	One sample of locally harvested market fish.	7D3 OR 2F1 (should alternate between locations)	Quarterly (grab sample)	Gamma isotopic[4] analysis on edible portions of each sample.	Supplemental

Table 2.1 (continued)

Exposure Pathway and/or Sample Type	Number of Representative Samples and Sample Locations[1]	Sampling Stations	Collection Frequency	Type of Analysis	Required or Supplemental
c. Broadleaf Vegetation[5]	Three samples of broadleaf vegetation grown nearest off-site locations of highest calculated annual average ground level D/Q IF milk sampling is not performed.		Monthly (when available)	Gamma isotopic[4] analysis (that includes I-131) on edible portion.	Required (see notation #5)
	One sample of each of the similar broadleaf vegetation grown 15 to 30 km distant in the least prevalent wind direction IF milk sampling is not performed.		Monthly (when available)	Gamma isotopic[4] analysis (that includes I-131) on edible portion.	Required (see notation #5)
d. Vegetative Crops	One sample of broadleaf vegetation or vegetables or fruit	5F2, 7C1, and 7G1	Monthly (when available)	Gamma isotopic[4] analysis on edible portion.	Supplemental
	One sample of broadleaf vegetation or vegetables or fruit.	3C1, 6C1, 7E1	Quarterly (as provided by land owner)	Gamma isotopic[4] analysis on edible portion.	Supplemental
e. Meat sample	One sample of each species (cow, goat, sheep, deer, or pig) of edible meat portion slaughtered for personal consumption (not mass market).	BCM, BGM, BSM, JDM, JPM, ACM, ADM, APM, CCM	Quarterly (as available and provided by land owners within 8 km of plant site)	Gamma isotopic[4] analysis , and Total Sr 89/90 on edible portion.	Supplemental

Table Notations

1. Deviations are permitted from the required sampling schedule if specimens are unobtainable due to circumstances such as hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable specific alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the Radiological Environmental Monitoring Program, and submitted in the next Annual Radioactive Effluent Release Report, including a revised figure(s) and table for the ERMP reflecting the new location(s) with supporting information identifying the cause of the unavailability of samples for that pathway and justifying the section of the new location(s) for obtaining samples.

2. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor. There are normally three calcium sulfate phosphors in an environmental TLD BADGE. Film badges shall not be used as dosimeters for measuring direct radiation.

3. Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

4. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

5. If broadleaf vegetation food products are unavailable, additional air sampling as specified in Table 2.1, Parts 2 & 3 will be done in the NNW (station 1S1) and SE (Station 8S2) sectors.

6. The Branch Technical Position (Nov 79) states, "Any location from which milk can no longer be obtained may be dropped from the surveillance program after notifying the NRC in writing that they are no longer obtainable at that location". Although milk sampling performed at 5F2 is outside the 5-mile radius and is supplemental to the REMP, this notification should take place if 5F2 milk sampling ceases.

This page intentionally left blank.

TABLE 2.2

Distances and Directions to Environmental Monitoring Stations

Station Code[a]	Station Name	Radial Direction** (True Heading) Degrees	Radial Distance** From Plant	
			km	Miles
0S1	Exclusion Fence-Northwest Corner	320	0.16	0.1
0S2	North Gate	320	0.8	0.5
1S1	Wastewater Pond	330	0.64	0.4
2S1	Back Road-300 m North of Plant	0	0.32	0.2
3S1	Road NW of 230 kV Switchyard	23	0.64	0.4
4S1	Back Road Between Switchyards	43	0.8	0.5
5S1	500 kV Switchyard	58	0.64	0.4
5S2	Diablo Creek Weir	65	0.96	0.6
5S3	Microwave Tower Road	70	1.02	0.7
6S1	Microwave Tower	94	0.8	0.5
7S1	Overlook Road	112	0.48	0.3
8S1	Target Range	125	0.8	0.5
8S2	Southwest Site Boundary	128	1.76	1.1
8S3	DCSF 96-1 (monitor well)	145	0.52	0.33
9S1	South Cove	167	0.64	0.4
MT1	Meteorological Tower	185	0.32	0.2
DCM	Diablo Cove Marine	270	0.32	0.2
WN1	Northwest Guard Shack	290	0.32	0.2
WN2	Diablo Creek Outlet	283	0.25	0.15
1A1	Crowbar Canyon	327	2.56	1.6
1A2	Blanchard Spring	331	2.4	1.5
0B1	Point Buchon	325	5.76	3.6
1C1	Montana de Oro Campground	336	7.52	4.7
3C1	Ranch Vegetation	20	7.16	4.5
4C1	Clark Valley Gravel Pit	45	9.28	5.8
5C1	Junction Prefumo/See Canyon Roads	64	7.52	4.7
6C1	Household Garden	98	7.24	4.5
7C1	Pecho Creek Ruins (Mello Farm)	120	6.56	4.1
7C2	Rattlesnake Canyon	124	7.52	4.7
2D1	Sunnyside School	10	11.04	6.9
3D1	Clark Valley	24	9.92	6.2
4D1	Los Osos Valley Road	36	12.16	7.6
6D1	Junction See/Davis Canyon Roads	89	13.4	8.3
7D1	Avila Gate	118	10.56	6.6
7D2	Avila Beach	110	12.16	7.6
7D3	Avila Pier	120	11.0	6.9
7E1	Avila Valley Barn	103	13.94	8.7
2F1	Morro Bay (Commercial Landing)	0	17.44	10.9
2F2	Morro Bay Power Plant	358	17.9	11.2
5F1	SLO OEL	79	16.41	10.2
5F2	Cal Poly Farm	60	20.16	12.6
5F3	SLO County Health Department	70	20.32	12.7

Table 2.2 (continued)

Station Code[a]	Station Name	Radial Direction** (True Heading) Degrees	Radial Distance** From Plant km	Miles
7F1	Shell Beach	110	17.28	10.8
7G1	Arroyo Grande (Kawaoka Farm)	115	26.88	16.8
7G2	Oceano Substation	118	27.68	17.3
AVA	Avila Beach (near pier)	109	11.75	7.3
CBA	Cambria Moonstone Beach	330	45.86	28.5
CYA	Cayucos Beach (near pier)	350	26.87	16.7
DY1	Drywell 115'	77	0.041	0.026
DW1	Drinking Water (Plant Potable Water Sys)	161	0.59	0.37
GW1	Groundwater Monitoring Well 1	271	0.15	0.09
GW2	Groundwater Monitoring Well 2	204	0.21	0.13
IS1-IS8	ISFSI	65	0.48	0.3
MDO	Montana de Oro (Spooners Cove)	336	7.56	4.7
OW1	Observation Well 01	336	0.07	0.046
OW2	Observation Well 02	157	0.07	0.045
OEL	Offsite Emergency Lab	79	16.41	10.2
OUT	Plant Outfall	270	0.32	0.2
PMO	Pismo Beach (near pier)	113	20.76	12.9
PON	Pacific Ocean North of Diablo Cove	305	2.4	1.5
POS	Pacific Ocean South of Diablo Cove	180	0.64	0.4
WW2	Water Well 02	70	1.02	0.63
BCM	Blanchard (Farm) Cow Meat	320	1.94	1.2
BGM	Blanchard (Farm) Goat Meat	320	1.94	1.2
BSM	Blanchard (Farm) Sheep Meat	320	1.94	1.2
CCM	Control Cow Meat	328	59.5	37
JDM	Johe (Property) Deer Meat	21	5.24	3.26

*The reference point used is the dome of Unit 1 containment.

*Station Code (XYZ):

X - First number (0-9) represents the radial sector in which the station is located:

0	- Northwest	5	- East-northeast
1	- North-northwest	6	- East
2	- North	7	- East-southeast
3	- North-northeast	8	- Southeast
4	- Northeast	9	- South-southeast

Y - Letter (S, A-H) represents the distance from the plant:

S	- On-site
A	- 0-2 miles from plant (but off-site)
B	- 2-4 miles from plant
C	- 4-6 miles from plant
D	- 6-8 miles from plant
E	- 8-10 miles from plant
F	- 10-15 miles from plant
G	- 15-20 miles from plant
H	- Greater than 20 miles from plant

Z - Second number represents the station number within the zone.

Table 2.2 (continued)

*Station Codes exceptions:

The following stations do not follow the coding system:

- Diablo Cove Marine (DCM)
- Meteorological Tower (MT1)
- Northwest guard shack (WN1)
- Diablo Creek outlet (WN2)
- Pacific Ocean North (PON)
- Pacific Ocean South (POS)
- Offsite Emergency Lab (OEL)
- Plant outfall (OUT)
- Drinking water (DW1)
- Water Well 02 (WW2)
- Observation Well 01 (OW1)
- Observation Well 02 (OW2)
- Drywell 115 (DY1)
- Avila Beach (AVA)
- Groundwater Monitoring Well 1 (GW1)
- Groundwater Monitoring Well 2 (GW2)
- Montana de Oro (MDO)
- Pismo Beach (PMO)
- Cayucos Beach (CYA)
- Cambria Moonstone Beach (CBA)
- Blanchard Cow Meat (BCM)
- Blanchard Goat Meat (BGM)
- Blanchard Sheep Meat (BSM)
- Control Cow Meat (CCM)
- Johe Deer Meat (JDM)
- Johe Pig Meat (JPM)
- Andre Cow Meat (ACM)
- Andre Deer Meat (ADM)
- Andre Pig Meat (APM)
- ISFSI TLDs (IS1 – IS8)

This page intentionally left blank.

