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PG&E Letter HBL-20-012

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

Docket No. 50-133, License No. DPR -7
Humboldt Bay Power Plant, Unit 3
Responses to NRC Requests for Additional Information on the Final Status Survey Reports for the Humboldt Bay Power Plant

Reference:

1. PG&E Letter HBL-20-007, Final Status Survey Report for the Humboldt Bay Power Plant Reactor Caisson Survey Units, dated April 1, 2020 (ML20092M643)
2. PG&E Letter HBL-20-011, Response to NRC Request for Additional Information on the Final Status Survey Report for the Caisson, Survey Units NOL01-09 and NOL01-09-FSR, July 20,2020
3. PG&E Letter HBL-20-010, Final Status Survey Report for the Humboldt Bay Power Plant Trailer City Area, dated May 21, 2020 (ML20142A287)
4. Email from NRC Project Manager, John B. Hickman, FSSR Items, dated July 29, 2020
5. Email from NRC Project Manager, John B. Hickman, Last Question on Caisson FSSR, dated August 12, 2020

Dear Commissioners and Staff:

In Reference 1, Pacific Gas and Electric Company (PG&E) submitted the Final Status Survey Report for the Humboldt Bay Power Plant Reactor Caisson Survey Units and in Reference 2 provided responses to requests for additional information regarding this report. In Reference 3, PG&E submitted the Final Status Survey Report for the Humboldt Bay Trailer City Area. In References 4 and 5, the NRC provided requests for additional information (RAIs), regarding the reports. The Enclosure to this letter provides PG&E responses to the RAIs.

PG&E makes no new or revised regulatory commitments (as defined in NEI 99-04) in this letter.

If you have any questions or require additional information, please contact Mr. Philippe Soenen at (805) 459-3701.

Sincerely,

/Maureen Zawalick for James Welsch

James M. Welsch
Senior Vice President Generation and Chief Nuclear Officer

Enclosure

cc: Humboldt Distribution
cc/enc: John B. Hickman, NRC Project Manager
Scott A. Morris, NRC Region IV Administrator

Responses to NRC Requests for Additional Information on the Final Status Survey Reports for Humboldt Bay Power Plant

References:

1. PG&E Letter HBL-20-007, Final Status Survey Report for the Humboldt Bay Power Plant Reactor Caisson Survey Units, dated April 1, 2020 (ML20092M643)
2. PG&E Letter HBL-20-011, Response to NRC Request for Additional Information on the Final Status Survey Report for the Caisson, Survey Units NOL01-09 and NOL01-09-FSR, dated July 20, 2020
3. PG&E Letter HBL-20-010, Final Status Survey Report for the Humboldt Bay Power Plant Trailer City Area, dated May 21, 2020 (ML20142A287)

The applicability of the above references to the requests for additional information (RAIs) is specified below.

RAI # 1 (References 1, 2, and 3):

No discussion is present regarding residual radioactivity in the groundwater media, please provide residual radioactivity concentrations.

PG&E Response to RAI #1:

Included below are well water monitoring results for 2015, 2016, and 2017, three of the years with the highest potential for ground water impact from cutter soil mix (CSM) wall and caisson excavation work. Essentially, these values have remained the same since the start of active DECON in 2009. It is PG&E's opinion that previous spent fuel leakage, prior to managing leakage by maintaining an inward differential, was eliminated through decay and water flow.

Groundwater Monitoring Summary (2015-2017)

(Groundwater monitoring ceased 3rd quarter 2017)

Medium or Pathway Sampled	Year	Type and Total Number of Analyses Performed	Lower Limit of Detection (LLD)	All Indicator Locations		Location with Highest Annual Mean				Control Locations		Number of Non-routine Reported Measurements
				Mean, (Fraction) & [Range] [b]		Mean, (Fraction) & [Range] [b]		Mean, (Fraction) & [Range] [b]		Mean, (Fraction) & [Range] [b]		
				Co-60	Cs-137	Co-60	Cs-137	Co-60	Cs-137	Co-60	Cs-137	
Waterborne Groundwater (Monitoring wells) [pCi/L]	2017	Gamma Isotopic (24)	Co-60: 15pCi/L Cs-137: 18 pCi/L	<MDA (0/24) [N/A]	<MDA (0/24) [N/A]	N/A	N/A	<MDA (0/24) [N/A]	<MDA (0/24) [N/A]	N/A	N/A	0
		Tritium (50)	ODCM: 2.0E+03 pCi/L Plant Policy: 400	<MDA, (0/50), [N/A]		<MDA, (0/50), [N/A]		<MDA, (0/50), [N/A]		N/A		0
	2016	Gamma Isotopic (50)	Co-60: 15pCi/L Cs-137: 18 pCi/L	<MDA (0/50) [N/A]	<MDA (0/50) [N/A]	N/A	N/A	<MDA (0/50) [N/A]	<MDA (0/50) [N/A]	N/A	N/A	0
		Tritium (50)	ODCM: 2.0E+03 pCi/L Plant Policy: 400	<MDA, (0/50), [N/A]		<MDA, (0/50), [N/A]		<MDA, (0/50), [N/A]		N/A		0
	2015	Gamma Isotopic (56)	Co-60: 15pCi/L Cs-137: 18 pCi/L	<MDA (0/56) [N/A]	<MDA (0/56) [N/A]	N/A	N/A	<MDA (0/56) [N/A]	<MDA (0/56) [N/A]	N/A	N/A	0
		Tritium (56)	ODCM: 2.0E+03 pCi/L Plant Policy: 400	<MDA, (0/56), [N/A]		<MDA, (0/50), [N/A]		<MDA, (0/56), [N/A]		N/A		0
		Results identified as "<" are not included in the calculation of average and maximum values										

