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Exhibit No.: \_\_\_\_\_  
Date:  November 4, 2011  
Witness: Daniel K. Menegus  
Steven A. Whelan

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**PACIFIC GAS AND ELECTRIC COMPANY**

**PIPELINE SAFETY ENHANCEMENT PLAN  
(IMPLEMENTATION PLAN)**

**UPDATED WORKPAPER PAGES SUPPORTING**

**CHAPTER 4  
GAS TRANSMISSION VALVE AUTOMATION PROGRAM**

**CHAPTER 5  
PIPELINE RECORDS INTEGRATION PROGRAM**

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**PACIFIC GAS AND ELECTRIC COMPANY  
IMPLEMENTATION PLAN**

**CHAPTER 4  
GAS TRANSMISSION VALVE AUTOMATION PROGRAM**

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**CHAPTER 5  
PIPELINE RECORDS INTEGRATION PROGRAM**

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Workpapers Supporting Chapter 4, Valve Automation

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Table 2  
Capital Expenditures by Maintenance Activity Type (MAT)

Line No	Order	PSRS Id	Order Description	MAT	Operative Date	2011	2012	2013	2014	Total	Workpaper Reference	Map Reference
1	97000502	23619	VALVE AUTO - ANTIOCH TERMINAL, PH. 1	44A	3/31/2013	-	108,147	153,864	-	262,011	WP 4-5	WP 4-198
2	97000503	23620	VALVE AUTO - ANTIOCH TOWN METER STA, PH. 1	44A	3/31/2013	-	695,382	989,344	-	1,684,726	WP 4-7	WP 4-199
3	97000501	23621	VALVE AUTO - SP3-LINE 191 MTR STA, PH. 1	44A	3/31/2013	-	546,380	777,354	-	1,323,734	WP 4-9	WP 4-200
4	97000521	23622	VALVE AUTO - LOS MEDANOS, PH. 1	44A	3/31/2013	-	299,031	425,442	-	724,473	WP 4-11	WP 4-201
5	97000504	23623	VALVE AUTO - CONCORD METER STA, PH. 1	44A	6/30/2013	-	128,029	967,286	-	1,095,315	WP 4-13	WP 4-202
6	97000505	23624	VALVE AUTO - VINE HILL, PH. 1	44A	6/30/2013	-	93,189	704,062	-	797,251	WP 4-15	WP 4-203
7	97000506	23626	VALVE AUTO - "C" STREET STA, PH. 1	44A	6/30/2013	-	44,189	333,859	-	378,048	WP 4-17	WP 4-204
8	97000507	23627	VALVE AUTO - FRANKLIN CANYON, PH. 1	44A	6/30/2013	-	12,252	92,564	-	104,816	WP 4-19	WP 4-205
9	97000508	23629	VALVE AUTO - SAN PABLO, PH. 1	44A	6/30/2013	-	22,064	166,696	-	188,760	WP 4-21	WP 4-206
10			<b>Total MAT 44A - StanPac Capital</b>			-	<b>1,948,663</b>	<b>4,610,471</b>	-	<b>6,559,134</b>		
11												
12	30842306	23442	VALVE AUTO - MILPITAS TERMINAL, PH. 1	2H3	12/31/2011	2,740,284	87,395	-	-	2,827,679	WP 4-23	WP 4-207
13	30842318	23440	VALVE AUTO - SIERRA VISTA STN, PH. 1	2H3	12/31/2011	907,628	28,947	-	-	936,575	WP 4-26	WP 4-208
14	30842310	23441	VALVE AUTO - RENGSTORFF STN, PH. 1	2H3	12/31/2011	2,174,999	69,367	-	-	2,244,366	WP 4-28	WP 4-209
15	30842297	23439	VALVE AUTO - LARKSPUR DR, PH. 1	2H3	12/31/2011	2,758,056	87,962	-	-	2,846,018	WP 4-30	WP 4-210
16	30842314	23438	VALVE AUTO - SAN ANDREAS, PH. 1	2H3	12/31/2011	945,614	30,158	-	-	975,772	WP 4-33	WP 4-211