TABLE 2.3:

Detection Capabilities for Environmental Sample Analysis [(a) (b)]

Lower Limits of Detection (LLD) [(c)]

Analysis	Water (pCi/L)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/L)	Food Products (pCi/kg, wet)	Soil/Sediment (pCi/kg, dry)[f]
Gross beta	4	0.01				
H-3	400[d]					
Mn-54	15		130			150
Fe-59	30		260			300
Co-58	15		130			150
Co-60	15		130			150
Zn-65	30		260			300
Zr-95	30					300
Nb-95	15					150
I-131	1[e]	0.07		1	60	
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-140	60			60		600
La-140	15			15		150

Table Notations

a) The gamma emitters and corresponding LLD values listed are derived from standard ODCM guidance for environmental samples as found in Table 4.12-1 in NUREG-1301. This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report.

b) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be per the recommendations of Regulatory Guide 4.13, Revision 1, July 1977.

c) The LLD is defined, for purposes of these specifications, as the a-priori smallest concentration of radioactive material in a sample that will yield a net count, above system background, that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal.

d) If no drinking water pathway exists, a value of 3,000 pCi/L may be used for tritium. All groundwater wells should use the 400 pCi/L tritium value regardless of drinking water use.

e) The LLD value of 1 pCi/L for I-131 is applicable only to sources used as drinking water. If no drinking water pathway exists, a value of 15 pCi/L may be used for I-131.

f) The gamma emitters LLD values listed for soil/sediment are derived from the Cs-134/137 10:1 ratio established in the environmental LLDs in NUREG-1301, Table 4.12-1.

TABLE 2.3 (Continued)

Table Notations

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 s_b}{E \times V \times 2.22 \times Y \times \exp(-\lambda t)}$$

Where:

- LLD = the "a priori" the lower limit of detection as defined above (as pCi per unit mass or volume)
- S_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)
- E = the counting efficiency (as counts per transformation)
- V = the sample size (in units of mass or volume)
- 2.22 = the number of transformations per minute per pico-curie
- Y = the fractional radiochemical yield (when applicable)
- λ = the radioactive decay constant for the particular radionuclide
- t = the elapsed time between sample collection (or end of the sample collection period) and time of counting

The value of S_b used in the calculation of the LLD for a detection system will be based on the actual observed variance of the background counting rate or of the counting rate of the blank samples (as appropriate) rather than on an unverified theoretically predicted variance. In calculating the LLD for a radionuclide determined by gamma-ray spectrometry, the background will include the typical contributions of other radionuclides normally present in the samples (e.g., potassium-40 in milk samples).

Analyses will be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors will be identified and described in the Annual Environmental Radiological Operating Report.

Typical values of E, V, Y and t should be used in the calculation. It should be recognized that the LLD is defined as a-priori (before the fact) limit representing the capability of a measurement system and not as a-posteriori (after the fact) limit for a particular measurement.

TABLE 2.4: Reporting Levels for Radioactivity Concentrations in Environmental Samples

Analysis	Water (pCi/L)	Airborne Particulate or Gases (pCi/m^3)	Fish (pCi/kg, wet)	Milk (pCi/L)	Food Products (pCi/kg, wet)
H-3	* 20,000				
Mn-54	1,000		30,000		
Fe-59	400		10,000		
Co-58	1,000		30,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	** 2	0.9		3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200			300	

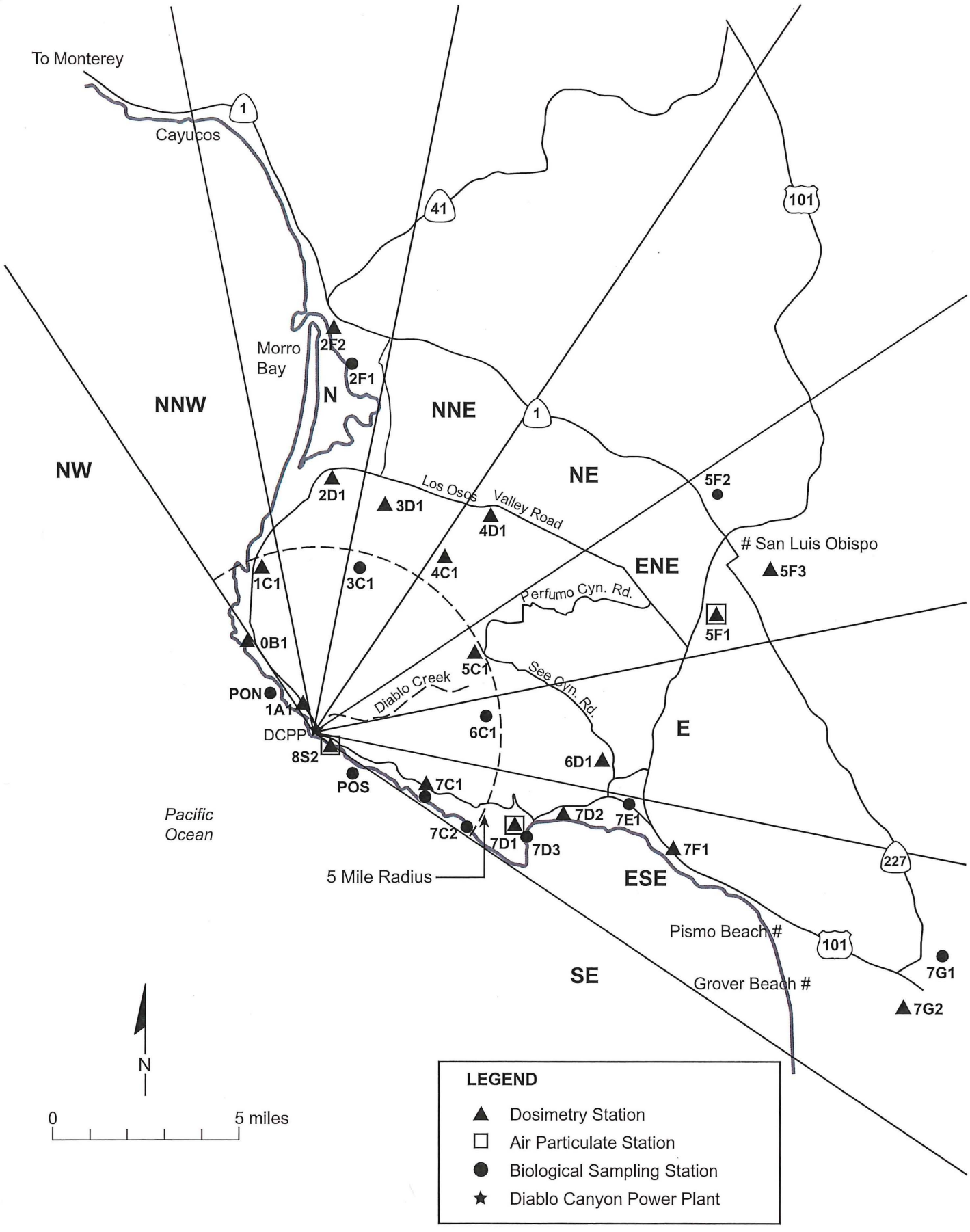
* For drinking water samples. This is the 40 CFR 141 value. If no drinking water pathway exists, a value of 30,000 pCi/L may be used.

** If no drinking water pathway exists, a value of 20 pCi/L may be used

This page intentionally left blank.

Figure 2.1- Diablo Canyon Off-site Stations

This page intentionally left blank.