[b] The mean and the range are based on detectable measurements only. The fraction of detectable measurements at specified locations is indicated in parentheses; e.g., (10/12) means that 10 out of 12 samples contained detectable activity. The range of detected results is indicated in brackets; e.g., [23 to 34].

2017 Results

(Groundwater monitoring ceased 3rd quarter 2017)

TABLE C-4
GROUNDWATER MONITORING WELL RESULTS

Monitor Well Number	Sample Date	Alpha Activity (pCi/L)	Beta Activity (pCi/L)	Gamma Activity (pCi/L)		Tritium Activity (pCi/L)
				Cs-137	Co-60	
MW-11*	2/15/2017	< 4.39 (MDA)	2.53 ± 1.13	< 4.01 (MDA)	< 1.83 (MDA)	< 312 (MDA)
RCW-SFP-2*	2/15/2017	< 35.6 (MDA)	< 13.7 (MDA)	< 4.17 (MDA)	< 4.56 (MDA)	< 312 (MDA)
RCW-SFP-3*	2/15/2017	< 58.6 (MDA)	< 17.9 (MDA)	< 5.06 (MDA)	< 5.44 (MDA)	< 297 (MDA)
RCW-SFP-4*	2/15/2017[1]	< 16.5 (MDA)	15.1 ± 5.01	< 3.66 (MDA)	< 4.25 (MDA)	< 311 (MDA)
RCW-SFP-5*	2/15/2017	< 21.7 (MDA)	< 10.8 (MDA)	< 5.16 (MDA)	< 4.41 (MDA)	< 306 (MDA)
RCW-SFP-6*	2/15/2017	< 2.85 (MDA)	0.897 ± 0.576	< 4.03 (MDA)	< 4.38 (MDA)	< 309 (MDA)
RCW-CS-5*	2/15/2017	< 2.93 (MDA)	2.3 ± 0.783	< 3.03 (MDA)	< 3.51 (MDA)	< 295 (MDA)[2]
RCW-CS-6*	2/15/2017	< 198 (MDA)	< 72.2 (MDA)	< 4.06 (MDA)	< 3.07 (MDA)	< 311 (MDA)
RCW-CS-7*	2/15/2017	< 207 (MDA)	97.7 ± 50	< 3.50 (MDA)	< 4.05 (MDA)	< 299 (MDA)
RCW-CS-8*	2/15/2017[1]	< 144 (MDA)	< 90.7 (MDA)	< 3.43 (MDA)	< 3.05 (MDA)	< 307 (MDA)
RCW-CS-9*	2/15/2017	< 104 (MDA)	< 40.8 (MDA)	< 6.19 (MDA)	< 5.53 (MDA)	< 307 (MDA)
RCW-CS-10*	2/15/2017	< 35.9 (MDA)	< 12.3 (MDA)	< 4.05 (MDA)	< 3.98 (MDA)	< 313 (MDA)

*Indicates 12 groundwater monitoring wells.

Monitor Well Number	Sample Date	Alpha Activity (pCi/L)	Beta Activity (pCi/L)	Gamma Activity (pCi/L)		Tritium Activity (pCi/L)
				Cs-137	Co-60	
MW-11*	5/5/2017	< 5.42 (MDA)	< 3.02 (MDA)	< 5.68 (MDA)	< 4.91 (MDA)	< 305 (MDA)
RCW-SFP-2*	5/5/2017	< 87.2 (MDA)	< 16.8 (MDA)	< 3.18 (MDA)	< 3.05 (MDA)	< 308 (MDA)
RCW-SFP-3*	5/5/2017	< 38.3 (MDA)	27.3 ± 8.17	< 3.00 (MDA)	< 4.15 (MDA)	< 305 (MDA)
RCW-SFP-4*	5/5/2017	< 22.6 (MDA)	10.9 ± 4.19	< 3.36 (MDA)	< 3.83 (MDA)	< 304 (MDA)
RCW-SFP-5*	5/5/2017	< 24.1 (MDA)	< 16.6 (MDA)	< 4.94 (MDA)	< 4.05 (MDA)	< 296 (MDA)
RCW-SFP-6*	5/5/2017	< 2.92 (MDA)	2.01 ± 0.964	< 3.48 (MDA)	< 3.20 (MDA)	< 296 (MDA)
RCW-CS-5*	5/5/2017	< 2.77 (MDA)	3.02 ± 1.07	< 3.03 (MDA)	< 4.19 (MDA)	< 290 (MDA)
RCW-CS-6*	5/5/2017	< 138 (MDA)	< 92.8 (MDA)	< 4.69 (MDA)	< 2.69 (MDA)	< 310 (MDA)
RCW-CS-7*	5/5/2017	< 260 (MDA)	< 153 (MDA)	< 4.44 (MDA)	< 3.96 (MDA)	< 325 (MDA)
RCW-CS-8*	5/5/2017	< 143 (MDA)	< 108 (MDA)	< 4.64 (MDA)	< 3.62 (MDA)	< 320 (MDA)
RCW-CS-9*	5/5/2017	< 63 (MDA)	< 47.6 (MDA)	< 4.08 (MDA)	< 4.21 (MDA)	< 322 (MDA)
RCW-CS-10*	5/5/2017	< 33.5 (MDA)	17.3 ± 9.45	< 3.59 (MDA)	< 3.37 (MDA)	< 308 (MDA)

