Pacific Connector Gas Pipeline, LP

Resource Report No. 11

Reliability and Safety

Pacific Connector Gas Pipeline Project

September 2017

Responses to FERC's August 11th Comment List

Agency	Agency Comment #	Agency Comment (Original PCGP Report Text as Quoted are in " ")	Response Summary
FERC	1	PCGP states that design and location of the cathodic protection (CP) system cannot be done until at least one year following pipeline installation. To ensure that potential impacts from the connected action of installation and operation of the CP system are addressed to the extent possible, include at a minimum the following general parameters of the CP system: a. approximate number of ground-beds and rectifiers that would be required for the Pacific Connector Pipeline, and approximate spacing along the pipeline; b. approximate size of disturbance required for installation and operation of a typical ground-bed and rectifier; c. typical location of ground-beds and rectifiers relative to the pipeline construction work space and operational right-of-way; d. a statement indicating whether or not environmental surveys completed for the proposed pipeline include all areas anticipated to be disturbed by installation of the CP system. If not, describe PCGP's plan to address the environmental survey requirements of the as-yet unknown locations for the CP system. If PCGP is unable to include approximate locations and size of the CP system specific to the planned Pacific Connector Pipeline, then include the requested information using CP systems installed in existing natural gas pipelines in the Project area, for example the Northwest Pipeline Grants Pass Lateral.	Addressed in section 11.5.4
FERC	2	Include in Table 11.6-1 a new column that lists the feature(s) or reason that each listed area is believed to qualify as a U.S. Department of Transportation Class 3 or greater location.	Column added to table 11.6-1

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API	American Petroleum Institute
CFR	Code of Federal Regulations
CP	Cathodic Protection
Dth/d	Dekatherms per day
DOT	Department of Transportation
EPCM	Engineering, Procurement, and Construction Management
°F	Fahrenheit
FERC	Federal Energy Regulatory Commission
HCA	High Consequence Area
IMP	Integrity Management Program
JCEP	Jordan Cove Energy Project, L.P.
MP	Milepost
NGA	Natural Gas Act
O&M	Operations and Maintenance

OPS	Office of Pipeline Safety
PCGP	Pacific Connector Gas Pipeline, L.P.
PHMSA	Pipeline and Hazardous Materials Safety Administration
RP	Recommended Practice
SCADA	Supervisory Control and Data Acquisition
USDOT	U.S. Department of Transportation

RELIABILITY AND SAFETY

11.1 INTRODUCTION

Pacific Connector Gas Pipeline, L.P. ("PCGP") is seeking authorization from the Federal Energy Regulatory Commission ("FERC" or "Commission") under Section 7 of the Natural Gas Act ("NGA") to construct and operate a new approximately 229-mile-long, 36-inch-diameter natural gas transmission pipeline ("Pipeline") capable of transporting approximately 1,200,000 dekatherms per day ("Dth/d") of natural gas from interconnections with two existing interstate natural gas pipelines (Ruby Pipeline LLC ["Ruby"] and Gas Transmission Northwest LLC ["GTN"]) to the proposed liquefied natural gas ("LNG") export facility ("LNG Terminal") being developed by Jordan Cove Energy Project L.P. ("JCEP"). The Pipeline and the LNG Terminal are referred to, collectively, as the "Project."

This Resource Report 11 provides the information regarding the reliability and safety of the proposed PCGP Pipeline. Resource Report 1 provides a detailed description of the proposed PCGP Pipeline components.

11.2 PIPELINE REGULATIONS AND SAFETY STANDARDS

The Federal Pipeline Safety Act (49 United States Code 601,101 *et seq*.), authorizes the U.S. Department of Transportation ("USDOT") to regulate pipeline safety standards. The USDOT Pipeline and Hazardous Materials Safety Administration ("PHMSA") Office of Pipeline Safety ("OPS") is the federal safety authority for ensuring the safe, reliable, and environmentally sound operation of the U.S. pipeline transportation system and develops regulations and other approaches to risk management to assure safety in design, construction, testing, operation, maintenance, and emergency response of pipeline facilities. (See www.phmsa.dot.gov)

Generally, the natural gas transmission industry has an excellent record of public safety. Pipelines and related facilities designed and maintained with strict adherence to USDOT standards and regulations greatly reduce hazards and impacts associated with the construction and operation of gas transmission facilities. These safety standards and regulations, together with advances in pipeline manufacturing, protective coatings, construction, inspection techniques and more mature and robust integrity management and public awareness programs minimize the potential for pipeline failure and are intended to ensure adequate protection for the public from natural gas pipeline failures.

The Code of Federal Regulations ("CFR") Title 49 Part 192 ("49 CFR §192") prescribes minimum safety requirements for pipeline facilities and the transportation of gas including minimum design requirements, material selection and qualification, and protection from internal, external, and atmospheric corrosion. The proposed PCGP Pipeline will be designed, constructed, operated, and maintained to meet or exceed the USDOT Minimum Safety Standards stated in 49 CFR §192.

Examples of PCGP requirements that exceed 49 CFR §192 include:

- 100% non-destructive testing of mainline welds whereas 49 CFR §192 requires only 10% of the welds be nondestructively tested in Class 1 locations; and
- a minimum of 36 inches of cover in non-rock areas which includes cultivated land, marshes, lakes, and ponds and a minimum of 60 inches of cover at road drainage

ditches, railroads, stream and waterbody crossings, and improved roadways. 49 CFR §192 dictates that pipelines constructed on land in Class 1 locations must be installed with a minimum depth of cover of 30 inches in normal soil and 18 inches in consolidated rock. PCGP will exceed this requirement and install the pipeline with at least 36 inches of cover in Class 1 locations with normal soils and at least 24 inches of cover in consolidated rock areas.