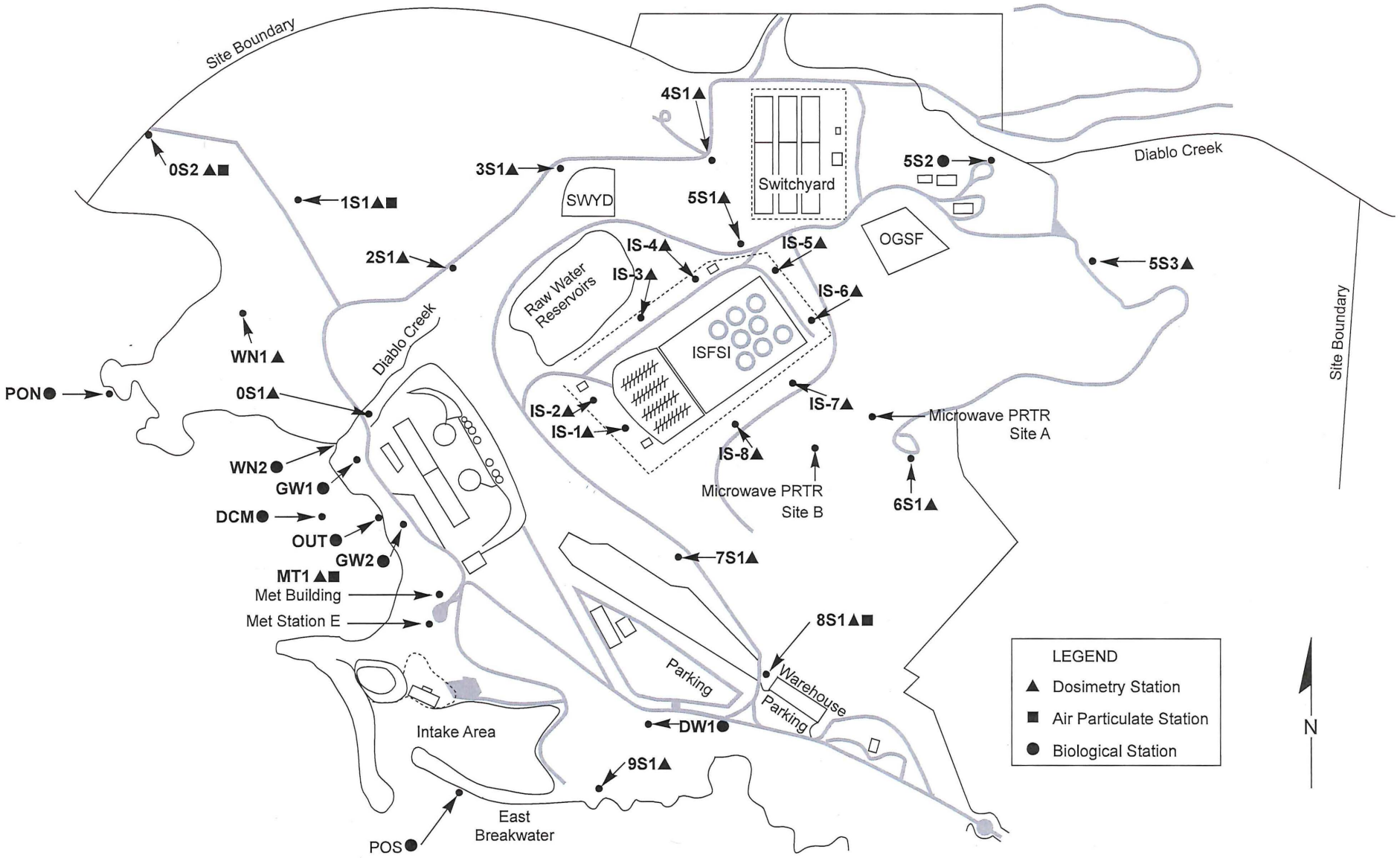


Units 1 and 2 Diablo Canyon off-site stations.

This page intentionally left blank.

Figure 2.2- Diablo Canyon On-site Stations

This page intentionally left blank.

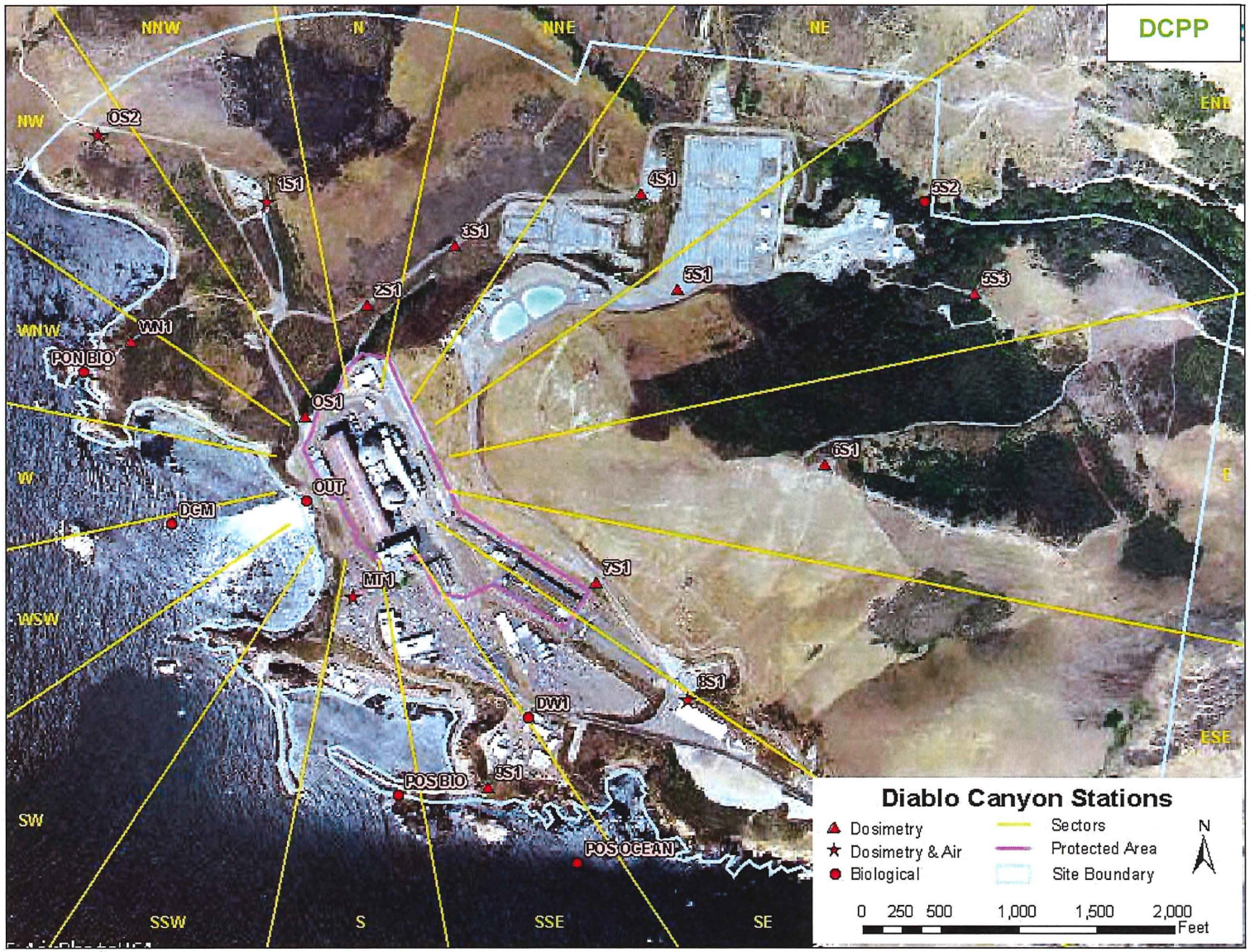


DCPP Onsite ERMP Stations

This page intentionally left blank.

Figure 2.3- Diablo Canyon Station Locations

This page intentionally left blank.


DCPP
NNW
N
NNE
NE
ENE
NW
OS2
1S1
4S1
5S2
3S1
5S1
5S3
2S1
WNW
WN1
PON BIO
OS1
6S1
W
OUT
DCM
7S1
MT1
WSW
8S1
DW1
POS BIO
9S1
SW
POS OCEAN
ESE
SSW
S
SSE
SE
Diablo Canyon Stations
Dosimetry
Dosimetry & Air
Biological
Sectors
Protected Area
Site Boundary
N
0 250 500 1,000 1,500 2,000
Feet

This page intentionally left blank

3.0 RADIOLOGICAL DATA-SUMMARY OF TABLES

This section summarized the analytical results of the environmental samples collected during the monitoring period. The results, shown in Appendix A, were presented in a format similar to that prescribed in the NRC's Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979 (NUREG-1301).

Each table was nuclide specific and the total numbers of analyses for that radionuclide were provided. Additionally, the number of measurements which exceeded the Reporting Levels (NRC Notification Level) found in Table 2.4 of this report were provided. The first column listed the matrix or pathway sampled during the period. The second column listed the nuclides analyzed and number of samples performed. The third column provided the required a-priori Lower Limit of Detection (LLD) for radionuclides that have detection capability requirements as specified in Table 2.3 of this report. The fourth, fifth, and sixth columns contained the mean and range of results for locations. The seventh column contained the number of reportable occurrences for the location pathway. Occasionally, the required LLD may not be met. An example of this

occurrence might be due to hold times between sampling and analysis. Such cases, if any, were addressed in Section 4.2 of this report.

The a-posteriori Minimum Detectable Concentration (MDC) listed for each analysis in Appendix C was used as the detection evaluation point for each sample collected. The MDC was calculated by the laboratory with each analysis (a-posteriori) and incorporated conditions observed at the laboratory during the analysis. This MDC value mathematically represents the lowest concentration of activity that could be detected by the laboratory with a 95% confidence level. The MDC was also understood as the concentration where there was only a 5% probability of falsely reporting a positive detection in a true blank sample. Note that the a-posteriori MDC equation used by the environmental lab was the same as the a-priori Lower Limit of Detection (LLD) equation specified in NUREG-1301.

For this report, a sample was considered to yield a "detectable measurement" when the "result" concentration exceeded the associated a-posteriori MDC value for that analysis.

Additionally, the tables of Appendix A provided the mean of all sample results analyzed for the specified radionuclide/ media type, the range, and the number of samples that were considered to have detectable activity of all the samples counted:

- The mean value consisted of the average of detectable concentrations
- The lowest and highest detected concentration values were listed as the range
- The number of detectable measurements and the total number of measurements were listed. For example, (4/20) would indicate that 4 of the 20 samples collected (for that sample type and that radionuclide) contained detectable radioactivity (> MDC).

The radionuclides reported in this section represented those that:

- had an LLD requirement in Table 2.3, or a Reporting Level listed in Table 2.4
- were of specific interest for any other reason

The radionuclides routinely analyzed and reported within a gamma spectroscopy analysis were: Ac-228, Ag-108m, Ag-110m, Ba-140, Be-7, Bi-212, Bi-214, Ce-141, Ce-144, Co-57, Co-58, Co-60, Cr-51, Cs-134, Cs-137, Fe-59, I-131, K-40, La-140, Mn-54, Nb-95, Pb-210, Pb-212, Pb-214, Ra-224, Ra-226, Ru-103, Ru-106, Sb-124, Sb-125, Th-234, Tl-208, Zn-65, and Zr-95.

