PACIFIC GAS AND ELECTRIC COMPANY
GTS RATE CASE 2011
Application 09-09-013
Data Response

PG&E Data Request No.:	DRA_030-12		
PG&E File Name:	GTS-RateCase2011_DR_DRA_030-Q12		
Request Date:	February 17, 2010	Requester DR No.:	DRA- INM-4
Date Sent:	March 4, 2010	Requesting Party:	DRA
PG&E Witness:	Redacted	Requester:	Jack Grau

SUBJECT: CAPITAL EXPENDITURES

QUESTION 12

Please explain and provide workpapers for PG&E's conclusions on page 6-9 and 6-10 that the example projects were highest or second highest risk pipelines in the San Joaquin Valley and the Bay Area. Provide the actual risk of the projects, how that risk was determined, and how it compares to the risk of other pipeline segments of lesser risk.

ANSWER 12

The risk for the projects was determined according to the Top-100 White Paper (GTS-RateCase2011_DR_DRA_030-Q12Atch01). The sorted actual risk numbers and determining factors for the highest risk segments of all of PG&E's transmission pipelines are shown on the 2008 Top-200 spreadsheet (GTS-RateCase2011_DR_DRA_030-Q12Atch02).

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hydro-tested to its maximum design and the pipeline can continue to operate at the same pressure with the higher safety factor.

3. Installing a new segment of gas pipeline that is tested and qualified to operate at the desired pressure within the new and anticipated future class location area.

Typically, when a pipeline class location increases due to development, PG&E will either pressure-test the pipeline to ensure adequate safety or install a new pipeline segment to meet both the safety requirements and maintain or increase capacity.

Development and urban expansion in the Bay Area, and particularly in the Bakersfield area, will require significant investment in pipeline replacements, due to class location changes per CFR 192.611. An example of a Class Location Change project is:

- 2012 – Replace 10,080 feet of Line 300A in Bakersfield due to a Class Location change. $6.0 million.

(2) Pipeline Risk Management Program

In 1998, PG&E developed a pipeline Risk Management (RM) Program to assess the risk of every segment of gas transmission pipeline within PG&E's system. The Chief of the Utilities Safety Branch at the California Public Utilities Commission (CPUC or Commission) approved the program on April 20, 2000.

Pipeline risk is determined by assessing two factors: (1) probability or likelihood of failure; and (2) local consequence of failure.

The probability of a pipeline failure depends on various physical characteristics such as diameter, wall-thickness, operating pressure, year installed, pipeline condition reports, method of construction, type of coating, depth of cover, vulnerability to third-party damage, and environmental factors such as proximity to earthquake faults and potential landslides. Factors used to determine consequences include: population density, impact zone of the pipeline, types of structures in proximity to the pipeline, environmental impacts (water

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crossings), magnitude of customer outages, and magnitude of gas flow lost should the pipeline segment fail.

Utilizing these characteristics, PG&E developed a risk assessment algorithm:

$$\text{Risk} = (\text{Likelihood of Failure}) \times (\text{Consequence of Failure})$$

The algorithms and associated variables used to develop the Likelihood of Failure and Consequence of Failure were derived by analyzing root cause technical data generated from pipeline failures that occurred across the nation over a 10-year period. Even though PG&E does not have a significant pipeline failure history, insights from incidents that occurred within the PG&E system were also used to establish the risk algorithms. The algorithms are reviewed annually with subject matter experts to determine if additional data or new incidents warrant a change to the algorithms.

PG&E uses these algorithms to derive risk numbers for every unique segment of gas transmission pipe. The pipeline segment risk numbers are then used to help identify, quantify, and prioritize high-risk pipeline segments. PG&E analyzes each high-risk segment and looks for engineering solutions and risk mitigation techniques to reduce pipeline risk. Pipeline risk reduction techniques include smart pigging, pipeline replacement, pipeline relocation, pipeline rehabilitation/recoating, erosion mitigation, underwater pipeline surveys, external corrosion direct assessment, internal corrosion mitigation, landowner notification, and public education programs. The RM Program ensures that PG&E is allocating capital safety and reliability dollars and resources to the highest risk pipeline segments and regulating stations within the system.

Examples of projects within this Planning Order include:

- 2011-2014 – Replace 7.9 miles of Line 108 between Ripon and Stockton. This is the highest risk pipeline in the San Joaquin Valley. $33.6 million.

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- 2011-2014 – Replace 8 miles of Line 107 between Livermore and Sunol. This is the highest-risk pipeline in the Bay Area. $35.1 million.
- 2011-2014 – Replace 4.3 miles of Line 131 in Fremont. This is the second highest risk pipeline in the Bay Area. $13.4 million.

b. Cathodic Protection Planning Order

This planning order includes the capital expenditures to comply with federal and state regulations for cathodic protection to protect buried steel gas pipelines from external corrosion. Capital projects primarily include replacement of deteriorated and failed pipeline coatings as well as corrosion prevention equipment such as anodes, rectifiers and monitoring systems.

c. Regulating Station Planning Order

This planning order contains capital projects to replace malfunctioning and obsolete equipment within existing gas regulation stations. A gas regulation station is designed to reduce and regulate high-pressure gas from either a backbone or local transmission pipeline to a lower pressure before it is delivered into a transmission line or distribution feeder main.

d. Pipeline Reliability < $1.0 Million Planning Order

This planning order is for pipeline reliability capital projects that cost less than $1.0 million each. Total expenditures for this planning order range from $7.7 million in 2010 to zero in 2014. Projects with costs greater than or equal to $1.0 million are assigned to their own specific planning order.