The federal regulations are intended to ensure adequate protection for the public and to prevent natural gas pipeline incidents and failures. 49 CFR §192 specifies: material selection and qualifications; minimum design requirements; the frequency of operating and maintenance activities; and protection from internal, external, and atmospheric corrosion.

11.3 PIPELINE HAZARDS

The transportation of natural gas by pipeline could involve some risk to the public in the event of an incident and subsequent release of gas. Potential impacts on public safety, from pipeline transportation of natural gas, have been directly related to leaks or line breaks due to corrosion or equipment malfunctions, or indirectly related to leaks or line breaks resulting from external forces not associated with pipeline operation (*e.g.*, damage from third-party digging near buried pipeline sections, or in some rare instances, from natural forces), or from infrequent intended gas releases as necessary during the routine operation and maintenance of pipeline facilities.

The results of an accident or natural catastrophe affecting a pipeline can include the following:

- gas release only;
- gas release with fire and/or explosion;
- exposure of the public and environment to the above; and
- operational impacts such as service deficiencies or interruption.

Emergency response and contingency plans will be developed to provide for a response to each of these circumstances.

The primary component of natural gas in interstate transmission pipelines is methane, a colorless, odorless, and tasteless gas. While not chemically toxic, methane is classified as an asphyxiant with a slight inhalation hazard. Exposure to high concentrations can result in serious injury or death due to oxygen deficiency. The specific gravity of methane in air is 0.55, which is lighter than air with a specific gravity of 1.0. As a result, methane rises and disperses rapidly in the atmosphere.

In general, unconfined mixtures of methane in air are not flammable/explosive because of the dilution of the methane by air. Mixtures of methane in air are flammable at concentrations between 4.0 and 16.0 percent methane by volume. If a natural gas leak occurs near an ignition source, ignition of a methane gas and air mixture is possible within these concentration limits.

Risks associated with third party damage can be managed with proper signage, monitoring, and landowner education programs. In addition, excavation of any type by a landowner or third party must utilize the nationwide 811 One-Call System to notify PCGP prior to the commencement of any such activity.

When Forest fires arise in the area, PCGP will closely monitor and protect the pipeline from wildfires. PCGP also has facilities built along the pipeline to aid in protecting the pipeline from wildfires. Along with PCGP's pipeline control there are Mainline Block Valve sites on the pipeline to aid in isolating which portions of the pipeline have product in them. Mainline Block Valves are described in detail in Section 11.4.5. PCGP will be in communications with emergency management offices and monitoring the wildfires. PCGP can determine what actions need to be taken to protect the pipeline and facilities in the area of the wildfires. If a wildfire was near PCGP's facility locations or a block valve site, PCGP would consider shutting down and isolating those facilities until the fire risk was mitigated. After all threats to safety for the area were assessed those facilities would be inspected to ensure there was no damage from the fire before restarting. In past situations, local Operations personnel have protected our above ground mainline valves by burying the valves with sand and earth material. We remain in close communication with our Operations staff at each of our locations to ensure the circumstance of the fire is tended to accordingly. As part of our comprehensive approach to safety, the pipeline right-of-ways are kept clear of major vegetation to provide visual access for aerial patrols. PCGP's ROW monitoring and management along with the pipeline's burial depth protects the pipeline from the heat of a wildfire. Forest fires are not considered a direct threat to underground pipelines due to the insulating effects of soil cover over the pipeline. Soil is a poor conductor of heat with thermal conductivity values ranging from 0.44 – 1.44 BTU/FT-hr. °F. The heat capacity of most soils is 0.20 – 0.25 BTU/LB °F. Because soil is such a poor conductor of heat, most vegetation below grade typically stays viable after the forest fire has ceased. The pipeline will be buried at depths below surface vegetation level.

A study completed in 1993 by Lloyd W. Swift *et al*. monitored flame and surface temperatures of three prescribed burns in Macon County, North Carolina. In the most severe cases, fire temperatures approached 1,500°F. During this burn, soil temperature was recorded as 113°F at a depth of approximately 2.5 in. (Swift, L.W. Jr., Elliot, K.J., Ottmar, R.D., and Vihnanek, R.E. 1993, *Site preparation burning to improve southern Appalachian pine-hardwood stands: Fire characteristics and soil erosion, moisture, and temperature*). While the specific fuel, climate, geographic, and geologic parameters vary from those expected near the PCGP Project area, the study illustrates the order of magnitude a potential fire may have on subsurface temperature conditions.

49 CFR §192 provides temperature de-rating factors if a pipeline is to be operated at elevated temperatures. De-rating is not applicable to pipelines in service below 250°F. For a pipeline buried at a typical depth of 36 inches, the empirical data suggests the pipeline will suffer no adverse effects as a result of a wildland fire.

Burial depths greater than the minimum requirements specified in 49 CFR §192 will not provide additional benefits or safety from the heat generated by wildland fires.

After a seismic event, PCGP will perform a "walk the line" of the affected portion of the pipeline (or reference natural disasters as outlined in PHMSA's Hazard Mitigation Planning. PCGP will impose minimal restrictions for land usage once the pipeline is in operation. However, permanent structures will not be permitted on the permanent right-of-way, including houses; tool sheds; garages, poles; guy wires; catch basins; swimming pools; trailers; leaching fields; septic tanks; or any other objects that are not easily removed. In general, digging, blading, grading or similar activities that may result in the removal of cover will not be permitted without express consent from PCGP.