Data from direct radiation measurements made by TLD were also provided in Appendix A in a similar format described above. Actual quarterly TLD results were listed in Appendix B.

4.0 ANALYSIS OF ENVIRONMENTAL RESULTS

4.1 REMP SAMPLING VARIANCE / DEVIATIONS

The DCPP Radiological Environmental Monitoring Program (REMP) allowed for deviations in the REMP sampling schedule "if samples were unobtainable due to hazardous conditions, seasonal unavailability, or malfunction of sampling equipment." Such deviations did not compromise the program's effectiveness and were normally anticipated for any radiological environmental monitoring program.

The DCPP REMP included both required and supplemental samples. This section described the variances/deviations with sampling and described some of the supplemental sampling conducted during the year.

4.1.1 DIRECT RADIATION

In July 2014, DCPP closed the onsite TLD processing lab and transitioned to a vendor TLD processor (Mirion Technologies in Irvine California). From January to June of 2014, the field TLD badge packets were processed by the DCPP TLD Lab. As of July 2014, the field TLD badge packets were processed by Mirion Technologies. DCPP REMP personnel continued to distribute and retrieve the TLDs from the field stations throughout 2014.

During the third quarter (3Q14) transition to the new TLD lab, there were abnormal low results from a majority of environmental TLDs during that quarter. The environmental TLDs read approximately 10% lower than expected. The cause of the lower readings was unknown and evaluations pointed to possible differences in lab background storage condition calculations between the DCPP lab and Mirion Technologies. Resolution of the 10% low readings could not be determined by DCPP or Mirion personnel. The 3Q14 environmental TLD results from Mirion were reported as found.

Other than the 3Q14 low TLD readings, there were no abnormal effects to the 2014 environmental TLD results.

The ISFSI projects team constructed additional cask storage concrete pads at the ISFSI in 2014. The third quarter IS-4 TLD read abnormally 10 mr lower than expected. Evaluation of this condition was either due to the 10% low readings discussed above, construction crews moving the TLD station, construction equipment parked between the IS-4 TLD and the radioactive casks, or a combination of these three factors.

4.1.2 AIRBORNE RADIOACTIVITY

The 2014 mean percent availability for all on-site and off-site air samplers was 99.2 percent. In other words, all air samplers were up and running 99.2 percent of the time. Less than 0.4 percent of run time could be attributed to equipment problems, filter exchange, or calibration processes. Specific 2014 air sampling run time deviations were as follows:

- 169 hours of lost run time occurred at station 0S2 during the week of 3/12/14 due to technician human error of not restarting the air sampling pump after filter exchange
- 84 hours of lost run time occurred at station 1S1 during the week of 3/12/14 due to air sample pump mechanical failure

- 139 hours of lost run time occurred at station 8S1 on 4/23/14 due to electrical maintenance at the power panel. This occurred with the particulate, iodine, and C-14 air samplers.
- 22 hours of lost run time occurred at station 7D1 during the week of 12/10/14 due to an electrical power outage from storm conditions

Actual 2014 percent availabilities for each station were as follows:

0S2 = 97.9 %
1S1 = 98.9 %
5F1 = 99.9 %
7D1 = 99.7 %
8S1 = 98.3 %
8S2 = 99.9 %
MT1 = 100 %

In 2013, a lost run time event was not reported in the 2013 AREOR. This error was identified during a REMP audit and is now reported within this 2014 AREOR as corrective action. During the week of 7/24/13, approximately 14.42 hours of air sampler lost runtime occurred at station 8S1 due to air sample pump mechanical failure.

During the first week of 2014, it was noted that air particulate sampling gross beta results at 6 of 7 stations were above 0.1 pCi/m^3. GEL counted those filters immediately on a gamma spec detector and found the activity due to naturally occurring Be-7 (approximately 0.1 pCi/m^3). During the fourth week of 2014, it was noted that the air particulate sampling gross beta result at station 5F1 was above 0.1 pCi/m^3. GEL counted that filter immediately on a gamma spec detector and found the activity due to naturally occurring Be-7.

Airborne C-14 supplemental sampling was performed weekly at station 8S1 (SE Sector) throughout 2014. Airborne C-14 supplemental sampling was added to stations 0S2 (NW Sector) and 5F1 (control station in San Luis Obispo) in August 2014.
General Engineering Labs (GEL) and DCPP REMP worked together to develop a method for sampling inorganic environmental airborne C-14 (as CO_2). It should be noted that C-14 lab data was reported in units of uCi/m^3 (not pCi/m^3) within Appendix C.
GEL has monitored C-14 samples from various locations around the US. In some instances a very slight negative bias has been observed in annual data sets. Note that the bias was not enough to

mask any true positive detection of C-14. GEL believes this bias may be the result of the sorbent picking up other chemical species in the field during the week long collection. These chemical species (possibly SO_2 or NO_2) could cause some quenching effects in the liquid scintillation analysis and varies by site location. This chemical interference created a net effect where some field cartridges were slightly lower in activity than laboratory blanks. The bias was less than the average two sigma method uncertainty and significantly less than the method average detection limit.

4.1.3 MARINE SAMPLES

All 2014 marine samples were collected as scheduled (including allowable variation).

The California Department of Fish and Game issued regulations prohibiting the collection of abalone along the central and southern coast of California. PG&E considers it unlikely that future collection of abalone will be allowed within the DCPP environs. The REMP has therefore ceased routine abalone sampling. Note that the sampling of abalone was previously performed and was supplemental to the REMP.

4.1.4 TERRESTRIAL SAMPLES

All 2014 terrestrial samples were collected as scheduled (including allowable variation) with the following exceptions:

- No Blanchard cattle were allowed to graze on the lands surrounding DCPP during 2014. Throughout 2014, Blanchard cattle were kept and grazed at the Old Creek Ranch in Cayucos California. Blanchard Cow Meat (BCM) was sampled quarterly for data trending and informational purposes as additional control samples.
- Blanchard Sheep Meat (BSM) and Blanchard Goat Meat (BGM) were not available and were not provided by the rancher during all of 2014. These animals were not slaughtered. These samples were supplemental. The changes in Blanchard ranch operations were due to the ongoing severe drought conditions along the central coast of California.
- Station 7E1 (Avila Barn) vegetation was not collected during the first quarter 2014 (1Q14) due to severe drought conditions and produce non-availability.

4.1.5 OCEAN SURFACE WATER, DRINKING WATER, AND GROUNDWATER

All 2014 water samples were collected as scheduled (including allowable variation) with the following exceptions:

- Observation Well 02 (OW2) was dry during all four quarters of 2014. No OW2 monitoring well water samples were obtained in 2014.

4.1.6 REPLICATE SAMPLES

Replicate sampling was conducted within the REMP for program strength and correlation. A replicate sample is an additional sample (same matrix type and station) taken independently from the original scheduled REMP sample. The replicate sample collection is performed by a different person and shipped to GEL to ensure analysis result correlation and method consistency.

Replicate samples were taken from:

- AVA – Beach Sand (3/27/14)
- 3C1 - Vegetation (5/29/14)
- DW1 – Drinking Water (9/9/14)
- 5F2 - Vegetation (12/15/14)

The results of the replicate analyses were within expected correlation of routine sampling.

4.2 COMPARISON OF ACHIEVED LLDS WITH REQUIREMENTS

For each analysis having an LLD requirement, criteria for the calculated "*a-priori*" (before the fact) LLD were met during the sampling and analysis process. Meeting these process criteria satisfies the "a-priori" LLD requirements. The "*a-posteriori*" (after the fact) Minimum Detectable Concentration (MDC) for that analysis was also compared with the required "*a-priori*" (before the fact) LLD.

Table 2.3 of this report list the required "a-priori" Lower Limits of Detection (LLDs) for environmental sample analyses required by the DCPP Radiological Environmental Monitoring Program. Occasionally an LLD may not have been achievable due to sampling process situations, such as hold times between sampling and analysis. In such cases, a discussion of the situation was provided.

All analyzed REMP samples met the specified "a-priori" LLD requirements in 2014.

4.3 COMPARISON OF RESULTS AGAINST REMP REPORTING LEVELS

NRC notification was required whenever a Reporting Level listed in Table 2.4 of this document was exceeded. Reporting Levels are the environmental concentrations that relate to the ALARA design dose objectives of 10 CFR 50, Appendix I.

It should be noted that environmental isotopic concentrations were averaged over the calendar quarter for the purposes of this comparison, and that Reporting Levels applied only to DCPP plant related effluent radioactivity.

No REMP Reporting Levels were exceeded during this 2014 monitoring period.

4.4 DATA ANALYSIS BY MEDIA TYPE

The REMP data for each media type is discussed below. A sample was considered to yield a "detectable measurement" when the result concentration exceeded the MDC for that analysis.

4.4.1 Direct Radiation (Environmental TLDs)

Direct radiation was continuously measured at 32 locations surrounding DCPP using Panasonic UD-814 thermo-luminescent dosimeters (TLDs). These 32 locations were made up of 29 indicator stations & 3 control stations. These TLD dosimeters were distributed and collected by station every calendar quarter for processing. The preoperational and historical operating values were evaluated for adverse trends.

DCPP environmental TLD results were measurements of all environmental gamma radiation sources (cosmic, terrestrial, radon, etc) at each station during the deployment period. Transient and lab storage background dose contributions were subtracted prior to reporting. Technically, these TLDs read out in units of milli-roentgen. Because gamma and beta radiation have quality factors of 1 for conversion from roentgen to rem, the environmental TLD unit of reporting was converted to milli-rem for consistency of unit reporting and exposure communications.

