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PG&E Letter HBL-13-003

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

10 CFR 50.75(f)
10 CFR 50.82(8)(v)
10 CFR 50.82(8)(vii)

Docket No. 50-133, License No. DPR-7
Humboldt Bay Power Plant, Unit 3
Decommissioning Funding Report for Humboldt Bay Power Plant, Unit 3

Dear Commissioners and Staff:

Pacific Gas and Electric Company (PG&E) is submitting its decommissioning funding report for Humboldt Bay Power Plant (HBPP), Unit 3, pursuant to the requirements of 10 CFR 50.75(f), 10 CFR 50.82(8)(v), and 10 CFR 50.82(8)(vii).

Humboldt Bay, Unit 3

At the end of calendar year 2012, the market value of the HBPP, Unit 3 (220 MWt) decommissioning trust funds was $272.0 million. PG&E estimates it will need to collect an additional $474.4 million (future nominal dollars) over 4 years, beginning in 2014, based on a site-specific decommissioning cost estimate prepared by PG&E staff and submitted to the California Public Utilities Commission's Nuclear Decommissioning Cost Triennial Proceeding (NDCTP) on December 21, 2012. The NDCTP application is based on actual bids for remaining HBPP civil work scope, costs for removal of underground reactor caisson, cost associated with a delay in the Department of Energy's acceptance of site-stored spent fuel, cost to remediate site radioactivity to nuclear resident farmer criteria, and updated remaining decommissioning costs based on actual past HBPP decommissioning data versus industry estimates.

The market value of the HBPP trust is lower than the minimum amount of the NRC decommissioning estimate of $687.2 million (2013 dollars) that was calculated pursuant to the requirements of 10 CFR 50.75(c), which is based on a minimum 1200 MWt plant. This is due to $268.5 million having been spent on decommissioning activities through December 2012, and an estimate to complete of $618.1 million for the NRC radiological scope.

PG&E is confident the HBPP trust, with the noted additional contributions, will be sufficient to ensure successful decommissioning and maintaining the spent fuel in an independent spent fuel storage installation (ISFSI) at HBPP until 2025, based on the December 2012 site-specific decommissioning cost estimate prepared by PG&E staff.

Supporting Cost Estimates

Based on a December 2012 site-specific cost estimate prepared by PG&E staff, PG&E estimates that the decommissioning costs are about $888.9 million (including $268.5 million disbursed from the trust(s) through December 2012 and $618.1 million future radiological removal costs) for HBPP, Unit 3, in 2013 dollars. These costs do not include site restoration of the facilities ($.9 million), or spent fuel management until 2025 ($139.5 million). To assure that sufficient funds will be available for decommissioning, PG&E established external sinking trust fund accounts for HBPP, Unit 3.

Supporting Enclosures

Enclosures 1-4 provide supporting documentation for this report.

Enclosure 1 provides decommissioning funding status information in a format suggested by Nuclear Energy Institute (NEI) and the NRC.

Enclosure 2 provides information on the escalation of the required decommissioning funding amounts to 2013 dollars. As required by 10 CFR 50.75(c)(2), and using NUREG-1577, "Standard Review Plan on Power Reactor Licensee Financial Qualifications and Decommissioning Funding Assurance," Revision 1, and NUREG-1307, "Report on Waste Burial Charges," Revision 15, the information includes escalation factors for energy, labor, and waste burial costs.

Enclosure 3 is a cash flow of the total decommissioning of HBPP that identifies the monies for NRC scope (removal of radiological contamination), site restoration (including the non-radiological work) and the spent fuel management.

Enclosure 4 contains the PG&E decommissioning cost estimate report prepared in December 2012 for HBPP, Unit 3. The report provides cost estimates for the decommissioning of the nuclear, non-nuclear facilities, and spent fuel management, including operation of the ISFSI in 2011 dollars

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this letter. Should you have any questions, please contact Mr. Bob Kapus at (707) 444-0810.

Sincerely,

Edward D. Halpin
Senior Vice President – Chief Nuclear Officer

Enclosures
cc/enc: John B. Hickman, NRC/FSME/DWMEP Project Manager
Arthur T. Howell, III, NRC Region IV
HBPP Humboldt Distribution
INPO

NRC Decommissioning Funding Status Report
Humboldt Bay Power Plant Unit 3
(2 pages)

NRC Decommissioning Funding Status Report
Humboldt Bay Power Plant - Unit 3 (220 MWt)

As provided in 10 CFR 50.75(f)(1), each power reactor licensee is required to report to the NRC on a calendar year basis, beginning March 31, 1999, and annually thereafter, on the status of its decommissioning funding for each reactor that it owns and has already closed.

Note that Items 3, 4, and 8 are data included in PG&E's Nuclear Decommissioning Cost Triennial Proceeding (NDCTP) filed with the California Public Utilities Commission (CPUC) on December 12, 2012. PG&E does not anticipate a decision on this filing until late 2013 or early 2014.

	$ in Millions
1. The minimum decommissioning fund estimate, pursuant to 10 CFR 50.75 (b) and (c).[1]	
January 2013 dollars	$ 687.2

(HBPP is a shutdown unit with a Site Specific Cost Study; therefore, the minimum decommissioning fund estimate is based on the Site Specific Cost Study shown in item 8 of this enclosure.)

2. The amount accumulated at the end of the calendar year preceding the date of the report for items included in 10 CFR 50.75 (b) and (c). (Alternatively, the total amount accumulated at the end of the calendar year preceding the date of the report can be reported here if the cover letter transmitting the report provides the total estimate and indicates what portion of that estimate is for items not included in 10 CFR 50.75 (b) and (c)).

Market Value (December 2012 dollars)	$ 272.0

3. A schedule of the annual amounts remaining to be collected; for items in 10 CFR 50.75 (b) and (c). (Alternatively, the annual amounts remaining to be collected can include items beyond those required in 10 CFR 50.75 (b) and (c) if the cover letter transmitting the report provides a total cost estimate and indicates what portion of that estimate is for items that are not included in 10 CFR 50.75 (b) and (c).

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[1] * The NRC formulas in section 10 CFR 50.75(c) include only those decommissioning costs incurred by licensees to remove a facility or site safely from service and reduce residual radioactivity to levels that permit: (1) release of the property for unrestricted use and termination of the license; or (2) release of the property under restricted conditions and termination of the license. The cost of dismantling or demolishing non-radiological systems and structures is not included in the NRC decommissioning cost estimates. The costs of managing and storing spent fuel on site until transfers to DOE are not included in the cost formulas.

Amount remaining	$ 474.4
Number of years to collect 2014-2017	4 years
Annual amount to be collected	$ 118.6

4. The assumptions used regarding escalation in decommissioning cost, rates of earnings on decommissioning funds (assumes trust will be gradually converted to a more conservative, all fixed income portfolio after 2010), and rates of other factors used in funding projections (all values below are from the 2012 NDCTP filing).

Escalation in decommissioning costs Rate of Return	2.6 percent

5. Any contracts upon which the licensee is relying pursuant to 10 CFR 50.75(e)(1)(v).
None

6. Any modifications to a licensee's current method providing financial assurance occurring since the last submitted report. None

7. Any material changes to trust agreements. None

8. CPUC Submittal in 2012 Dollars in Millions:

Total Project (Decommission 2012)	$ 1,027.0
Scope Excluded from NRC calculations	$ 0.9
Scope of ISFSI from Licensing to Decommissioning in 2025	$ 139.5
Scope Decommissioned and disbursed from Trust(s)	$ 268.5
Total NRC Decommissioning Remaining Scope	$ 618.1

2013 Decommissioning Estimate
(1 page)

Composite Escalation
(1 page)

Development of E Component
(4 pages)

Development of L Component
(2 pages)

Development of B Component
(1 page)

Nuclear Regulatory Commission
Estimate of Decommission Costs for Boiling Water Reactor (BWR)
In 2012

	HBPP BWR ($ in millions)	
Jan 1986 Estimate	$114.80	
Escalated to 1999	128.9	(Table 2.1 in NUREG 1307 Rev 14 has no value for 1999 Burial)
Escalated to 2000	400.2	($360.9 in 2000 Submittal)
Escalated to 2001	354.1	($425.3 in 2001 Submittal)
Escalated to 2002	357.4	($445.6 in 2002 Submittal)
Escalated to 2003	373.8	($430.1 in 2003 Submittal)
Escalated to 2004	388.0	($439.6 in 2004 Submittal)
Escalated to 2005	416.8	($453.2 in 2005 Submittal)
Escalated to 2006	519.2	($494.3 in 2006 Submittal)
Escalated to 2007	538.3	($548.6 in 2007 Submittal)
Escalated to 2008	564.4	($590.9 in 2008 Submittal)
Escalated to 2009	574.6	($573.8 in 2009 Submittal)
Escalated to 2010	594.5	($596.6 in 2010 Submittal)
Escalated to 2011	626.5	($619.0 in 2011 Submittal)
Escalated to 2012	659.9	($645.4 in 2012 Submittal)
Escalated to 2013	687.2	

Jan 1986 based on 10 CFR 50.75 (c) Table of minimum amounts
BWR based on minimum 1200 MWt = ($104 + (.009xMWt)) million per unit
where BWR less than 1200 MWt use P=1200 MWt, HBPP 220 MWt
NUREG-1307 Rev 15 has a revision of Values for Burial Function impacting back to 2008

Composite Escalation

Calculating Overall Escalation Rate

BWR	Dec-05	Dec-06	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Dec-12	Weight (1)
L (Labor)	2.0600	2.1218	2.1939	2.2536	2.2784	2.3175	2.3711	2.4081	0.65
E (Energy)	1.9106	1.9808	2.4513	1.8323	2.0402	2.3945	2.7719	2.8187	0.13
B (Burial)	13.3331	13.8744	14.4164	15.0096	15.6028	16.5439	17.4856	18.4273	0.22

(1) from NUREG 1307 Revision 15, Report on Waste Burial Charges, Section 2 Summary, Page 3 ... where A, B, and C are the fractions of the total 1986 dollar costs that are attributable to labor (0.65), energy (0.13), and burial (0.22), respectively, and sum to 1.0.

BWR
Combined Escalation Rate for:

Dec-06	Dec-07	Dec-08	Dec-09	Dec-10	Dec-11	Dec-12
4.6891	4.9163	5.0052	5.1788	5.4573	5.7484	5.9857

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 15, Section 3.2
Using Regional Indices SERIES ID: WPU0573 Light Fuel Oils (as of 03/14/13) and WPU0543 Industrial Electric Power (as of 03/14/13)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (2000 = 100) (P) =Industrial Energy Power	PPI for Light Fuel Oils (2000=100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (2000 = 100) (P) =Industrial Energy Power BWR wt = 0.54	PPI for Light Fuel Oils (2000=100) (F) = Light Fuel Oils BWR wt = 0.46	Energy Escalation Factor (E) for BWR (Humboldt)
Dec-99	126.5	72.9	1.0000	1.0000	1.0000
Jan-00	126.8	75.3	1.0024	1.0329	1.0164
Feb-00	126.7	87.9	1.0016	1.2058	1.0955
Mar-00	126.7	89.7	1.0016	1.2305	1.1069
Apr-00	126.8	83.1	1.0024	1.1399	1.0656
May-00	128.6	82.9	1.0166	1.1372	1.0721
Jun-00	133.6	86.2	1.0561	1.1824	1.1142
Jul-00	136.2	88.7	1.0767	1.2167	1.1411
Aug-00	137.4	91.6	1.0862	1.2565	1.1645
Sep-00	137.8	110.1	1.0893	1.5103	1.2830
Oct-00	134.1	108.6	1.0601	1.4897	1.2577
Nov-00	130.9	108.4	1.0348	1.4870	1.2428
Dec-00	132.7	100.6	1.0490	1.3800	1.2013
Jan-01	136.4	96.1	1.0783	1.3182	1.1887
Feb-01	136.4	91.6	1.0783	1.2565	1.1603
Mar-01	136.5	83.1	1.0791	1.1399	1.1070
Apr-01	135.1	86.2	1.0680	1.1824	1.1206
May-01	136.2	94.2	1.0767	1.2922	1.1758
Jun-01	148.4	90.2	1.1731	1.2373	1.2026
Jul-01	149.5	81.3	1.1818	1.1152	1.1512
Aug-01	148.9	83.2	1.1771	1.1413	1.1606
Sep-01	148.2	93	1.1715	1.2757	1.2195
Oct-01	143.8	76.8	1.1368	1.0535	1.0985
Nov-01	137.3	70.5	1.0854	0.9671	1.0310
Dec-01	136.9	56.6	1.0822	0.7764	0.9415
Jan-02	136.3	58.3	1.0775	0.7997	0.9497
Feb-02	135.4	59.6	1.0704	0.8176	0.9541
Mar-02	135.7	69.1	1.0727	0.9479	1.0153
Apr-02	135.4	76.4	1.0704	1.0480	1.0601
May-02	137.9	75	1.0901	1.0288	1.0619
Jun-02	143.6	71.4	1.1352	0.9794	1.0635
Jul-02	144.9	75.5	1.1455	1.0357	1.0950
Aug-02	145.0	77.9	1.1462	1.0686	1.1105
Sep-02	145.8	89.5	1.1526	1.2277	1.1871
Oct-02	140.0	95.1	1.1067	1.3045	1.1977
Nov-02	139.5	82.8	1.1028	1.1358	1.1180
Dec-02	139.6	84.6	1.1036	1.1605	1.1297
Jan-03	140.3	95.7	1.1091	1.3128	1.2028
Feb-03	140.6	120.4	1.1115	1.6516	1.3599
Mar-03	143.3	128.9	1.1328	1.7682	1.4251
Apr-03	144.3	98.3	1.1407	1.3484	1.2363
May-03	145.1	85.5	1.1470	1.1728	1.1589
Jun-03	148.3	87.2	1.1723	1.1962	1.1833
Jul-03	151.6	90.1	1.1984	1.2359	1.2157
Aug-03	151.3	94.1	1.1960	1.2908	1.2396
Sep-03	152.0	88.2	1.2016	1.2099	1.2054
Oct-03	147.4	97.8	1.1652	1.3416	1.2463
Nov-03	142.7	93.0	1.1281	1.2757	1.1960
Dec-03	142.9	95.8	1.1296	1.3141	1.2145

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 15, Section 3.2
Using Regional Indices SERIES ID: WPU0573 Light Fuel Oils (as of 03/14/13) and WPU0543 Industrial Electric Power (as of 03/14/13)

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Jan-04	143.1	106.8	1.1312	1.4650	1.2848
Feb-04	143.1	100.8	1.1312	1.3827	1.2469
Mar-04	143.1	107.8	1.1312	1.4787	1.2911
Apr-04	143.1	115.2	1.1312	1.5802	1.3378
May-04	144.2	116	1.1399	1.5912	1.3475
Jun-04	152.4	111.5	1.2047	1.5295	1.3541
Jul-04	152.2	119.3	1.2032	1.6365	1.4025
Aug-04	154.0	131.1	1.2174	1.7984	1.4846
Sep-04	154.0	136.8	1.2174	1.8765	1.5206
Oct-04	145.8	161.7	1.1526	2.2181	1.6427
Nov-04	144.9	153.6	1.1455	2.1070	1.5878
Dec-04	146.2	133.8	1.1557	1.8354	1.4684
Jan-05	148.9	138.5	1.1771	1.8999	1.5096
Feb-05	148.0	146	1.1700	2.0027	1.5530
Mar-05	148.1	169.4	1.1708	2.3237	1.7011
Apr-05	148.7	170.9	1.1755	2.3443	1.7131
May-05	151.1	165.3	1.1945	2.2675	1.6881
Jun-05	159.7	180.6	1.2625	2.4774	1.8213
Jul-05	162.1	186.2	1.2814	2.5542	1.8669
Aug-05	162.5	194.5	1.2846	2.6680	1.9210
Sep-05	162.8	209.9	1.2870	2.8793	2.0194
Oct-05	159.5	252.0	1.2609	3.4568	2.2710
Nov-05	161.1	199.1	1.2735	2.7311	1.9440
Dec-05	161.4	193.6	1.2759	2.6557	1.9106
Jan-06	167.0	191.8	1.3202	2.6310	1.9231
Feb-06	168.6	190.0	1.3328	2.6063	1.9186
Mar-06	167.4	199.2	1.3233	2.7325	1.9715
Apr-06	169.6	221.9	1.3407	3.0439	2.1242
May-06	170.8	231.4	1.3502	3.1742	2.1892
Jun-06	181.2	238.1	1.4324	3.2661	2.2759
Jul-06	181.9	231.6	1.4379	3.1770	2.2379
Aug-06	180.2	241.4	1.4245	3.3114	2.2925
Sep-06	181.0	203.1	1.4308	2.7860	2.0542
Oct-06	171.2	198.1	1.3534	2.7174	1.9808
Nov-06	167.2	198.2	1.3217	2.7188	1.9644
Dec-06	167.8	200.4	1.3265	2.7490	1.9808
Jan-07	171.9	180.0	1.3589	2.4691	1.8696
Feb-07	175.7	191.5	1.3889	2.6269	1.9584
Mar-07	172.1	215.1	1.3605	2.9506	2.0919
Apr-07	173.1	231.8	1.3684	3.1797	2.2016
May-07	179.2	225.3	1.4166	3.0905	2.1866
Jun-07	186.7	222.4	1.4759	3.0508	2.2003
Jul-07	187.0	237.8	1.4783	3.2620	2.2988
Aug-07	187.6	225.5	1.4830	3.0933	2.2237
Sep-07	188.4	238.9	1.4893	3.2771	2.3117
Oct-07	182.7	243.3	1.4443	3.3374	2.3151
Nov-07	180.3	288.2	1.4253	3.9534	2.5882
Dec-07	180.0	266.7	1.4229	3.6584	2.4513
Jan-08	181.9	273.8	1.4379	3.7558	2.5042
Feb-08	180.0	280.2	1.4229	3.8436	2.5364