*Indicates 12 groundwater monitoring wells.

Table C-4 Notes:

1. Monitoring wells RCW-SFP-4 and RCW-CS-8 were located adjacent to each other in a small depression in the FSS area of the upper yard. During the first quarter well sampling event of 2017, some dirt and gravel were found to be covering the well lids. As a result, turbidity measurements for both wells were elevated. The increased sediment in the water was most likely due to surface influence rather than a significant disturbance in the water column or excessive stress placed on the formation. GEL Labs was advised of the higher than normal turbidity measurements and was requested to allow any sediment in the samples to settle before analyses were performed. The GEL data report for monitoring wells RCW-SFP-4 and RCW-CS-8 appeared to be in line with values seen previously. This action was documented in corrective action SAPN 1428500.

2. On February 27, 2017, GEL Labs advised via email that the H-3 sample for monitoring well RCW-CS-5 was damaged during shipment and the sample was lost. GEL collected a H-3 sample from the nitric acid preserved sample. GEL reported H-3 activity for RCW-CS-5 as less than 295 pCi/L, which is a normal value for H-3 activity in HBPP monitoring wells and less than the required LLD of 400 pCi/L. This action was documented in corrective action SAPN 1428501.

2016 Results

TABLE C-4
GROUNDWATER MONITORING WELL RESULTS

Monitor Well Number	Sample Date	Alpha Activity (pCi/L)	Beta Activity (pCi/L)	Gamma Activity (pCi/L)		Tritium Activity (pCi/L)
				Cs-137	Co-60	
MW-11*	2/11/2016	< 3.58	6.59 ± 1.97	< 4.61	< 4.96	< 306
RCW-SFP-1*	2/11/2016	< 21.8	< 12.2	< 4.97	< 5.68	< 302
RCW-SFP-2*	2/11/2016	< 25.9	17.2 ± 10.9	< 5.12	< 4.01	< 308
RCW-SFP-3*	2/11/2016	< 45.6	< 30.8	< 6.17	< 5.11	< 306
RCW-SFP-4*	3/11/2016	< 32.1	< 20.5	< 4.77	< 4.61	< 297
RCW-SFP-5*	2/11/2016	, < 34.3	< 20.5	< 5.83	< 5.74	< 307
RCW-SFP-6*	2/11/2016	< 3.72	< 2.10	< 4.85	< 4.82	< 306
RCW-CS-5*	2/11/2016	< 2.61	3.90 ± 1.35	< 3.81	< 4.79	< 308
RCW-CS-6*	2/11/2016	< 112	< 104	< 5.13	< 4.34	< 307
RCW-CS-7*	2/11/2016	< 169	< 102	< 4.42	< 4.67	< 303
RCW-CS-8*	2/11/2016	< 201	< 143	< 4.87	< 4.95	< 307
RCW-CS-9*	2/11/2016	< 102	< 71.1	< 5.07	< 5.53	< 301
RCW-CS-10*	2/11/2016	< 36.0	< 23.0	< 4.52	< 4.83	< 299
*Indicates thirteen (13) groundwater monitoring wells.						
MW-11*	5/10/2016	< 1.95	< 2.15	< 5.87	< 3.53	< 336
RCW-SFP-1*	5/10/2016	< 4.79	< 5.11	< 3.90	< 4.96	< 334
RCW-SFP-2*	5/10/2016	< 22.8	< 23.6	< 4.62	< 5.50	< 339
RCW-SFP-3*	5/10/2016	< 68.7	< 25.2	< 4.35	< 4.08	< 335
RCW-SFP-4*	5/10/2016	< 43.9	< 21.7	< 5.71	< 5.16	< 336
RCW-SFP-5*	5/10/2016	< 45.2	< 14.9	< 4.77	< 3.53	< 339
RCW-SFP-6*	5/10/2016	< 3.14	< 1.70	< 4.55	< 4.38	< 336
RCW-CS-5*	5/10/2016	< 3.08	4.46 ± 2.39	< 3.72	< 4.88	< 338
RCW-CS-6*	5/10/2016	< 123	< 129	< 5.37	< 4.21	< 338
RCW-CS-7*	5/10/2016	< 112	104 ± 59	< 4.49	< 5.47	< 342
RCW-CS-8*	5/10/2016	< 105	< 85.1	< 3.54	< 5.24	< 331
RCW-CS-9*	5/10/2016	< 75.8	< 58.3	< 2.88	< 3.10	< 301
RCW-CS-10*	5/10/2016	< 23.6	< 17.6	< 3.85	< 4.37	< 338
*Indicates thirteen (13) groundwater monitoring wells.						
MW-11*	8/23/2016	< 3.84	3.07 ± 1.19	< 3.34	< 2.29	< 296
RCW-SFP-2*	8/23/2016	< 46.2	< 23.4	< 3.23	< 3.49	< 302
RCW-SFP-3*	8/23/2016	< 42.0	< 29.0	< 3.99	< 2.33	< 288
RCW-SFP-4*	8/23/2016	< 57.1	< 35.0	< 3.31	< 4.46	< 292
RCW-SFP-5*	8/23/2016	< 43.3	< 13.8	< 5.06	< 3.25	< 294
RCW-SFP-6*	8/23/2016	< 2.27	1.99 ± 0.98	< 4.04	< 3.97	< 298
RCW-CS-5*	8/23/2016	< 3.28	2.69 ± 0.91	< 4.15	< 4.00	< 298
RCW-CS-6*	8/23/2016	< 121	< 110	< 5.83	< 6.87	< 289
RCW-CS-7*	8/23/2016	< 255	< 119	< 5.13	< 4.68	< 299
RCW-CS-8*	8/23/2016	< 191	< 80.6	< 3.21	< 3.71	< 299
RCW-CS-9*	8/23/2016	< 84.4	< 57.0	< 3.94	< 5.21	< 298
RCW-CS-10*	8/23/2016	< 37.8	< 20.5	< 4.51	< 6.76	< 304
*Indicates twelve (12) groundwater monitoring wells.						