In July 2014, DCPP closed the onsite TLD processing lab and transitioned to a vendor TLD processor (Mirion Technologies in Irvine California). From January to June of 2014, the field TLD badge packets were processed by the DCPP TLD Lab. As of July 2014, the field TLD badge packets were processed by Mirion Technologies. DCPP REMP personnel continued to distribute and retrieve the TLDs from the field stations throughout 2014.

During the third quarter (3Q14) transition to the new TLD lab, there were abnormal low results

from a majority of environmental TLDs during that quarter. The environmental TLDs read approximately 10% lower than expected. The cause of the lower readings was unknown and evaluations pointed to possible differences in background lab storage conditions between the DCPP lab and Mirion Technologies. Resolution of the 10% low readings could not be determined by DCPP or Mirion personnel. The 3Q14 environmental TLD results from Mirion were reported as found.

The unrestricted area surrounding DCPP was sparsely inhabited out to five miles from the site (ref 2014 Land Use Census within this AREOR Section 8).

The ambient direct radiation levels within the DCPP plant site boundary (approximately an 800 meter radius from U-1 CTMT structure) were elevated at some locations (IS-1 thru IS-8) due to ISFSI dry cask used fuel storage. An evaluation of direct radiation measurements and member of public occupancy times within the site boundary indicated all federal criteria for member of public dose limits (10CFR20.1301) were conservatively met. It should be noted that the following Environmental TLD locations were all within the DCPP site boundary and were not located within the unrestricted area: 0S1, 0S2, WN1, 1S1, 2S1, 3S1, 4S1, 5S1, 5S3, 6S1, 7S1, 8S1, 8S2, 9S1, MT1, and IS1 through IS8.

The first graph (provided on the next page) illustrated overall trending of environmental TLDs with regard to distance from the DCPP plant site. Inner ring, outer ring, special interest, and control stations were combined and averaged to obtain a single standard quarter value for each represented plot line. It should be noted that inner and outer ring TLD averages remained within and trended with pre-operational ranges. It should also be noted that ISFSI loading had not affected these inner and outer ring trending results.

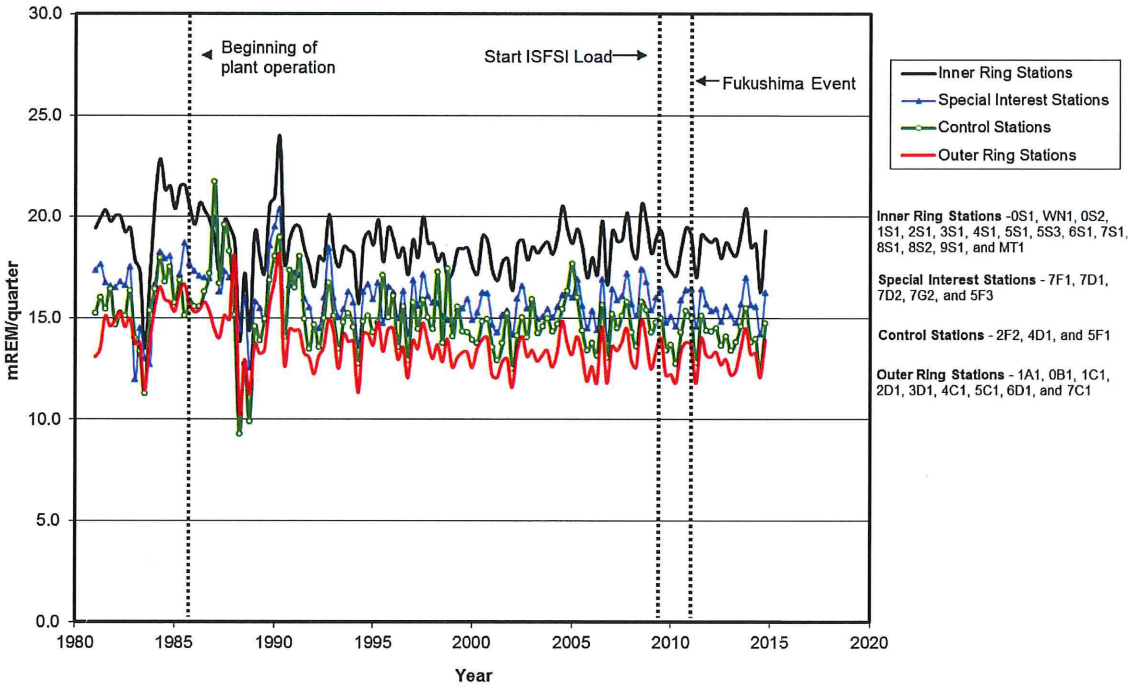
The second graph (provided on the next page) illustrated averaged environmental TLD results from the southeast sector (stations 8S1, 8S2) and northwest sector (stations 0S1, 0S2, 0B1). These sectors were chosen for graphical trending due to their highest historically averaged wind directions and therefore would have the most impact on environmental TLD results.

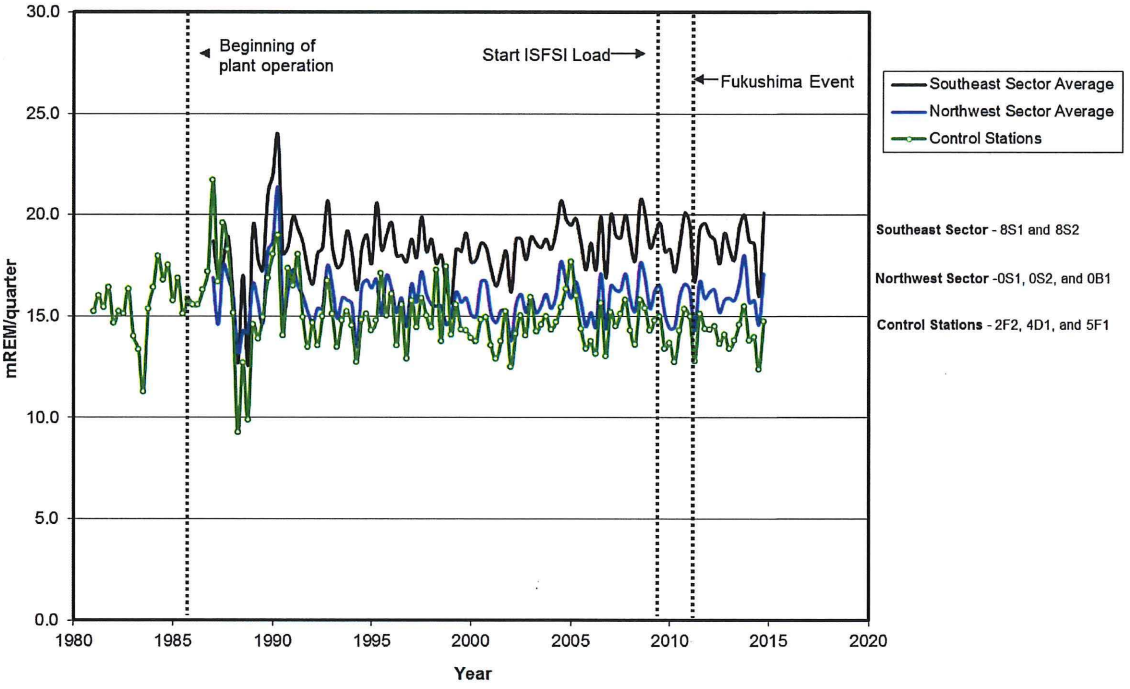
Averaged control stations (2F2, 4D1, 5F1) were provided for natural background reference.

Appendix B provides individual station environmental TLD standard quarter dose results. Appendix B also provides an individual station historical average along with low/high ranges from 1987 to 2013 for comparison of the 2014 data.

Other than the 3Q14 low TLD readings, there were no abnormal 2014 environmental TLD results.

Trending Of TLD Direct Radiation Results





Direct radiation was continuously measured at 8 stations surrounding the Independent Spent Fuel Storage Installation (ISFSI) using Panasonic UD-814 thermo-luminescent dosimeters (TLDs). These 8 stations were located directly adjacent and exterior to the ISFSI protected area, with 2 TLD stations on each of the four sides of the ISFSI. It should be noted that these ISFSI TLD stations were well within the DCPP site boundary and were not located within the unrestricted area. These dosimeters were distributed and collected every calendar quarter for readout.