PCGP will design paved and unpaved road crossings based on potential axle loads, material, design standards, and depth of cover required as permit conditions. As the

development of new roads and natural resources occurs in the vicinity of the proposed pipeline, PCGP will use specific safety requirements for the analysis, design, and construction of new crossings. Specific plans for addressing new roads crossing the pipeline or natural resource development are contingent upon the specific use and will be developed at the time of a specific proposal from a landowner. Temporary crossings for light duty maintenance vehicles will not adversely affect the pipeline.

PCGP has identified and evaluated known landslide and seismic hazards and has routed the pipeline to avoid these areas where possible to ensure long term stability and safety of the pipeline as identified in Resource Report 6.

11.4 SAFETY MEASURES IN DESIGN AND CONSTRUCTION

49 CFR §§192.5-192.517 prescribe minimum requirements for the design, construction, and testing of pipelines and pipeline facilities.

11.4.1 Class Locations

Specific safety measures are incorporated in the regulations based on the population density around the pipeline. The categories of population density are known as class locations and are based on the number of buildings intended for human occupancy and duration of public use in areas that extend 220 yards on either side of the centerline of any continuous one-mile length of pipeline known as a class location unit. 49 CFR §192.5 establishes four pipeline design classification standards that provide increasingly more conservative design requirements as population density increases.

Class Location	Any class location unit that has:
1	10 or fewer buildings intended for human occupancy.
2	More than 10 but fewer than 46 buildings intended for human occupancy.
3	46 or more buildings intended for human occupancy; or An area where the pipeline lies within 100 yards (91 meters) of either a building or a small, well-defined outside area (such as a playground, recreation area, outdoor theater, or other place of public assembly) that is occupied by 20 or more persons on at least 5 days a week for 10 weeks in any 12-month period. (The days and weeks need not be consecutive.)
4	Buildings with four or more stories above ground.

The majority of the PCGP Pipeline is located within Class 1 areas, with a total of 221.82 miles, 6.29 miles located in Class 2, and .98 miles located in Class 3. The PCGP Pipeline is not located in any Class 4 areas. The installed pipe will be designed to meet the current class location. PCGP will monitor for changes in population density around the Pipeline with aerial survey that will facilitate a comparison between the previous and current residence count. Table 11.4-1 below provides the class locations by milepost along the Proposed Route.

Table 11.4-1

PCGP Class Locations

County	Class	MP Begin	MP End	Length (mi)
Coos	Class 1	0	1.24	1.24
Coos	Class 3	1.24	1.33	0.09
Coos	Class 1	1.33	2.34	1.01
Coos	Class 2	2.34	3.11	0.77
Coos	Class 1	3.11	3.38	0.27
Coos	Class 2	3.38	6.47	0.27
Coos	Class 1	6.47	21.12	15.82
Coos	Class 3	21.12	21.25	0.13
Coos	Class 1	21.25	22.39	3.65
Coos	Class 2	22.39	22.74	0.35
Coos	Class 1	22.74	22.89	0.15
Coos	Class 2	22.89	23.26	0.37
Coos/Douglas	Class 1	23.26	50.66	27.88
Douglas	Class 2	50.66	51.14	0.48
Douglas	Class 1	51.14	51.39	0.25
Douglas	Class 2	51.39	51.59	0.20
Douglas	Class 1	51.6	55.54	4.15
Douglas	Class 2	55.54	57.76	1.23
Douglas	Class 1	57.76	94.67	38.02
Douglas	Class 2	94.68	94.89	0.25
Douglas /Jackson	Class 1	94.89	121.88	26.67
Jackson	Class 2	121.88	122.15	0.27
Jackson	Class 1	122.15	122.18	0.03
Jackson	Class 2	122.18	122.43	0.25
Jackson	Class 1	122.43	122.45	0.02
Jackson	Class 2	122.45	123.23	0.78
Jackson	Class 1	123.23	132.46	9.17
Jackson / Klamath	Class 1	132.47	169.50	37.08
Klamath	Class 1	169.51	197.65	27.18
Klamath	Class 3	197.65	198.08	0.50
Klamath	Class 1	198.08	198.17	0.09
Klamath	Class 2	198.17	198.57	0.40
Klamath	Class 1	198.57	198.61	0.04
Klamath	Class 3	198.61	198.74	0.13
Klamath	Class 1	198.74	198.96	0.22
Klamath	Class 3	198.96	199.09	0.13
Klamath	Class 1	199.09	203.79	4.70
Klamath	Class 2	203.79	204.13	0.34
Klamath	Class 1	204.13	204.58	0.45

Klamath	Class 2	204.58	204.90	0.32
Klamath	Class 1	204.9	228.81	23.75

Note 1 - Class Location is preliminary in nature and is based on a desk-top study. Field verification to be completed at a later date.

Note 2 - Mileposts are reference points and do not equal total length due to route changes.

Design factors, set by Class Location, are used in calculations used to determine minimum pipe wall thickness, hydrostatic test pressures, and maximum allowable operating pressure. Class Location is also used to determine the required extent of nondestructive examination of welds, the location of mainline block valves and the frequency of pipeline patrols and leak surveys. Class locations representing more populated areas require higher safety factors in pipeline design, testing, and operation.

11.4.2 Pipeline and Pipeline Components Design

PCGP will design the steel pipe in accordance with 49 CFR §§192.101-192.115, to determine the required wall thicknesses for the required maximum allowable operating pressure. PCGP will procure pipe in accordance with one or more of the listed pipe specifications in Appendix B to 49 CFR §192 and will implement an inspection and test plan for the pipe to assure pipe is manufactured and delivered to the required quality. Pipe will be marked and transported in accordance with 49 CFR §192.63 and §192.65.