4. Work Requested by Others, MWC-83 (Roy A. Surges)

This category covers plant PG&E installs, replaces, and/or relocates at the request of third parties, typically governmental agencies for public-works projects. Cities, counties, developers, Caltrans and transportation agencies such as Valley Transit Authority and Sacramento Regional Transit drive the typical WRO relocations. Capital expenditures in this category are driven entirely by existing land rights. PG&E pays zero to 100 percent of the specific project relocation costs.

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Top-100 White Paper

The "Top-100" is a list of gas transmission pipeline segments that have been identified as having the highest concern in PG&E's Risk Management system. This list enables PG&E to focus safety and reliability efforts in the highest risk areas.

The Top-100 is published annually by PG&E's Integrity Management department. The list is developed from the pipeline data in the GIS system accordance with Integrity Management's Risk Management Procedures (RMPs). The RMPs define how PG&E identifies and manages pipeline risk in accordance with 49 CFR 192. Only gas transmission pipelines as defined in 49 CFR 192 are evaluated.

The Top 100 List

The Top-100 list identifies the gas transmission pipeline segments that have the highest relative risk or likelihood of failure (LOF) due to four key types of threats. These threats include: Third Party dig-ins (TP), External Corrosion (EC), Design of Materials (DM), and Ground Movement (GM). The RMP-01 procedure provides risk algorithms and weighting for these threats. Every segment of gas transmission pipe in PG&E's system (as defined in 49 CFR 192) is evaluated.

For each of the threats above, a relative likelihood of failure and relative risk number is calculated according to the evaluation criteria established in the RMPs. The relative risk is the product of the likelihood of failure times the consequences of a failure at the location of the segment. Also, for each segment, the risk values for the four threats are added together, resulting in a relative overall risk, or Future Risk value. In total, there are 9 risk categories for each pipeline segment (TP Risk, TP LOF, EC Risk, EC LOF, DM Risk, DM LOF, GM Risk, GM LOF, and Future Risk).

The Top 100 list is comprised of:

- 10 pipeline segments with highest TP Risk.
- 10 pipeline segments with highest TP LOF.
- 10 pipeline segments with highest EC Risk.
- 10 pipeline segments with highest EC LOF.
- 10 pipeline segments with highest DM Risk.
- 10 pipeline segments with highest DM LOF.
- 10 pipeline segments with highest GM Risk.
- 10 pipeline segments with highest GM LOF
- 20 pipeline segments with highest Future Risk

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Top-100 White Paper

The Top-100 list may have more or less than exactly 100 segments. Some individual pipe segments may appear in two or more different threats categories. Also, some of the categories may have several segments that tie for tenth in highest relative risk or likelihood of failure.

The segments that are within the 20 highest values for each of the risk categories would be considered to be in the Top-200, and those within the 30 highest in each category would be considered Top-300.

Evaluation by Pipeline Engineering

When the Top-100 list is published, the Pipeline Engineering group sorts the listed segments by Area and groups the segments by Line. The Top 200 and 300 lists are reviewed to check for adjacent or encompassed segments. It often makes sense to include adjacent segments in the scope of a pipeline replacement because as soon as the higher risk segments fall off the Top 100 list, the Top 200 segments will replace the Top 100.

The first evaluation of the Top-100 list involves reviewing the GIS data for assumed values or missing information. Researching records and updating the data may lower the calculated risk such that the segment is no longer within the "Top 100".

The next evaluation involves focusing on the type of risk threat and identifying mitigation alternatives. For Third Party threats, adding pipeline markers or increasing the cover may be needed to reduce the risk. For External Corrosion threats a close interval survey, or other indirect assessment may justify lowering the risk value. For Design Materials threats, verify piping properties in GIS and check if it includes flaws such as wrinkle bends or miters. Past examination results and hydrotest records may be also utilized to reduce the risk of the old pipelines. For Ground Movement threats, a detailed study can justify lowering the risk values, otherwise, replacement and possibly rerouting may be necessary to reduce risk. The main contributing threats for Overall Future Risk segments will have to be identified in order to identify mitigating alternatives.

To establish a list of potential projects to be considered for pipeline replacement, the focus was primarily on the Design of Materials risk category. This is because replacement is the primary mode of mitigating old pipelines in poor condition. Third Party, External Corrosion, and Ground Movement were also reviewed for segments with known conditions that warrant pipeline replacement.

Creating Projects

After mitigation alternatives are identified, projects can be scoped. The projects are entered into PSRS as reliability projects. These projects are prioritized based on level of risk reduction and leveled for budgeting purposes.

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Top-100 White Paper

Each year, the RMP criteria evolve, GIS data is updated, and new technologies add mitigation alternatives. As new Top-100 lists are published and projects are identified, the existing projects need to be reevaluated and re-prioritized.