2016 Results (continued)

TABLE C-4 (Continued)
GROUNDWATER MONITORING WELL RESULTS

Monitor Well Number	Sample Date	Alpha Activity (pCi/L)	Beta Activity (pCi/L)	Gamma Activity (pCi/L)		Tritium Activity (pCi/L)
				Cs-137	Co-60	
MW-11*	11/10/2016	< 5.08	3.76 ± 1.29	< 5.93	< 4.05	< 281
RCW-SFP-2*	11/10/2016	< 46.9	< 16.9	< 5.38	< 6.25	< 284
RCW-SFP-3*	11/10/2016	< 46.3	< 22.9	< 4.69	< 3.92	< 282
RCW-SFP-4*	11/10/2016	< 62.7	< 24.2	< 6.02	< 4.28	< 279
RCW-SFP-5*	11/10/2016	< 25.1	< 12.7	< 3.41	< 3.69	< 274
RCW-SFP-6*	11/10/2016	< 2.90	1.50 ± 0.86	< 3.80	< 3.98	< 281
RCW-CS-5*	11/10/2016	< 2.94	2.63 ± 1.05	< 3.91	< 5.64	< 275
RCW-CS-6*	11/10/2016	< 158	< 77.3	< 3.29	< 3.85	< 273
RCW-CS-7*	11/10/2016	< 233	< 87.0	< 4.37	< 3.83	< 273
RCW-CS-8*	11/10/2016	< 210	< 85.4	< 3.68	< 4.02	< 280
RCW-CS-9*	11/10/2016	< 91.2	< 45.7	< 3.87	< 4.30	< 276
RCW-CS-10*	11/10/2016	< 43.4	< 20.6	< 3.95	< 4.39	< 278

*Indicates twelve (12) groundwater monitoring wells.