PCGP pipeline components will meet or exceed the minimum requirements set forth in 49 CFR §§192.141-192.161. Valves will meet or exceed the requirements of ANSI/API 6D and 49 CFR §192.145 and flanges will meet or exceed the requirements of ASME/ANSI B16.5 and 49 CFR §192.147. PCGP will implement an inspection and test plan for the valves to assure they are manufactured and delivered to the required quality.

As part of the integrity management plan, PCGP plans to install facilities to accommodate inline inspection tools. These facilities include an inspection tool launcher and receiver vessels and will be designed in accordance with relevant ASME pipeline and vessel codes and 49 CFR §192.150.

11.4.3 Compressor Station Design and Construction

The proposed PCGP Pipeline Compressor Station will be designed to meet or exceed the minimum requirements set forth in 49 CFR §§192.163-192.173.

All piping at the PCGP Compressor Station will be manufactured, tested and inspected in accordance with American Petroleum Institute (API) specifications and wall thickness will conform to requirements contained in 49 CFR §192. The PCGP Compressor Station will be located on property owned by PCGP and will be enclosed by a 7-foot high chain-link security fence topped with three strands of barbed wire to maintain the security of the facility. A controlled access system will be installed to restrict access to authorized personnel only. The compressor building will be ventilated to minimize the potential for gas accumulation in enclosed areas and will be constructed of noncombustible material. Electrical equipment and wiring installed in compressor stations will conform to the NFPA-70, as applicable.

The PCGP Compressor Station will also be equipped with safety detection and emergency shut down systems. For example, the station will have hazardous gas and fire detection systems, and an emergency shut down system. These safety and emergency systems

will be tested routinely to ensure they are operating properly. The system will include sensors for detecting natural gas as well as ultraviolet sensors for detecting flames. The emergency shutdown system will be designed to automatically shut down and isolate elements of the compressor station in the event of unsafe concentrations of natural gas or in the event of a fire. Additionally, the compressor station equipment will be designed to shut down automatically if a mechanical failure poses risk to the equipment or otherwise constitutes a hazard. The compressor station will be equipped with relief valves to protect the piping from over-pressurization and be equipped with a blowdown system that can safely and rapidly depressurize part or all of the compressor station to a safe location.

11.4.4 Meter Stations Design and Construction

The proposed PCGP Pipeline Meter Stations will be designed to meet or exceed the minimum requirements set forth in 49 CFR §§192.351-192.359.

All aboveground PCGP meter station perimeters will be enclosed by 7-foot high chain-link security fences topped with three strands of barbed wire. All gates and access points will remain locked to prevent unauthorized access.

11.4.5 Mainline Block Valves

The proposed PCGP Pipeline includes sectionalizing, mainline block valves that serve the purpose of allowing sections of the pipeline to be isolated from the rest of the pipeline system for maintenance purposes or incident management. These mainline block valves will be installed to meet or exceed the minimum requirements set forth in 49 CFR §192.179, including that each transmission line must have sectionalizing block valves spaced such that each point on the pipeline in a:

- Class 1 location be within 10 miles;
- Class 2 location be within 7.5 miles;
- Class 3 location be within 4 miles; and
- Class 4 location be within 2.5 miles.

Table 11.4-2, below, lists the approximate MP location for each block valve location for the proposed PCGP Pipeline:

Table 11.4-2

PCGP Mainline Block Valve Locations

MLV	MP	County
BVA -1	0	Coos
BVA -2	15.07	Coos
BVA -3	29.5	Coos
ABVA -4	48.58	Douglas
BVA - 5	59.58	Douglas
BVA - 6	71.51	Douglas
BVA - 7	80.03	Douglas
BVA -8	94.66	Douglas
BVA - 9	113.65	Jackson
ABVA - 10	122.18	Jackson

ABVA - 11	132.48	Jackson
BVA - 12	150.7	Jackson
BVA - 13	169.48	Klamath
BVA - 14	187.43	Klamath
ABVA - 15	197.79	Klamath
ABVA - 16	211.58	Klamath
BVA - 17	228.81	Klamath

Each sectionalizing block valve on a transmission line must be readily accessible and protected from tampering and damage, supported to prevent settling of the valve or movement of the pipe to which it is attached and each section of a transmission line between main line valves must have a blowdown valve with enough capacity to allow the transmission line to be blown down as rapidly as practicable and located so the gas can be blown to the atmosphere without hazard.

PCGP mainline block valves are buried with the valve actuator installed above-ground at a readily accessible height. A bypass and a blowdown system are included at each mainline block valve location. The blowdown system is designed to allow a safe and, if required, a rapid depressurization to the atmosphere. This blowdown system allows for the infrequent need to depressurize a section of the pipeline for maintenance purposes or for incident management. The valve actuator and ancillary equipment are enclosed by a chain link perimeter fence that restricts access to authorized personnel only.

11.4.6 Welding

Welding on the Pipeline will be performed in accordance with the requirements of 49 CFR §§192.221-192.245. Welding will be performed by qualified welders in accordance with qualified welding procedures per API Standard 1104 or section IX of the ASME Boiler and Pressure Vessel Code. The quality of the test welds used to qualify welding procedures will be determined by destructive testing in accordance with the applicable welding standard(s). Welding will be visually inspected by qualified persons. Only a specified percentage of welds are required to be nondestructively tested, based primarily on the Class Location. PCGP plans to radiographically or ultrasonically inspect all girth welds made on piping six-inches or larger in diameter. Inspections will be made with testing equipment according to written procedures by experts trained and qualified in inspection testing. The acceptability of a weld that is nondestructively tested or visually inspected will be determined according to API Standard 1104 or Section IX of the ASME Boiler and Pressure Vessel Code.