Questions

For questions, please contact:

Redacted

Appendix

"Beginning in 1985v2.doc" - A history of PG&E's Risk Management program, by Redacted

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ROUTE	SEGMENT NO	LST ASMT	MP ZONE	HCA	Top 100 Risk Type	Final Rank	Rank

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[illegible]	SEGMENT NO	MP1	MP2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	GRADE	[illegible]	[illegible]	MAKE	[illegible]	MAOP	SMYS MAOP	[illegible]	SMYS MOP	[illegible]	[illegible]	JOB NO	[illegible]	FOOTAGE	[illegible]	HCA ID	ASMT PLAN
1815-15	139.3	2.5440	2.1320	[illegible]				[illegible]	X42	[illegible]	[illegible]			313.0000	18.2907	[illegible]	18.2907		[illegible]	142470	[illegible]	[illegible]		[illegible]	E11
1816-01	411	0.0400	1.0000	[illegible]				24000		0.1410	3.5000			0.0000	0.0000	222.0000	-26.1150					[illegible]		[illegible]	
1818	104.8	2.1700	2.1800	1.000	ARC	ERW	BUTT	35000	GRB	0.1880	10.7500		2	400.0000	32.6748	400.0000	-32.6748	HAA	G	152081	1111[illegible]	[illegible]		[illegible]	
1818	104.8	2.1800	2.2100	0.800	ARC	SSAW	BUTT	35000	GRB	0.1880	10.7500	AOS	2	400.0000	40.8475	400.0000	-40.8475	HAA	G	157081	[illegible]	[illegible]		[illegible]	
1853-1	100	0.0000	0.0033	1.000	ARC	SMLS	BUTT	35000	GRB	0.1880	8.6250		1	800.0000	40.2738	800.0000	-40.2738	HAA	F	100125	[illegible]	[illegible]		[illegible]	
1853-1	100	0.0036	0.0369	1.000	ARC	SMLS	BUTT	35000	GRB	0.1880	8.6250		1	800.0000	40.2738	800.0000	-40.2738	HAA	F	100125	[illegible]	[illegible]		[illegible]	
1978	105	4.1400	4.4000	-0.800	ARC			24000	GRA	0.1880	8.6250		1	390.0000	35.8[illegible]	300.0000	-37.5[illegible]	HAA	F	60[illegible]	[illegible]	[illegible]		[illegible]	
2405-05	141.5	4.8151	4.4100	1.000	ARC	DSAW	BUTT	42000	X42	0.2810	12.7500			650.0000	35.1100	300.0000	-37.8081	TAPE	G	4740073	[illegible]	[illegible]		[illegible]	E14
305A	240.3	273.8342	278.3175	1.000	ARC	DSAW	BUTT	60000	X60	0.5000	34.0000		1.87	757.0000	42.4[illegible]	754.0000	42.3[illegible]	FBE	E	7547788	[illegible]	[illegible]		[illegible]	E12
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EP3	100.33	155.0[illegible]	156.8[illegible]	1.000	ARC	SMLS	BUTT	35000	GRB	0.3750	12.0000	AOS	4	500.0000	21.4286	250.0000	-11.4286	BARE		6742[illegible]	1111[illegible]	[illegible]		[illegible]	E12
EP3	100.34	156.8895	156.8895	1.000	ARC	SMLS	BUTT	35000	GRB	0.3750	12.0000	AOS	4	600.0000	27.4286	250.0000	-11.4286	BARE		6742[illegible]	1111[illegible]	[illegible]		[illegible]	E12
EP3	100.35	158.4897	158.4300	-0.800	ARC	SSAW	BBCR	35000	AOS	0.2500	16.0000	AOS	4	420.0000	48.0000	150.0000	-17.1429	TAPE		38003	1111[illegible]	[illegible]		[illegible]	E12
EP3	100.6	159.4000	158.4300	-0.800	ARC	SSAW	BBCR	35000	AOS	0.2500	16.0000	AOS	4	420.0000	48.0000	150.0000	-17.1429	TAPE	E	38003	1111[illegible]	[illegible]		[illegible]	E12
EP3	100.6	155.4000	158.5200	-0.800	ARC	SSAW	BBCR	35000	AOS	0.2500	16.0000	AOS	4	420.0000	48.0000	150.0000	-17.1429	TAPE	E	38003	1111[illegible]	[illegible]		[illegible]	E12
EP3	100.6	155.5200	158.5200	-0.800	ARC	SSAW	BBCR	35000	AOS	0.2500	16.0000	AOS	4	420.0000	48.0000	150.0000	-17.1429	TAPE	E	38003	1111[illegible]	[illegible]		[illegible]	E12
STUB8404	301	0.0000	0.0042	-1.000	[illegible]			35000	GRB	0.1410	4.5000			0.0000	0.0000	[illegible]	-8.4[illegible]					[illegible]		[illegible]	E12
STUB8405	301	0.0000	0.0025	[illegible]				24000		0.1410	4.5000			0.0000	0.0000	424.0000	-35.1[illegible]					[illegible]		[illegible]	E12

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