2015 Results

TABLE C-4
GROUNDWATER MONITORING WELL RESULTS

Monitor Well Number	Sample Date	Alpha Activity (pCi/L)	Beta Activity (pCi/L)	Gamma Activity (pCi/L)		Tritium Activity (pCi/L)
				Cs-137	Co-60	
MW-11*	2/16/2015	< 5.36 (MDA)	8.14 ± 2.17	< 6.23 (MDA)	< 5.40 (MDA)	< 321 (MDA)
RCW-SFP-1*	2/16/2015	< 2.36 (MDA)	4.19 ± 1.25	< 5.59 (MDA)	< 5.77 (MDA)	< 324 (MDA)
RCW-SFP-2*	2/16/2015	< 9.97 (MDA)	< 9.38 (MDA)	< 5.55 (MDA)	< 4.28 (MDA)	< 314 (MDA)
RCW-SFP-3*	2/16/2015	< 6.66 (MDA)	7.63 ± 2.97	< 4.72 (MDA)	< 5.20 (MDA)	< 316 (MDA)
RCW-SFP-4*	2/16/2015	< 5.52 (MDA)	4.76 ± 2.31	< 4.45 (MDA)	< 4.47 (MDA)	< 320 (MDA)
RCW-SFP-5*	2/16/2015	< 7.08 (MDA)	< 3.81 (MDA)	< 5.14 (MDA)	< 4.10 (MDA)	< 314 (MDA)
RCW-SFP-6*	2/16/2015	< 12.2 (MDA)	< 10.0 (MDA)	< 6.09 (MDA)	< 5.57 (MDA)	< 319 (MDA)
RCW-CS-3*	2/16/2015	< 1.75 (MDA)	< 1.94 (MDA)	< 4.70 (MDA)	< 3.07 (MDA)	< 325 (MDA)
RCW-CS-5*	2/16/2015	< 2.99 (MDA)	3.81 ± 1.60	< 4.93 (MDA)	< 5.15 (MDA)	< 328 (MDA)
RCW-CS-6*	2/16/2015	< 115 (MDA)	< 83.1 (MDA)	< 5.42 (MDA)	< 3.83 (MDA)	< 322 (MDA)
RCW-CS-7*	2/16/2015	< 135 (MDA)	< 87.2 (MDA)	< 6.26 (MDA)	< 6.74 (MDA)	< 334 (MDA)
RCW-CS-8*	2/16/2015	< 147 (MDA)	< 92.7 (MDA)	< 5.07 (MDA)	< 7.00 (MDA)	< 311 (MDA)
RCW-CS-9*	2/16/2015	< 23.7 (MDA)	< 31.6 (MDA)	< 5.05 (MDA)	< 4.75 (MDA)	< 323 (MDA)
RCW-CS-10*	2/16/2015	< 25.2 (MDA)	< 21.6 (MDA)	< 3.93 (MDA)	< 3.80 (MDA)	< 325 (MDA)
MW-11*	5/13/2015	< 11.2 (MDA)	< 10.70 (MDA)	< 4.19 (MDA)	< 4.26 (MDA)	< 346 (MDA)
RCW-SFP-1*	5/13/2015	< 2.97 (MDA)	< 3.56 (MDA)	< 4.54 (MDA)	< 3.44 (MDA)	< 346 (MDA)
RCW-SFP-2*	5/13/2015	< 16.2 (MDA)	< 9.68 (MDA)	< 6.31 (MDA)	< 6.76 (MDA)	< 347 (MDA)
RCW-SFP-3*	5/13/2015	< 25.8 (MDA)	< 15.90 (MDA)	< 3.73 (MDA)	< 4.60 (MDA)	< 343 (MDA)
RCW-SFP-4*	5/13/2015	< 10.8 (MDA)	< 8.73 (MDA)	< 4.69 (MDA)	< 3.01 (MDA)	< 347 (MDA)
RCW-SFP-5*	5/13/2015	8.73 ± 4.47	< 3.80 (MDA)	< 5.24 (MDA)	< 5.72 (MDA)	< 326 (MDA)
RCW-SFP-6*	5/13/2015	< 13.8 (MDA)	< 11.90 (MDA)	< 4.20 (MDA)	< 3.22 (MDA)	< 332 (MDA)
RCW-CS-3*	5/13/2015	< 3.05 (MDA)	< 2.49 (MDA)	< 4.51 (MDA)	< 6.20 (MDA)	< 342 (MDA)
RCW-CS-5*	5/13/2015	< 4.25 (MDA)	4.45 ± 1.85	< 4.60 (MDA)	< 4.59 (MDA)	< 349 (MDA)
RCW-CS-6*	5/13/2015	< 217 (MDA)	< 90.4 (MDA)	< 4.14 (MDA)	< 4.76 (MDA)	< 391 (MDA)
RCW-CS-7*	5/13/2015	Note 1	Note 1	Note 1	Note 1	< 344 (MDA)
RCW-CS-8*	5/13/2015	< 240 (MDA)	< 153 (MDA)	< 3.97 (MDA)	< 4.05 (MDA)	< 346 (MDA)
RCW-CS-9*	5/13/2015	< 29.5 (MDA)	< 20.2 (MDA)	< 4.47 (MDA)	< 4.71 (MDA)	< 350 (MDA)
RCW-CS-10*	5/13/2015	< 30.1 (MDA)	< 20.4 (MDA)	< 3.45 (MDA)	< 4.64 (MDA)	< 344 (MDA)
MW-11*	8/13/2015	< 22.0 (MDA)	< 10.9 (MDA)	< 3.93 (MDA)	< 4.81 (MDA)	< 219 (MDA)
RCW-SFP-1*	8/13/2015	< 23.5 (MDA)	< 16.0 (MDA)	< 3.54 (MDA)	< 3.91 (MDA)	< 239 (MDA)
RCW-SFP-2*	8/13/2015	< 16.1 (MDA)	< 11.3 (MDA)	< 3.46 (MDA)	< 3.85 (MDA)	< 229 (MDA)
RCW-SFP-3*	8/13/2015	< 44.5 (MDA)	< 30.1 (MDA)	< 3.85 (MDA)	< 4.57 (MDA)	< 236 (MDA)
RCW-SFP-4*	8/13/2015	< 38.5 (MDA)	< 20.3 (MDA)	< 4.39 (MDA)	< 5.06 (MDA)	< 237 (MDA)
RCW-SFP-5*	8/13/2015	< 13.1 (MDA)	< 8.19 (MDA)	< 4.42 (MDA)	< 4.08 (MDA)	< 237 (MDA)
RCW-SFP-6*	8/13/2015	< 11.8 (MDA)	< 6.71 (MDA)	< 3.75 (MDA)	< 2.97 (MDA)	< 248 (MDA)
RCW-CS-3*	8/13/2015	< 3.15 (MDA)	2.53 ± 1.14	< 3.86 (MDA)	< 3.84 (MDA)	< 236 (MDA)
RCW-CS-5*	8/13/2015	< 2.74 (MDA)	2.71 ± 1.10	< 4.62 (MDA)	< 4.51 (MDA)	< 235 (MDA)
RCW-CS-6*	8/13/2015	< 122 (MDA)	< 103 (MDA)	< 3.94 (MDA)	< 3.37 (MDA)	< 243 (MDA)
RCW-CS-7*	8/13/2015	< 353 (MDA)	< 145 (MDA)	< 2.94 (MDA)	< 3.18 (MDA)	< 248 (MDA)
RCW-CS-8*	8/13/2015	< 139 (MDA)	< 107 (MDA)	< 5.29 (MDA)	< 4.82 (MDA)	< 239 (MDA)
RCW-CS-9*	8/13/2015	< 136 (MDA)	< 86.2 (MDA)	< 4.75 (MDA)	< 4.57 (MDA)	< 232 (MDA)
RCW-CS-10*	8/13/2015	< 39.9 (MDA)	< 28.5 (MDA)	< 4.82 (MDA)	< 6.69 (MDA)	< 233 (MDA)