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 15, Section 3.2
Using Regional Indices SERIES ID: WPU0573 Light Fuel Oils (as of 03/14/13) and WPU0543 Industrial Electric Power (as of 03/14/13)

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Mar-08	183.1	339.6	1.4474	4.6584	2.9245
Apr-08	185.2	352.5	1.4640	4.8354	3.0149
May-08	189.5	384.9	1.4980	5.2798	3.2377
Jun-08	191.9	410.5	1.5170	5.6310	3.4094
Jul-08	196.1	423.8	1.5502	5.8134	3.5113
Aug-08	197.1	343.9	1.5581	4.7174	3.0114
Sep-08	195.9	335.1	1.5486	4.5967	2.9507
Oct-08	193.0	279.0	1.5257	3.8272	2.5844
Nov-08	187.7	218.2	1.4838	2.9931	2.1781
Dec-08	188.3	163.0	1.4885	2.2359	1.8323
Jan-09	190.3	159.8	1.5043	2.1920	1.8207
Feb-09	190.3	145.6	1.5043	1.9973	1.7311
Mar-09	187.6	136.8	1.4830	1.8765	1.6640
Apr-09	186.9	159.9	1.4775	2.1934	1.8068
May-09	190.5	158.6	1.5059	2.1756	1.8140
Jun-09	193.3	183.7	1.5281	2.5199	1.9843
Jul-09	196.2	165.2	1.5510	2.2661	1.8799
Aug-09	194.7	196.1	1.5391	2.6900	2.0685
Sep-09	194.9	186.6	1.5407	2.5597	2.0094
Oct-09	189.9	193.3	1.5012	2.6516	2.0304
Nov-09	186.0	207.8	1.4704	2.8505	2.1052
Dec-09	186.0	197.5	1.4704	2.7092	2.0402
Jan-10	186.3	220.7	1.4727	3.0274	2.1879
Feb-10	186.1	200.2	1.4711	2.7462	2.0577
Mar-10	189.0	217.0	1.4941	2.9767	2.1761
Apr-10	188.8	231.5	1.4925	3.1756	2.2667
May-10	192.0	226.0	1.5178	3.1001	2.2457
Jun-10	197.8	212.4	1.5636	2.9136	2.1846
Jul-10	199.8	209.3	1.5794	2.8711	2.1736
Aug-10	200.8	221.4	1.5874	3.0370	2.2542
Sep-10	200.0	220.0	1.5810	3.0178	2.2420
Oct-10	194.6	235.8	1.5383	3.2346	2.3186
Nov-10	190.9	245.3	1.5091	3.3649	2.3628
Dec-10	191.4	250.0	1.5130	3.4294	2.3945
Jan-11	193.1	260.4	1.5265	3.5720	2.4674
Feb-11	194.4	278.8	1.5368	3.8244	2.5891
Mar-11	195.0	307.5	1.5415	4.2181	2.7727
Apr-11	194.1	325.1	1.5344	4.4595	2.8800
May-11	196.9	315.1	1.5565	4.3224	2.8288
Jun-11	205.7	316.9	1.6261	4.3471	2.8777
Jul-11	215.3	311.5	1.7020	4.2730	2.8846
Aug-11	216.6	296.9	1.7123	4.0727	2.7981
Sep-11	215.8	306.5	1.7059	4.2044	2.8552
Oct-11	206.6	299.6	1.6332	4.1097	2.7724
Nov-11	204.0	322.7	1.6126	4.4266	2.9071
Dec-11	204.4	301.0	1.6158	4.1289	2.7719
Jan-12	201.1	308.8	1.5897	4.2359	2.8070
Feb-12	200.3	316.5	1.5834	4.3416	2.8522
Mar-12	199.8	330.8	1.5794	4.5377	2.9403
Apr-12	198.1	327.1	1.5660	4.4870	2.9096

Calculation of Energy Escalation Factor - Reference NUREG-1307, Revision 15, Section 3.2
Using Regional Indices SERIES ID: WPU0573 Light Fuel Oils (as of 03/14/13) and WPU0543 Industrial Electric Power (as of 03/14/13)

			REBASED TO 1986 = 100		
	PPI for Fuels & Related Products (2000 = 100) (P) =Industrial Energy Power	PPI for Light Fuel Oils (2000=100) (F) = Light Fuel Oils	PPI for Fuels & Related Products (2000 = 100) (P) =Industrial Energy Power BWR wt = 0.54	PPI for Light Fuel Oils (2000=100) (F) = Light Fuel Oils BWR wt = 0.46	Energy Escalation Factor (E) for BWR (Humboldt)
May-12	201.5	315.6	1.5929	4.3292	2.8516
Jun-12	207.7	284.6	1.6419	3.9040	2.6825
Jul-12	221.5	287.9	1.7510	3.9492	2.7622
Aug-12	222.1	313.4	1.7557	4.2990	2.9257
Sep-12	222.8	330.4	1.7613	4.5322	3.0359
Oct-12	214.1	334.1	1.6925	4.5830	3.0221
Nov-12	210.9	311.6	1.6672	4.2743	2.8665
Dec-12	213.0	302.6	1.6838	4.1509	2.8187

Nov 12 through Dec 12 are Preliminary Values from PPI Indices

Based on Base Year 2000 being the indice values Dec 1999, Jan 2013 base will be Dec 2012

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 15, Section 3.1
Using Regional Indices SERIES ID: CIU2010000000240I (as of 03/14/13)
Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (2005=100)	Labor Escalation Factor
Dec-05	100	2.06000
Jan-06		
Feb-06		
Mar-06	100.6	2.07236
Apr-06		
May-06		
Jun-06	101.8	2.09708
Jul-06		
Aug-06		
Sep-06	102.5	2.11150
Oct-06		
Nov-06		
Dec-06	103	2.12180
Jan-07		
Feb-07		
Mar-07	104.2	2.14652
Apr-07		
May-07		
Jun-07	104.9	2.16094
Jul-07		
Aug-07		
Sep-07	105.7	2.17742
Oct-07		
Nov-07		
Dec-07	106.5	2.19390
Jan-08		
Feb-08		
Mar-08	107.8	2.22068
Apr-08		
May-08		
Jun-08	108.4	2.23304
Jul-08		
Aug-08		
Sep-08	109.3	2.25158
Oct-08		
Nov-08		
Dec-08	109.4	2.25364
Jan-09		
Feb-09		
Mar-09	109.9	2.26394
Apr-09		
May-09		
Jun-09	110	2.26600
Jul-09		
Aug-09		
Sep-09	110.3	2.27218
Oct-09		
Nov-09		

Calculation of Labor Escalation Factor - Reference NUREG-1307, Revision 15, Section 3.1
Using Regional Indices SERIES ID: CIU2010000000240I (as of 03/14/13)
Note 1: The Base Labor factor was re-indexed in December 2005, at which time the index was reset to 100.

	Employment Cost Indust West Region Private Industry (2005=100)	Labor Escalation Factor
Dec-05	100	2.06000
Dec-09	110.6	2.27836
Jan-10		
Feb-10		
Mar-10	111.3	2.29278
Apr-10		
May-10		
Jun-10	111.7	2.30102
Jul-10		
Aug-10		
Sep-10	112.3	2.31338
Oct-10		
Nov-10		
Dec-10	112.5	2.31750
Jan-11		
Feb-11		
Mar-11	113.5	2.33810
Apr-11		
May-11		
Jun-11	114.3	2.35458
Jul-11		
Aug-11		
Sep-11	114.6	2.36076
Oct-11		
Nov-11		
Dec-11	115.1	2.37106
Jan-12		
Feb-12		
Mar-12	115.7	2.38342
Apr-12		
May-12		
Jun-12	116.3	2.39578
Jul-12		
Aug-12		
Sep-12	116.9	2.40814
Oct-12		
Nov-12		
Dec-12	116.9	2.40814

Development of Burial Escalation
Developed from NUREG-1307 Revision 15
Table 2.1 "VALUES OF B SUB-X AS A FUNCTION OF LLW BURIAL SITE, WASTE VENDOR, AND YEAR" (Summary for non-Atlantic Compact)
Revised to Bx Values for Generic LLW Disposal Site are assumed to be the same as that provided for the Atlantic Compact, for lack of a better alternative at this time
Revised to Bx Values for Generic LLW Disposal Site are assumed to be Combination of Compact-Affliated and Non-Compact Facility for HBPP

	BWR Burial Costs (South Carolina)	BWR Restated to 1986 = 100
1986	1.561	1.0000
1987		
1988	1.831	1.1730
1989		
1990		
1991	2.361	1.5125
1992		
1993	9.434	6.0436
1994	9.794	6.2742
1995	10.42	6.6752
1996	10.379	6.6489
1997	13.837	8.8642
1998	13.948	8.9353
1999		
2000	16.244	10.4061
2001	16.474	10.5535
2002	16.705	10.7015
2003	17.337	11.1063
2004	17.970	11.5119
2005	19.391	12.4222
2006	20.813	13.3331
2007	21.658	13.8744
2008	22.504	14.4164
2009	23.430	15.0096
2010	24.356	15.6028
2011	25.825	16.5439
2012	27.295	17.4856
2013	28.765	18.4273

Table 2.1 Note (e) Bx values for the generic site are assumed to be the same as that provided for the Atlantic Compact for lack of a better alternative at this time
Note (f) Effective with NUREG-1307, Revision 8 (Ref.3) an alternative disposal option was introduced in which the bulk of the LLW is assumed to be dispositioned by waste vendors and/or disposed of at a non-compact disposal facility
Note (g) Effective with NUREG1307, Revision 15, the nomenclature for the two disposal options, referred to as "Direct Disposal" and "Direct Disposal with Vendors" in previous revisions of NUREG-1307, is changed to "Compact-Affiliated Disposal Facility Only" and "Combination of Comapct-Affiliated and Non-Compact Disposal Facilities" to better describe the options.

2013 has no information in NUREG-1307 Rev 15. 2013 is an estimate that is calculated by by applying the average % change between 2010 and 2012 and adding to the 2012 base

Nuclear Decommissioning Cash Flow for Assurance Funding
(1 page)

Humboldt Bay Power Plant
Decommissioning Cash Flow (Note 1)
2013 Dollars

Year	NRC	NON - NRC	SPENT FUEL MANAGEMENT	TOTAL	Cummulative Decommission Estimate		
1996	$1,678,452			$1,678,452	$1,678,452		
1997	$8,663,216			$8,663,216	$10,341,668		
1998	$5,573,757		$344,408	$5,918,165	$16,259,833		
1999	$723,490		$2,281,454	$3,004,944	$19,264,777		
2000	$85,241		$2,736,091	$2,821,332	$22,086,109		
2001	$89,543		$398,012	$487,555	$22,573,664		
2002	$994,127		$113,704	$1,107,831	$23,681,495		
2003	$494,838		$2,539,476	$3,034,314	$26,715,809		
2004	$491,070		$1,444,628	$1,935,698	$28,651,507		
2005	$161,506		$1,671,769	$1,833,275	$30,484,782		
2006	$1,073,612		$3,546,617	$4,620,229	$35,105,011		
2007	$4,474,247		$9,240,172	$13,714,419	$48,819,430		
2008	$12,590,383		$28,485,988	$41,076,371	$89,895,801		
2009	$32,901,391		$3,179,956	$36,081,347	$125,977,148		
2010	$56,957,494		$5,734,776	$62,692,270	$188,669,418		
2011	$60,585,531		$5,495,157	$66,080,688	$254,750,106		
2012	$80,966,451	$0	$5,120,117	$86,086,569	$340,836,675	$340,836,675	Actual
2013	$159,567,437	$380,160	$4,950,314	$164,897,911	$505,734,586	$612,788,405	Actual + Market Value
2014	$178,650,426	$380,160	$4,810,683	$183,841,269	$689,575,855	$608,101,808	Actual + Equivalent Liquidation
2015	$98,292,470	$126,720	$4,810,683	$103,229,873	$792,805,728		
2016	$87,902,768	$0	$5,081,813	$92,984,581	$885,790,309		
2017	$54,044,696	$0	$4,874,885	$58,919,581	$944,709,890		
2018	$32,096,192	$0	$4,874,885	$36,971,077	$981,680,967		
2019	$5,797,186	$0	$4,595,622	$10,392,808	$992,073,775		
2020	$839,389	$0	$4,799,354	$5,638,743	$997,712,518		
2021	$420,574	$0	$4,595,622	$5,016,196	$1,002,728,714		
2022	$420,574	$0	$4,595,622	$5,016,196	$1,007,744,910		
2023	$439,198	$0	$4,595,622	$5,034,820	$1,012,779,730		
2024	$550,712	$0	$5,194,254	$5,744,966	$1,018,524,696		
2025	$1,295,619	$0	$9,384,682	$10,680,301	$1,029,204,997		
TOTAL	$888,821,591	$887,040	$139,496,366	$1,029,204,997			

1) Cash Flow is based on construction of ISFSI and Fuel removed from HBPP in 2025 (Assumes DOE Used Fuel Repository opens 2024 allowing HBPP Fuel to be shipped during 2024-2025)

2) Trust Account Value of $267.3 million is Expense Equivalent Liquidation Value (Includes Tax Break)
Market Value of Trust as of 12/12 was $272.0 million, actual expended as of 12/12 was $340.8 million

Decommissioning Project Report
for the Humboldt Bay Power Plant Unit 3
(121 pages)

DECOMMISSIONING PROJECT REPORT FOR THE HUMBOLDT BAY POWER PLANT UNIT 3 2012 - 2024

December 2012

STUDY REVISION PAGE

Title:	**Decommissioning Project Report for the Humboldt Bay Power Plant Unit 3, 2012-2024**

Revision Signatures

Steve Shelanskey Robert Kapus	12/20/2012	Kerry Rod	12/20/2012
Prepared by	Date	Approved by	Date
Brooke Winterton	12/20/2012		
Checked by	Date		

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Issued	0	12/20/12	R. Kapus S. K. Shelanskey	All	New

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EXECUTIVE SUMMARY

Pacific Gas and Electric Company (PG&E) has prepared this site-specific Decommissioning Project Report (DPR) for decommissioning the Humboldt Bay Power Plant Unit 3 (HBPP Unit 3) to identify the cost and schedule to complete decommissioning and license termination of HBPP Unit 3. This DPR incorporates the site specific decommissioning tasks and detailed plans which have been identified as a result of the ongoing implementation of the decommissioning effort. The projected total cost to decommission HBPP Unit 3, including costs spent to date and a 10% to 25% line item contingency applied to remaining work depending on the degree of difficulty, is estimated to be approximately $982.4 million (2011 dollars).

The DPR assumes the removal of identified contaminated and activated plant components and structural materials, and that decommissioning will be accomplished within the 60-year period required by current Nuclear Regulatory Commission (NRC) regulations. The DPR assumes that the spent fuel remains in storage at the site until such time that the transfer to a United States Department of Energy (DOE) facility can be completed. Once the spent fuel transfer is complete, the storage facility will be decommissioned.

The major cost contributors to the remaining decommissioning cost are (1) changes to the scope of the planned decommissioning work, including removal of the reactor caisson, intake and discharge canal remediation and an assumed four year extension of the time spent fuel will be stored on site, and (2) higher pricing from competitive bids received from the industry, staffing (labor plus per diem), safety and field oversight of removal of alpha contaminated plant systems and components, spent fuel storage, final site surveys, tools and equipment, and the disposition of waste generated in the decontamination and demolition of HBPP Unit 3. The estimate is based on several key assumptions, including regulatory requirements, estimating methodology, contingency requirements, and site restoration requirements. A complete discussion of the assumptions used in this estimate is presented in Section 3.

Methodology

In March, 2009, PG&E authorized the preparation by TLG Services, Inc. of a cost study for decommissioning HBPP Unit 3 (2009 Cost Study).The methodology used to develop the 2009 decommissioning cost estimates for HBPP Unit 3 followed the basic approach originally presented in the "Guidelines for Producing Commercial Nuclear Power Plant Decommissioning Cost Estimates," (T.S. LaGuardia et al., AIF/NESP-036, May 1986.) This reference describes a unit factor method for determining decommissioning activity costs. This DPR uses a different methodology: specific bid pricing and experience gained by PG&E after four years of full-scale decommissioning.

Over the past four years, the majority of decommissioning work has been installation of site infrastructure and removal of systems and components, known as the Plant System Removal Phase. In this phase, PG&E established a self-perform arrangement in which PG&E provided direct supervision of a contracted work force performing work on a Time-And-Material basis or on a Cost-Plus basis. This type of contracting arrangement was optimal, due to several factors

including the dynamics of maintaining specific plant systems in service while others were removed from service and the configuration control that must be maintained; removal of large components with known high levels of radiation that required slow and methodical disassembly; and removal of contaminated systems under special engineering controls and requirements. Careful planning and special measures were taken to accomplish this work with maximum safety to the workers and the public. A work scope of this nature, wherein uncertainty exists as to the exact effort that is required to perform all tasks, lends itself to Time-And-Material or Cost-Plus contracting. This phase is now largely completed.

PG&E is currently transitioning from self-perform to lump sum fixed cost contracting, commensurate with the change in nature of the work.

As HBPP Unit 3 Decommissioning transitions from the Plant System Removal Phase, where work scope was dynamic with significant uncertainty, to the Civil Works Projects Phase, where work scope is well defined, the remaining decommissioning work has been analyzed and then described in major, well defined Civil Works Projects. These Civil Works Projects include Turbine Building Demolition, Nuclear Facilities Demolition and Excavation, Intake and Discharge Canal Remediation, Office Facility Demobilization, and Final Site Restoration. Detailed bid specifications were developed for each project and then bids were solicited from multiple vendors. The use of competitively bid, fixed price contracts assures PG&E that the costs are fully understood and provides for some financial risk mitigation.