17	30842291	23380	VALVE AUTO - HEALY STATION, PH. 1	2H3	12/31/2011	460,725	14,694	-	-	475,419	WP 4-35	WP 4-212
18	30840648	23379	VALVE AUTO - SF GAS LOAD CENTER, PH. 1	2H3	12/31/2011	1,157,871	36,928	-	-	1,194,799	WP 4-37	WP 4-213
19	30842276	23462	VALVE AUTO - CROSSMAN AVE, PH. 1	2H3	12/31/2011	2,164,894	69,044	-	-	2,233,938	WP 4-39	WP 4-214
20	30842323	23594	VALVE AUTO - VAN BUREN & RINGWOOD, PH. 1	2H3	9/30/2012	44,130	2,229,826	-	-	2,273,956	WP 4-41	WP 4-215
21	30842274	23597	VALVE AUTO - COMMERCIAL WAY, PH. 1	2H3	9/30/2012	46,932	2,371,409	-	-	2,418,341	WP 4-43	WP 4-216
22	30842271	23598	VALVE AUTO - BIRCH & S. DELAWARE, PH. 1	2H3	9/30/2012	47,291	2,389,581	-	-	2,436,872	WP 4-45	WP 4-217
23	30842302	23599	VALVE AUTO - LOMITA PARK, PH. 1	2H3	9/30/2012	7,757	391,932	-	-	399,689	WP 4-47	WP 4-218
24	30842290	23600	VALVE AUTO - HAMLIN COURT, PH. 1	2H3	9/30/2012	31,327	1,582,896	-	-	1,614,223	WP 4-49	WP 4-219
25	30842316	23601	VALVE AUTO - SAND HILL, PH. 1	2H3	9/30/2012	55,416	2,800,107	-	-	2,855,523	WP 4-52	WP 4-220
26	30842283	23602	VALVE AUTO - EDGEWOOD, PH. 1	2H3	9/30/2012	72,427	3,659,656	-	-	3,732,083	WP 4-55	WP 4-221
27	30843884	23603	VALVE AUTO - CRYSTAL SPRINGS, PH. 1	2H3	12/31/2012	-	2,447,714	219,285	-	2,666,999	WP 4-58	WP 4-222
28	30842289	23970	VALVE AUTO - HALF MOON BAY TAP, PH. 1	2H3	12/31/2012	-	653,658	58,560	-	712,218	WP 4-61	WP 4-223
29	30842319	23604	VALVE AUTO - SULLIVAN AVE, PH. 1	2H3	12/31/2012	-	367,937	32,963	-	400,900	WP 4-63	WP 4-224
30	30842299	23605	VALVE AUTO - LAWRENCE & LAKEHAVEN, PH. 1	2H3	12/31/2012	-	3,003,316	269,060	-	3,272,376	WP 4-65	WP 4-225
31	30842303	23606	VALVE AUTO - MARTIN STATION, PH. 1	2H3	12/31/2012	-	333,672	29,893	-	363,565	WP 4-68	WP 4-226
32	30842270	23607	VALVE AUTO - BAYSHORE & GENEVA, PH. 1	2H3	12/31/2012	-	849,104	76,069	-	925,173	WP 4-70	WP 4-227
33	30842312	23608	VALVE AUTO - ROUSSEAU STREET, PH. 1	2H3	12/31/2012	-	2,530,287	226,682	-	2,756,969	WP 4-72	WP 4-228
34	30842280	23609	VALVE AUTO - DIANA, PH. 1	2H3	12/31/2012	-	1,421,651	127,362	-	1,549,013	WP 4-75	WP 4-229
35	30842293	23611	VALVE AUTO - HWY 101 & SCHELLER, PH. 1	2H3	12/31/2012	-	614,352	55,038	-	669,390	WP 4-77	WP 4-230
36	30842287	23613	VALVE AUTO - FONTANOSO, PH. 1	2H3	3/31/2013	-	375,786	534,643	-	910,429	WP 4-79	WP 4-231
37	30842269	23971	VALVE AUTO - ANZAR TAP STATION, PH. 1	2H3	3/31/2013	-	692,378	985,070	-	1,677,448	WP 4-81	WP 4-232
38	30842266	23614	VALVE AUTO - ALUM ROCK, PH. 1	2H3	3/31/2013	-	430,359	612,287	-	1,042,646	WP 4-83	WP 4-233
39	30842261	23615	VALVE AUTO - 7A & 7B PLS, PH. 1	2H3	3/31/2013	-	416,267	592,237	-	1,008,504	WP 4-85	WP 4-234
40	30842305	23618	VALVE AUTO - MAYBURY, PH. 1	2H3	3/31/2013	-	281,692	400,773	-	682,465	WP 4-88	WP 4-235