*Indicates fourteen (14) groundwater monitoring wells.

2015 Results (continued)

TABLE C-4 (Continued)
GROUNDWATER MONITORING WELL RESULTS

Monitor Well Number	Sample Date	Alpha Activity (pCi/L)	Beta Activity (pCi/L)	Gamma Activity (pCi/L)		Tritium Activity (pCi/L)
				Cs-137	Co-60	
MW-11*	11/09/2015	< 5.83 (MDA)	< 4.82 (MDA)	< 3.57 (MDA)	< 2.80 (MDA)	< 296 (MDA)
RCW-SFP-1*	11/09/2015	< 18.9 (MDA)	< 8.70 (MDA)	< 4.80 (MDA)	< 4.27 (MDA)	< 292 (MDA)
RCW-SFP-2*	11/09/2015	< 31.3 (MDA)	< 17.5 (MDA)	< 5.55 (MDA)	< 4.57 (MDA)	< 288 (MDA)
RCW-SFP-3*	11/09/2015	< 44.2 (MDA)	< 35.6 (MDA)	< 3.08 (MDA)	< 3.70 (MDA)	< 297 (MDA)
RCW-SFP-4*	11/09/2015	< 31.0 (MDA)	< 15.0 (MDA)	< 4.48 (MDA)	< 5.45 (MDA)	< 293 (MDA)
RCW-SFP-5*	11/09/2015	< 18.1 (MDA)	< 5.28 (MDA)	< 3.67 (MDA)	< 4.66 (MDA)	< 297 (MDA)
RCW-SFP-6*	11/09/2015	< 4.30 (MDA)	< 3.71 (MDA)	< 4.05 (MDA)	< 4.61 (MDA)	< 288 (MDA)
RCW-CS-3*	11/09/2015	< 2.27 (MDA)	1.70 ± 0.872	< 4.87 (MDA)	< 3.74 (MDA)	< 293 (MDA)
RCW-CS-5*	11/09/2015	< 3.06 (MDA)	1.95 ± 0.921	< 4.38 (MDA)	< 3.71 (MDA)	< 284 (MDA)
RCW-CS-6*	11/09/2015	< 183 (MDA)	< 131 (MDA)	< 4.78 (MDA)	< 4.76 (MDA)	< 292 (MDA)
RCW-CS-7*	11/09/2015	< 150 (MDA)	< 82.1 (MDA)	< 4.38 (MDA)	< 4.52 (MDA)	< 294 (MDA)
RCW-CS-8*	11/09/2015	< 145 (MDA)	< 95.5 (MDA)	< 4.43 (MDA)	< 5.53 (MDA)	< 282 (MDA)
RCW-CS-9*	11/09/2015	117 ± 61.8	< 64.6 (MDA)	< 3.89 (MDA)	< 5.89 (MDA)	< 292 (MDA)
RCW-CS-10*	11/09/2015	< 33.8 (MDA)	< 15.0 (MDA)	< 6.40 (MDA)	< 6.83 (MDA)	< 304 (MDA)

*Indicates (14) groundwater monitoring wells.

Table C-4 Notes:

1. RCW-CS-7 was unable to be purged during the second quarterly groundwater sampling event and water monitoring parameters were not collected (conductivity, pH and turbidity). Adequate volume of sample for gross alpha, gross beta, Am-241, Cs-137, Co-60 and Total Strontium could not be obtained. The only sample obtained for offsite analysis was the H-3 sample. This action was documented in corrective action SAPN 1406334.