Remaining Costs

The cost estimate for the remaining work at HBPP Unit 3 is based on industry pricing in lieu of a budgetary cost estimate. This cost estimate is backed by competitive bids and four years of successful decommissioning.

A detailed breakdown of these major cost contributors to the decommissioning cost estimate is reported in the table below and in Section 3 of this document.

SUMMARY OF DECOMMISSIONING COST CONTRIBUTORS
(Thousands, 2011 Dollars)

Cost Category	Percentage	Amount
General Staffing (Excludes Caisson)	14%	100,167
Remainder of Plant Systems	8%	56,693
Site Infrastructure	0%	2,074
Specific Project Costs (Excludes Disposal / Caisson / Canal)	14%	104,254
Waste Disposal (Excludes Caisson / Canals)	10%	74,011
Small Value Contracts	5%	36,042
Spent Fuel Management	9%	62,608
Contingency (Excludes Caisson / Canals)	6%	46,552
Caisson (including Disposal & Contingency)	26%	191,627
Canal Remediation (including Disposal & Contingency)	7%	47,408
Common Site Support - Caisson and Canals	1%	6,196
TOTAL	100%	727,633

1 INTRODUCTION

1.1 OBJECTIVE

The objective of this Decommissioning Project Report (DPR) is to provide an updated, comprehensive evaluation of the remaining activities, costs, and schedule to decommission HBPP Unit 3 as well as to provide a status of the work completed to date.

1.2 PRIOR HISTORY

The site on which HBPP Unit 3 is located was initially developed in around 1950 by PG&E as a fossil based electrical generating station. Attachment A, Site History of Humboldt Bay Power Plant Unit 3, provides a photographic history of the site beginning in the mid-1940s. HBPP Unit 3 is a 65-megawatt (MW) nuclear reactor that began commercial operation in 1963 and was taken off-line in 1976 to refuel and to make seismic modifications. In 1979, prior to the completion and acceptance of the seismic modifications, the nuclear incident at Three-Mile Island occurred and, as a result, the Nuclear Regulatory Commission (NRC) mandated a comprehensive series of other modifications that would have required additional investment. The California Public Utilities Commission (CPUC) approved an early decommissioning plan for HBPP Unit 3 because the additional investments required by the NRC made restarting the plant uneconomic.

Pacific Gas and Electric Company (PG&E) placed the plant in a long term storage and monitoring condition known as SAFSTOR. During this period, the plant was maintained to ensure the integrity of its safety systems and to ensure that the health and safety of the public, environment, and work force were protected. Several cost studies were performed between 1978 and 2009. PG&E hired a specialty consultant, TLG Services, Inc., to prepare the 2001 SAFSTOR Decommissioning Study that was issued in 1997. The decommissioning cost study and subsequent studies by TLG provided PG&E with sufficient information to prepare the financial planning documents for decommissioning, as required by the Nuclear Regulatory Commission (NRC). The cost studies provided estimates that were based on detailed studies of the unique features of the facility and accounted for lessons learned at other facilities that had undergone similar decommissionings. These estimates were not detailed engineering documents, but were financial analyses prepared in advance of the detailed engineering that would be required to carry out the decommissioning. The latest cost study (2009 Cost Study) was approved by the CPUC in the 2009 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP).

While in SAFSTOR, PG&E planned and constructed an Independent Spent Fuel Storage Installation (ISFSI). Once construction and testing were completed, PG&E transferred the spent nuclear fuel from the spent fuel pool to the ISFSI, finishing in 2008. The CPUC found PG&E's costs incurred in connection with construction of the ISFSI reasonable in the 2009 NDCTP.

1.3 PLANT DESCRIPTION

HBPP Unit 3 is located approximately four miles southwest of Eureka, California. The site consists of approximately 143 acres located on the mainland shore of Humboldt Bay. Figure 1.1 shows the layout of the site and the surrounding area. The most current aerial view of the site is shown in Attachment A, Site History of HBPP Unit 3.

The Nuclear Steam Supply System (NSSS) for HBPP Unit 3 consisted of a single cycle, natural circulation, boiling water reactor and the associated control and support systems. The generating unit had a rated core thermal power of 220 MWth (thermal) with a corresponding net electrical output of 65 MWe (electric).

The NSSS is located within the "primary containment structure." The primary containment is located mostly below grade and consists of a drywell vessel and a suppression chamber. Both the drywell and the suppression chamber area are located within a reinforced concrete caisson. The drywell vessel is centrally located in the caisson and serves as the primary containment vessel. The suppression chamber is constructed of reinforced concrete and lined with carbon steel plate. Six vent pipes connect the drywell to a common ring header at the top of the suppression chamber. Downcomers drop from the ring header and terminate below the normal water level of the suppression pool. As a system, the drywell, suppression chamber, and interconnecting piping were designed to reduce the pressure increase in the event of a local process system piping failure. Other supporting systems included the turbine-generator system that converted heat produced in the reactor to electrical energy; a closed feedwater cycle whereby steam was condensed and the condensate/feedwater was returned to the reactor vessel; and a Circulating Water System (CWS) that delivered the water required to remove the heat load from the main condenser and other auxiliary equipment and returns it to the bay through the discharge pipes and a canal.

At the time that HBPP Unit 3 entered commercial service in 1963, the nuclear fuel assemblies utilized stainless steel as the fuel rod cladding. The stainless steel-clad fuel experienced gross cladding failures during operation. These failures were severe enough that radioactive fuel was released from the cladding and dispersed throughout numerous plant systems, contaminating these systems with alpha emitting radionuclides (i.e., transuranic elements). HBPP Unit 3 completed the transition from stainless steel to zircaloy assemblies in 1969.

Over the SAFSTOR period, as beta and gamma emitting radionuclides have decayed, alpha has become a more dominant factor in dose contribution. Because alpha causes more severe biological damage when internal exposure occurs, the potential radiological dose consequences are likewise more severe. This issue leads to a unique, plant-specific concern for HBPP Unit 3 decommissioning. The extent of the alpha contamination requires additional radiological controls and will reduce the efficiency of component removal activities.

1.4 NRC LICENSE TERMINATION

1.4.1 License Termination Plan

There are two NRC-issued licenses that pertain to HBPP Unit 3: one issued under 10 CFR §50 pertaining to operation of the plant and the other issued under 10 CFR §72 pertaining to the storage of spent nuclear fuel and operation of the ISFSI. Once the decommissioning effort is complete, PG&E will petition the NRC to terminate the 10 CFR §50 license. At least two years prior to the anticipated date of license termination, a License Termination Plan (LTP) is required. Submitted as a supplement to the Final Safety Analysis Report (FSAR) or its equivalent, the plan must include: a site characterization, description of the remaining dismantling activities, plans for

site remediation, procedures for the final radiation survey, designation of the end use of the site, an updated cost estimate to complete the decommissioning, and any associated environmental concerns. The NRC will notice the receipt of the plan in the Federal Register, make the plan available for public comment, and schedule a local hearing. LTP approval will be subject to any conditions and limitations as deemed appropriate by the NRC.

Incorporated into the LTP is the Final Survey Plan. This plan identifies the radiological surveys to be performed once the decontamination activities are completed and is developed using the guidance provided in the "Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)." This document incorporates the statistical approaches to survey design and data interpretation used by the Environmental Protection Agency (EPA). It also identifies state-of-the-art, commercially available instrumentation and procedures for conducting radiological surveys. Use of this guidance ensures that the surveys are conducted in a manner that provides a high degree of confidence that applicable NRC criteria are satisfied. Once the survey is complete, the results are provided to the NRC in a format that can be verified. The NRC then reviews and evaluates the information, performs an independent confirmation of radiological site conditions, and makes a determination on final termination of the license.

The NRC will terminate the 10 CFR §50 operating license if it determines that site remediation has been performed in accordance with the LTP and that the terminal radiation survey and associated documentation demonstrate that the facility is suitable for release.

1.4.2 Radiological Criteria for License Termination

In 1997, the NRC published Subpart E, "Radiological Criteria for License Termination," amending 10 CFR §20. This subpart provides radiological criteria for releasing a facility for unrestricted use. The regulation states that the site can be released for unrestricted use if radioactivity levels are such that the average member of a critical group would not receive a Total Effective Dose Equivalent (TEDE) in excess of 25 millirem (mR) per year, and provided that residual radioactivity has been reduced to levels that are As Low as Reasonably Achievable (ALARA).

The NRC and the EPA differ on the amount of residual radioactivity considered acceptable in site remediation. The EPA has two limits that apply to radioactive materials. An EPA limit of 15 mR per year is derived from criteria established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund). An additional limit of 4 mR per year, as defined in 40 CFR §141.16, is applied to the drinking water exposure pathway.

On October 9, 2002, the NRC signed an agreement with the EPA on the radiological decommissioning and decontamination of NRC-licensed sites. The Memorandum of Understanding (MOU) provides that EPA will defer exercise of authority under CERCLA for the majority of facilities decommissioned under NRC authority. The MOU also includes provisions for NRC and EPA consultation for certain sites when, at the time of license termination, (1) groundwater contamination exceeds EPA-permitted levels; (2) NRC contemplates restricted release of the site; and/or (3) residual radioactive soil concentrations exceed levels defined in the MOU. The MOU does not impose any new requirements on NRC licensees and should reduce the involvement of the EPA with NRC licensees who are decommissioning. Most sites are

expected to meet the NRC criteria for unrestricted use, and the NRC believes that only a few sites will have groundwater or soil contamination in excess of the levels specified in the MOU that trigger consultation with the EPA. However, if there are other hazardous materials on the site, the EPA may be involved in the cleanup. As such, the possibility of dual regulation remains for certain licensees. The present study does not include any costs for this occurrence.

Early in the decommissioning process, PG&E conducted extensive studies on projected use of the land upon which HBPP was constructed. The purpose of the studies was, in part, to evaluate the radiological impact on people who would work or inhabit the land after the operating license for the plant was terminated. By determining the land use, PG&E could calculate the residual radioactive contamination levels below which the radiation doses from the ground would meet the criteria from the NRC and EPA. The 2009 Cost Study estimate for remediation of soils and structures was based on the NRC limit of 25 mR per year and a land use that included control of the site for at least an additional 30 years beyond license termination.

Subsequent to the 2009 Cost Study, PG&E has engaged stakeholders and reviewed the lessons learned for remediation of radioactivity at other facilities. Although NRC regulations and the MOU between the NRC and EPA would allow for a license termination once the 25 mR per year criteria was met, PG&E decided that a more prudent criteria was the lower EPA limit and a land use that would allow for immediate release of the property for unrestricted public habitation. This cost study is based on the lower limits.

1.5 STATE AND LOCAL APPROVALS

While the NRC has the authority to terminate the 10 CFR §50 license, State and local authorities and the public also have input into decommissioning activities. For example, the NRC provides opportunities for public involvement during its decommissioning determinations. State agencies such as the California Coastal Commission, the California Environmental Protection Agency Department of Toxic Substance Control, and the State Water Control Board also have the opportunity to address end-state site conditions. To better anticipate the direction expected to be provided by State and local sources, PG&E established communications directly with the governmental entities and helped form a Citizens' Advisory Board (CAB).

Meeting Date	Agency	Summary
3/6/2012	Joint meeting with Department of Toxic Substances Control (DTSC) and North Coast Regional Water Quality Control Board (NCRWQCB) (Cleanup Section)	Provided overview of decommissioning project and DTSC-lead remediation project to NCRWQCB staff and discussed agency coordination requirements to be considered during project planning.
4/5/2012	NCRWQCB	Discussed approach to permitting of planned Ground Water Treatment System (GWTS) to treat stormwater and water from construction dewatering, and status of Liquid Radwaste (LRW) system NPDES discharge.
7/12/2012	US Army Corps of Engineers	Discussed permitting issues related to the dredging of the Intake/Discharge canals and Fisherman's Channel
8/3/2012	California Coastal Commission (CCC)	Meeting to discuss overall permitting approach and schedule for necessary permits for decommissioning , and to discuss application for immaterial Coastal Development Permit (CDP) amendment for construction of Ground Water Treatment System (GWTS) and establish schedule for CCC approval.
9/4/2012	DTSC	Provided overview of decommissioning project, and key issues, including slurry wall installation, canal remediation and final site restoration; discussed planned permitting activities and relationship to DTSC remediation planning process.
Meeting Date	**Agency**	**Summary**
9/6/2012 HBPP site	CCC	Provided overview of

visit		decommissioning project and key issues, including slurry wall installation, canal remediation and final site restoration; discussed planned permitting activities.
11/8/2012	CCC	Discussed change in decommissioning project plan to include removal of reactor caisson and discussed status and schedule for developing the CDP application for the spent fuel pool/caisson removal.
11/29/2012	Joint meeting with CCC & DTSC	Joint meeting to discuss decommissioning permitting activities and coordination of DTSC remediation planning process with CCC permitting process; pre-application meeting regarding CDP amendment for Caisson and spent fuel pool removal.
12/11/2012	NCRWQCB	Provided overview of decommissioning project, and key issues, including slurry wall installation, canal remediation, final site restoration and planned permitting activities; discussed status of NPDES permit and planned termination of LRW discharge, and status of construction general stormwater permit and associated construction of GWTS.

1.6 ISFSI OPERATIONS AND DEMOLITION

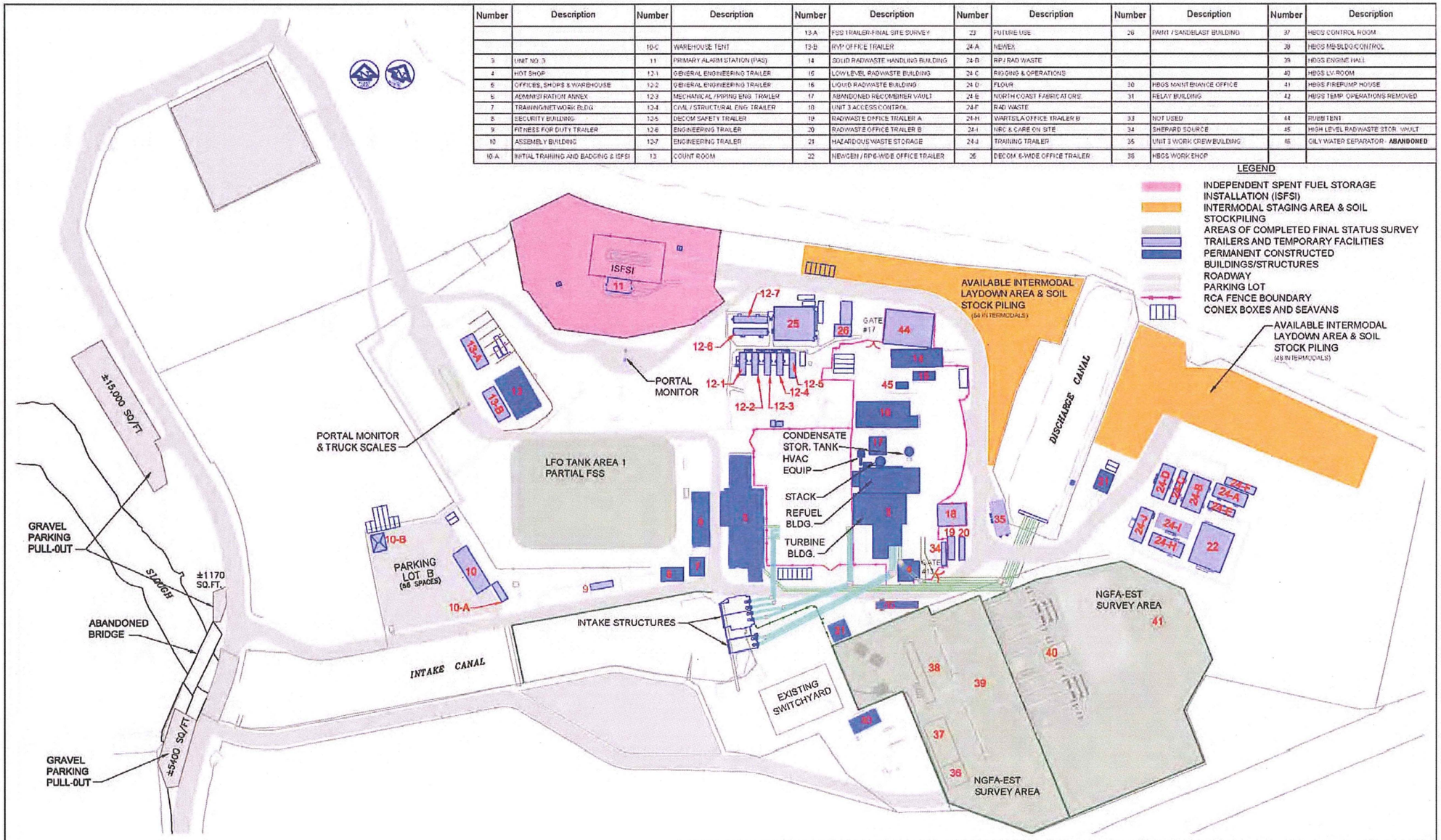
The ISFSI will continue to operate under a separate and independent license (10 CFR §72) following the termination of the §50 operating license. The ISFSI will continue to operate until all spent fuel and Greater Than Class C (GTCC) material has been transferred to the DOE. This study assumes that the DOE will commence transferring all spent fuel from HBPP Unit 3 in the year 2024.

At the conclusion of the transfer process, the ISFSI will be decommissioned. The storage modules are not assumed to be activated from the storage of fuel, due to the age of the fuel when placed in the modules and the relatively short residence time. Consequently, this estimate does not include the cost of any significant decontamination of the ISFSI facility. Confirmation of the radiological status will be obtained through surveys and sampling of the modules.

The NRC will terminate the ISFSI 10 CFR §72 license when it determines that site remediation has been performed in accordance with a license termination plan and the terminal radiation survey and associated documentation demonstrate that the structure is suitable for release. Once the requirements are satisfied, the NRC will be in a position to terminate the license for the ISFSI.

