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Elizabeth Scheehle
Chief, Oil and GHG Mitigation Branch
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Re: Pacific Gas and Electric Company's Comments on the Draft Regulation Proposal for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities

Dear Ms. Scheehle,

Pacific Gas and Electric Company (PG&E) appreciates the opportunity to provide comments on the Air Resources Board's (ARB) Draft Regulation Proposal for Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities[1] (Draft Proposal). PG&E provides its overall comments on the Draft Proposal in Sections I and detailed input on the source proposals in Sections II through VIII.

I. INTRODUCTION

PG&E is committed to providing safe and reliable natural gas service, in a responsible and environmentally sensitive manner. To date, PG&E has: developed one of the most aggressive and comprehensive gas transmission pipeline modernization programs; adopted the latest innovative technologies, including an advanced, car-mounted Picarro leak-detection device; and reduced our response time for odor calls to 19 minutes. Minimizing leaked and vented emissions from our natural gas system is a priority, and PG&E appreciates ARB's attention to this important policy area.

Overall, PG&E appreciates ARB staff's openness and willingness to work with stakeholders on this regulation. However, the April 27 Workshop marked the first time that stakeholders have been given the full details of ARB's regulation.[2] As described below, in its current form, there are a number of areas where the regulation may not be not technically

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[1] Air Resources Board. 2015. Proposed Regulation Order, Article 3: Greenhouse Gas Emission Standards for Crude Oil and Natural Gas Facilities. Website: http://www.arb.ca.gov/cc/oil-gas/meetings/Draft_Regulatory_Language_4-22-15.pdf

[2] ARB staff discussed broad regulatory acidities and research at an August 25, 2014 Workshop and broad source category proposals at a December 9, 2015 Workshop.

feasible or may be inconsistent with PG&E's operations. Additionally, there are a number of requirements that need further definition and elaboration. Accordingly, PG&E requests that ARB release a revised Draft Proposal prior to the release of the Initial Statement of Reasons (ISOR) to afford stakeholders enough time to fully understand the requirements and provide technical input and substantive comments.

Additionally, in areas where the regulation is technically and operationally possible, it is not clear that some of the requirements are cost effective. For example, the Draft Proposal requires operators identify and repair very small leaks—as low as 1,000 parts per million volume (ppmv) or approximately 0.30 pounds (lb) of methane per day. While ARB must have relied on data to arrive at these screening values, given the cost of repair, it is difficult to see how this low threshold is cost effective. PG&E recommends that ARB provide more detailed cost and emissions data prior to releasing the ISOR.

II. SEPARATOR AND TANK SYSTEMS

PG&E uses a wide variety of tank and separator systems to maintain gas quality on its system. These vary from small tanks that are changed infrequently (e.g., only once a year) to larger systems on PG&E's gas storage wells. ARB's Draft Proposal requires annual flash testing of primary or secondary vessels and, if the annual emission rate is greater than 10 metric tons per year, the installation of a vapor collection system and leak-free solid roofs.[3]

At PG&E's three gas storage facilities—McDonald Island, Los Medanos, and Pleasant Creek Underground Storage Facilities—PG&E operates 56 vessels which appear to meet the definition of primary vessel. They are used to remove production fluids, tri-ethylene glycol, pipeline liquids, and compressor oil from the gas stream. After an initial review, PG&E has the following comments and recommendations for this source category proposal:

- **ARB Should Establish a Throughput Threshold for Separator Equipment at Natural Gas Storage Wells:** For separation equipment, ARB should establish a throughput threshold to exclude systems that collect small amounts of liquid, and, therefore, only release small amounts of methane emissions. This would improve the overall cost-effectiveness of the regulation by forgoing unneeded testing. These systems would be well below the 10 metric tons per year.

  PG&E recommends that ARB exempt primary and secondary vessels generating less than 365 barrels (bbl oil) of liquid per year. This liquid throughput exemption will eliminate the unnecessary cost of flash testing vessels that would be below the 10 metric ton threshold.