WP 4-2

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GTAM Capital Expenditures and Expenses by Cost Component by Year

<b>Expense</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2011-2014 Total</b>
Labor - Change Management/Training	\$0	\$931,344	\$815,068	\$1,040,092	<b>\$2,786,503</b>
Labor - Roadmap/Preliminary Design	\$499,970	\$0	\$0	\$0	<b>\$499,970</b>
Labor - Software Development, Testing, Deployment	\$0	\$403,391	\$0	\$0	<b>\$403,391</b>
Labor - Data Conversion/Prep/Validation	\$0	\$3,155,616	\$6,654,814	\$6,184,651	<b>\$15,995,081</b>
Labor - Project Management	\$0	\$0	\$0	\$0	<b>\$0</b>
Hardware	\$0	\$1,361,080	\$0	\$0	<b>\$1,361,080</b>
Software	\$0	\$0	\$0	\$0	<b>\$0</b>
<b>Total Expense</b>	<b>\$499,970</b>	<b>\$5,851,432</b>	<b>\$7,469,882</b>	<b>\$7,224,743</b>	<b>\$21,046,026</b>
<b>Capital</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2011-2014 Total</b>
Labor - Change Management/Training	\$0	\$5,277,613	\$4,618,717	\$4,305,822	<b>\$14,202,153</b>
Labor - Roadmap/Preliminary Design	\$3,337,604	\$0	\$0	\$0	<b>\$3,337,604</b>
Labor - Software Development, Testing, Deployment	\$829,740	\$14,988,054	\$11,246,861	\$8,166,191	<b>\$35,230,846</b>
Labor - Data Conversion/Prep/Validation	\$0	\$5,594,681	\$3,213,898	\$8,097,493	<b>\$16,906,072</b>
Labor - Project Management	\$0	\$2,977,671	\$2,977,391	\$2,037,124	<b>\$7,992,186</b>
Hardware	\$2,905,304	\$8,264,731	\$3,075,875	\$559,250	<b>\$14,805,159</b>
Software	\$279,625	\$5,143,235	\$2,104,645	\$2,583,735	<b>\$10,111,240</b>
<b>Total Capital</b>	<b>\$7,352,273</b>	<b>\$42,245,986</b>	<b>\$27,237,386</b>	<b>\$25,749,615</b>	<b>\$102,585,259</b>
<b>Total GTAM Project Forecast</b>	<b>\$7,852,242</b>	<b>\$48,097,417</b>	<b>\$34,707,268</b>	<b>\$32,974,357</b>	<b>\$123,631,285</b>

WP 5-12

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 Workpapers Supporting Chapter 5, Pipeline Records Integration Program

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GTAM Capital Expenditures and Expenses by Cost Component