FIGURE 1.1
LAYOUT OF THE NUCLEAR PLANT SITE AND SURROUNDING AREA

Number	Description	Number	Description	Number	Description	Number	Description	Number	Description	Number	Description
				13-A	FSS TRAILER-FINAL SITE SURVEY	23	FUTURE USE	26	PAINT / SANDBLAST BUILDING	37	HBGS CONTROL ROOM
		10-C	WAREHOUSE TENT	13-B	RVP OFFICE TRAILER	24-A	NEWEX			38	HBGS MS-BLDG/CONTROL
3	UNIT NO. 3	11	PRIMARY ALARM STATION (PAS)	14	SOLID RADWASTE HANDLING BUILDING	24-B	RP / RAD WASTE			39	HBGS ENGINE HALL
4	HOT SHOP	12-1	GENERAL ENGINEERING TRAILER	15	LOW LEVEL RADWASTE BUILDING	24-C	RIGGING & OPERATIONS			40	HBGS LV-ROOM
5	OFFICES, SHOPS & WAREHOUSE	12-2	GENERAL ENGINEERING TRAILER	16	LIQUID RADWASTE BUILDING	24-D	FLOUR	30	HBGS MAINTENANCE OFFICE	41	HBGS FIREPUMP HOUSE
6	ADMINISTRATION ANNEX	12-3	MECHANICAL / PIPING ENG. TRAILER	17	ABANDONED RECOMBINER VAULT	24-E	NORTH COAST FABRICATORS	31	RELAY BUILDING	42	HBGS TEMP. OPERATIONS REMOVED
7	TRAINING/NETWORK BLDG.	12-4	CIVIL / STRUCTURAL ENG. TRAILER	18	UNIT 3 ACCESS CONTROL	24-F	RAD WASTE				
8	SECURITY BUILDING	12-5	DECOM SAFETY TRAILER	19	RADWASTE OFFICE TRAILER A	24-H	WARTSILA OFFICE TRAILER B	33	NOT USED	44	RUBB TENT
9	FITNESS FOR DUTY TRAILER	12-6	ENGINEERING TRAILER	20	RADWASTE OFFICE TRAILER B	24-I	NRC & CARE ON SITE	34	SHEPARD SOURCE	45	HIGH LEVEL RADWASTE STOR. VAULT
10	ASSEMBLY BUILDING	12-7	ENGINEERING TRAILER	21	HAZARDOUS WASTE STORAGE	24-J	TRAINING TRAILER	35	UNIT 3 WORK CREW BUILDING	46	OILY WATER SEPARATOR - **ABANDONED**
10-A	INITIAL TRAINING AND BADGING & ISFSI	13	COUNT ROOM	22	NEWGEN / RP 6-WIDE OFFICE TRAILER	25	DECOM 6-WIDE OFFICE TRAILER	36	HBGS WORK SHOP		



HBPP CIVIL WORKS PROJECT	DATE	DRAWING	SHEET	REV
CAMPUS MAP	6/28/12	SK–CIVIL–001	1 8 of	0

2 DECOMMISSIONING PLANNING AND ACTIVITIES

2.1 INITIAL PLANNING

In 2008 and 2009, PG&E began an intensive planning and preparation phase in advance of beginning the decommissioning process. This phase included engineering; work planning; financial planning; and initial stakeholder outreach; performance of a radiological characterization survey of work areas, major components, and structures (including the drywell); sampling of internal piping and primary shield cores; development of cost and work control program; development of detailed work plans and schedules; development of a radioactive waste processing and disposal plan; and the development of the engineering decommissioning licensing basis. PG&E was committed to completing this phase completely in order to better assure itself, its regulators, and the public that decommissioning could be started and completed both safely and cost effectively.

The initial approach to determining the cost of decommissioning HBPP Unit 3 was to breakdown the entire effort into four periods (note that the numbering starts with Period 2 to maintain numbering conventions with previous cost studies):

- Period 2: Safe Storage and Decommissioning Preparations
- Period 3: Preparations
- Period 4: Decommissioning Operations and License Termination
- Period 5: ISFSI Operations and Demolition

2.1.1 Periods 2 and 3

Periods 2 and 3 have been completed. PG&E did extensive pre-project planning in preparation for decommissioning of the nuclear plant. The company benchmarked against completed decommissioning projects and compared budgets and schedules across the industry. A high degree of uncertainty and risk was identified with the initial phases of decommissioning due to the elevated alpha hazard, limited footprint within which activities would occur, and the sheer quantity of work that needed to be performed. The planning focused on self-performed decontamination and removal of radioactive and hazardous waste, and removal of installed equipment from HBPP Unit 3. PG&E also needed to implement other projects at the site simultaneously; i.e., construct a new generating facility (Humboldt Bay Generating Station (HBGS)), decommission fossil units, construct an ISFSI, and perform other required site modifications and 60kv switchyard upgrade. Due to the technical and regulatory nature of decommissioning a nuclear facility, the work associated with this plan affected the other work performed at the site. Thus the various projects were planned to closely coordinate activities to avoid space conflicts and related adverse impacts.

The initial planning process accounted for the various technical, regulatory, and coordination challenges to successful decommissioning of Unit 3 including topics such as System and Area Closure, Decontamination, Transportation and Waste Disposal. Planning also accounted for:

- Permitting and Regulations

  Governmental agencies from local boards to the State of California approve and issue permits to perform specific activities during decommissioning. The Decommissioning organization expects only minor changes to permits, once issued.

  Several governmental agencies at the State and federal level promulgate regulations that affect various activities associated with decommissioning. The Decommissioning organization anticipates only minor changes to the pertinent regulations that would affect decommissioning.

  PG&E will make significant changes to the License Bases Documents (LBDs) during the course of the decommissioning. The changes to LBDs revolve around the changes made to the site and plant configurations. PG&E has anticipated the need to change LBDs and has planned and staffed to make the changes.

- Low-Level Radioactive Waste Disposal

  The contaminated and activated material generated in the decontamination and dismantling of a commercial nuclear reactor is classified as low-level (radioactive) waste (LLRW), although not all of the material is suitable for "shallow-land" disposal. With the passage of the "Low-Level Radioactive Waste Policy Act" in 1980, and its Amendments of 1985, the states became ultimately responsible for the disposition of low-level radioactive waste generated within their own borders.

  Until recently, there were two facilities available to PG&E for the disposal of low-level radioactive waste generated by Humboldt. As of July 1, 2008, however, the facility in Barnwell, South Carolina was closed to generators outside the Atlantic Compact (comprised of the states of Connecticut, New Jersey and South Carolina). This left the facility in Clive, Utah, operated by Energy Solutions, as the only available destination for low-level radioactive waste requiring controlled disposal. This facility is not licensed to accept Class B and C radioactive wastes (B&C LLRW). Since the closure of Barnwell, SC, to non-Compact states, a new facility was licensed for receipt and storage of B&C LLRW; Waste Control Specialist (WCS) in Texas. HBPP shipped its first container in October 2012 using an 8-120 A Cask containing Reactor Pressure Vessel (RPV) internals. HBPP worked closely with the disposal site to obtain timely State approval of import petitions, waste profiles, certifications, procedures, etc. Anticipating the very strong industry demand for access to WCS, PG&E proactively managed the process so that HBPP was at the top of the queue for the facility's acceptance of out-of-state waste. This success eliminated the need to construct and operate an on-site interim Class B and C waste storage facility.

  The dismantling of the components residing closest to the reactor core generates radioactive waste considered unsuitable for shallow-land disposal. These materials contain concentrations of radionuclides that exceed the limits established by the NRC for Class C radioactive waste and are classified as Greater Than Class C (GTCC). The Low-Level Radioactive Waste Policy Amendments Act of 1985 assigned the federal government the responsibility for the disposal of this material. The Act also stated that the beneficiaries of the activities resulting in the generation of such radioactive waste bear all reasonable costs

of disposing of such waste. However, to date, the federal government has not identified a cost for disposing of GTCC or a schedule for acceptance. As such, the GTCC radioactive waste will be packaged and stored at the ISFSI until such time that the DOE can accept shipment of those materials. The GTCC wastes will be processed, packaged in the same type of container as for spent nuclear fuel, and transferred to the ISFSI in 2013. GTCC will be stored at the ISFSI at a cost equivalent to that envisioned for the spent fuel.

- Schedule

  PG&E established the work sequence and duration based upon ongoing planning efforts. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate. PG&E has scheduled decommissioning of the HBPP site over a period of approximately ten years finishing in June 2018. Site restoration will be complete in 2018. An additional year of administrative closeout is included in the estimate. Schedule duration is sufficient for the activities to be completed. The ISFSI will continue in operation until the DOE takes custody of the fuel and GTCC waste.

- Stakeholder Involvement

  Stakeholders have a vested interest in the safe, effective, and efficient completion of all decommissioning activities. Stakeholders include PG&E, employees, local community members, local government, State regulators and federal regulators. Stakeholder interests range from continued employment opportunities to the radiological consequences of decommissioning activities to environmental impacts of previous plant operations and the site environmental end state condition. PG&E has actively sought out the inputs from the local stakeholders through sponsorship of a Citizens Advisory Board (CAB). PG&E continues to engage governmental agencies and regulators at all levels to ensure that they are informed of the ongoing and anticipated activities.

2.1.2 Schedule Impacts on Staffing Needs

Scheduled work drives the need for personnel. As the work load increases, the staffing to successfully complete pre-project planning as well as the implementation of the plans increases. As the work is completed, the need for staffing begins to decrease as well.

PG&E established the work sequence and duration based upon ongoing planning efforts and PG&E's forecast schedule. The schedule is relied upon in calculating the carrying costs, which include program management, administration, field engineering, equipment rental, and support services such as quality control and security in addition to the staffing ramp-up/ramp-down. This systematic approach for assembling decommissioning estimates ensures a high degree of confidence in the reliability of the resulting cost estimate.

In the initial phases of the HBPP Unit 3 decommissioning, PG&E self-performed all the work including planning, engineering, large component removal, and systems removal. The self-performed work

included those activities where there was a high degree of uncertainty or risks involved. As the decommissioning transitions to work where the scope is well defined and uncertainty is minimal, PG&E is shifting from self-performed work to fixed price contracts. The staffing costs for the on fixed price contracts are borne by the successful bidder. However, the continuing costs associated with overhead staffing will persist. Those costs include the personnel who are part of management, engineering, safety, and Radiation Protection.

- 2005 Staffing Bases:

  The peak staffing to support the 2005 schedule was estimated to be approximately 121 utility, Decommissioning Oversight Contractor (DOC), and Security personnel. The peak period for staffing was anticipated to last for nine months. The estimate assumed that a DOC would manage, plan, and perform all of the physical decommissioning activities. The DOC would be responsible for recruiting, acquiring, hiring and supervision of the staff. PG&E would have a limited number of personnel to oversee the activities of the DOC. A separate Radwaste contractor would be commissioned to manage processing and disposal of decommissioning wastes.

  The 2005 estimate assumed that the fossil units would continue to operate which was expected to result in the site being less congested, having less people on site, and having more available laydown space and work area.

- 2009 Staffing Bases Changes:

  Several assumptions were changed between the 2005 and 2009 estimates. First, PG&E commissioned a project to construct the HBGS on the site to replace the aging fossil units. Second, PG&E decided to demolish Units 1 and 2 and sell the two combustion jet engine generating units. The sequence includes construction of HBGS followed by removal of the fossil units. Limited Unit 3 decommissioning was scheduled to proceed until demolition of Units 1 and 2 had been completed. This sequence allowed for continued reliable generation of electricity for the local area; expanding laydown areas for Unit 3 demolition onto the removed Units 1 and 2 footprint; and providing time to prepare Unit 3 with a Radwaste processing area. After demolition of Units 1 and 2, preparation of Unit 3, and full decommissioning of Unit 3 was undertaken.

  Recent industry decommissioning experience indicated that use of a DOC has resulted in unanticipated expense, schedule extension, and other issues. Therefore, PG&E decided to self-perform the decommissioning activities of high uncertainty and risk and manage the processing and disposal of waste with internal resources. Use of a DOC did provide two advantages that PG&E wished to retain. First, a DOC could efficiently identify, screen and select augmented staff with minimal impact on PG&E Management's time. Second, a DOC could provide clear delineation between full-time PG&E employees and the augmented staff provided by the DOC. To retain these two desired features, PG&E selected a staffing company to provide augmented staff. The staffing company was contracted to help recruit, acquire, and manage augmented staff. The staffing company will relieve site management of the burden of soliciting, screening, and identifying potential staff augmentation candidates. The use of the staffing company resulted in cost and manager labor savings. PG&E retains

the responsibility for oversight of decommissioning activities and augmented staff; and, therefore will keep full-time PG&E employees in key positions to assure that the decommissioning is performed safely, effectively, and efficiently.

- 2012 Staffing Bases Changes:

  The self-performed work conducted from 2009 through 2012 was performed well.

  During this same period, PG&E separately decommissioned Units 1 and 2 using a fixed price contract. The scope of the Unit 1 and 2 decommissioning was well defined with little uncertainty. The total costs for that decommissioning were under budget and the work completed ahead of schedule. Based on this experience, PG&E decided to identify those remaining scopes of work for HBPP Unit 3 that could be easily and well defined with little or no uncertainty.

  Shifting major pieces of work scope to a fixed-price contract has the effect of reducing the PG&E staff that is required. The residual staff that remains with PG&E is considered overhead and is comprised mainly of management, engineering, oversight, safety, and RP. The duration that the overhead is required will be extended based upon adding the reactor caisson removal as a new scope of work. That scope will add about 2 ½ years to the duration of the decommissioning and, therefore, the same amount of time added to the need to retain the overhead staffing.

2.1.3 Impact of Alpha Contamination

The extremely high levels of alpha contamination present in the plant makes HBPP Unit 3 unique in the realm of decommissioning of commercial nuclear plants. This results in:

- lower productivity associated with greater use of protective clothing and respiratory protection;
- significantly greater efforts to avoid generating airborne releases due to decontamination efforts, which constrains options as to techniques that can be used and results in more time and fiscal resources being consumed; and
- significantly increases the demand on Radiation Protection resources to provide sampling, survey, job coverage, and respiratory protection support for work.

The net effect of these is to increase the duration, staffing and consumables needed to complete the work.

2.1.4 Transition Special Projects

PG&E identified several special projects. Special projects are those activities that do not provide direct progress on the schedule but do support scheduled activities. As such, the special projects were incorporated into the planning and cost estimate processes. Examples of special projects include:

- Re-Locate Access Control:

The rad-waste transportation plan calls for the enlargement of the area surrounding Gate 13, where the current alternate access control is located. To support that change in plant design, a new alternate access will need to be constructed and installed. This project includes the engineering to support the movement and modification of the plant, implementation of the new alternate access and to move the current equipment, and re-calibrate and test the equipment prior to opening the new access control.

- Restore 75 Ton Refueling Building Crane:

The 75 ton main hoist, which was originally built in 1947 for a substation in San Francisco, has not been used in the last 20 years. Due to the age of this equipment, replacement parts are no longer available and any required replacement will result in extensive evaluations of parts equivalency. To improve the safety of the operation of the 75 Ton main hoist new electrical and control components including refurbished or new motors are required. This equipment is needed for access to the reactor vessel for characterization.

- Temporary Utilities for Decommissioning:

Temporary utilities are needed in most areas to prepare for decommissioning, such as electrical power, service air, water, lighting, ventilation, and communications. Existing utilities, designed for routine operations and maintenance, are typically inadequate or unavailable to meet the needs of decommissioning. For example, power tools often require higher voltage and/or amperage to operate, additional lighting is typically needed in most rooms, and ventilation systems need to be modified. These temporary utilities need to be planned, designed, purchased, and made operational prior to starting decommissioning activities.

- Additional Infrastructure:

Increased staffing required for the decommissioning of Humboldt Bay Power Plant results in the need for additional office space, including facilities for breaks, restrooms, storage of records, records management, and the construction of a second access road that connects the main access road to PG&E facilities north of the parking lot. This work includes the engineering, surveying, geotechnical, permitting, materials testing, and inspection needed to complete design of the access road and monitor construction. The increased staffing to support the decommissioning activities requires the purchase/leasing of additional trailers and installation of services such as telephone, computer, water, and electrical.

2.1.5 Periods 4 and 5

Period 4, Decommissioning Operations, is ongoing and Period 5, ISFSI, is in operations. Over the past four years, the majority of decommissioning work has been installation of new site infrastructures and removal of systems and components, otherwise known as the Plant System Removal Phase. In this phase, PG&E established a self-perform arrangement in which PG&E provided direct supervision of a contracted work force performing work on a Time-And-Material basis or on a Cost-Plus basis. This type of contracting arrangement was necessary, and optimum, due to several factors including

the dynamics of maintaining specific plant systems in service while others were removed from service and the configuration control that must be maintained; removal of large components with known high levels of radiation that required slow and methodical disassembly; and removal of contaminated systems under special engineering controls and requirements. Careful planning and special measures were taken to accomplish this work with maximum safety to the workers and the public. Work scope of this nature, wherein uncertainty exists as to the exact effort that will be required to perform all tasks, lends itself to Time-And-Material or Cost-Plus contracting. This phase has been undertaken by PG&E and is near completion. During this period to support full scale-decommissioning a significant number of required plant modifications, site improvements and infrastructure were put in place.