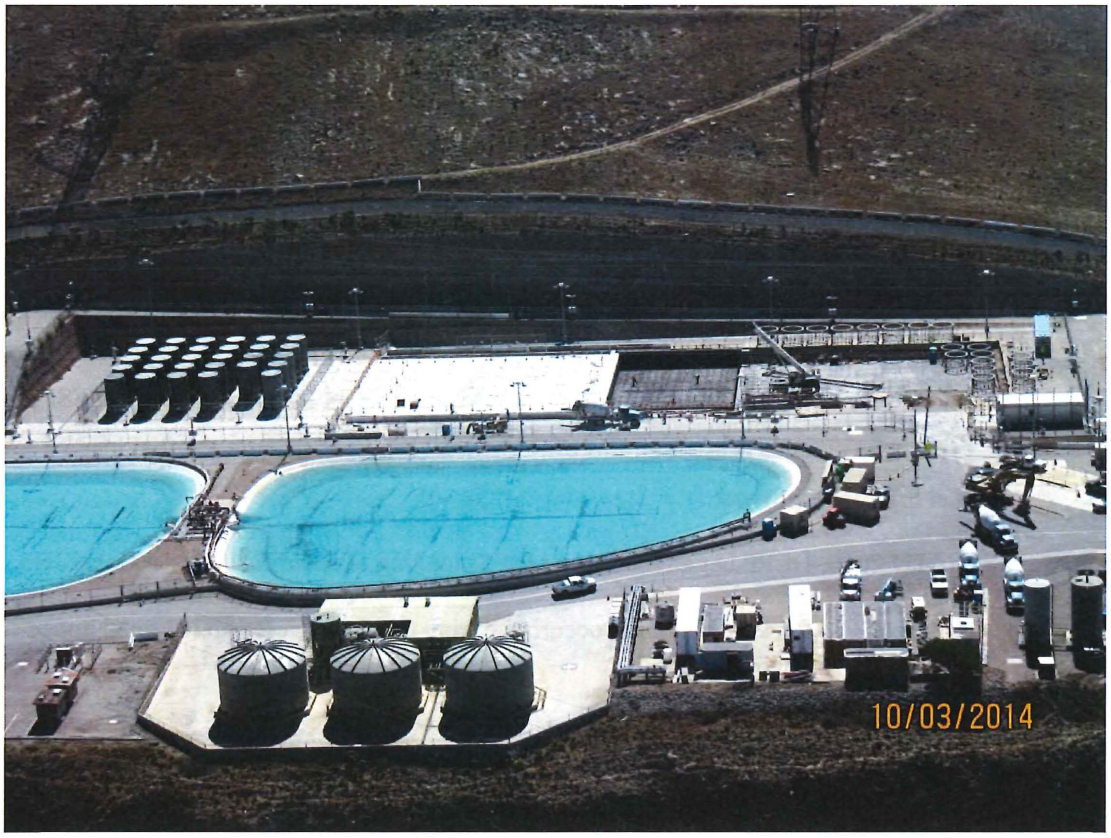
- The first spent fuel dry cask canister was loaded onto the ISFSI pad in June 2009. The small increase in radiation levels at the ISFSI pad prior to spent fuel canister load was due to storage of Radioactive Material (RAM) equipment in seatrains at the ISFSI pad prior to an outage. These seatrains of RAM were removed prior to the first load of spent fuel dry cask canisters.
- In May 2010, DCPP began the second ISFSI loading of spent fuel dry cask canisters.
- A third ISFSI loading campaign occurred during the first quarter of 2012 and ended on 3/17/2012.
- A fourth ISFSI loading campaign occurred from August to October of 2013.

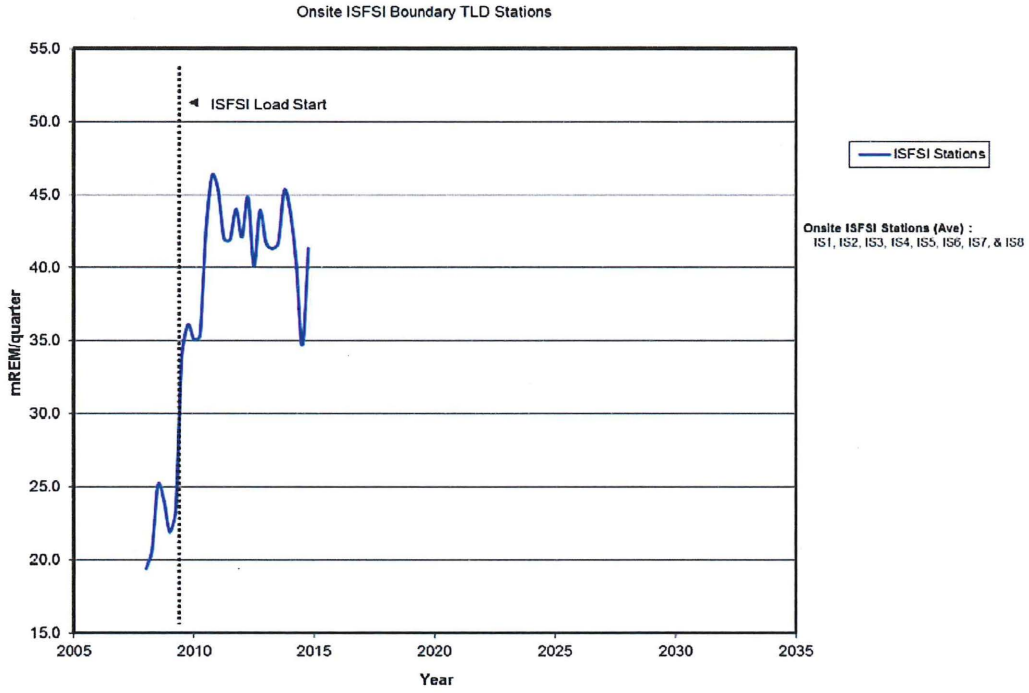
The ISFSI projects team constructed additional cask storage concrete pads at the ISFSI in 2014. The third quarter IS-4 TLD read abnormally 10 mr lower than expected. Evaluation of this condition was either due to the 10% low readings discussed previously, ISFSI construction crews moving the TLD station, construction equipment parked between the IS-4 TLD and the radioactive casks, or a combination of these three factors.

The ambient direct radiation levels within the DCPP plant site boundary and directly adjacent to the ISFSI pad were elevated due to dry cask used fuel storage. An evaluation of direct radiation measurements and member of public occupancy times surrounding the ISFSI indicated all federal criteria for member of public dose limits (10CFR20.1301) were conservatively met. No adverse trends were noted at the DCPP inner ring stations due to ISFSI for 2014 as indicated by the previous page graphs.

It should be noted that the DCPP inner ring TLD results tracked in correlation with normal Environmental TLD outer ring, special interest, and control station fluctuations. It should also be noted that DCPP inner ring TLD results remained within pre-operational ranges.

The following page contains a picture of the ISFSI pad along with a trend graph of ISFSI pad TLD results (IS-1 through IS-8). ISFSI pad TLD stations IS-1 through IS-8 were located adjacent to the ISFSI pad fencing (see map in Figure 2.2 of this report).


10/03/2014


Onsite ISFSI Boundary TLD Stations
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
mREM/quarter
ISFSI Load Start
2005
2010
2015
2020
2025
2030
2035
Year
ISFSI Stations
Onsite ISFSI Stations (Ave) :
IS1, IS2, IS3, IS4, IS5, IS6, IS7, & IS8

4.4.2 Airborne

Air particulate and radioiodine samples were collected weekly from six indicator stations (MT1, 0S2, 1S1, 7D1, 8S1, and 8S2) in the DCPP environs and one control station (5F1). A total of 363 air particulate filters and 363 iodine cartridges were collected and analyzed as part of the normal REMP.

Natural occurring gross beta activity was detected in every weekly air particulate sample collected from all indicator and control stations. Comparison of the data showed that the mean values of gross beta activities for the indicator stations were consistent with those obtained for the control station and historical trending. Normal background gross beta values ranged from 4.2E-3 to 1.1E-1 pCi/m^3. The gross beta activities detected at the air sampling stations were tabulated in Appendix A.

Gamma isotopic analyses were performed on quarterly composites of the air particulate filters from each of the REMP air stations. The midpoint date of the quarter was used to label the composite. Appendix A summarized those results.

A total of 363 normal REMP weekly charcoal cartridges were analyzed for I-131.
I-131 was not detected in 2014.

Appendix A summarizes overall REMP air sampling results.

Appendix C contains individual air sampling station data results.

4.4.3 Drinking Water, Ocean Surface Water, and Groundwater

Drinking Water

Drinking water samples were collected from indicator stations DW1, 5S2, WN2, 1A2, and control station OEL. The samples were analyzed for gamma emitters, gross beta, tritium, total strontium 89/90, Iron-55, and Nickle-63.

No plant related radionuclides were detected in any of the 2014 drinking water samples.

The results of the drinking water samples collected from both the indicator and control stations are summarized in Appendix A and individually listed in Appendix C.

Ocean Surface Water

Ocean surface water samples were collected monthly from indicator stations OUT, DCM, and control station 7C2. The samples were analyzed for gamma emitters, gross beta, tritium, total strontium 89/90, Iron-55, and Nickle-63.

No DCPP related radionuclides were detected in any of the 2014 ocean surface water samples.

The results of the surface water samples collected from both the indicator and control stations are summarized in Appendix A and individually listed in Appendix C.

Groundwater

As part of the nuclear industry NEI 07-07 Groundwater Protection Initiative (GPI); DCPP began sampling various ground water sources in 2006. These sources included onsite monitoring wells (OW1, OW2, DY1, & 8S3), an aquifer well (WW2), Diablo Canyon creek (5S2 & WN2), and a groundwater spring (1A2).

One groundwater aquifer well (Water Well 02) was available within the plant site boundary. This well was located about 250 feet above and to the east of the power block. Water Well 02 was sampled quarterly for gamma emitters, gross beta, tritium, total strontium 89/90, Iron-55, and Nickle-63. No plant related radionuclides were detected in 2014.

One shallow (approximately 70 feet deep) subsurface monitoring well was located southeast at approximately 0.3 miles from the power block. This monitoring well was labeled DCSF96-1 (station 8S3). 8S3 was sampled quarterly for gamma emitters, gross beta, tritium, total strontium 89/90, Iron-55, and Nickle-63. No plant related radionuclides were detected in 2014.

Stations 5S2, WN2, and 1A2 were discussed in the previous Drinking Water paragraphs.