  PG&E provides the recommended threshold of 365 bbl based on the gas-to-oil ratio (GOR) data available. If ARB staff believe this value is not appropriate, PG&E requests that ARB provide an alternative thresholds.

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[3] Section 95213(a)(1)

- **ARB Should Exempt Separator Equipment at Natural Gas Compressor Stations:** PG&E also recommends that separators used in the natural gas compression process or located at a compressor station should be exempt. Separators associated with compression collect small amounts of liquid relative to storage and production facilities. Exempting the separators related to compression will reduce record keeping and enforcement costs.

- **ARB Should Provide for Streamlined Testing Procedures:** The Draft Proposal requires testing of each primary and secondary vessel. While this may be justified for systems in which the primary and secondary vessels are operating in substantially different process streams, PG&E's gas reservoirs produce relatively uniform production fluid and could be assessed with a single representative flash test.

  For example, PG&E's largest storage facility operates 28 primary vessels associated with the removal of production fluids. Performing 28 flash tests on vessels all operating at the same pressure and temperature, and removing the same fluid, is redundant. PG&E recommends that ARB allow operators to use a representative sample or rotating testing schedule for primary and secondary vessels that are removing the same fluid and operating at the same conditions.

III. RECIPROCATING COMPRESSORS

PG&E currently has 30 reciprocating compressors in its service territory, which are all rated above 500 horsepower. For compressors over 500 rated horsepower, ARB's Draft Proposal requires either collecting vented gas with a vapor collection system or conducting annual measurements and replacing equipment that emits at a level at or below 2 standard-cubic-feet-per minute (scfm).[4] This represents a modification of the initial proposal, which required changing seals every 36 months, 26,000 hours of operation or routing vent gas to a collection system. After an initial review, PG&E has the following comments and recommendations for this source category proposal:

- **Allow Critical Component Exemption for Compressors:** PG&E relies on compressors on the backbone transmission system to move gas from the California border to demand centers along its pipeline. Compressors provide both flow capacity and pressure to serve customers. Whenever a compressor is taken offline it presents a potential reliability issue for PG&E, which must be managed carefully.

  Based on its initial review, in most cases PG&E believes it will be able to repair and return its compressors to service within the 14 to 28 day timeframe without interrupting service to its customers. This understanding is contingent on several factors:

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[4] Section 95213(e)

1. The ability of PG&E to operate its compressor up to 14 to 28 days (with extension) before shutting the unit down;
2. The ability of PG&E to stagger the annual surveys throughout the year and vary the dates between years;
3. That the ARB or the applicable air district is able to quickly confirm that repairs have been made and allow PG&E to return the unit to service; and
4. That ARB maintains an annual frequency.

However, in instances where multiple compressors at a given station where above the threshold set by ARB or any of the above conditions were not met, PG&E would potentially not have enough pipeline capacity to supply all the demands on its system. To avoid this outcome, PG&E recommends that ARB allow operators to work with the applicable district or with ARB to set a longer timeline in cases where system reliability is threatened. This could be structured similarly to the critical components exemption in Section 95213 (3)(D).

- **ARB Should Allow for Alternative Measurement Method:** Additionally, the regulation requires that each reciprocating compressor provide a port for making individual measurements and that operators measure each individual compressor rod packing or seal to determine the flow rate.

  PG&E's compressor stations operate inside buildings. The buildup of natural gas is a potential hazard and, accordingly, compressors are designed to vent rod packing or seal gas through a common outlet to the outside of the compressor building. PG&E does not believe placing a measurement device in-line with a packing vent while still common to the unit vent header will necessarily result in accurate measurement. PG&E does not feel it is practical to retrofit its compressor stations to allow for accurate individual measurements, while ensuring that these facilities operate safely and reliably.

  Given these concerns, PG&E recommends that ARB allow for an alternative measurement methodology. ARB staff should revise the regulation to allow operators to measure the total leakage per compressor unit and then divide this total by the number of rod packings. This method is already used by ARB in the Mandatory Reporting Regulation (MRR) and would be effective for identifying and repairing leaks.