At the same time PG&E was commencing decommissioning of HBPP Unit 3, it also was decommissioning fossil plants located on site to provide access and lay-down for the Unit 3 nuclear decommissioning. PG&E evaluated the management options for decommissioning and removal of out-of-service electrical production units. Fossil decommissioning included demolition of Units 1 and 2 with a capacity of 53 MW(e) each and removal of the two 15 Mw(e) combustion turbine units that have been used as peaking and emergency (MEPPS) units. The work scope was well defined with little uncertainty associated with system and component removal requirements. A single demolition/decommissioning organization, led by the HBPP Director and Nuclear Plant Manager was chosen. It provided a better means to plan work activities, coordinate space usage, levelize staffing needs, and control and monitor costs. From the early planning efforts of defining the project scope to development of the technical and administrative specifications to obtaining competitive bids and managing the execution of the project, the project team successfully managed this project within budget and seven months ahead of schedule. The model established for the Fossil Decommissioning is being adopted for the well-defined scopes of work for decommissioning HBPP Unit 3.

2.2 COMPLETED ACTIVITIES

HBPP Unit 3 successfully completed the transfer of spent nuclear fuel assemblies from the spent fuel pool in five casks to the independent spent fuel storage installation (ISFSI) in December 2008. Since the 2009 NDCTP, the site has fully transitioned into full scale decommissioning. During this period, PG&E took on some of the most challenging and laborious projects involving significant risk and radiologically significant work activities.

To support full scale-decommissioning, a significant number of required plant modifications, site improvements and infrastructure were put in place. The changes to the site and facilities included: a new 2,000 ft2 radiological control access; 4,000 ft2 environmental count room facility; truck portal monitors and scale; 5,000 ft2 tented enclosure for radwaste handling; and 25,000 ft2 of office space constructed from ten new trailers, nine re-powered trailers and six re-used trailers from Humboldt Bay Generating Station (HBGS); re-powering and implementing cold and dark program on all three units fossil and nuclear and to mitigate the environmental challenges with provisions of the new construction storm water general permit, a significant upgrade and paving project was completed to the main road.

Decommissioning activities to date have resulted in the removal and disposal of all large components outside of the NSSS, the reactor vessel head, and most of the supporting systems outside of the NSSS.

PG&E completed removal of most large nuclear components, excluding the reactor vessel, and safely transported these oversized, overweight shipments to distant radiological disposal sites without incident. These large nuclear components included spent fuel pool racks, high and low pressure turbines, turbine crossover, main condenser halves, reactor head, heat exchangers and low and intermediate heaters. The project received PG&E's Sibley award for excellence in health and safety performance in 2008, 2009, and 2010.

The 2009 Cost Study estimated a 34 month schedule for removal of the Turbine Building systems. Even though PG&E faced difficult challenges such as dealing with alpha contaminated plant systems, PG&E successfully completed component removal from the Turbine Building within the planned 34 months. This work involved removal of many different systems and components, each presenting different challenges. By February 2012, the main steam piping, feed water piping and other plant systems had been removed from the turbine building. To add a margin of radiological safety, a multiple barrier approach was used to protect the workers and minimize the potential for spread of contamination. Multiple layers of protective clothing and respiratory protection were provided for personnel in the work area, and multiple containment boundaries such as sleeves, fixatives, and glove bags were used on the components. The concentrations and quantities of alpha contamination were of such concern to HBPP Unit 3 management that they felt compelled to inform the NRC due to associated risks. The alpha contamination levels have been compared to high levels found at DOE nuclear weapons sites. An NRC Commissioner visited the site in early 2010 and had very positive comments about the controls implemented to address the contamination. As a follow-up, the NRC Chairman, visited the site in August, 2010, in part to review the activities pertaining to the control of the alpha contamination. The Chairman was favorably impressed with the professional attitudes of personnel and high quality of work being performed at the site. He noted that HBPP had received PG&E's Sibley award three years in a row and stated that it was justified and reflective of the performance of the site staff.

A testament to the rigor of the processes implemented to control the extreme levels of alpha contamination was that the entire Turbine Building Preparation project was completed without a single incident of a worker becoming contaminated; there were no significant radiation exposures; there were no unplanned exposures; and there were no releases of contamination to the environment.

Staying on schedule has enabled PG&E to plan to demolish the turbine building one year ahead of schedule. Through a thorough competitive bid process based on technical merit and commercial terms, the demolition contractor is now mobilized, trained and preparation activities are underway to start decontamination and physical turbine building demolition work in December 2012.

Other accomplishments include:

- A reactor vessel removal contract is in place to remove the internals and a separate contract to segment the shell has been awarded. Removal of more than 65% of the reactor internals has been achieved to date. After twenty five years, the drywell was re-opened and the reactor

head removed. The vessel was flooded, water filtered, an extension tank installed and thirty-two control rods removed. Surveys and characterization of the reactor vessel were completed. To date, the internals removed from the reactor include the chimney and chimney clamps, upper core guide, fuel hold downs, core support plate, and specimen baskets.

- Since the closure of Barnwell, SC, to non-Compact states, HBPP Unit 3 commenced its first shipment of B&C LLRW to Waste Control Specialist (WCS) in Texas, in October 2012 using an 8-120 A Cask containing RPV internals. HBPP Unit 3 worked closely with the disposal site to obtain timely State approval of import petitions, waste profiles, certifications, procedures, etc. Anticipating the very strong industry demand for access to WCS, PG&E proactively managed the process so that HBPP Unit 3 was at the top of the queue for the facility's acceptance of out-of-state waste. This success eliminated the need to construct and operate an on-site interim Class B and C waste storage facility that was applied for as a contingency plan and approved by the California Coastal Commission in October 2011.

- HBPP Unit 3 successfully completed its fourth designated "Radiological Significant Decommissioning Activity" (RSDA) by transferring the contents of ISC-18 (remnants of spent nuclear material) into a shipping cask and shipped it to Barnwell, SC for processing in October 2012. This process waste container was vacuum dried, helium leaked tested and delivered back to PG&E where the package will be placed in the Greater Than Class C (GTCC) cask. This final sixth cask will be loaded in 2013 with this process waste container and highly radioactive internal components from the reactor vessel, and moved to the ISFSI for storage.

- PG&E executed a contract in 2011 to remove the abandoned, out-of-service liquid radwaste tanks. To date, three of the four tanks have been removed and this resulted in a significant reduction of high-risk alpha contaminated system tanks. The remaining spent resin tank is expected to be removed early in 2013.

- Systems removal from the Turbine Building has been completed and the building prepared for turnover to a prime contractor, for decontamination and demolition (D&D). This D&D work is about to begin and is scheduled for completion by mid-2013.

- In the Valve Gallery, significant progress was made removing main steam line piping and other systems outside the reactor vessel dry well. This work will resume following Turbine Building demolition.

- In the Refueling Building, the Cleanup and Shutdown Heat Exchanger systems have been removed.

- In the Suppression Chamber, preparatory work for systems removal has been established including safety improvements to the man-lift (conveyor belt) access, emergency egress, scaffolding, lighting, and ventilation. Systems removal will begin in December 2012.

- In the Off-gas Tunnel, significant systems removal progress has been made after establishing access, erecting material handling and packaging containment structure, and other special setups.

- PG&E completed a major effort to consolidate about 10,000 cubic yards of soil generated from numerous site improvements required to support decommissioning since it began. The management of this soil as fill for a material handling area, avoided the need for expensive storage or disposal off site, and opened valuable laydown areas on the congested site for other uses.

- The HBPP Unit 3 Decommissioning Project has been successfully coordinating work with another major project on site, the Humboldt Bay Switchyard GIS Replacement Project. The on time completion of this project is required to bringing the new equipment on-line during a critical transmission outage schedule period.

- Exemption requests were approved by the NRC for waste material disposal at US Ecology, Idaho, enabling PG&E to significantly reduce its waste disposal costs.

- A Request for Proposal (RFP) bid package was completed and issued to perform the major civil works scope for decommissioning. The RFP process is still in progress.

- An evaluation of the need to remove the deep reactor vessel caisson structure, and a feasibility study for its removal, were completed. The conclusion of this evaluation and study was to recommend removal of the caisson. The major civil works RFP is currently being updated to include this new scope of work.

Actual decommissioning costs to date are very close to forecasted amounts from previously approved cost studies.

2.3 TRANSITIONING TO CIVIL WORKS PROJECTS

PG&E is transitioning from plant systems removal activities to civil works execution projects performed similarly to the demolition of two retired fossil units adjacent to the nuclear unit. .

The nuclear decommissioning effort incorporates lessons learned from the recently completed fossil decommissioning project. The remaining nuclear building demolition work or civil works effort is similar in nature to the fossil decommissioning project with scope-specific work, proven methodologies, and predefined boundaries. The strategy is to transition from self-perform to more lump sum fix cost contracting, commensurate with the change in nature of the work.

As HBPP Unit 3 Decommissioning transitions from the Plant System Removal Phase, where work scope was dynamic with significant uncertainty, to the Civil Works Projects Phase, where work scope is well defined, a contracting plan similar to that used for Fossil Decommissioning will be implemented. Award of five major work scopes in various stages of development are planned as five separate contracts to five or fewer Contractors. These include Turbine Building Demolition, Nuclear Facilities Demolition and Excavation, Intake and Discharge Canal Remediation, Office Facility

Demobilization, and Final Site Restoration, as described in the following section. Each work scope is supported by detailed and high quality bid specifications with a clear and concise description of work, which enables PG&E to solicit RFPs that are competitively bid and awarded as Firm Fixed-Price or Fixed Unit Price contracts.

PG&E formed an interdisciplinary and broad-based subject matter expert team to develop and vet fifteen technical specifications accompanied by ten administrative specifications. The specifications developed by this technically focused group will define the requirements and criteria to complete the remainder of the decommissioning at HBPP Unit 3, including a plan for final site restoration.

The Specifications Development Team met every week for twelve months and a Long Term Strategy Team met every week for seven months developing the Level 1 Long Term Schedule and Exit Strategy. This effort resulted in issuance of the HBPP Unit 3 Decommissioning Capstone Document to the D&D industry. The Capstone Document was provided to the Bidders to facilitate transfer of knowledge from these teams to the qualified Bidders. The insights, challenges, and expectations these teams achieved during development of the civil works projects will help the Bidders create responsive, well-thought-out bids to complete this complex undertaking safely and successfully.

2.4 MAJOR CIVIL WORK PROJECTS

Removal of the boiling water reactor steam and condensate systems from the Turbine Building was completed in early 2012. The contract for asbestos abatement and surface decontamination and demolition (D&D) of the Turbine Building was awarded in 2012 with the work scope planned for completion in mid 2013. The following five major civil work projects will span the next five years at HBPP Unit 3:

2.4.1 Turbine Building Demolition:

The scope of work includes asbestos abatement (primarily of the Reactor Feed Pump raceways and penetrations), open air demolition of a concrete structure.

2.4.2 Intake and Discharge Canal Remediation:

This scope of work includes mechanical removal of radiologically and chemically contaminated sediment from the Intake and Discharge Canals, demolition of the discharge outfall and levee to Humboldt Bay, demolition of the intake and discharge structures, restoration of levee and coastal trail along the Bay, management and dewatering of contaminated sediments, and water treatment to meet discharge permit requirements.

2.4.3 Nuclear Facilities Demolition and Excavations:

This scope of work includes decommissioning and demolition of all remaining permanent plant structures and facilities identified for demolition. Additionally, this scope of work includes installation of a slurry bentonite wall to the Unit F clay layer that will encompass the Reactor Building Caisson, Turbine Building foundation, and other deep structures in the Unit 3 area to provide groundwater control and isolation. Note that this scope of work will include removal of the Reactor Caisson and Foundation Piles. The Nuclear Facilities Demolition and Excavations, including the removal of the

Spent Fuel Pool, is a significant and diverse scope of work representing the principal contract of HBPP Decommissioning.

2.4.4 Office Facility Demobilization

This scope of work includes removal and/or demolition of office facilities, including buildings and structures owned and leased by PG&E. Most of buildings and structures to be removed are modular or trailer type construction. Leased trailers and structures are to be isolated, disconnected, removed from HBPP Unit 3, and returned to the owner. Buildings and structures owned by PG&E are to be isolated, disconnected, demolished, and disposed as waste, unless released for salvage or recycle. This scope of work includes an estimated 32 building units comprising approximately 40,000 square feet.

2.4.5 Final Site Restoration

This scope of work includes development of site grading and drainage, placement of ground cover including vegetation and other surfacing, road construction and repairs, installation of fencing and site lighting, and other final site development work to achieve the required end state condition for PG&E's future industrial use. It includes demolition of remaining miscellaneous structures to support final site restoration plans. The parcel containing the restoration area is approximately 102 acres. Main features of this scope of work include removal of buried asbestos containing materials; demolition of reinforced concrete settling basins, truck ramp, and associated piping; soil excavation, backfilling, and compaction; wetlands construction; finish grading; storm drain system installation; topsoil placement; vegetation establishment; installation of erosion control features; ground cover installation; final surfacing; and removal of portal monitors and truck scales.

Benefits realized by transitioning to the Civil Works Projects Phase with predominant firm fixed-price/fixed unit price contracting include single or multiple D&D contractors who can coordinate concrete shaving, liner removal, structural removal, and other demolition activities; streamline financial control; reduce PG&E overhead staffing; and provide a specialized Bidder Team with experience from other similar projects. The overall approach PG&E has taken to complete HBPP Unit 3 Decommissioning has produced proven and successful results at other D&D projects and programs throughout the U.S.

2.5 BID SPECIFICATIONS

In 2011 and 2012, as the self-performed portions of the decommissioning were well underway, PG&E identified scopes of work that were well understood with minimal risk. PG&E decided that competitively bid, fixed price contracts for the work would be the most cost effective, efficient, and safest way to complete the work. In order to assure itself and its stakeholders that the contractors would meet all expectations, PG&E developed a set of bid specifications. The specifications contain the requirements that successful bidders must meet and PG&E's commitments to those bidders. The topics contained in the specifications include (partial list):

- Health and Safety Requirements;
- Project Coordination and Meeting Requirements;
- Quality Programs;

- Temporary Facilities and Utilities;
- Environmental Protection;
- Waste Management;
- Decontamination Processes; and
- Final Site Restoration

PG&E commissioned publication of a Decommissioning Capstone Document that summarizes the expectations, goals, processes, and projects that will be performed under fixed-price contracts. The Decommissioning Capstone Document will help all parties, including HBPP Unit 3 staff, bidders, and stakeholders, understand the approach and final outcomes of this phase of the decommissioning.

PG&E developed several bid specifications to identify and control important aspects of the bidding, award, and implementation of fixed price contracts. Both clear direction to the bidders and clear commitments for support and oversight by PG&E will result in consistent and reliable bids on the front side and work that meets PG&E's expectation after implementation. The bid specifications include (partial list):

2.5.1 Health and Safety Requirements (01-11-01)

PG&E fosters a safety culture and expectation of exemplary safety performance. Protection of personnel and the environment while providing a safe work place are the number one priorities at PG&E. The purpose of this specification is to outline the health and safety requirements for the performance of all work identified in the Specifications for decontamination, demolition and/or remediation activities at the former HBPP Unit 3. This specification includes requirements for training, radiation protection, monitoring and control, site security, as well as PG&E's expectations and codes of conduct.

2.5.2 Project Coordination (01-31-13)

PG&E will continue to self-perform some minor activities after awarding of fixed-price contracts. Those activities include operations, maintenance, and some decommissioning. The purpose of this specification is to outline the coordination requirements for the performance of all work identified in the Specifications for decontamination, demolition, and/or remediation activities at HBPP Unit 3. Defined in this specification are operations performed by PG&E, procedure identification and compliance, work sequencing and constraints, work planning, environmental quality, radiation protection and final status survey requirements, and expected responses to emergencies.

2.5.3 Submittal Procedures (01-33-00)

PG&E considers development of accurate and timely submittals for project planning, and during demolition, to be extremely important. Proper, complete, and appropriate documentation is necessary to record project decisions, the basis for planned activities, execution of the Work, and conformity with project plans and specifications. PG&E also recognizes that submittal and review is a two-way street. The purpose of this specification is to clearly define the expectations and processes for submittal and review of all project documentation including drawings, calculations, design data, test and inspection reports, procedures, and plans. Included in this specification are the requirements to be followed by both the contractor and by PG&E.

2.5.4 Contractor Quality Control (01-45-16)

Contractor Quality Control (CQC) is the means by which a contractor ensures that the work, including that performed by subcontractors and suppliers, complies with the requirements of the Contract. This specification defines the requirement for a contractor to have, maintain, and implement a CQC Plan. It further defines the content requirements for the CQC Program and for the CQC organization. To assure PG&E of proper and compliant implementation of this specification, the specification also includes requirements and methods that PG&E will implement to verify Quality.

2.5.5 Temporary Facilities and Controls (01-50-00)

The purpose of this specification is to provide the contractors with information about regulatory community and PG&E requirements for permits and approvals for facilities, structures, and engineered solutions necessary to support the Decommissioning effort. Because of the dynamic nature of the work, a variety of temporary systems will be necessary, including utilities, laydown areas and structures, and protective systems and barriers. In addition, the Civil Works contractors must develop plans addressing a variety of temporary and changing situations, particularly with respect to noise and dust control, traffic and pedestrian routing, and other field logistics as work amongst the various Civil Works contracts progresses around the site. This specification provides the expectations and direction to assist with successful completion of work while accounting for the requirements for temporary facilities and controls.

2.5.6 Stormwater Pollution Prevention Plan (SWPPP) Implementation (01-57-13)

All stormwater collected and discharged from the HBPP Unit 3 is subject to regulation under a NPDES permit. PG&E and its contractors are responsible for maintaining stormwater collection and discharge systems, and preventing pollution from entering stormwater flow into Humboldt Bay, including through the Intake and Discharge Canals. PG&E accomplishes this through a system of drain inlets, underground piping, and BMP that control erosion, minimize sediment loss, and prevent or limit exposure of potential contaminants to precipitation during routine plant operations. This specification defines the requirements for both PG&E and contractors to comply with the requirements of the NPDES permit and the SWPPP including control of materials, required staffing, inspections, maintenance of control and monitoring systems, and responses to hazardous wastes.