Three shallow (approximately 37 to 73 feet deep) French drain system monitoring wells were located within the plant protected area and in close proximity to the containment structures, spent fuel pools, and auxiliary building (plant power block). These French drain systems were labeled Observation Well 01 (OW1), Observation Well 02 (OW2), and Drywell 115 (DY1).

Observation Well 02 (OW2) was not sampled in 2014 due to no water present in the well during the entire 2014 timeframe. There has been an ongoing severe drought in San Luis Obispo County which contributed to this well being dry.

French drain monitoring wells OW1 and DY1 contained low levels of tritium throughout 2014 due to rainwater washout of gaseous tritium exiting the plant vent system (via an approved effluents discharge path). These tritium concentrations were evaluated and were not due to a plant system leak or spill.

Two additional groundwater monitoring wells (stations GW1 and GW2) were installed along the western side of the DCPP site on December 14, 2011. DCPP REMP began sampling these new wells during the first quarter of 2012.

Tritium was detected in three quarterly samples of GW1 monitoring well during 2014 due to rainwater washout of gaseous tritium exiting the plant vent system (via an approved effluents discharge path). These tritium concentrations were evaluated and were not due to a plant system leak or spill.

Rain washout of tritium is discussed within NRC Regulatory Issue Summary (RIS) 2008-003, "Return/Re-use of Previously Discharged Radioactive Effluents".

Further reporting of these monitoring wells was provided in Section 5.2 of this report.

4.4.4 Ingestion

Marine Biological Samples

Mussels were collected quarterly from stations DCM, 7C2, and POS. Mussels were collected annually from station PON (due to small mussel bed/availability at station PON).

Fish samples were collected quarterly from stations DCM, PON, POS, 7C2 (control), and a local fish market (7D3 or 2F1). Market fish samples were locally caught fish.

Cs-137 was detected in fish at the following stations, dates, and concentrations:

- PON Perch 1/16/14 7.16 pCi/kg
- PON Rockfish 1/16/14 5.90 pCi/kg
- 7D3 Market Fish 4/8/14 5.58 pCi/kg
- DCM Perch 5/23/14 7.40 pCi/kg
- 7D3 Market Fish 7/29/14 6.69 pCi/kg
- DCM Perch 11/11/14 8.92 pCi/kg

Pre-operational (pre-1985) DCPP REMP sampling observed measurable Cs-137 in fish and sediment due to atmospheric nuclear weapons testing fallout from the 1960's and 1970's. Finding Cs-137 in fish or sediment has been historically common in SLO County and the DCPP environs due to fallout. The historical fish Cs-137 concentrations have ranged from 3 to 14 pCi/kg. These 2014 concentrations of Cs-137 detected in fish are within this range.

This Cs-137 activity was also in agreement with the 1981 California Dept of Health Services Radiological Health Branch report and is considered part of SLO County background radioactivity. The 1981 ranges of Cs-137 observed in the Diablo cove (DCM) fish were 0 to 26 pCi/kg (0 to 12 pCi/kg in 2015). The 1981 ranges of Cs-137 observed in market fish were 0 to 38 pCi/kg (0 to 17 pCi/kg in 2015). The 1981 ranges of Cs-137 observed in ocean sediment were 0 to 93 pCi/kg (0 to 42 pCi/kg in 2015). The 1981 ranges of Cs-137 observed in soil were 0 to 298 pCi/kg (0 to 135 pCi/kg in 2015).

Another recent background source of Cs-137 into California environs was due to the March 2011 Fukushima Event and subsequent jet stream isotopic dispersion to the United States.

Because Cs-137 has an isotopic half-life of approximately 30 years, this contaminant should be detected in the DCPP environs for the next 10 to 40 years depending on initial concentration and the detection sensitivity of the DCPP REMP analyses. Cs-137 has a longer environmental half-life in coastal seawaters than in open oceans due to input sources like rain watershed runoff and storm condition sediment re-suspension.

No Cs-134 was found in these fish samples. Cs-134 has a shorter isotopic half-life (approximately 2 years), would be indicative of nuclear reactor fission products, and would not be attributed to atomic weapons testing. Because Cs-134 was absent in the REMP fish analyses; fish Cs-137 concentrations were attributed to either pre-1980's nuclear weapons testing or Fukushima related fallout.

A summary of these samples (required and supplemental) is described in Table 2.1. A summary of sample results is provided in Appendix A and individually listed in Appendix C.

All other marine fish and mussel samples did not detect any DCPP related radionuclides in 2014.

Marine Aquatic Vegetation

Supplemental marine aquatic kelp sampling was performed quarterly at REMP sample indicator

stations DCM, PON, POS, and 7C2 (control). No DCPP related isotopes were detected in 2014.

Supplemental intertidal algae sampling was performed quarterly at REMP sample stations DCM and 7C2 (control). No DCPP related isotopes were detected in 2014.

Each sample was analyzed for gamma emitting radionuclides. A summary of the sample results is provided in Appendix A and individually listed in Appendix C.

Ocean Sediment and Recreational Beach Sampling

Ocean sediment samples were collected annually from stations DCM and 7C2. Each sample was analyzed for gamma emitting radionuclides, total strontium 89/90, Iron-55, and Nickle-63.

Supplemental recreational beach sand samples were collected semi-annually from stations Avila Beach (AVA), Montana de Oro Spooner's Cove (MDO), Pismo Beach near pier (PMO), Cayucos Morro Strand State Beach (CYA), and Cambria Moonstone Beach (CBA). Each sample was analyzed for gamma emitting radionuclides, total strontium 89/90, Iron-55, and Nickle-63.

Only natural occurring isotopes where detected in the ocean sediment and recreational beach sand samples collected for 2014.

4.4.5 Food Crops (Vegetation)

Samples of broad leaf vegetation were collected monthly (when available) from two indicator stations (7C1 and 7G1), and one control location (5F2). Supplemental samples were also collected quarterly from residence or commercial gardens at stations 3C1, 6C1, and 7E1. The samples were analyzed for gamma emitting radionuclides and for Iodine-131 on edible portions.

A summary of the vegetation sample results are provided in Appendix A and individual results listed in Appendix C. No DCPP related isotopes were detected in 2014 vegetation.

4.4.6 Milk

There are no milking animals for human consumption within 5 miles of the plant site. In cases where milk sampling is not available, the REMP permits collection of broad leaf vegetation from three sample locations in place of milk. Since broadleaf sampling is also not available in the DCPP environs, the DCPP REMP requires additional air sampling at stations 8S2 and 1S1.

Supplemental samples of milk were collected monthly from Cal Poly Farm (station 5F2). The samples were analyzed for gamma emitting radionuclides, Iodine-131, and total strontium 89/90. These milk samples were collected monthly from station 5F2 due to Cal Poly dairy being the closest milk producer relative to the DCPP site and regardless of the availability of milk stations within 5 miles of the plant.

No DCPP related radionuclides were detected in station 5F2 milk samples during 2014.

A summary of the sample results are provided in Appendix A and individual results listed in Appendix C.

4.4.7 Meat Products

Meat products were collected quarterly when available or provided from landowners.

No Blanchard cattle were allowed to graze on the lands surrounding DCPP during 2014. Throughout 2014, Blanchard cattle were kept and grazed at the Old Creek Ranch in Cayucos California. Blanchard Cow Meat (BCM) was sampled quarterly for data trending and informational purposes as additional control samples.

Blanchard Sheep Meat (BSM) and Blanchard Goat Meat (BGM) were not available and were not provided by the rancher during all of 2014. These animals were not slaughtered. These samples were supplemental.

The changes in Blanchard ranch operations were due to the ongoing severe drought conditions along the central coast of California.

Control station free range, grass fed meat sampling was conducted of ranches outside the influence of DCPP. This meat was purchased by REMP personnel from the Whole Foods Market in SLO. The control station meat consisted of Hearst Ranch meat which is located approximately 37 miles north of the DCPP site or SunFed Ranch which raises cattle in the foothills of Sacramento Valley and the rangeland of the Klamath Basin between Mt Shasta and Crater Lake. This REMP station code was CCM (Control Cow Meat) and provided a control location far from the site.

A summary of the sample results are provided in Appendix A and individual results listed in Appendix C. No DCPP related isotopes were detected in 2014 meats.

5.0 GROUND WATER MONITORING

Diablo Canyon is committed to improving management of situations involving inadvertent radiological releases that get into onsite groundwater. This commitment reflects the nuclear industry's high standard of public radiation safety and protection of the environment. Trust and confidence on the part of local communities, California State, the NRC, and the general public is paramount to this commitment.

Groundwater gradient studies of the DCPP ISFSI site and a general assessment of sub-regional hydro-geologic conditions indicates that groundwater (subsurface) flow beneath the Diablo Canyon power block is west toward the Pacific Ocean or northwest toward Diablo Creek. Any groundwater present beneath the DCPP power block was not used as a source of drinking water. It should be noted that this DCPP power-block groundwater gradient and Diablo Creek both discharge into the Pacific Ocean.

5.1 NEI 07-07 GROUNDWATER PROTECTION INITIATIVE - REPORTING

5.1.1 NEI 07-07 Objective 2.4 (b), Annual Reporting:

"Document in the AREOR all on-site ground water sample results that are included in the REMP as described in the DCPP Offsite Dose Calculation Manual (ODCM)".

