4.7 Hazardous Materials/Risk of Upset

Aera proposes to re-establish oil production at the existing East Cat Canyon Oil Field through the construction and operation of a thermal enhanced oil recovery facility, including 296 wells, processing facilities, and field systems. To support the proposed Aera East Cat Canyon facilities, a 14-mile, 8-inch natural gas pipeline and 0.3 115 kV power line would also be constructed. The proposed Project also includes the importation of light crude via Compressed Natural Gas (CNG) trucks for blending from Aera’s Belridge Producing Complex near Bakersfield (140.4 miles), and exportation of produced, blended crude oil back to Aera’s Belridge Producing Complex.

This section describes the public safety and risk issues that may be associated with the proposed Project. Upset conditions can create acute public health impacts, spills of hazardous materials, or site contamination. External events, such as wildfires, can pose threats to normal operations of oil and gas facilities. The following sections describe the environmental and regulatory settings for the proposed Project pertinent to an assessment of these risk issues, impact significance criteria, the potential for upset, and levels of public safety and spill risk associated with those potential upsets and their significance relative to County thresholds. Risk mitigation measures, cumulative risk impacts, and risk impacts of the project alternatives are also discussed. Potential impacts to biological resources and ground- or surface water resources as a result of an upset condition are discussed in Sections 4.3 and 4.9, respectively.

4.7.1 Environmental Setting

4.7.1.1 Characteristics of Crude Oil, Natural Gas and Odorant

This section discusses the properties of crude oil and natural gas as they relate to safety impacts, such as spills, leaks, explosions, and fires.

As it emerges from the wellhead, crude oil is a heterogeneous mixture of solids, liquids, and gases. This mixture includes sediments, water and water vapor, salts, and acid gases, including carbon dioxide and, sometimes, hydrogen sulfide. Flammable vapors that may emanate from crude oil include methane, propane, butane, and pentane. Water that is part of the fluid produced from the well is called “produced water” and contains many of the same components found in crude oil. The combined crude oil and produced water that comes from the well is called “emulsion.”

Crude oil comes in many forms. Thin and volatile oils are called “light”, whereas thick and viscous ones are “heavy”. Light oils have an American Petroleum Institute (API) gravity of 30 to 40 degrees, which means that the density is much less than 1.0 gram per cubic centimeter (g/cc; the density of water). These oils float easily on water. By contrast, some heavy oils have an API gravity of less than 12 degrees and are so dense that they sink, rather than float, in water. Oil that has the same density of water has an API gravity of 10.

Most oils are mixtures of many different compounds, most of which are hydrocarbons. There are four main hydrocarbon groups in petroleum. Saturates are hydrocarbons consisting of straight chains of carbon atoms, while aromatics are hydrocarbons consisting of rings of carbon. Asphaltenes are complex polycyclic hydrocarbons that contain many complicated carbon rings, and nitrogen-, sulfur- and oxygen-containing (NSO) compounds are mostly nitrogen, sulfur, and oxygen.

East Cat Canyon crude originating from the targeted Brooks formation is a bituminous heavy crude oil with an API gravity range of 7.6 to 9 (AERA EIR, Appendix J: ECCR QRA 03/2016, Pg. 29). The produced crude oil will be blended with 22% light crude oil for transport, to a corresponding API gravity of 12. Cat
Canyon crudes are “sour” meaning that total sulfur content is >0.5%, and generally higher. For example, East Cat Canyon crude oil product has 5.6 wt. % total sulfur (Aera 2018). The sulfur in heavy crude oil is mostly in the form of liquid compounds (i.e., mercaptans, thiophenes). Due to the total sulfur content, the combustion product from a crude oil fire will contain sulfur dioxide (SO2), which can have respiratory health effects.

Other constituents of crude oil include nitrogen and oxygen compounds, and water- and metal-containing compounds, such as iron, vanadium, and nickel. The Aera East Cat Canyon Oil Field produced gas contains significant hydrogen sulfide (H2S). According to the QRA (see Appendix J), the produced gas will contain from 15,000 to 100,000 ppm H2S ... The QRA toxicity hazard analysis assumed 100,000 ppm H2S. This is well above lethal concentrations and poses a hazard to oil field workers.