RAI # 2 (Reference 3):

Not all radionuclides of concern in Table 6.4 of the LTP are addressed in the surveys. Usually, only Cs-137 is addressed directly while many ROCs are "deselected" and otherwise accounted for. This leaves 6-7 ROCs not accounted for in the surveys. Please provide data for these ROCs.

PG&E Response to RAI #2:

In the deselection process Humboldt Bay Power Plant (HBPP) Radionuclides of Concern (ROCs) that were determined to be *insignificant* in a particular Survey Unit were eliminated from the Final Status Survey (FSS) process (i.e. statistical evaluation). Their potential dose contribution was conservatively accounted for in demonstrating compliance [Ref. NUREG-1757 Vol. 2]. The dose contribution is not considered a "surrogate" since there is no comparison of this dose to another known dose contributor (e.g. Cs-137 value representing a value for a radionuclide not assayed for).

All radionuclides not deselected were analyzed for in each sample, and radionuclides that were detected were included in the statistical analysis. When there were multiple radionuclides identified the unity rule was implemented in determining the acceptance, or rejection, of the null hypothesis. The 6-7 ROCs mentioned in the RAI, assayed below the Minimum Detectable Activity (MDA)/Lower Limit of Detection (LLD) for the analysis. The FSS Plan requires that the analyses attempt to meet an MDA that is 10 percent of the radionuclide's Derived Concentration Guideline Level (DCGL). HBPP conservatively far exceeds that requirement. When actual reported activities are recorded and their fractional contribution to unity is determined their contributions are insignificant to the statistical analysis as shown in the table for the nuclides in OOL09-01.

OOL09-01

Nuclide	Mean	Scaled DCGL	Fraction	Fraction Toward Unity*
Co-60	-1.13E-02	3.47E+00	-3.26E-03	0.00
Eu-152	-3.55E-02	9.14E+00	-3.88E-03	0.00
Eu-154	-3.43E-03	8.59E+00	-3.99E-04	0.00
H-3	7.00E-02	6.22E+02	1.13E-04	0.00
Nb-94	-1.27E-02	6.49E+00	-1.96E-03	0.00
Np-237	1.79E-02	1.01E+00	1.77E-02	0.02
Sr-90	-2.47E-02	1.37E+00	-1.81E-02	0.00
Am-241	-3.46E-02	2.28E+01	-1.52E-03	0.00

*Unity values must be from 0-1. There can be no negative unity values.

As shown in the above example of OOL09-01, sample results showing the analysis below the MDA/LLD for the analysis for the non-deselected radionuclides provide no statistical significance to the unity determination.

RAI # 3 (Reference 3):

Please clarify why the "deselection" listing of ROCs is different in NOL09-08 vs the other survey units.

PG&E Response to RAI #3:

Much of the initial data used for calculations were based on limited characterization/FSS data, and as such those data were used to base initial criteria in a conservative manner. Additional data was gathered during decommissioning and used to update prior, albeit conservative, assumptions as to the potential dose contributions of deselected radionuclides. As this data was analyzed, and the

methodology was updated, the dose contributions were updated as well to further reflect a more accurate radiological status of the HBPP site upon license termination. The dose selections for Survey Units OOL09-01 through OOL09-07 and OOL09-09 through OOL09-10 reflect the earlier calculations and are, as such, more conservative estimates of the potential dose contributions for the deselected radionuclides. The dose selection for OOL09-08 presents a more accurate representation of the potential radiological status and dose contributions based on the more recent data evaluated.

RAI #4 (Reference 3):

Provide the depth of backfill in each of the survey units. Also, clarify whether, in each case, the last few feet of backfill originated from off-site after the surveys were performed.

PG&E Response to RAI #4:

The approximate depth of backfill was less than 1 meter over the entire Trailer City Area except for OOL09-01, which has a backfilled depth of approximately 22 feet. The estimated backfill for the area of the circulating water excavation in OOL09-01 was approximately 3,442 cubic yards of reuse GARDIAN material over an area approximately 28 feet wide, 150 feet long, and 22 feet deep.

All Final Site Restoration (FSR) surveys were performed after reuse material backfilling was completed and before placement of any off-site material (topsoil, engineered rock/gravel, concrete or asphalt and plants) was applied. For most of the Trailer City area, the depth of the off-site topsoil was approximately 6 inches to 1 foot. Survey Units OOL09-01 and OOL09-09 also had gravel, concrete, and asphalt poured on top. There was approximately 1 to 2 feet of offsite road-base material placed on top of the final surveyed area prior to asphalt paving. The depth of the gravel for the catch basins in the area ranged from 6 inches to one foot.

RAI #5 (Reference 3):

If the backfill exceeded a depth of 1 meter, provide information regarding the non-surface volume of backfill and how it was shown to meet the release criteria for all ROCs.

PG&E Response to RAI #5:

All areas in Trailer City that were backfilled with onsite reuse material were on an average less than 1 meter in depth with the exception of OOL09-01 circulating water excavation. The circulating water excavation was on average 22 feet in depth with an average of approximately 28 feet wide and 150 feet long.