IV. PNEUMATIC DEVICES AND PUMPS

PG&E uses a combination of high-bleed, low-bleed, and intermittent-bleed devices within its system, as shown in Table 1.

Table 1: PG&E Pneumatic Devices at Compressor and Storage Facilities

	High-Bleed	Low-Bleed	Intermittent
McDonald Island[1]	0	79	29
Los Medanos[2,3]	16	0	20[4]
Pleasant Creek[2,3]	20	0	30[4]

Transmission Compressor Stations	10	1	207
Notes: 1. Data as of 12/31/2014. 2. ARB Transmission and Distribution Survey. 3. Assumes Los Medanos and Pleasant Creek are high-bleed. 3. Assumed Controller Gas Actuated No Bleed and Actuator Piston Valve Operator as intermittent bleed device			

ARB's Draft Proposal prohibits continuous-bleed pneumatic devices and pumps, unless designed to use compressed air to operate or if the vented gas is routed to an existing sales gas system.[5] This represents a change from the initial proposal, which required that pneumatic devices meet a low-bleed rate standard of 6 scfh.[6] After an initial review, PG&E has the following comments and recommendations for this source category proposal:

- **ARB Should Allow Continuous-Bleed Pneumatics That Meet a 6 scfh Threshold:** PG&E believes that the complete elimination of continuous bleed natural gas devices is unnecessary and not cost-effective. All new construction is designed to minimize, if not eliminate, the use of continuous bleed gas devices. However, continuous bleed gas pneumatic devices may still be used for two primary reasons:

  1. The cost to construct and maintain power service and air compression infrastructure or both is significantly disproportionate to the cost of the bleed gas lost over the lifecycle of the equipment. This is often the case when the quantity of continuous bleed control devices at a remote site is very low, an example would be remote wells at a storage facility.

  2. Due to the design and criticality of a facility or component, a gas continuous bleed device is determined to be more reliable than air or electric when the additional auxiliary systems required to operate an air or electric device are considered.

  Installation of a vapor recovery system in these cases is also impractical as it will require site power and add complexity which will reduce reliability. Based on preliminary estimates, replacement costs could range from $15,000 for a straight device replacement to $250,000 for a retrofit requiring conversion from a purely pneumatic to an electro pneumatic device. Accordingly, PG&E recommends that the 6 scfh requirement in the previous draft of this regulation be reinstated.

  In addition to the reasons above, prohibiting low-bleed devices conflicts with direction PG&E has received from ARB in the Mandatory Reporting Regulation (MRR). In 2015, ARB required the installation of metering devices on high-bleed pneumatic devices using a threshold of 6 scfh. As a result, PG&E removed 46 high-bleed devices from service, replacing 12 with low-bleed devices.

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[5] Section 95213(g)(1)
[6] Air Resources Board. December 9, 2014. Presentation at Oil and Natural Gas Methane Workshop. Website: http://www.arb.ca.gov/cc/oil-gas/meetings/Workshop_Presentation_12-9-14.pdf. Pp 22.

- **Replacements for High-Bleed Devices May Not Be Available:** A direct lower-bleed replacement may not be feasible for some existing continuous-bleed devices. ARB should require the 6 scfh threshold for all new devices, but provide a process for exempting certain devices when the operator shows that it is either technically infeasible or would result in a disproportionate cost. Over time, this would still result in the transition to low-bleed devices, as station-control equipment reaches the end of its useful life.

V. METHANE LEAK DETECTION AND REPAIR:

The Draft Proposal requires that components covered by the regulation be inspected annually,[7] in accordance with Environmental Protection Agency (EPA) Method 21, or quarterly,[8] using an optical-gas-imaging instrument. If a leak is discovered using optical gas imaging, the leak must be measured using EPA Method 21 within two days (accessible leaks) or 14 days (inaccessible leaks).[9]

Leaks with a measured total hydrocarbon concentration between 1,000 and 10,000 ppmv shall be successfully repaired or removed from service within seven days (with a potential seven-day extension); leaks measured above 10,000 ppmv shall be repaired or removed from service within three days (with a potential two day extension), and leaks measured above 50,000 ppmv shall be repaired or removed from service within two days.