2.5.7 Supplemental Environmental Protection Requirements (01-57-19)

In addition to PG&E's commitment to the health and safety of personnel and the environment as noted in Specification 01-11-01, PG&E is committed to demonstrating environmental leadership through its actions. This specification defines the general environmental requirements and expectations that PG&E intends to impose on contractors performing work at HBPP Unit 3. Included in the specification are quality requirements, accountabilities, and training. Specific requirements are defined for hazardous materials, biological resource preservation, cultural resource preservation, air quality, noise and vibration, water quality, vehicular traffic, and aesthetics and visual resource preservation.

2.5.8 Waste Management (01-74-01)

The HBPP Unit 3 Decommissioning and Demolition Civil Works Projects will involve several discrete processes generating waste that must be managed for offsite disposal onsite reuse, or in limited cases, offsite reuse. PG&E currently conducts its own waste management operations in accordance with a Site-wide Waste Management Plan addressing contaminated soil, demolition debris, and radiological waste. The plan is robust and addresses regulatory background and requirements; provides information on site-specific waste management practices, policy, and procedure; and serves to meet a requirement of the California Coastal Commission for compliance with permitting, documents, and agreements. This specification requires the contractor to develop a plan and to manage wastes in accordance with PG&E's established waste management and radiological protection programs. The specification provides direction on scheduling, waste acceptance criteria, waste accumulation, packaging, loading, shipping, and decontamination.

2.5.9 Building Decontamination (02-51-00)

HBPP Unit 3 interior concrete surfaces were painted with Carboline lead based paint after construction. During plant operation and SAFSTOR, the concrete surfaces were subjected to liquid and gaseous contamination, which resulted in loose and fixed contamination of the concrete surfaces with alpha and beta-gamma emitting radionuclides. The contamination was often fixed in place by repeatedly painting the floors, walls, and ceilings. This specification covers decontamination of the surfaces to contamination levels that are low enough to allow open air demolition. This specification includes allowable decontamination methods, sequencing and schedules, plan development, plan evaluation, personnel and environmental safety requirements, debris and material controls, and final acceptance criteria.

2.5.10 Above Ground Demolition – RCA Structures (02-41-16.02)

This Specification Section describes the expectations of PG&E in demolishing the above ground portions of the buildings located inside the HBPP Unit 3 Radiologically Controlled Area (RCA) ("RCA Structures"). In developing these Specifications, PG&E separated the Work of this Section from the Work of Specification Section 02 61 00, "Removal of Subgrade Structures and Contaminated Soil" because several of the deeper subgrade features must be protected until they are ready for removal. Specifically, the Refueling Building at El.+12 is located atop the Reactor Caisson and Caisson Access Shaft that extend down to El.-66, the Spent Fuel Pool at El.-14, and the Cask Pit inside the Spent Fuel Pool at El.-24. The RCA structures included in this specification include:

- Solid Rad Waste Building (Building 14)
- Low Level Rad Waste Building (Building 15)
- Liquid Rad Waste Building (Building 16)
- Hot Machine Shop (Building 4)
- SAS Building/Recombiner/Instrument Building (Building 17)
- Plant Ventilation Stack Base
- Refueling Building (Building 3)
- Various miscellaneous RCA structures

2.5.11 Non RCA Ancillary Buildings Demolition (02-41-16.09)

This Specification Section describes the expectations of PG&E in demolishing buildings and structures located outside the HBPP Unit 3 Radiologically Controlled Area (RCA). These structures are removed after or in conjunction with demolition of the RCA structures and include a mix of permanent and temporary facilities. The end state of the Non RCA Ancillary Buildings Demolition is all identified Buildings and Structures have been demolished or removed from the HBPP site and the site is stabilized and turned over for Final Site Restoration.

2.5.12 Removal of Subgrade Structures, Contaminated Soil (02-61-00.01)

This specification describes the work involved in removal of hazardous, nonhazardous, and radiological contaminated materials, which include paving, concrete slabs, subgrade structures, embedded pipe, soils, and debris. The contractor's work plans shall include a description on how the contractor will keep dose As Low As Reasonably Achievable (ALARA) and minimize the generation of wastes. In addition to licensed nuclear material, other environmental contaminants that may be encountered include total petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals, including chromium, lead, copper, and molybdenum.

Removal of subgrade structures and contaminated soils includes the following:

- Condensate Pump Pit and four (4) Casings
- Unit 3 Turbine Building slabs, embedded piping and subgrade structure and removal of the Condensate Pump Pit and two (2) Pit Casings
- Liquid RadWaste Handling Building slabs and subgrade structures
- Sump and trenches
- Hot Machine Shop slab and subgrade structures and the pit casing
- Recombiner SAS Building and sump
- High Level Storage Vault
- North and South Yard Drainage Stormwater drain system
- Underground Radwaste and utility piping
- Off Gas Tunnel
- Circulation cooling water intake and discharge water piping up to the canals
- Firewater protection pipe on the north and east side of Unit 3.
- All buried and embedded piping within the RCA boundary shall be removed.

2.5.13 Removal of Subgrade Structures and Contaminated Soil – Spent Fuel Pool (02-61-00.01)

This specification is for the demolition of the Spent Fuel Pool sub-grade structure to the minus twenty-nine (–29) foot elevation to remove three Spent Fuel Pool concrete walls (one must be retained to support the Suppression Pool), remove contaminated soil around the pool cell after the walls has been removed, and also includes removal of the tremie concrete below the SPF floor. The Fuel Pool was a poured-in-place concrete vault approximately twenty-six (26) feet by twenty (20) feet high with a deeper cask pit that extends from El. -14 to -24 foot elevation and is ten (10) by twelve (12) feet, six (6) inches. The spent fuel pool stainless steel liner was installed due to cracks that formed in the structural walls as a result of seismic activity. It is known that water leaked from the

Spent Fuel Pool into the sub-grade soil. There is evidence of water intrusion behind the liner. It is anticipated that fifty (50) to two hundred fifty (250) gallons per day of in-leakage of groundwater into the pool can be expected when the SPF is drained, in the absence of mitigation measures. The liner will have been removed by others when this work scope is initiated.

2.5.14 Intake and Discharge Canal (02-60-00)

This specification describes the requirements for setup and mechanical removal of contaminated sediment from the Intake and Discharge Canals, demolition of discharge outfall structure that is within existing levee, removal of the intake/discharge structures and isolation and severing the circulation water piping, restoration of levee, management and dewatering of sediments. Remediation, removal or isolation of the Intake and discharge circulation cooling water piping is coordinated with canal remediation. This specification further stipulates sequencing and scheduling requirements, planning and evaluation requirements, safety requirements, excavation methods and surveys, demolition controls and debris management, water management, and other safety and environmental requirements.

2.5.15 Final Site Restoration (32-71-00.00)

This specification is for completing the final restoration Work to fulfill the requirements of the various permits covering HBPP Unit 3 and to assist with obtaining the NRC's release of the Part 50 license. Included in this Work are demolition of the Assembly building (10); removal of asbestos containing materials; demolition of reinforced concrete settling basins, truck ramp and associated piping; soil excavation, backfilling, and compaction; wetlands construction; finish grading; storm drain system installation; topsoil placement; vegetation establishment; installation of erosion control features; ground cover installation; final surfacing; removal of portal monitors and truck scales; fencing and gate installation; lighting installation; and construction of new roads or repairs to existing roads.

3 COST ESTIMATE

Site-specific cost estimates were prepared for PG&E prior to commencing decommissioning of the HBPP unit 3 facility. The estimates were based on the unique features of the facility, previous studies and accounted for lessons learned at other facilities that had undergone similar decommissionings. As PG&E identified efficiencies and discovered issues that affected work processes, and therefore costs, changes to implementation methodologies were researched, planned, and reviewed by management. With system dismantling work underway, PG&E has not updated the previous cost studies; rather this current estimate reflects forecasts which have been developed from engineering studies, and/or or actual contractor bids. This estimate update incorporates the site specific and special tasks that have been prescribed or implemented as a result of the ongoing decommissioning planning. The basis of the estimate and the sources of information, methodology, site-specific considerations, assumptions, and total costs are described in this section. PG&E currently estimates that the cost to complete remaining decommissioning work at HBPP Unit 3 is $727.6 million including contingency.[1] The total cost of decommissioning Humboldt Unit 3 is $982.4 million. This represents an increase from the forecast approved in the 2009 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP) of $499.9 million (in 2008 dollars) for decommissioning HBPP Unit 3.

The principal drivers of the projected cost increase are unforeseen changes in the scope of work to be performed. In its previous cost studies, PG&E had specifically assumed that the reactor caisson and associated structures three feet and more below grade level would remain in place. In late 2011, PG&E was able to obtain access to one portion of the bioshield wall surrounding the reactor vessel. Laboratory testing revealed that there was greater neutron activation than had been predicted. PG&E now believes that it has no viable alternative but to remove the entire reactor caisson containment structure. After a detailed feasibility study, PG&E has determined that this new scope of work will be approximately $192 million, including contingency.

Additionally, given political realities within Humboldt County, and state and local regulatory requirements, the probability is high that PG&E will ultimately be required to mitigate the final restoration state of the project to a more stringent standard than previously assumed under NRC regulations. PG&E has changed its previous assumption and assumed lower values of residual radioactive material. This change in scope particularly impacts the remediation of the intake and discharge canals which, with associated soil removal and disposal, is estimated to be approximately $47 million, including contingency. It is PG&E's judgment that moving to the more rigorous standard now will not only result in more complete remediation, but will also result in lower costs than the costs associated with regulatory uncertainty, delay and potential litigation. Joint site support and groundwater treatment costs for the caisson and canal are $6.2 million,

Costs for spent fuel management have increased because four additional years are assumed to be required to store high level radioactive waste (spent nuclear fuel) on site until a federal repository or suitable facility is established by the DOE. The cost of this changed assumption is approximately $20 million, including contingency.

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[1] Unless specifically stated otherwise, dollars used herein are in 2011$.

Collectively, these three items constitute $265.2 million, about 55% of the total increase.

Cost Category	Amount
General Staffing (Excludes Caisson)	**100,167**
Overall Project	87,002
License Termination Survey (Excludes Caisson)	13,166
Remainder of Plant Systems	**56,693**
Direct Labor	32,814
Craft	17,748
Radiation Protection	15,066
Liquid Radwaste System	6,659
Tools & Equipment *	17,220
Common Tools	3,771
Rad Protection	12,628
Glove Bags	821
Site Infrastructure	**2,074**
Specific Project Costs (Excludes Disposal / Caisson / Canal)	**104,254**
Reactor Vessel Removal	15,368
Turbine Bldg Demolition	14,307
Other Civil Works	74,579
Waste Disposal (Excludes Caisson / Canals)	**74,011**
Labor (Packaging and Handling)	18,994
Third Party Disposal Sites	52,315
Waste Handling Building	2,701
Small Value Contracts	**36,042**
Small Dollar Vendors	10,751
Specialty Contracts	25,291
Spent Fuel Management	**62,608**
Security	47,243
ISFSI O&M	7,925
ISFSI Removal	2,000
NRC Fees	2,940
Transfer to DOE	2,500
Contingency (Excludes Caisson / Canals)	**46,552**
Subtotal Base	**482,402**
Caisson	**191,627**
Field Work	78,000
Packaging / Material Handling	12,932
Project Staffing	22,126
Waste Disposal	24,037
License Termination Survey	6,168
Tools and Supplies	2,346
Other	4,238
Caisson Contingency	41,780
Canal Remediation	**47,408**
Removal	21,000
Disposal	20,224
Canal Contingency	6,184
Common Site Support - Caisson and Canals	**6,196**
Relocation of Trailer City	2,542
Groundwater Treatment	2,893
Groundwater Treatment System Operation	761
Subtotal Caisson / Canal / GWTS	**245,230**
TOTAL	**727,633**

Finally, PG&E now has several years of actual decommissioning experience as the site transitioned from SAFSTOR to full scale decommissioning. The prior study was based on time estimates developed in the industry, adjusted for expectations regarding the difficulty of the work to be performed at Humboldt. The current cost DPR reflects additional experience with safely managing alpha contamination and the constrained working environment (in the case of projects performed on a time and material basis) as well as actual contract values and competitive bid pricing in lieu of budgetary estimates. In particular, experience has shown that additional attention to safety and other work requirements has led to additional labor hours, beyond levels anticipated in removing plant systems and Humboldt specific costs (reflected in third party bids) higher than forecast.

3.1 BASIS OF ESTIMATE

PG&E formed an interdisciplinary and broad-based subject matter expert team to develop and vet fifteen technical specifications accompanied by ten administrative specifications. The specifications developed by this technically focused group defined the requirements and criteria to complete the remainder of the decommissioning at HBPP Unit 3, including a plan for final site restoration. The Specifications Development Team met every week for twelve months and a Long Term Strategy Team met every week for seven months developing the Level 1 Long Term Schedule and Exit Strategy. The effort resulted in a document known as the Decommissioning Capstone Document.

Three bids were received from leading industry/reputable companies for all four discrete civil works projects. One additional bid was received for canal remediation only. The four projects are: Intake and Discharge Canal Remediation; Nuclear Facilities Demolition and Excavations; Office Facility Demobilization; and Final Site Restoration.

PG&E identified potential issues associated with the reactor caisson. To better understand the alternatives to resolve radiological issues associated with the caisson, PG&E commissioned an engineering feasibility study. The study, known as the Kiewit HBPP Caisson Feasibility Study, evaluated methods, risks, schedules, and costs for removal of the caisson. After PG&E evaluated the technical issues associated with remediation and in-place abandonment versus removal, management determined that the only viable solution was complete excavation and removal of the caisson.

In addition to the cost of civil works, PG&E will incur overhead costs associated with oversight of the civil works projects, safety monitoring, ongoing engineering work, and control of the site. Those costs are captured in the staffing plan.

3.2 REMAINING MAJOR DECOMMISSIONING COST DRIVERS

The significant cost drivers for completing decommissioning of HBPP Unit 3 have been identified and analyzed, and implementation strategies developed. They include:

3.2.1 Changes in Scope of Work.

Changes in the scope of work which was previously assumed are as follows:

Changes to Final-State Land Use. The 2009 Cost Study assumed that the land that the facility occupied would remain under the control of PG&E for an extended period of time and,

be used only for industrial purposes, and identified a specific value of radioactive material to be left at the site. After consultations with stakeholders and a re-evaluation of this assumption, PG&E decided to assume the lower values of residual radioactive material associated with greater public uses of the site.

- Reactor Vessel Caisson Removal Project. The 2009 Cost Study assumed that the reactor caisson would be decontaminated and structures greater than three feet below grade would be left in place. Testing resulted in the discovery of greater than forecast nuclear activation in the concrete bioshield walls surrounding the reactor vessel. After evaluating alternatives, PG&E determined that the only viable solution is to entirely remove the reactor vessel caisson. This new project is estimated to be approximately $192 million. This project is discussed in Section 3.3.

- Intake and Discharge Canal Remediation. The 2009 Cost Study assumed that the intake and discharge canals were to be back-filled with clean fill brought in from off-site, at an estimated cost of $3 million. The scope of this project has been significantly modified, and the additional cost to demolish the intake and discharge canal concrete structures, remove silt/sediment and excavate six inches into the walls and bottom of the canal is estimated at $47 million. This project is discussed in Section 3.5.

- ISFSI. Costs for spent fuel management have increased because four additional years are assumed to be required to store high level radioactive waste (spent nuclear fuel) on site until a federal repository or suitable facility is established by the DOE. This change in scope increases decommissioning cost estimates by roughly $20 million including contingency. The additional cost is primarily related to the additional time that security personnel will be at the site.

3.2.2 Civil Works Projects.

In addition to changes in scope, the Civil Works Projects effort marks a transition from self-performance of decommissioning activities to competitively-bid, fixed cost completion of major remaining decommissioning activities. The details are discussed in Section 3.4.

3.2.3 Updates to 2009 Cost Study Estimated Costs.

After the full decommissioning effort for HBPP Unit 3 started, PG&E identified several cost items that were accruing costs at a faster rate than was predicted by the 2009 Cost Study. PG&E undertook several studies of the individual parameters to better quantify the costs. Most of the cost increase has been determined to be attributable to the encounter during the course of decommissioning of more unfavorable work conditions than anticipated, including higher levels of alpha contamination and a more physically constrained working environment.

- Labor – Remainder of Plant Systems Removal. Labor costs to remove plant systems have been higher than anticipated. Most of this is attributable to enhanced emphasis on safety, on account of the higher than anticipated levels of alpha contamination, a more constrained than anticipated work environment, and associated work rules, that limit the time workers can

physically engage in their craft. For example, work preparation time including activities such as pre-job tailboards, and equipment and work site inspections were increased to avoid injury or exposures. Break times were enhanced beyond expectations to ensure worker focus. These precautions increased safety margins against injuries and accidents for employees working in the field. The first three years of decommissioning from 2009 to 2011 had planned 122,000 craft hours (i.e., hours engaged in the physical process of decommissioning), with a downward adjustment of 8% to reflect labor hours for these kinds of activities not engaged in physical processes. The actual adjustment for these safety-related labor rules, however, was much greater.

To ensure worker focus, safety tailboards and other pre-planning activities were strengthened and adequately conducted with the work force prior to, during and after the completion of each task. Non-production times including breaks were enhanced beyond expectations on account of radiological conditions and associated work requirements.

Break times and tailboards are required by regulations and labor agreements. In addition, PG&E's safety program requires activities such as personnel stretching, work site inspections, and equipment pre-use inspections. These precautions increase safety margins against injuries and accidents for employees working in the field. Personnel must leave the Radiologically Control Area (RCA) for breaks because no eating, drinking, or smoking is allowed in the RCA. The process of leaving and re-entering the RCA takes at least 30 minutes, allowing time for logging into the area, radiological screening upon exit, and logging back into the area. Personnel working in Surface Contaminated Areas (SCA) require additional time to don and doff protective clothing for area entry and exit respectively. Transit time through the RCA Access Point adds 30 minutes round trip for each break.