11.4.7 Strength Testing Requirements

PCGP plans to hydrostatically strength test the proposed PCGP Pipeline to substantiate the proposed maximum allowable operating pressure and to confirm integrity. Except as provided otherwise by 49 CFR §192.505 and 49 CFR §192.619, the required strength test pressure shall be at least equal to the maximum allowable operating pressure multiplied by the following factors:

Class Location	Factor
1	1.1
2	1.25
3	1.5
4	1.5

PCGP shall make, and retain for the useful life of the pipeline, a record of each test performed.

11.4.8 Cover

Except as provided otherwise in 49 CFR §192.327, each buried transmission line must be installed with a minimum cover as follows:

Location	Normal Soil (inches)	Consolidated Rock (inches)
Class 1	30	18
Class 2, 3 or 4	36	24
Drainage ditches of public roads and railroad crossings	36	24

PCGP will exceed the above Class 1 requirement and install the pipeline with at least 36 inches of cover in Class 1 locations with normal soils and 24 inches of cover in consolidated rock areas unless unfeasible, but no less than 18 inches.

11.4.9 Corrosion Control

To protect the proposed PCGP Pipeline from external corrosion, PCGP will apply external protective coating meeting the requirements of 49 CFR §192.461 and install a cathodic protection (CP) system meeting the requirements of 49 CFR §192.463 installed and placed in operation within one year after completion of construction.

PCGP will also apply an internal coating to both reduce friction and provide internal corrosion resistance. The Pipeline compressor station is equipped with filter separators to aid in removal of free water to reduce the risk that liquids will collect in the pipeline.

Each pipeline that is under CP must be tested at least once each calendar year, but with intervals not exceeding 15 months. Each CP rectifier or other impressed current power source must be inspected six times each calendar year, but with intervals not exceeding two and one-half months, to insure that it is operating.

PCGP will electrically isolate the Pipeline from other underground metallic structures, unless the Pipeline and the other structures are electrically interconnected and cathodically protected as a single unit. Where the Pipeline is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in other areas where fault currents or unusual risk of lightning may be anticipated, the Pipeline will be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices.

The operator must inspect each pipeline or portion of pipeline that is exposed to the atmosphere for evidence of atmospheric corrosion at least once every three calendar years, but with intervals not exceeding 39 months.

PCGP will maintain records and maps to show the location of cathodically-protected piping, CP facilities, galvanic anodes, and neighboring structures bonded to the CP system.

PCGP will install a low voltage CP system to assist in protecting the buried pipeline from corrosion. The CP system functions by using rectifiers and/or ground beds to impress a DC current of approximately one Volt on the pipeline. This current provides protection from corrosion by making the pipeline cathodic to the surrounding environment. All rectifiers and electrical equipment are enclosed inside locked metal boxes. Furthermore,

properly applied and maintained external pipeline coating serves as a barrier against the formation of corrosion products and greatly reduces the requirements of the CP system. Although existing soil surveys may indicate whether or not a corrosive environment may be present, the CP system design requires an assessment of actual pipe to soil potentials. Such potentials cannot be accurately approximated until the pipe is in the ground and the electrical interaction with the surrounding environment can be measured. At least one year will be required before CP system design and location parameters can be finalized. PCGP's environmental survey corridor width should allow sufficient room to install the need CP System for the majority of the route.

PCGP will assess CP requirements and will install ground-beds and rectifiers at least one year following final pipeline installation. The Grounding bed spacing will likely in 30 to 40 mile range, however soil conditions might dictate a closer spacing in some areas depending on site specific conditions such as rock and climate. The project is expected to need approximately 7 to 9 ground beds and rectifiers which is expected to be installed on land used within the construction footprint. The ground beds are typically parallel and adjacent to the pipeline and can normally be in the pipeline easement or what was used as Temporary workspace during construction. Rectifiers are typically sited at a mainline valve site whenever possible. Should a deep well ground bed and rectifier unit have to be sited separately (200' x 5' for the ground bed and 10' x 10' site for the rectifier unit) they could still be sited in the pipeline construction right of way and most likely within the permanent easement.

The assessment process will consist of close interval survey, soil resistivity readings, and plotting and graphing the results to show low potential areas. This information will be used to determine the design requirements and locations of anode-beds and rectifiers. This work will be completed by qualified consultants.

Following the installation and balancing of the CP system, PCGP personnel will routinely check the voltage and amperage of the rectifiers, as well as the pipe-to-soil potentials. Continual adjustments will be made as conditions change. In addition to maintenance activities, annual close interval surveys will be completed to determine pipe to soil potentials in accordance with USDOT requirements.

PCGP will consult with federal, state, and local agencies regarding permitting of the CP system following the completion of pipeline construction. Applications for permits related to the CP system will not be included in this FERC Certificate Application. Furthermore, the installation of the CP system is exempt from section 7(c) of the NGA and would be permitted in accordance with 18 CFR Part 2.55(a), *Auxiliary installations* as considered by the FERC for obtaining more efficient or more economical operation of an authorized transmission facility. Prior approval from the FERC is not required under 18 CFR 2.55(a)(2)(i), therefore, CP system design requirements and permitting should not be integrated as an action to the proposed transmission facility under this regulation.

11.4.10 General Construction

PCGP will employ qualified inspectors to be on site during construction activities with stop-work authority if any public safety or environmental issues are imminent or observed. Safety meetings will be held daily with all construction personnel. PCGP contractors are expected to develop, adopt, maintain and certify the implementation of project specific health and safety procedures, policies and programs as necessary to comply with all applicable federal, state and local regulations, and PCGP standards for the contractor scope of work to be performed.