PG&E currently inspects all compressor and storage facilities on an annual basis. Additionally, PG&E's compressor stations are under 24-hour continuous leak monitoring. Each compressor station has a fixed gas-detection alarm system to monitor the concentration of gas in the compressor house. When a leak is detected, PG&E crews pinpoint the leak and replace the equipment.

- **ARB Should Provide Justification for its Leak Thresholds:** As described above, ARB set several escalating thresholds for leak detection, beginning at 1,000 ppmv and moving up to 50,000 ppmv. These appear to be based on air district volatile organic compound (VOC) rules and may not be appropriate or cost-effective for controlling methane emissions.

  Specifically, a 2012 California Energy Commission (CEC) study[10], in which ARB participated, found only a weak correlation between concentration levels and flow rate. As shown in Table 2, below, the approximately 89 percent of fugitives would be reduced with a threshold of 50,000 ppmv and 96 percent would be captured by a

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[7] Section 95213(g)(A)
[8] Section 95213(g)(B)
[9] Section 95213(g)(B)(1)
[10] California State University, Fullerton. 2012. Estimation of Methane Emissions from the California Natural Gas System (California Energy Commission), website: http://www.energy.ca.gov/2014publications/CEC-500-2014-072/CEC-500-2014-072.pdf

threshold of 10,000 ppmv.[11] Moreover, concentrations below 50,000 ppmv are well less than 2 scfm.

Table 2: CSUF Natural Gas Systems Leak Data

Method 21 Leak Concentration (ppmv)	Leaks Detected	Leak Rate (cfm)			lb CH4/ day[1]	Percent Total
		Max	Min	Average		
0 to 999	16	0.005	0.005	0.005	0.30	0.07
1,000 to 9,999	108	0.410	0.005	0.029	1.8	2.79
10,000 to 49,999	109	1.640	0.005	0.071	4.3	6.90
50,000+	205	8.850	0.005	0.489	30	89.40
Total	438	8.850	0.005	0.256	16	100.00
Notes: 1. Based on average leak rate and assumes 100% of leaked gas is methane						

While PG&E has not had the opportunity to review the data that ARB relied on to arrive at these screening values, it is concerned that these thresholds are not cost-effective and could lead to frequent and costly repairs. PG&E recommends that ARB examine the cost effectiveness for each screening value given that the vast majority of emissions would be captured with a value of 50,000 ppmv.

VI. CENTRIFUGAL COMPRESSORS:

PG&E currently has seven gas turbine driven centrifugal compressors in its service territory. The Draft Proposal requires replacing wet seals with dry seals or routing vent gas to a vapor collection system.[12] PG&E has transitioned to dry seals on its system and would thus be in compliance with the proposed regulation.

VII. WELL STIMULATION TREATMENTS

PG&E does not hydraulically fracture natural gas wells and is not in the process of completing additional natural gas storage facilities. Therefore, the provisions in the Draft Proposal governing vapor recovery systems on circulation tanks for well stimulation treatments would not apply to PG&E.[13]

VIII. LIQUIDS UNLOADING

The Draft Proposal requires that natural gas wells that are vented to remove liquids use a vapor collection system, measure the volume of natural gas vented, or calculate the volume of natural gas vented.[14] PG&E does not vent natural gas from its storage wells and instead uses velocity tubing to unload liquids and would thus be in compliance.

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[11] Not that this can be obtained by multiplying the average flow rate (cubic feet per minute [cfm]) and the component count.
[12] Section 95213(f)
[13] Section 95213(b)(1)
[14] Section 95213(h)(1)

IX. CONCLUSION

Thank you for the opportunity to submit these comments on the ARB's regulatory activities for oil and natural gas sector. Please feel free to contact me if you have any questions or concerns.

Sincerely,

/s/

Matthew Plummer

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