All reuse material used to backfill the deep excavation in OOL09-01 was monitored to be acceptable for reuse through the GARDIAN bulk monitoring systems on site. This

backfill material in the deep excavation is the same material that was used to complete the backfill of the entire Trailer City area and final elevation of the discharge canal area (top of the excavation).

From a review of the analytical sampling of this backfill material from these areas, an MDA of approximately 0.1 pCi/g for Cs-137 was estimated. This value would be indicative of the remainder of the reuse material used to complete the backfill of the discharge canal, area 51 and circulating water excavations. In addition, a review of GARDIAN system data indicates that the backfill material would have displayed an approximate average MDA of 0.30 pCi/g for Cs-137 through the less accurate bulk reuse protocol.

RAI # 6 (References 1 and 2):

In response to RAI 2 [Reference 2 of this submittal] *for the Caisson, you had the following notes:*

"Note 1 – Production of Cs-137 is greater than Nb-94 to start. The ratio of half-lives is provided below: 30 years for Cs-137 divided by 2.1 E+4 years for Nb-94 equals 1.4 E-3 (combined with production difference, less than a significant number for the sum of fractions calculation)."

"Note 2 – Production of Pu-239 is much greater than that of Np-237 because of direct neutron capture by U-238 vs. multiple decays and capture to produce Np-237. The ratio of half-lives is provided below: 2.4 E+4 years for Pu-239 divided by 2.14 E+6 years for Np-237 = 1E-2 (combined with difference in production, less than a significant number in the sum of fractions calculation)."

Could you clarify what is meant by "Production is greater to start" and "less than a significant number" in the notes. Additionally, it appears that you are claiming there is a surrogate relationship between the stated radionuclides. If so, what is the impact to the surrogate radionuclide DCGL value per MARSSIM methods? Please clarify that the surrogate relationship will remain consistent given the difference in environmental transport mechanisms for the specified radionuclides (e.g., Np-237 is extremely mobile environmentally).

It appears to us that the one nuclide (or two in this case) is being used as a surrogate for the unreported nuclide(s) based on known production ratios and similar characteristics for environmental transport, and doing so has no impact on the applicable DCGL due to the difference in production rates and specific activity of the radionuclides. If you can provide the math to demonstrate this per MARSSIM's surrogate measurement process and demonstrate that the change to the surrogate radionuclide's DCGL value is negligible (e.g., a delta less than 0.05 pCi/g would be appropriate for Cs-137's DCGL of 7.9 pCi/g), then we can find the logic adequate.

PG&E Response to RAI # 6:

PNL-4628, *Residual Radionuclide Distribution and Inventory at the Humboldt Bay Nuclear Plant* states, "Although substantial amounts of Nb-94 may be produced by neutron activation of steel components within the pressure vessel, the extreme insolubility of niobium apparently prevents its dissolution from the neutron-activated steel, thereby minimizing any subsequent redisposition throughout other systems of the plant." Therefore, it is evident that all significant amounts of Nb-94 would be captured in the reactor internals waste streams that have been removed as part of HBPP decommissioning activities. It is also reasonable to assume that there are no residual amounts of Nb-94 present based on the table in PG&E's response to RAI #2 in this submittal, which shows a Nb-94 Sum of Fractions for survey unit OOL09-01 of 0.00, and a comprehensive review of HBPP Laboratory gamma analysis reports from all FSS samples collected at HBPP from decommissioning activities that indicates no positive detection of Nb-94 greater than method detection levels. It should be noted that if Nb-94 had been detected in any FSS sample, the survey unit dose contribution from the nuclide would have been included in the Sum of Fractions calculation for consideration relative to the release criterion.

Np-237 is produced from neutron absorption of U-235, a primary constituent in nuclear fuel, with a secondary production method from alpha decay of Am-241 (daughter of Pu-241, produced from neutron absorption of Pu-240). Np-237's long half-life of 2.144E+04 years, compared with its parent, Am-241, of 4.33E+02 years, is a factor of almost 50 longer. Additionally, it is unlikely that Np-237 would be present in a sample without Am-241 also being present. It is also reasonable to assume that there are no significant residual amounts of Np-237 present based on the table in PG&E's response to RAI #2 in this submittal, which shows a Np-237 Sum of Fractions for survey unit OOL09-01 of 0.02. A comprehensive review of HBPP Laboratory gamma analysis reports from all FSS samples collected at HBPP from decommissioning activities indicates no positive detection of Np-237 greater than method detection levels. Comprehensive review of FSS samples collected indicate that Am-241 has only been identified in three samples, all investigation samples, from separate FSS survey units containing discrete commodities with various levels of activation products and fission products. None of the samples containing Am-241 identified Np-237 above the detection limits. It should be noted that if Np-237 had been detected in any FSS sample, the survey unit dose contribution from the nuclide would have been included in the Sum of Fractions calculation for consideration relative to the release criterion. It should also be noted that it is not appropriate to use the term "surrogate ratio" in this context between the Np-237 and Am-241 since there is no equilibrium between the long-lived daughter (Np-237) and the parent (Am-241). Also, a surrogate makes the assumption that the nuclide being surrogated is not easily measured, which is not the case since Np-237 is measured during every gamma analysis.