PG&E's updated estimates of labor expenses for remaining work were developed based on actual experience to date, anticipated decommissioning methods, radiological conditions expected, safety requirements and other factors. Based on this information, crew sizes for each resource were estimated and applied to the duration of each major activity to calculate a total man-hour estimate. These estimates together with anticipated billing rates, were used to estimate the labor cost to perform the remaining decommissioning work. PG&E has increased the 2009 estimate of $23 million by an additional $32.8 million. Staffing is discussed further in section 3.7.

- Tools and Equipment/RP Supplies. HBPP Unit 3 has significant alpha radiological hazards which must be carefully handled. Experience to date has shown that the consumption rate for tools and equipment and radiation protection supplies is much higher than initially forecast. Addressing high alpha radiological contamination involves the controlled cutting and disassembly of each system, which requires extensive scaffolding and man lifts to access the work locations. To facilitate radiological safety, and enhance personnel safety scaffolding is erected multiple times in any given area. Various other tools and equipment, including one-of-a-kind specialty devices, are needed for rigging components out from their installed locations, and replacing permanently installed utilities with temporary utilities to perform the work. Once contaminated, tools and equipment often need to be disposed of as waste to protect workers, and to avoid the spread of contamination. The 2009 estimate of

$9.3 million has been spent and an additional $19.3 million is required to complete decommissioning.

- License Termination Survey. The 2009 Cost Study included $4 million for a final site survey. Using industry benchmarking, including the estimated costs for DCPP Unit 1 and Unit 2, PG&E now estimates that the cost of the survey, including professional staff, radiation protection technicians and per diem expenses will be $19 million, which is an increase of $15 million.

- Turbine Building Demolition. The 2009 estimate for the turbine building decontamination and demolition was $4 million. After an evaluation of the two competitive bids received, a specialty contractor has been awarded $14 million to demolish the building, which is an increase of $10 million.

- Site Infrastructure and Plant Modifications. Prior to beginning decommissioning of (HBPP Unit 3, the site was configured to safely monitor and store the hazards associated with operating and maintaining the plant. To prepare for and sustain the decommissioning effort, major new infrastructure and some site modifications were needed. Certain activities planned for in the 2009 Cost Study were completed, and others were determined to be not needed. The additional costs for Infrastructure for Facility Modifications were driven primarily by the unexpected costs associated with providing access to the site and providing work space for personnel once on site. The Radiological Protection (RP) facilities have required additional staffing and testing to control the extreme alpha contamination on site. The large number of samples needed to adequately assess the extent and concentration of alpha contamination combined with the requirement to achieve very low background radiation levels in the resulted in the decision to construct a new counting facility rather than attempting to salvage existing facilities. Additional RP facilities included an enclosure ("RUBB Tent") for packaging radioactive materials for shipment and a new access control facility for personnel and material access and egress to and from the radiologically controlled areas of the facility. The RUBB Tent was constructed to facilitate packaging in inclement weather and to control potential airborne releases during packaging. The access control facility was expanded to more efficiently accommodate large numbers of workers during peak transit times to and from their work areas.

  The 2009 estimate of $8.6 million for facility upgrades to support full scale-decommissioning has been expended. An additional $8.2 million in infrastructure improvements and installations are needed to facilitate the shutdown of the liquid radwaste system, including an alternate liquid radwaste system, groundwater treatment system, waste packaging storage facility and to relocate certain facilities (office trailers).

- Small Value Contracts. The 2009 estimate did not take into account certain smaller value contracts, which are critical to the decommissioning work. Services include infrastructure support such as janitorial, water, garbage disposal, trailer rental, maintenance of office facilities, membership fees, California Coastal Commission fees, and office supplies. The

current estimate of $10.8 million is based on the expected spend rate of existing contracts and meeting project milestones.

- Contingency. The current estimate includes $94.5 million in contingency, an increase of $40.5 million from the 2009 estimate. The project has used $36 million of the 2009 contingency. Contingency on the remaining scope of work ranges from 10 percent to 25 percent applied to various decommissioning activities.

3.3 REACTOR VESSEL CAISSON REMOVAL

The industry standard for planning and executing nuclear facility decommissionings is to decontaminate structures that are greater than three feet below grade and leave them in place. A previous cost studies for HBPP Unit 3 assumed that structures more than three feet below grade, with the exception of the spent fuel pool, would be left in place. PG&E had previously decided on complete removal of the spent fuel pool due to previously identified leakage and the contamination levels of the leaked water.

A caisson is a water tight structure used as a foundation or to carry out work under water. Caissons have been used for centuries as building foundations and, occasionally, as structures housing activities such as garages and pump stations. In the case of HBPP Unit 3, the caisson was a first of its kind to house a nuclear containment structure, pressure suppression chamber, bioshield wall surrounding a reactor vessel, and nuclear steam supply system below grade. The advantages of this approach included additional shielding provided by the soils and external pressure to assist with pressure suppression in the event of an accident. The caisson was constructed by forming 13 foot sections above ground and then excavating and water jetting the ground from underneath the structure thus allowing it to "sink" into the earth. This technique allowed the work force to remain above ground. The construction of the caisson ultimately placed the lowest floor at approximately 66 feet below sea level, the bottom of the structure about 80 feet below grade, and most of the structure below the water table.

PG&E first obtained access to the interior of the bioshield wall surrounding the reactor vessel in late 2011. When a portion of the caisson structure was sampled in the spring of 2012, quantities of neutron activation products significantly higher than forecast were discovered. The newly discovered technical issues that have a significant impact on in-place disposal of the caisson include the additional quantities of neutron activation products within the caisson structure and uncertainty of survey methodologies to verify that residual radioactive contamination levels would meet the release criteria.

- The activation product identified in the concrete bioshield wall is a long-lived radioisotope known as Carbon-14 (C-14). C-14 has a half-life of 5730 years, is considered biologically important, and was identified in portions of the concrete that were exposed to the neutron flux from the operating reactor. Remediating the C-14 would require removal of well over 21 inches from the supporting walls. PG&E has determined that removal of this quantity of material could result in an unstable structure leading to a significant safety risk to personnel performing the removal and final status surveys. Additionally, removal of only the activated concrete would cause schedule delays and additional disposal fees. Recommendations from the Electric Power Research

Institute (EPRI) and several facilities that have encountered C-14 activated concrete are to remove and dispose of the entire structure.

- The interior walls within the caisson contain many small diameter electrical conduits and small bore piping. Verification of contamination levels within these smaller diameter tubes is problematic.
- In addition to the smaller tubing, larger contaminated embedded piping is also present within the caisson. Experience in the turbine building has been that the ability to clean the piping to clearance levels has been very difficult and resulted in large quantities of secondary waste for disposal.
- Cracks in the caisson walls, particularly adjacent to the spent fuel pool, contain radioactive contamination that must either be removed by "chasing cracks" or otherwise accounted for in dose modeling. Other sites have found it most economical to simply remove those structures where contaminated cracks in the concrete affect the dose modeling.
- The radiological dose modeling required for a structure the size of the caisson containing uncertain levels of contamination due to both embedded contaminated piping and levels of neutron activation products presented an additional challenge.
- Removal of activated concrete, and contaminated conduit and small bore piping would result in an unstable structure that would pose a significant risk of collapse while workers are below grade removing those materials.

PG&E commissioned an engineering feasibility study to identify alternatives to resolve radiological issues associated with the caisson. The study evaluated methods, risks, schedules, and costs for removal of the caisson. After PG&E evaluated the technical issues associated with remediation and in-place abandonment versus removal, it determined that the only viable solution was complete excavation and removal of the caisson. PG&E also engaged the CAB in evaluating the options for the caisson. The CAB has expressed desires to have the site returned to that state to the extent that is reasonable, including removal of subgrade structures.

The technical, safety, regulatory and public perception challenges associated with leaving the caisson in place appear insurmountable. The challenges posed by caisson removal include groundwater control, large volumes of soil requiring removal, and ground (stability) control around the work area. To adequately and safely control ground water intrusion, from the investigative work completed to date, it appears that a slurry wall to approximately one hundred and seventy (170) feet below grade to the Unit F clay layer will be required. The slurry wall will be used for the removal of both the concrete caisson and the spent fuel pool. The cost to the decommissioning project of removing the caisson is significantly more than the original cost estimate for decontamination and in-place disposal. The cost increases are comprised of the costs to construct ground water controls, increased material packaged and sent for disposal, and the additional schedule time to complete the removal. The feasibility study identified the following cost contributors:

Total	$191.6 M
Field Work	$78.0 M
Packaging/Material Handling	$12.9 M
Project Staffing	$22.1 M
Waste Disposal	$24.0 M
License Termination Survey	$6.2 M
Tools and Supplies	$2.3 M
Other	$4.2 M
Contingency	$41.8M

Additionally, the feasibility study estimated that removal of the caisson will add two and one half years to the schedule.

The benefits of removing the caisson include enhanced personnel safety during the project, mitigation of the concerns pertaining to surveying in situ materials, removal of the entire source term, elimination of the risk associated with legal or regulatory challenges, and resolution of the concerns of the CAB.

3.4 CIVIL WORKS PROJECTS

After a successful asbestos abatement and demolition of the above grade demolition of the fossil units 1 and 2 (adjoining the nuclear unit 3) seven months ahead of schedule and without injury, PG&E made a significant effort to develop similar bid specifications that were thorough and complete with clear definition of scope and strong emphasis on safety and environmental compliance for nuclear unit 3. As discussed above in Section 2,3, PG&E is now transitioning to a Civil Works Projects Phase, PG&E's bid specifications include all HBPP Unit 3 safety and environmental expectations and specific requirements so bidders clearly understand the culture that is paramount to successfully performing work at the HBPP Site. PG&E expects that all work is performed with safety at the forefront and built into every aspect of work execution, and that all work is accomplished in a manner that will protect the environment and assure the local community that the HBPP Site will be left in a condition that at least meets, if not exceeds all requirements.

3.4.1 Nuclear Facilities Demolition and Excavations:

The scope of work includes decommissioning and demolition of all remaining permanent plant structures and facilities identified for demolition. Additionally, this scope of work includes installation of a slurry bentonite wall to the Unit F clay layer that will encompass the Reactor Building Caisson, Turbine Building foundation, and other deep structures in the Unit

3 area to provide groundwater control and isolation. Note that this scope of work will potentially include removal of the Reactor Caisson and Foundation Piles. The Nuclear Facilities Demolition and Excavations, including the removal of the Spent Fuel Pool, is a significant and diverse scope of work representing the principal contract of HBPP Unit 3 Decommissioning.

3.4.2 Office Facility Demobilization

The scope of work includes removal and/or demolition of office facilities, including buildings and structures owned and leased by PG&E. Most of buildings and structures to be removed are modular or trailer type construction. Leased trailers and structures are to be isolated, disconnected, removed from HBPP Unit 3, and returned to the owner. Buildings and structures owned by PG&E are to be isolated, disconnected, demolished, and disposed as waste, unless released for salvage or recycle. This scope of work includes an estimated 32 building units comprising approximately 40,000 square feet.

3.4.3 Final Site Restoration

The scope of work includes development of site grading and drainage, placement of ground cover including vegetation and other surfacing, road construction and repairs, installation of fencing and site lighting, and other final site development work to achieve the required end state condition for PG&E's future industrial use. It includes demolition of remaining miscellaneous structures to support final site restoration plans. The parcel containing the restoration area is approximately 102 acres. Main features of this scope of work include removal of buried asbestos containing materials; demolition of reinforced concrete settling basins, truck ramp, and associated piping; soil excavation, backfilling, and compaction; wetlands construction; finish grading; storm drain system installation; topsoil placement; vegetation establishment; installation of erosion control features; ground cover installation; final surfacing; and removal of portal monitors and truck scales.

3.4.4 Known Challenges

The HBPP Unit 3 nuclear decommissioning project has unique challenges due to its specific design features, highly congested facilities and underground systems/utilities, contamination issues, limited access, high water table, etc. Furthermore, multiple operations conducted by separate entities (PG&E, various contractors, etc.) are and will continue to occur simultaneously throughout the course of the decommissioning, requiring close coordination, communication, and interface between the parties. Known challenges at HBPP Unit 3 that support an understanding of the significant increase in the value to perform the work at HBPP Unit 3 from the competitive bids and as shown in the above graph are:

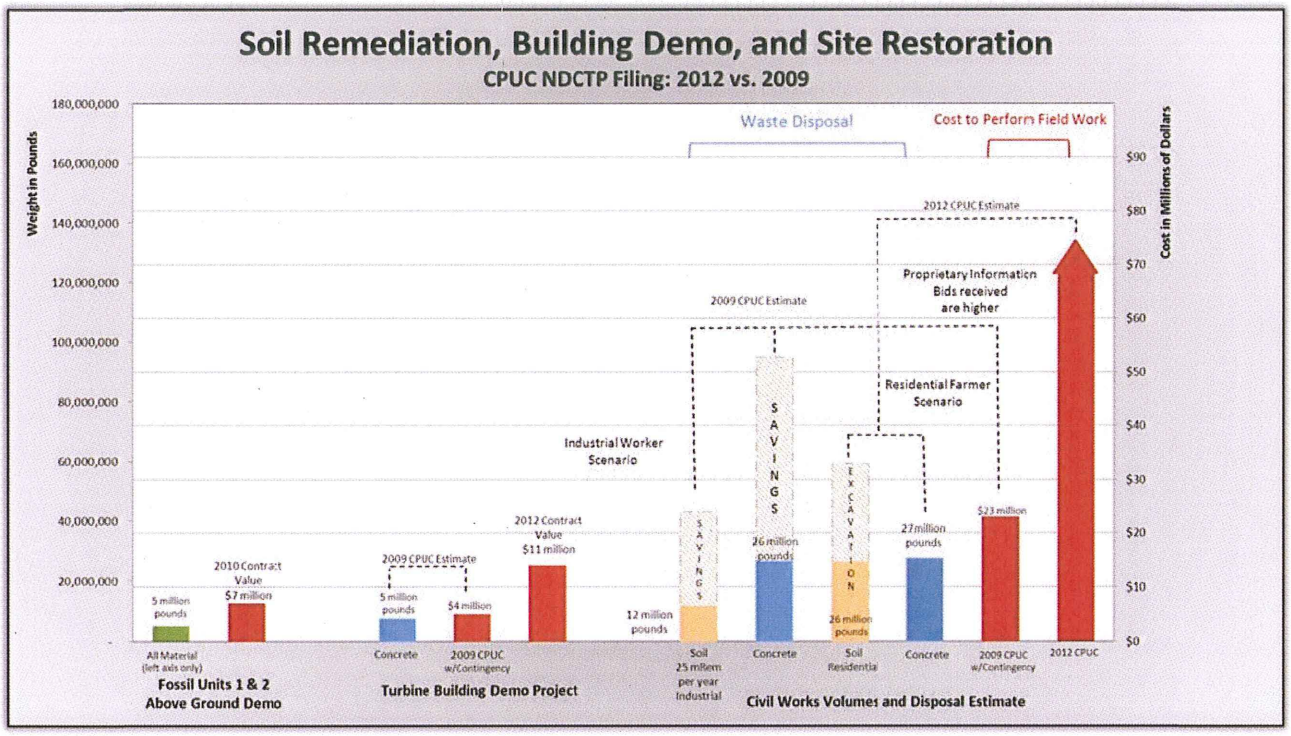
- **Weather:** Eureka receives about 75 percent of its average annual rainfall during the rainy season, generally October through April, with greatest monthly totals in December and January. Eureka's average annual rainfall over the 110-year period is 38.87 inches. The area available for staging empty and filled intermodals and the ability for PG&E to ship intermodals during the rainy season may affect the rate at which the structures can be demolished.

- **Site Coordination and Congestion:** The site footprint is extremely small and constricted. Coordination among all parties performing work onsite is critical for success. Very little space is available onsite for laydown areas, soil stockpiling, demolition debris, and equipment operation, including demolition machines and truck traffic. Significant delays or inefficiencies may be unavoidable due to interference and coordination with other site activities. The constricted space may limit the pace of demolition and excavation. Personnel access to the below grade areas of the reactor caisson (suppression cells, drywell, access shaft, etc.), is restricted (confined space and radiation area) and requires detailed planning to ensure optimal time on tools. Additionally, the number of personnel working below El. -14 in the RFB must be minimized due to space restrictions and limited egress / ingress.

- **Below Grade Obstructions:** Underground utilities and other underground commodities that have not been appropriately documented may be encountered during installation of a support of excavation system or during open-cut excavation. Original plant design drawings of underground utilities and commodities may not match the installed configurations in the field. Systems may have been added or altered without corresponding as-built documentation. Obstructions are anticipated and contingency plans are needed for unexpected obstructions in the excavations. Previously unidentified areas of radiological or non-radiological contamination associated with unidentified underground commodities may also be encountered during excavations. This may require additional measures, including soil sampling and segregation of soil stockpiles, to be applied to appropriately manage potentially contaminated soil that was unexpected. Increased coordination with PG&E will be required in responding to such discoveries.

- **Deep Excavations:** Excavations deeper than (+) 8-foot elevation (approximately four feet below grade) will require water control. Numerous excavations will be deeper than four feet and will require the need to collect and pump the water into holding tanks. Due to the depth of these excavations, shoring may be required for water intrusion and for stabilization of trenches. Excavation spoils have to be sampled for hazardous constituents before disposition for reuse or offsite disposal. Spoils are required to be stockpiled until sample results are received, generally a 14-day turnaround. Soil piles are required to be maintained and managed to prevent water runoff and potential cross-contamination. Due to the small footprint of the Site, there is limited space for stockpiling soils. Soil stockpiles may accumulate faster than PG&E can package and ship the soil offsite.