4.7.1.2 Regional Overview

The site for the proposed Project is located in the eastern area of the Cat Canyon Oil Field, which has been used for oil production purposes for more than 100 years. The Cat Canyon Oil Field is a State-designated oil field with boundaries defined by the California Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR), which covers over 26,440 acres and includes nearly 1,600 active, Idle, and abandoned oil wells.

Currently the proposed Project site contains approximately 184 inactive and previously abandoned oil wells, four active oil production wells operated by ERG Resources, LLC, and four non-producing test wells, owned by Aera. Adjacent land parcels owned and operated by ERG and Greka, are currently being utilized for oil and gas production.

The health, safety, and environmental performance of the oil and gas industry is regulated by local, State, and Federal agencies. While oversight and continual improvements in drilling, engineering, and operations continues to lower the potential risks of oil and gas facilities to people and the environment; the inherent nature of the materials handled compel hazard and risk management.

4.7.1.3 Historical Operations and Legacy Fill Materials

The proposed Project site has been utilized for oil and gas production activities for 80 years. In the Aera East Cat Canyon Oil Field, the discovery well, Brooks Oil Company No.1 (now Fullerton Oil Company No.1), was drilled in 1909 and had an initial daily yield of 150 barrels. Historically, oil production activities at the proposed Project site were operated by independent operators and later Husky Oil Company starting around 1910. Historic accumulations (determined to be 50 years old or greater) of asphaltic and heavy hydrocarbons that remain at the proposed Project site are attributed to these early years of oil production operations.

In 1984, the proposed Project site was transferred to Shell Oil Company. In 1997, Shell and Mobil combined their California exploration and production operations to form Aera. Intermittent production activities at the proposed Project site were conducted until 1989, when the operations were shut down due to economic reasons. Aera or its predecessors implemented an oil well decommissioning program between the late 1980s and 2003 under the supervision of the California Division of Oil, Gas and Geothermal Resources (DOGGR). 178 of the oil wells at the proposed Project site attributed to Aera or its predecessors companies are currently listed as plugged and abandoned (Division of Oil, Gas, and Geothermal Resources, 2013); however, six wells drilled by other previous operators (Victory 17, Field Fee 1, 2, 6, 6A, and Victory 3) were not found in the DOGGR well database (see Section 2.4). Four nonproducing test wells (Victory G1, G3, and G7 as well as Field Fee G2) that were drilled in 2012 in support of reservoir
4.7 HAZARDOUS MATERIALS/RISK OF UPSET

As further detailed in the Tetra Tech, Inc. assessment, no hazardous levels of any chemicals of potential concern (i.e., volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, petroleum hydrocarbons (carbon range C7-C44 [gasoline, diesel, and asphaltic]), benzene, toluene, ethylbenzene, xylene, and Title 22 metals) were found in the assessment areas. The results of chemical analyses were consistent with heavy oil: predominantly (60 to 75 percent) very heavy range (C23+) hydrocarbons/asphaltic materials. The heavy and mid-ranges (C13-C22) combined generally make up 95 to 100 percent of the hydrocarbons that were sampled and analyzed.

4.7.1.4 Wild Fire Risk and Protection

The proposed Project is within a high fire hazard area (see Figure 8, p. 23, 2016 SBCFD Unit Strategic Fire Plan). High fire hazard areas are those regions of the County which are exposed to significant fuel loads, such as large areas of undisturbed native or naturalized vegetation or areas which, due to location, have less than optimal fire response times. The proposed Project area falls within the jurisdiction of the Santa Barbara County Fire Department and is served by County Fire Station Number 23, which is located at 5003 Depot Avenue in Sisquoc. Station 23 is within 4 miles, or approximately 8 minutes, from the Aera East Cat Canyon Oil Field, Cat Canyon Road entrance. In addition, there are three fire stations within close proximity to the Aera East Cat Canyon Oil Field, including Station 21 in Orcutt, Station 22 in Santa Maria, and Station 24 in Los Alamos.