<b>Cost Component</b>	<b>Expense</b>	<b>Capital</b>	<b>Total</b>
Labor-CM & Training Cost	\$ 2,786,503	\$ 14,202,153	\$ 16,988,656
Labor-Roadmap Cost Detail	\$ 499,970	\$ 3,337,604	\$ 3,837,574
Labor-Software Dev Cost Detail	\$ 403,391	\$ 35,230,846	\$ 35,634,237
Labor-Data Cost Detail	\$ 15,995,081	\$ 16,906,072	\$ 32,901,153
Labor-PM Cost Detail	\$ -	\$ 7,992,186	\$ 7,992,186
Hardware Cost Detail	\$ 1,361,080	\$ 14,805,159	\$ 16,166,240
Software Cost Detail	\$ -	\$ 10,111,240	\$ 10,111,240
<b>Total</b>	<b>\$21,046,026</b>	<b>\$102,585,259</b>	<b>\$123,631,285</b>

WP 5-13

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GTAM Cost Forecast by Cost Component by Phase

<b>Cost Component</b>	<b>Phase 0</b>	<b>Phase 1</b>	<b>Phase 2</b>	<b>Phase 3</b>	<b>Total</b>
Labor - Change Management/Training	\$0	\$8,537,730	\$6,302,412	\$2,148,514	<b>\$16,988,656</b>
Labor - Roadmap/Preliminary Design	\$3,837,574	\$0	\$0	\$0	<b>\$3,837,574</b>
Labor - Software Development, Testing, Deployment	\$2,176,041	\$17,912,462	\$11,723,055	\$3,822,682	<b>\$35,634,240</b>
Labor - Data Conversion/Prep/Validation	\$2,460,700	\$7,526,928	\$11,590,884	\$11,322,644	<b>\$32,901,156</b>
Labor - Project Management	\$0	\$4,147,958	\$2,903,682	\$940,547	<b>\$7,992,187</b>
Hardware	\$2,905,304	\$9,625,812	\$3,075,875	\$559,250	<b>\$16,166,241</b>
Software	\$279,625	\$5,268,136	\$1,979,745	\$2,583,735	<b>\$10,111,241</b>
<b>Total GTAM Project Forecast</b>	<b>\$11,659,244</b>	<b>\$53,019,026</b>	<b>\$37,575,653</b>	<b>\$21,377,372</b>	<b>\$123,631,295</b>

Note: Figures may not sum due to rounding.

WP 5-14

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GTAM Labor-Software Development, Testing, Deployment by Year

WP 5-17

Cost Component	Cap/Exp	2011	2012	2013	2014	Total Estimate	Description
Data Synchronization and migration	Capital	\$829,740	\$6,049,566	\$5,516,042	\$4,667,762	\$17,063,110	Data synchronization, design conversion, integration framework, conversion programs, and data migration functions
Blueprint & design for future solutions and retirement of legacy systems	Capital	\$0	\$472,454	\$170,012	\$203,567	\$846,033	Blueprint and design to link station drawings to Documentum (equipment, functional locations, etc.) and retire GAS FM for GT
Data access - design and development to enable data access solutions	Capital	\$0	\$3,149,025	\$129,970	\$175,381	\$3,454,375	Interface design/build/test between Documentum and GIS and SAP, make GasMap 3.0 data accessible to GasView
SAP work order change development	Capital	\$0	\$1,037,292	\$0	\$0	\$1,037,292	Development resources for SAP work order enhancement for materials traceability
Data export - design and development of data export solutions	Capital	\$0	\$919,183	\$200,435	\$0	\$1,119,618	Export of GIS data for MapGuide & GasView, enable current mapping product in mobile solution, and ETL for Gas Model Builder
Design and development of Integrity Management feeds	Capital	\$0	\$613,833	\$200,435	\$0	\$814,268	Integrity Management from GasMap and IRTNNet feed
Project and Portfolio Management (PPM) integration with SAP and GIS	Capital	\$0	\$559,250	\$1,342,200	\$0	\$1,901,450	Implement project and portfolio ability for prioritizing capital and expense projects for GT and migrate PLM functions for Pipeline, CP, and Line Equipment
Mobile software design and development	Capital	\$0	\$348,358	\$2,046,871	\$2,364,269	\$4,759,497	Design/develop/deploy mobile software for Pipeline, CP and Line Equipment
Software development workstream leads	Capital	\$0	\$1,839,093	\$1,640,897	\$755,212	\$4,235,201	Dedicated resources for GIS, IAM, Mobile, SAP, and IM/Risk analysis workstream leads
Deployment of SAP changes	Expense	\$0	\$403,391	\$0	\$0	\$403,391	Development resources for SAP work order enhancement for materials traceability
	<b>Capital</b>	\$829,740	\$14,988,054	\$11,246,861	\$8,166,191	\$35,230,846	
	<b>Expense</b>	\$0	\$403,391	\$0	\$0	\$403,391	
	<b>Total</b>	\$829,740	\$15,391,446	\$11,246,861	\$8,166,191	\$35,634,237	