PCGP standards address minimum safety, health and environmental requirements for all activities related to constructing the Pipeline including:

- reporting (man-hours worked and miles driven); recordable events such as lost time, restricted duty, medical case and fatality; and non-recordable events such as first aid cases, environmental spills and releases;
- professional conduct, drugs and alcohol, and weapons;
- safety and environmental briefings and meetings;
- personnel protection equipment;
- hazard identification, safe work practices and work permits (*e.g.*, confined space entry, lockout/tagout);
- job safety analysis and work planning;
- fire prevention and watch, housekeeping, motor vehicles, tools and equipment;
- warning signs, barricades, cones, flashers, overhead structure and utility markers;
- excavation safety (including call before you dig, 811 One-Call);
- cranes, rigging and lifting;
- blasting;
- hazardous and waste management;
- incident management (emergency response plan, spill response plan, notification and investigation); and
- community engagement.

PCGP will prepare and implement transportation management plans that will include safety measures and traffic flow management. Appropriate traffic control signs will be used any time there is construction within 20 feet of any road, at all equipment crossings of improved roads (paved or gravel), and when a high volume of traffic will be entering or existing on an improved road from the right-of-way. Flag persons, signs, barricades, guard rails, safety fences, and signals will be placed and maintained at road crossings as required in federal, state, or county permit stipulations. In the absence of such regulations, PCGP will place signs 500 feet in each direction from the crossing identifying that construction or flagmen are ahead. Flagmen will be used on each side of the road crossing whenever equipment is working in or crossing over any improved road. Flagmen will be equipped with high-visibility safety vests and stop/slow signs. Posted speed limits will be observed on highways, county roads, and posted private roads.

PCGP will prepare a fugitive dust control plan to control fugitive dust generated from earthworks and road construction or use by employing best management practices. This would include, among others, minimizing the amount of ground disturbance, watering, and controlling traffic speed.

11.5 SAFETY MEASURES IN OPERATIONS

49 CFR §§192.601-192.809 prescribe minimum requirements for the operation and maintenance of pipeline facilities and qualification of pipeline personnel.

PCGP will prepare and follow a manual of written procedures for conducting operation and maintenance activities and for emergency response. The manual will also include procedures for handling abnormal operations. This manual will be reviewed and updated by PCGP at intervals not exceeding 15 months, but at least once each calendar year. This manual will be prepared before operation of the Pipeline commences. Appropriate parts

of the manual will be kept at locations where operation and maintenance activities are conducted.

11.5.1 Class Location Changes

Whenever an increase in population density indicates a change in class location for a segment of an existing steel pipeline, PCGP will conduct a study, per 49 CFR §192.610, to determine if the established maximum allowable operating pressure is not commensurate with the present class location. Once the study is completed PCGP will either confirm or revise the maximum allowable operating pressure per 49 CFR §192.611.

11.5.2 Continuing Surveillance

PCGP will produce a procedure for continuing surveillance of its facilities to determine, and take appropriate action, concerning changes in class location, failures, leakage history, corrosion, substantial changes in CP requirements, and other unusual operating and maintenance conditions. If a segment of pipeline is determined to be in unsatisfactory condition but no immediate hazard exists, PCGP will initiate a program to recondition or phase out the segment involved, or, if the segment cannot be reconditioned or phased out, reduce the maximum allowable operating pressure in accordance with 49 CFR §192.619 (a) and (b).

11.5.3 Damage Prevention

PCGP will prepare and follow a written damage prevention program as per 49 CFR §192.614 and will prevent damage to the pipeline caused by excavation-related activities by adhering to the following damage prevention requirements:

- general notification of the public in the vicinity of the pipeline, in addition to notification of individuals or companies engaged in excavation activities, to make them aware of how to determine the general location of underground pipelines before excavation activities are begun.
- PCGP shall participate in One Call systems and be responsible to mark and prevent damage to pipelines for excavation activities by;
    - temporarily marking the buried pipeline in the excavation activity area prior to any work being done; and
    - inspection of the pipeline during excavation activities and afterwards to verify the integrity of the pipeline. PCGP will have personnel witness all excavations that occur on the right-of-way to verify that no damage occurs during excavations. If blasting is involved in the excavation, the inspection shall include a review of the blasting plan.

11.5.4 Emergency Response

PCGP will establish written procedures, in accordance with 49 CFR §192.615 to minimize the hazard resulting from a gas pipeline emergency. At a minimum, the procedures will provide for the following:

- establishing and maintaining adequate means of communication with appropriate fire, police, and other public officials;
- notifying appropriate fire, police, medical and other public, local and state officials of gas pipeline emergencies and coordinating with them both planned responses and actual responses during an emergency;

- receiving, identifying, and classifying notices of events which require immediate response by the operator;
- prompt and effective response to a notice of each type of emergency (gas detection, fire, explosion, natural disaster); prescribe actions directed toward protecting people first and then property; emergency shutdown and pressure reduction in any section of the pipeline necessary to minimize hazards to life or property;
- actions required to be taken by control room personnel during an emergency in accordance with 49 CFR §192.631;
- the availability of service subcontractors, personnel, equipment, tools, and materials, as needed at the scene of an emergency;
- making safe any actual or potential hazard to life or property;
- safely restoring any service outage; and
- beginning incident investigation process as soon after the end of the emergency as possible.

PCGP will:

- furnish its supervisors who are responsible for emergency action a copy of that portion of the latest edition of the emergency response procedures;
- train the appropriate operating personnel to assure that they are knowledgeable of the emergency procedures and verify that the training is effective; and
- review employee activities to determine whether the procedures were effectively followed in the event of an emergency.