Onsite groundwater monitoring points are described in the REMP and reported in this 2014 Annual Radiological Environmental Operating Report (AREOR) as follows:

Observation Well 01 (OW1), Observation Well 02 (OW2), Drywell 115 (DY1), DCSF96-1 (8S3), Water Well 02 (WW2), Groundwater Well 1 (GW1), Groundwater Well 2 (GW2), and Diablo Creek Outlet (WN2) were used for Groundwater Protection Initiative (GPI) data reporting and were described in 2014 DCPP AREOR Table 2.1.

A summary of the 2014 GPI monitor well sample results are summarized in Appendix A and individual results listed Appendix C.

The ground water beneath the DCPP power-block was not used as a source of drinking water.

5.2 ADDITIONAL GROUNDWATER SAMPLING OVERVIEW:

Ground water monitoring was reported in accordance with the nuclear industry NEI 07-07 Groundwater Protection Initiative (GPI) and the REMP. Concentrations of tritium were detected in two shallow French drain monitoring wells beneath the DCPP power-block. This tritium was coming from the rain-washout of gaseous tritium exiting the plant vent system via an approved effluent discharge route. DCPP has conducted rain-washout studies to document this phenomenon. These monitoring wells consisted of French drain systems that discharge into the associated monitoring well (OW1, OW2, or DY1). Rain communicated with these French drain systems via building structure to ground interfaces. Once rain water entered the monitoring wells, the water remained stagnant until another rain event caused transport. Subsequent quarterly sampling routinely indicated consistent tritium values due to monitoring well stagnation.

DY1 routinely experienced the highest tritium rain-washout concentrations due to its close proximity to the plant vent discharge points.

OW1 was connected to subsurface groundwater flow fissures and routinely trends with rain fall.

OW2 was dry throughout 2014. Ongoing extreme drought conditions throughout San Luis Obispo

County contributed to this well not containing any water in 2014.

It should be noted that hydro-geological studies of the DCPP site indicate that any groundwater (subsurface) flow beneath DCPP would flow to the Pacific Ocean.

The specific ranges of tritium detected in these power block monitoring wells for 2014 were as follows:

- OW1 - Observation Well 01 (1,180 to 1,400 pCi/L) 4 of 4 samples collected for tritium analysis.
- OW2 - Observation Well 02 ; no samples collected
- DY1 - Drywell 115 (5,260 to 8,660 pCi/L) 4 of 4 samples collected for tritium analysis.

This tritium was evaluated and attributed to the rain-washout of gaseous tritium exiting the plant vent system via an approved effluent discharge route. No other DCPP related isotopes were detected in OW1, OW2, or DY1.

Two down-gradient monitoring wells were added to the REMP in 2012.

Groundwater Well 1 (GW1) is located between the DCPP protected area and the cliff boundary of the Pacific Ocean. It is down gradient of Unit One power block. This well opening is located at approximately 85' above sea level on the same plane as the power block and is approximately 85' deep.

Groundwater Well 2 (GW2) is located between the DCPP protected area and the cliff boundary of the Pacific Ocean. It is down gradient of Unit Two power block. This well opening is located at approximately 85' above sea level on the same plane as the power block and is approximately 85' deep.

The specific ranges of tritium detected in GW1/GW2 monitoring wells for 2014 were as follows:

- GW1 - Groundwater Well 1 (262 to 358 pCi/L) 3 of 4 samples collected for tritium analysis.
- GW2 - Groundwater Well 2 (non-detected) 4 of 4 samples collected for tritium analysis.

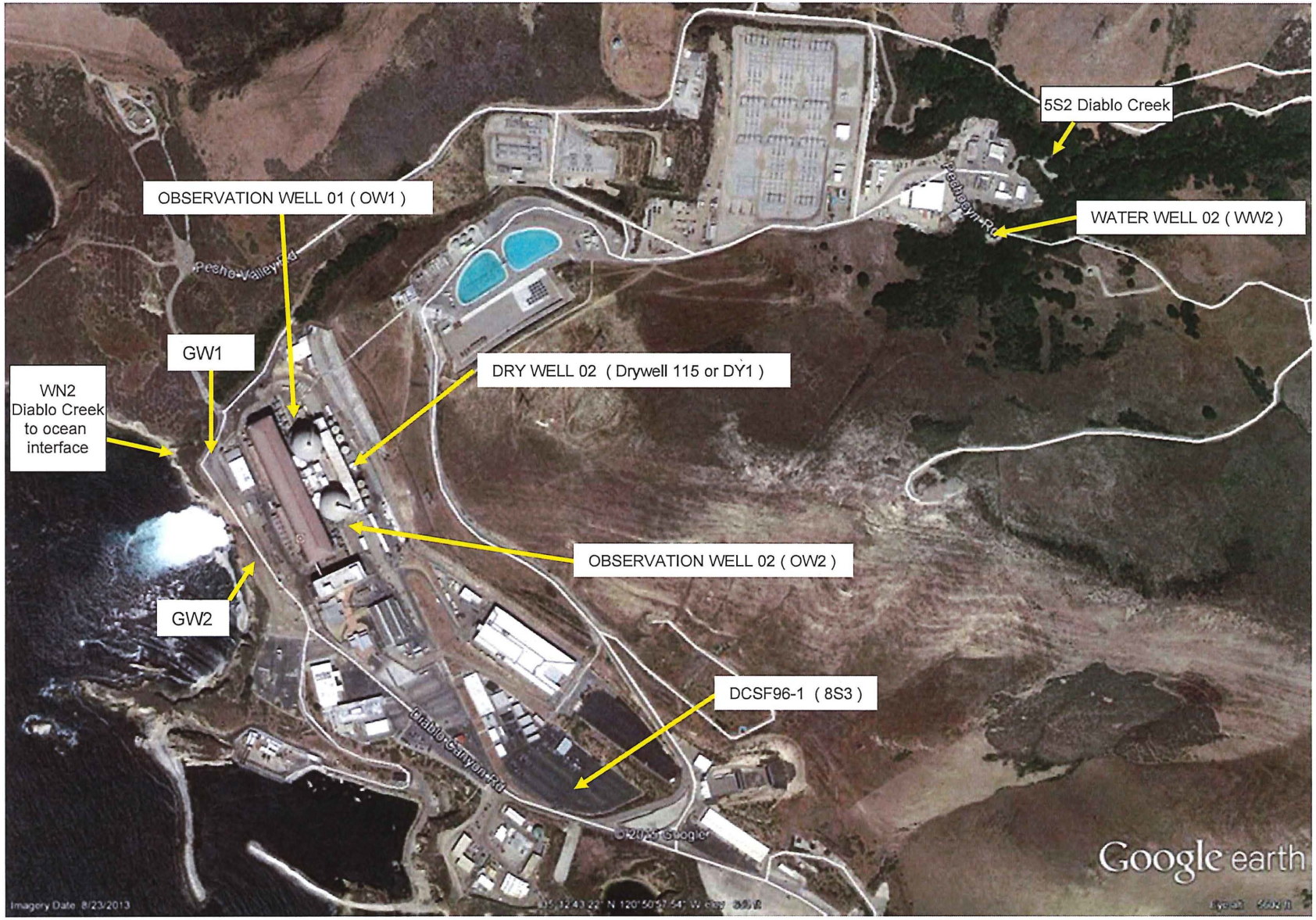
This tritium was evaluated and attributed to the rain-washout of gaseous tritium exiting the plant vent system via an approved effluent discharge route. No other DCPP related isotopes were detected in GW1 or GW2 in 2014.

Monitoring Well 8S3 was sampled quarterly in 2014.

No DCPP related isotopes were detected in 8S3 in 2014.

Rain washout of tritium is discussed within NRC Regulatory Issue Summary (RIS) 2008-003, "Return/Re-use of Previously Discharged Radioactive Effluents".

All other samples of groundwater at 1A2, WW2, and WN2 did not indicate the presence of tritium or any other DCPP related isotopes (only NORM isotopes were observed).


5S2 Diablo Creek
OBSERVATION WELL 01 (OW1)
WATER WELL 02 (WW2)
GW1
DRY WELL 02 (Drywell 115 or DY1)
WN2
Diablo Creek
to ocean
interface
OBSERVATION WELL 02 (OW2)
GW2
DCSF96-1 (8S3)
Google earth
Imagery Date: 8/23/2013

WELL ID
WATER SURFACE ELEVATION

LINE OF ESTIMATED POTENTIOMETRIC SURFACE

Cardno ENTRIX

GROUNDWATER GRADIENT MAP
PACIFIC GAS AND ELECTRIC
DIABLO CANYON NUCLEAR POWER PLANT
SAN LUIS OBISPO COUNTY, CALIFORNIA

FIGURE
SITE LOCATION

6.0 OLD STEAM GENERATOR STORAGE FACILITY MONITORING

In accordance with the DCPP Offsite Dose Calculation Manual (ODCM), the Old Steam Generator Storage Facility (OSGSF) sumps were inspected quarterly. If water was found in the sump of a vault containing plant equipment, the expectation was to sample that sump water and dispose of the water per plant protocols via an approved discharge pathway.

For reference, the following equipment was placed into this OSGSF on the following dates:

- 3/2/08 (outage 2R14), four DCPP Unit Two (U-2) Steam Generators
- 2/14/09 (outage 1R15), four DCPP Unit One (U-1) Steam Generators
- 11/6/09 (outage 2R15), one DCPP Unit Two (U-2) Reactor (Rx) Head
- 10/23/10 (outage 1R16), one DCPP Unit One (U-1) Rx Head

As of 10/23/10, the OSGSF contains eight old Steam Generators and two old Rx Heads.

No water was found in any OSGSF sumps during 2014 inspections.

This page intentionally left blank.