4.7.1.5 Produced Oil Transportation

Aera would implement the following policies, programs, and features as part of its tanker truck transportation program:

- Fleet trucks would meet or exceed the future (2019) California Air Resources Board low emissions standards;
- Fleet trucks would be replaced with new trucks or new truck engines every three years to achieve continuously lower emissions as engine efficiency and technology improves. This would reduce air emissions significantly from a standard aggregate fleet mix;
- The feasibility of alternative fuel trucks, such as liquefied natural gas, which could potentially reduce emissions further, would be evaluated as an alternative for Phase II;
- Fleet drivers would have a minimum of two years of commercial driver experience, plus extensive training in defensive driving, emergency response, and other driving skills;
- Drivers would be trained on Project-specific requirements, including loading and transportation procedures, local traffic concerns and hazards, driver safety, and driver courtesy;
All trucks would be linked to an integrated fleet geographical information management system that provides real-time satellite tracking and mapping of locations, speeds, and other parameters;

- A “geographical information system fence” feature can be used to set and measure compliance to limits, such as speed, acceleration, and de-acceleration, for trucks in a specific area and/or at a specific time of day;

- All tanker trucks would be equipped with dual-sided dashboard video cameras;

- A fleet maintenance program including California’s Biennial Inspection of Terminals inspection program;

- The fleet operates an Electronic Driver Vehicle Inspection Report system, integrated with its maintenance system; and

- The fleet would operate under an effective health, safety, security, and the environment management system and emergency response system.

### 4.7.2 Regulatory Setting

The proposed Project will be subject to the following primary Federal, State, and local regulations pertaining to oil and gas facilities, and associated hazardous material handling and fire protection.

#### 4.7.2.1 Federal Laws and Regulations

**Gas Pipelines**

Natural gas pipeline safety is managed by the Office of Pipeline Safety (OPS), U.S. Department of Transportation (DOT) Pipeline and Hazardous Material Safety Agency (PHMSA) and operators must follow the regulations in 49 CFR 192.1 to 192.1015, *Transportation of Natural and Other Gas by Pipeline*. The OPS is responsible for regulating the safety of natural gas transportation pipelines, including safety aspects related to design, construction, operation, and maintenance. Minimum safety requirements for gas pipelines are described in the Code of Federal Regulations 49 CFR Parts 191, 192 and 193. Under 49CFR 191, significant natural gas pipeline incidents are required to be reported to the PHMSA of the DOT.

Since 2003, the OPS implemented the Integrity Management Program (IMP), described in 49 CFR 192 Subpart O. This regulation requires pipeline operators to assess, identify, and address the safety of pipeline segments that are located in areas where the consequences of a pipeline failure could be significant. Under the IMP, pipeline operators are required to: identify all segments of the pipeline that pass through a high consequence area, conduct a baseline assessment of the integrity of these segments, address any safety issues, reassess the integrity of the pipeline at intervals not to exceed 5 years, and establish performance measures to assess the program’s effectiveness.

Up to 150,000 gallons of water would be required to test the natural gas pipeline. The actual volume of water would be dependent on the number of test sections and the sequence of the test. The natural gas pipeline would likely be divided into two to three test segments. Once the test has been completed on the first segment, the water would be transferred into the second segment of pipe. Once the second segment (or third if three segments are used) test has been completed, the water used would be analytically tested and discharged, as approved by the Regional Water Quality Control Board and landowners. All hydrostatic testing water would be discharged in a manner to minimize erosion and in accordance with all applicable permits.
SoCalGas typically hydrostatic tests new natural gas pipelines using fresh water from nearby sources, such as a municipal water district supply (e.g. fire hydrants, etc.). Compatible municipal tertiary reclaimed water could also be used if a sufficient nearby source is available.