PCGP will establish and maintain liaison with appropriate fire, police, medical and other public officials to:

- learn the responsibility and resources of each government organization that may respond to a gas pipeline emergency;
- acquaint the officials with the operator's ability in responding to a gas pipeline emergency;
- identify the types of gas pipeline emergencies of which the operator notifies the officials; and
- plan how the operator and officials can engage in mutual assistance to minimize hazards to life or property.

PCGP will maintain 24-hour emergency response capabilities, including an emergency-only phone number, which accepts collect charges. The number will be included in informational mail-outs, posted on all pipeline markers, and provided to local emergency agencies in the vicinity of the pipeline and compressor station.

PCGP will develop emergency response plans for its entire system. Operations personnel will attend training for emergency response procedures and plans prior to commencing pipeline operation. PCGP will meet with local emergency responder groups (fire departments, police departments, federal land management agencies and other public officials) to review plans and will work with these groups to communicate the specifics about the pipeline facilities in the area and the need for emergency response. PCGP will also meet periodically with the groups to review the plans and revise them when and as necessary. If requested by local public emergency response personnel, PCGP will participate in any operator-simulated emergency exercises and post-exercise critiques. PCGP will use adequate local or contract resources to support the pipeline and facilities if an emergency occurs. PCGP does not foresee requiring the purchase of additional

equipment or specialized equipment by any of the various state or local emergency responders. The consultation will occur after the pipeline is constructed as part of Operation's outreach to local communities and service providers.

In addition to pipeline safety standards for any pipelines within compressor stations, 49 CFR §§192.731-§192.736 establishes guidelines for inspections, hazardous materials storage, and monitoring at compressor stations. Personnel will be able to respond to a compressor station emergency in 60 minutes or less during non-scheduled work hours and within a few minutes if they are at the compressor station. Personnel will be on call at all times, 24 hours a day, 365 days a year to respond to emergencies. Emergencies while the compressor station is unattended will be monitored remotely via PCGP's Gas Control Facility. Personnel living within a 30 minute travel time of the compressor station will be dispatched by Gas Control in the event of an emergency at the compressor station.

Personnel will be Operator Qualified per DOT PHMSA requirements for operational and emergency situations at the station. Fire protection, first aid, and safety equipment will be maintained at the compressor station and PCGP personnel will be trained in first aid and proper equipment use.

All of the information that PCGP gathers about its system will be used to tailor its safety and integrity management activities, so that parts of the system in the greatest need of attention receive greater scrutiny, such as residential areas or areas subject to growth and development. For example, PCGP will decide where and when to internally inspect the pipeline based on this information. Risk assessment of the pipeline system determines what inspection criteria are required. This may include many different types of assessment tools which provide specific types of information about the condition of the pipeline.

11.5.5 Public Awareness

PCGP will establish a Public Awareness Program that will be in compliance with the guidelines of API RP 1162 and 49 CFR §192.616. The program and the media used for public awareness shall be as comprehensive as necessary to reach all areas in which an operator transports gas.

PCGP will ensure that the Public Awareness Program enables members of the public, appropriate public officials, emergency responders and persons engaged in excavation-related activities to:

- the use of a one-call notification system prior to excavation and other damage prevention activities;
- possible hazards associated with unintended releases from a gas pipeline facility;
- pipeline facility locations;
- physical indications that such a release may have occurred;
- steps that should be taken for public safety in the event of a gas pipeline release; and,
- procedures for reporting such an event.

The frequency of a targeted mail program to communicate public awareness and damage prevention information to residences, businesses and places of congregation shall be a minimum of once every two years. Mailings shall occur annually if:

- the area is located in what has been designated as a High Consequence Area (HCA);
- conditions exist that elevate the potential for third party damage, and;

- specific local conditions exist that warrant more frequent communication.

The frequency of a targeted mail program to provide emergency responders with information shall be annually.

The frequency of information distributed to public officials shall be annually, including areas designated as HCAs.

The frequency of a targeted mail program to local excavators and contractors shall be mailed annually.

More information about PCGP and pipeline safety can be found at www.pacificconnectorgp.com.

11.5.6 Patrolling

PCGP will patrol the Pipeline to observe surface conditions on and adjacent to the right-of-way for indications of leaks, construction activity, and other factors that could affect safety and operation. The frequency of patrols is determined by the size of the line, the operating pressures, the class location, terrain, weather, and other relevant factors, but intervals between patrols may not be longer than prescribed in the following:

	Maximum interval between patrols	
Class Location	At Highway & Railroad Crossing	At All Other Places
1, 2	7 1⁄2 months; at least twice each calendar year	15 months; at least once each calendar year.
3	4 1⁄2 months; at least four times each calendar year	7 1⁄2 months; at least twice each calendar year
4	4 1⁄2 months; at least four times each calendar year	4 1⁄2 months; at least four times each calendar year

Methods of patrolling may include walking, driving, flying or other appropriate means of traversing the right-of-way.

11.5.7 Leakage Surveys

PCGP will conduct leakage surveys of the Pipeline at intervals not exceeding 15 months, but at least once each calendar year. Additionally, leakage surveys using leak detector equipment will be conducted:

- in Class 3 locations, at intervals not exceeding 7 1⁄2 months, but at least twice each calendar year; and
- in Class 4 locations, at intervals not exceeding 4 1⁄2 months, but at least four times each calendar year.

11.5.8 Line Markers

Except as provided otherwise in 49 CFR §192.707, PCGP will place and maintain a line marker as close as practical over the Pipeline at each crossing of a public road and railroad, and, wherever necessary to identify the location of the Pipeline, to reduce the possibility of damage or interference.