3.4.5 BID RESULTS



A key input that is being used for the current cost estimate include the three competitive bids received to perform the remainder of the Civil Works projects at HBPP. Adjustments were made where there existed overlap between the feasibility study to remove the caisson and bids and overlaps the NDCTP and Fossil Decommissioning.

Adjustments/Reductions:

The Work Breakdown Structure (WBS) in the feasibility study delineates four key breakdown areas amounting to a cost estimate of $83M. Within this scope and cost estimate are areas that overlap with the Civil Works bids. The Kiewit feasibility study includes a cost of $17.8M for installation of the slurry wall. This cost is also provided in the Civil Works bids and it will have to be reduced from Nuclear Facilities Demolition and Excavations cost work breakdown structure which includes installation of a slurry wall. Also, the removal of the refueling building slab from +12 El. to +9 El., the concrete spent fuel pool/soils are part of the two inputs. From the caisson feasibility study the unit rates are: concrete removal $1,773 per cu. yd.; soil $265 per cu. yd.; and structure backfill $192 per cu. yd. The RFB concrete slab is 306 cu. yd. and concrete SFP is 471 cu. yd. Accounting for dewatering costs, concrete and soil removal and backfill costs apply a $4M reduction.

Therefore, a reduction of $21.8M or $22M is applied to the civil works bids because of these overlaps.

The caisson feasibility scope of work includes: demolition of Units 1 and 2 foundation slabs and pile caps; removal of foundation piles; and backfilling voids generated from the demolition and pile removal. The feasibility for this scope of work includes: Project Management; Office/Staff Expenses;

Operational & Compliance Support; Design and Engineering; Temporary Work; Unit 1 and 2 demolition, excavation and backfill. The total cost for this effort is estimated at $5M.

Therefore, a reduction of $5M is applied to the caisson feasibility study because this subgrade demolition and removal of the piles is part of the Fossil Decommissioning.

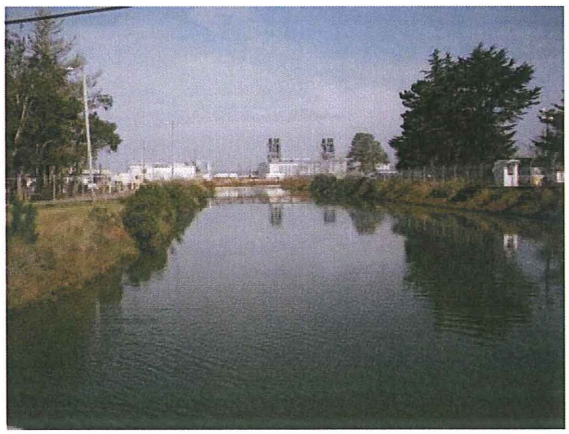
Three bids were received from leading industry/reputable companies for all four discrete civil works projects. The four projects are: Intake and Discharge Canal Remediation; Nuclear Facilities Demolition and Excavations; Office Facility Demobilization; and Final Site Restoration. A fourth bid was received from another well qualified company, but it only applied to performing the remediation of the intake and discharge canals. Pricing was received for each discrete project.

Inputs from Sourcing, Finance and Decommissioning Project Manager were sought to develop a composite pricing from the bids received to estimate the contract value for the CPUC filing.

3.5 Intake and Discharge Canal Remediation

The 2009 Cost Study assumed that minimal amount of soil and no sediment was to be removed from the intake canal to meet the land use release criteria associated with the Industrial Use Scenario. However, to meet the more stringent release that PG&E is now assuming, impacted soils and sediment will need to be removed.

The Discharge Canal was likely impacted from historical discharges from various pipes; most notably the Abandoned Radwaste Discharge Line via Unit 3 Discharge Tube and the Radwaste Discharge Line. The area and depth of impacted soil for this case was based on analytical data collected in 1998. Most of the data indicates that the bottom of the Discharge Canal was impacted above background. The greatest impact was a sample point at 42 pCi/g of Cs-137 at a depth interval of 1 to 2 ft. The sample collected from 2-3 ft. sample interval showed impacts above background at this depth. In the 2009 Cost Study, an estimated area of 233 ft^2 and 3 feet in depth was estimated to be excavated from the discharge canal and with an assumed bulking factor of 1.35 resulted in a volume of 945 ft^3.



HBPP Intake Canal

HBPP Discharge Canal

In order to fully evaluate the needs for remediating the intake and discharge canals and associated structures, HBPP Unit 3 management evaluated the final status survey methods and rigor, desires of the local community, and the experiences at other decommissionings. A postulated risk of identifying additional remediation needs at the end of the decommissioning long after completion of the canal remediation project was identified. Three approaches to address the risk are to:

- Begin the remediation early with the established radiological limits;
- Perform the remediation at the end of the decommissioning; or
- Remediate to the lower radiological limits (0.5 pCi/g).

The risk associated with starting early with the established radiological limits are that additional remediation needs will be identified at the end of the decommissioning during the final status survey process. Additional remediation will require the duplicate costs of establishing ground water controls, permitting, excavation, disposal, additional fill material, and re-performance of the final status surveys.

The risk associated with performing the remediation at the end of the decommissioning is the potential for overwhelming the transportation processes. The managing the volume of soil that would be transported during the same time frame the final soils removal for the site and the caisson would become impractical and may pose an unacceptable burden on the local roads and other infrastructure.

The risk associated with early remediation to lower radiological limits is the cost of disposal for the larger volume of material removed.

When the pros and cons of each approach were compared, PG&E decided that the financial risks associated with remediating early to the lower radiological limit were the prudent course of action.

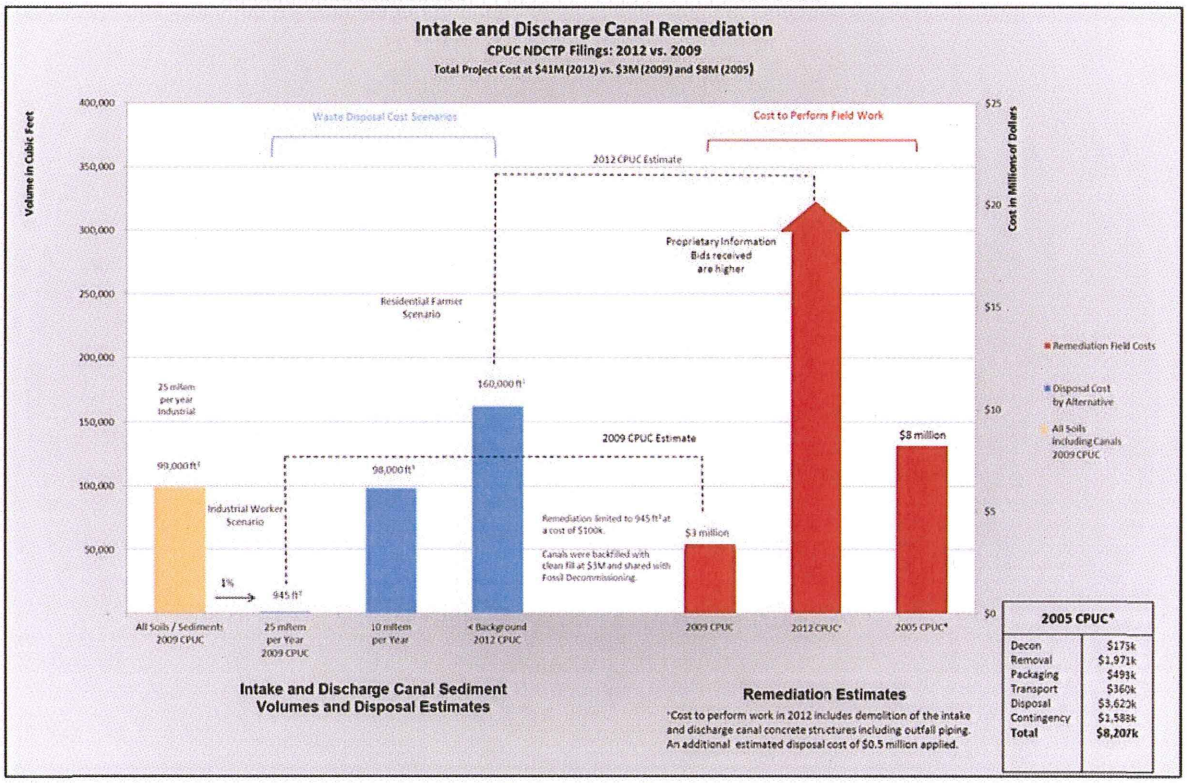
The 2012 cost estimate assumes dose limits commensurate with EPA limits and ALARA (As Low As Reasonably Achievable). This conservative approach requires that 24,000 ft^3 of soil be removed from the Intake Canal, and 120,000 ft^3 of soil be removed from the Discharge Canal. Over the past year, the Discharge Canal has filled with accumulated silt depositing a volume of 20,000 ft^3 which must be removed. The material contains biological material and is not suitable as site backfill due to the non-compatibility of the silt material.

PG&E prepared civil works bid specifications in June 2012. The scope of work to remediate the Intake and Discharge Canals included: mechanical removal of radiologically and chemically contaminated sediment; demolition of the discharge outfall and levee to Humboldt Bay; demolition of the intake and discharge structures; restoration of levee and coastal trail along the Bay; management of and dewatering of contaminated sediments, and water treatment to meet discharge permit requirements.

Four bids were received in September of 2012. The estimates to perform this work are proprietary information as bids are being technically evaluated, however, they are of a substantial cost. The recommendation is to follow the conservative approach because there may be a potential to incur these significant costs if final site surveys at the end of the project require additional remediation.

Delaying the project to the end of the project is not practical. Permitting for the remediation of the canals is expected to be in-place early 2014 and the estimated 1,000 shipments of intermodals to remove the sediment from the canal should start in 2014.

Canal Remediation	47,408
Removal	21,000
Disposal	20,224
Canal Contingency	6,184



3.6 STAFFING PLAN

Successful management of the cost of the decommissioning is contingent on control of Labor costs. To that end, the first priority is to manage the headcount for the entire duration of the decommissioning. PG&E developed a staffing plan specific to the headcount for each period that runs to the end of 2019. The HBPP Unit 3 staffing plan is connected to the working schedule to ensure that the necessary staff will be available to complete the decommissioning in a safe, cost effective, and timely manner.

PG&E assessed the staffing needs based on the work and project plans, complexity of the work, hazards associated with the work (alpha contamination in particular), potential conflicts with other projects on site, and the schedule to complete the work.

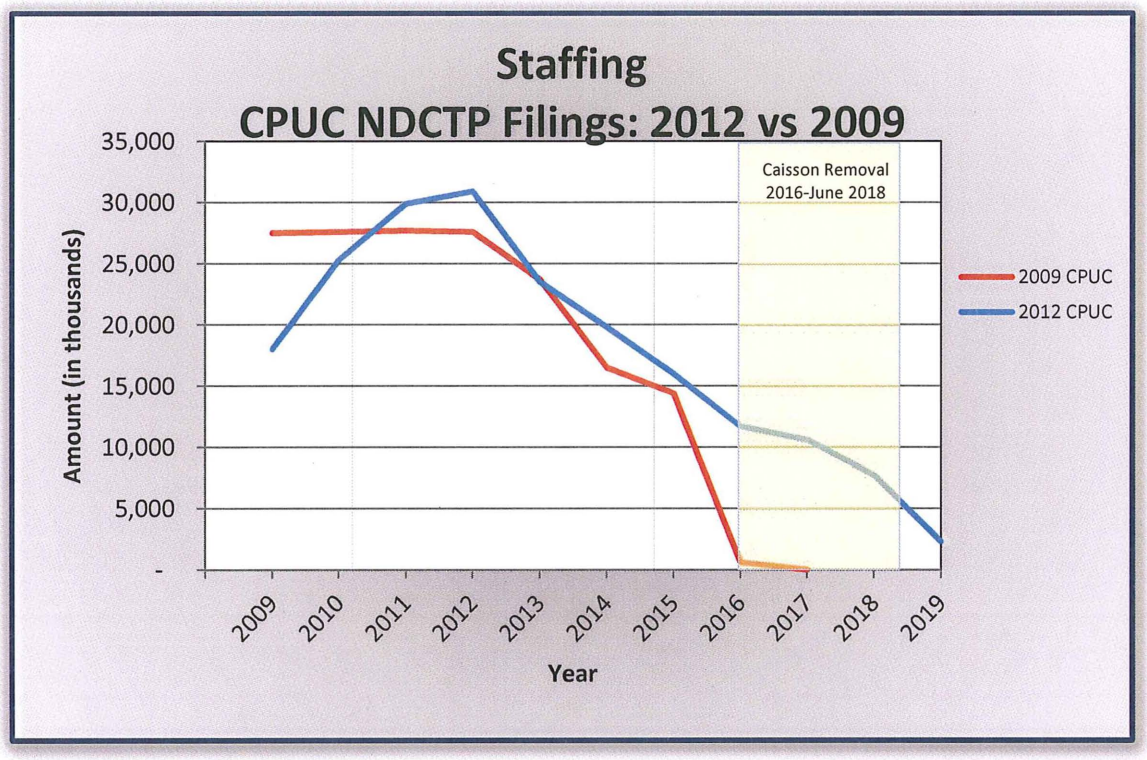
PG&E sought the help of highly experienced staff and consultants to assist in developing detailed plans and schedules. Four major companies supplied personnel with previous experience in decommissioning at 24 sites throughout the United States, who were also able to draw upon many years of personal experience when drafting their work plans and technical work papers. PG&E was thus able to benefit from the collective lessons learned at other commercial nuclear and Department of Energy/Department of Defense facilities that have undergone decommissioning. The table below summarizes the experience base used to provide planning, briefing, and field walk-downs:

Assignment	Number assigned	Sites Worked	
PG&E Fulltime Employee	1	CYAPC Brookhaven National Lab BRP DOE Fuel Processing Ft Calhoun Ft Greely Hanford Honeywell Fuel Processing INEL JACADS TOCDF K25 Oakridge KAPL	La Crosse MYAPC NASA Plumbrook Rocky Flats Rancho Seco Saxton SONGS Trojan UW Test Reactor Westinghouse Test Reactor YAEC Zion
Staffing Augment	9		
Planning & Special Projects	14		
Site Decommissioning Debriefs	7		

Attachment B, Subject Matter Experts, contains a detailed list of the positions and companies that supplied SMEs.

The Plant Director and the Department Managers responsible for the various aspects of the decommissioning met off-site several times in 2012 to develop and refine the staffing plan. The staffing plan includes ramp-up, ramp-down, durations, funding sources, and number of staff needed to complete each function associated with the decommissioning. The staffing plan starts in 2012 and continues through the caisson removal project, restoration and administrative close-out in about 2019.

Scheduled work drives the need for personnel. As the work load increases, the staffing to successfully complete project planning as well as the implementation of the plans increases. As the work is completed, the need for staffing begins to decrease as well. The prediction of staffing needs, staffing increases, and staff lay-offs is referred to as staffing ramp-up/ramp-down or simply as that "Staffing Plan" herein.



PG&E has scheduled the remainder of the decommissioning of the HBPP site over a period of approximately eight years finishing in 2019. Schedule duration is sufficient for the decommissioning activities including the caisson removal project that spans 2 ½ years. The ISFSI will continue in operation until the DOE takes custody of the fuel and GTCC waste, expected to commence at the end of 2024. These ISFSI costs are discussed in a separate work break down structure – Spent Fuel Management, and they are not included in the staffing plan.

The staffing plan for this cost estimate update starts in January 2012 and ends in 2019. The staffing ramp-downs in 2013 as the decommissioning complete removal of plant systems and transitions to civil works projects. The staffing plan continues to ramp down during the caisson removal project starting 2016 and into the latter part of 2018 during final site restoration. During close-out of the project in 2019, the staffing plan is at a minimum headcount as it submits its license termination request, completes its invoicing and closes out its records.

In order to better track and quantify costs for staffing, a work breakdown structure was developed. The "Staffing Plan" work breakdown structure consists of the following departments:

- Site Management
- Decommissioning including Finance and Sourcing

- Projects
- Engineering, Safety and Administration and Engineering Contracts
- Radiation Protection
- Radiological Materials Control and Count Room
- Environmental and Environmental Contracts including Permitting
- Site Services
- Final Status Survey

The staffing plan includes fixed overhead which are those costs incurred for maintaining staff that is assigned to management, safety, facility maintenance, licensing support, and procurement and finance. Fixed overhead are job functions that are needed regardless of the status and progress of the decommissioning. Because the job functions are independent of the scheduled demolition of the plant, the functions and associated positions are considered as fixed overhead. It also includes direct and discrete labor that are staffing costs for personnel who are directly supporting schedule progress such as engineered plans, development of work packages, and permits.

3.6.1 Site Management:

The Site Management structure is depicted in Attachment C.

3.6.2 Decommissioning:

The Decommissioning organization is responsible for oversight, identification, and controlling the execution of project transition and work. The Support Services group performs cost and budget control, procurement, and warehousemen functions. The Decommissioning organization structure is depicted in Attachment D.

3.6.3 Projects:

The Projects organization is responsible for implementing self-performed projects and oversight of civil works projects. The Projects organization structure is depicted in Attachment E.

3.6.4 3.6.4 Engineering:

The Engineering organization structure is depicted in Attachment F, and it includes a broader base of functions such as engineering, work control, safety, plant operations and plant administration.

The engineering functional area is responsible for: developing, reviewing, and approving drawings, calculations, work packages, and other documents; evaluating non-conformances of licensed components for engineering implications; assisting with development of work flow plans; revising Engineering procedures and programs; field engineering; and developing rigging and heavy lift plans.

The work control group prepares work packages, cost and time estimates, drafts clearance orders, and revises procedures during the planning phase.