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GTAM - Hardware by Year

WP 5-20

Cost Component	Cap/Exp	2011	2012	2013	2014	Total Estimate	Description
Mobile Hardware	Capital	\$2,905,304	\$2,237,000	\$2,237,000	\$0	<b>\$7,379,304</b>	Acquire mobile devices, hardware to support mobile applications, implement servers
Document Management and GIS Hardware	Capital	\$0	\$1,688,935	\$279,625	\$279,625	<b>\$2,248,185</b>	Purchase/build/deploy Documentum servers and infrastructure, hardware to accommodate migration of hosted linear referenced to GIS to an internal environment
Batch Management Hardware	Capital	\$0	\$3,499,921	\$0	\$0	<b>\$3,499,921</b>	Hardware to implement batch management for materials traceability
IAM and SAP Hardware	Capital	\$0	\$279,625	\$279,625	\$279,625	<b>\$838,875</b>	Additional application servers and storage, as needed for additional user base and functionality
IM and Risk Analysis Hardware	Capital	\$0	\$559,250	\$279,625	\$0	<b>\$838,875</b>	Install/deploy hardware required to support new IM and Risk Analysis and Statistical Analysis software
Batch Management Hardware Deployment	Expense	\$0	\$1,361,080	\$0	\$0	<b>\$1,361,080</b>	Hardware to implement batch management for materials traceability
	<b>Capital</b>	\$2,905,304	\$8,264,731	\$3,075,875	\$559,250	<b>\$14,805,159</b>	
	<b>Expense</b>	\$0	\$1,361,080	\$0	\$0	<b>\$1,361,080</b>	
	<b>Total</b>	\$2,905,304	\$9,625,811	\$3,075,875	\$559,250	<b>\$16,166,240</b>	



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GTAM - Software by Year

Cost Component	Cap/Exp	2011	2012	2013	2014	Total Estimate	Description
GIS and IAM Software License	Capital	\$0	\$2,415,960	\$1,185,610	\$2,304,110	<b>\$5,905,680</b>	Software licenses for GIS and IAM
Integrity Management software, Design Visualization Tool	Capital	\$279,625	\$1,118,500	\$67,110	\$0	<b>\$1,465,235</b>	Purchase and Install software needed to perform Integrity Management, Software design visualization/prototyping tool
Mobile Software License	Capital	\$0	\$182,688	\$684,150	\$0	<b>\$866,838</b>	Additional licenses to support mobile applications for Pipeline, CP and line equipment
Pipeline Risk Management and Statistical Analysis Software License	Capital	\$0	\$1,118,500	\$0	\$0	<b>\$1,118,500</b>	Purchase and Install software needed to perform statistical analysis for IM and Risk Analysis
SAP Software License	Capital	\$0	\$307,588	\$167,775	\$279,625	<b>\$754,988</b>	Licensing for SAP enhancement to provide functionality to manage linear assets
	<b>Capital</b>	\$279,625	\$5,143,235	\$2,104,645	\$2,583,735	<b>\$10,111,240</b>	
	<b>Expense</b>	\$0	\$0	\$0	\$0	<b>\$0</b>	
	<b>Total</b>	\$279,625	\$5,143,235	\$2,104,645	\$2,583,735	<b>\$10,111,240</b>	

WP 5-21