The words “Warning,” “Caution,” or “Danger” followed by the words “Gas (or name of gas transported) Pipeline” along with the PCGP name and the telephone number that PCGP

can be reached at all times will be written legibly on a background of sharply contrasting color on each line marker.

11.5.9 Record Keeping

PCGP will maintain records for the Pipeline in accordance with 49 CFR §192.709, including:

- the date, location, and description of each repair made to pipe will be retained for as long as the pipe remains in service; and
- a record of each patrol, survey, inspection, and test for at least 5 years or until the next patrol, survey, inspection, or test is completed, whichever is longer.

11.5.10 Qualification of Pipeline Personnel

49 CFR §§192.801-192.809 prescribe the minimum requirements for operator qualification of individuals performing covered tasks on a pipeline facility. PCGP ensures its personnel and contractors have the required knowledge and skills to comply with these requirements. PCGP will have and follow a written qualification program that shall include, among others, provisions to identify covered tasks, to ensure individuals performing covered tasks are qualified by an evaluation, and require individuals that are not qualified to perform a covered task to be directed and observed by an individual that is qualified. PCGP will maintain records that demonstrate compliance with these requirements.

11.6 INTEGRITY MANAGEMENT

49 CFR §§192.901-192.951 prescribe minimum requirements for an integrity management program (IMP) on any gas transmission pipeline.

PCGP will develop an enhanced pipeline IMP to maintain and improve pipeline safety and reliability for the entire PCGP system. The program will be implemented through:

- integrity assessment of pipelines in HCAs;
- improving integrity management data systems;
- increasing the integrity and reliability of the pipeline system, and;
- providing increased public assurance of pipeline safety.

This IMP program is audited by the USDOT. The IMP will be developed and implemented to comply with the prescriptive based requirements of Subpart O, 49 CFR §192. PCGP will monitor the program's effectiveness and strive for continuous improvement. The IMP will be updated during operation of the proposed PCGP.

PCGP will complete the HCA determination within one year of the in-service date of the PCGP Project. HCA locations are not used for route selection or alternatives determinations, nor do they impact pipe material selection. The level of safety, integrity, and reliability of the PCGP system is equivalent, whether or not the pipeline traverses an HCA.

Based on aerial photography analysis of the proposed route, PCGP has identified the following areas that could qualify as Class 3 locations; the locations are presented in Table 11.6-1:

Table 11.6-1

PCGP Class 3 or Greater Locations Along the Proposed Route

Class	MP Beginning	MP Ending	Feature for Class (Note 1)
Class 3	1.24	1.33	Ball Park and Commercial Buildings with potential occupancy of over 20 people
Class 3	21.12	21.25	Cell tower with associated Commercial Buildings with potential occupancy of over 20 people
Class 3	197.65	198.08	Sawmill with potential occupancy of over 20 people
Class 3	198.61	198.74	Commercial Buildings with potential occupancy of over 20 people
Class 3	198.96	199.09	Commercial Buildings with potential occupancy of over 20 people

Note 1 – Class 3 b. An area where the pipeline lies within 300 feet of either a building or a small, well-defined outside area (such as a playground, recreation area or other place of public assembly) that is occupied by 20 or more persons at least 5 days a week for 10 weeks in any 12-month period. All structure data will be field verified for final determination.

The first step in PCGP's pipeline safety monitoring process is to make sure that the pipeline is constructed properly.

During construction, the integrity of coatings designed to protect against corrosion are checked and imperfections are immediately repaired. PCGP will require non-destructive testing (*i.e*., x-ray inspection) of 100 percent of the welds in the pipeline. In addition, the pipeline will be strength-tested to a pressure of up to 1.5 times the maximum allowable operating pressure depending on class location prior to being placed into service.

Once the pipeline is in the ground and in service, PCGP will implement a number of routine monitoring measures including:

- performing land patrols which involve observing surface conditions on and near the transmission line right-of-way for indications of leaks, construction activity, and any other factors which might affect safety and operation; the term "patrolling" means the action of moving about over land or in the air or water for purposes of observing conditions on and adjacent to pipeline right-of-way for leaks, construction activity, facility marking, atmospheric corrosion, and other factors affecting safety and operations;
- performing aerial patrols at least once per calendar year depending on class location;
- inspecting river crossings;
- ensuring that class location survey is current; and
- conducting leak surveys at least once every calendar year as required by 49 CFR §192.

In addition to routine monitoring, potentially affected portions of the pipeline will be inspected during or immediately following any major natural disturbance events, such as an earthquake, floods, wildfires, etc. PCGP will access the right-of-way by foot, truck,

ATV, snow mobile, snow cat, or by aircraft depending on the accessibility of the area to be monitored.

During inspections, PCGP employees will look for signs of unusual activity or indications on the right-of-way. Discoloration of plants or grasses may be indicative of a small leak. Any missing or damaged pipeline markers used to identify the location of the pipeline will be promptly replaced or repaired. Any evidence of unauthorized activity will be reported and investigated. Additional testing will be conducted to verify the effectiveness of CP systems.

In addition to DOT-required surveys, PCGP will monitor the pipeline system using a supervisory control and data acquisition ("SCADA") system. SCADA systems are used to monitor and control facilities or equipment in industries such as telecommunications, water and waste control, energy, oil and gas refining, and transportation. A SCADA system gathers information, transfers the information back to a control center, carries out necessary analysis and control, and displays the information in a logical and organized fashion 24 hours a day, 7 days per week. Local maintenance and operations personnel will be available 24 hours a day, 7 days per week.