**Oil Production, Storage and Transportation Facilities**

**Overview of 40 CFR Parts 109, 110, 112, 113, and 114**

The requirements identified in these regulatory programs apply to oil storage and transportation facilities and terminals, tank farms, bulk plants, oil refineries, and production facilities, as well as bulk oil consumers, such as apartment houses, office buildings, schools, hospitals, farms, and State and Federal facilities as follows:

- Part 109 establishes the minimum criteria for developing oil-removal contingency plans for certain inland navigable waters by State, local, and regional agencies in consultation with the regulated community, i.e., oil facilities.

- Part 110 prohibits discharge of oil such that applicable water quality standards would be violated, or that would cause a film or sheen upon or in the water. These regulations were updated in 1987 to adequately reflect the intent of Congress in section 311(b)(3) and (4) of the Clean Water Act, specifically incorporating the provision “in such quantities as may be harmful.”

- Part 112 deals with oil spill prevention and preparation of Spill Prevention, Control, and Countermeasure (SPCC) Plans. These regulations establish procedures, methods, and equipment requirements to prevent the discharge of oil from onshore and offshore facilities into or upon the navigable waters of the United States. These regulations apply only to non-transportation-related facilities.

- Part 113 establishes financial liability limits; however, these limits were preempted by the Oil Pollution Act (OPA) of 1990.

- Part 114 provides civil penalties for violations of the oil spill regulations.

**United States Environmental Protection Agency (EPA)**

The EPA is responsible for the National Contingency Plan and acts as the lead agency in response to an onshore oil spill. EPA also serves as co-chair of the Regional Response Team, which is a team of agencies established to provide assistance and guidance to the on-scene coordinator (OSC) during the response to a spill. The EPA also regulates disposal of recovered oil and is responsible for developing regulations for Spill Prevention, Control, and Countermeasures (SPCC) Plans. SPCC Plans are required for non-transportation related onshore and offshore facilities that have the potential to spill oil into waters of the United States or adjoining shorelines (see above). Other EPA regulations and described below.

**Hazardous Waste Handling Requirements Resource Conservation and Recovery Act (RCRA) and Associated Hazardous and Solid Waste Amendments (HSWA), 40 CFR 260.** Implementation of RCRA resulted in the creation of a major federal hazardous waste regulatory program that is administered by the EPA. Under RCRA, the EPA regulates the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA was amended by the HSWA, which affirmed and extended the concept of regulating hazardous wastes from generation through disposal. HSWA specifically prohibits the use of certain techniques for the disposal of some hazardous wastes. Under RCRA, individual states may implement their own hazardous waste programs instead of RCRA, as long as the state program is at least as stringent as the federal RCRA requirements. EPA approved California’s program to implement Federal hazardous waste regulations on August 1, 1992.
Emergency Planning and Community Right-to-Know Act (EPCRA). Under the Emergency Planning and Community Right-to-Know Act (EPCRA), or Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), the EPA requires local agencies to regulate the storage and handling of hazardous materials and requires development of a plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments), an inventory of the hazardous materials, an emergency response plan, and an employee training program. These business plans must provide a description of the types of hazardous materials/waste onsite and the location of these materials. The information in the business plan can then be used in the event of an emergency to determine the appropriate response action, the need for public notification, and/or the need for evacuation.

Hazardous Materials Management Planning Section 112(r) of the Clean Air Act Amendments of 1990, 40 CFR 68. The EPA requires facilities that handle more than a threshold quantity of a regulated substance(s) to develop Risk Management Programs (RMPs) to prevent accidental releases of these substances. Stationary sources with more than a threshold quantity of a regulated substance are to be evaluated to determine the potential for, and impacts of, accidental releases from that process. RMPs consist of three main elements: a hazard assessment that includes off site consequences analyses and a five-year accident history; a prevention program; and an emergency response program. RMPs for existing facilities were required to be submitted in 1999 and must be updated every five years.

Hazardous Materials Transportation

Hazardous Materials Transportation Act (HMTA), 49 CFR 171, Subchapter C. The DOT, Federal Highway Administration, and the Federal Railroad Administration regulate transportation of hazardous materials at the federal level. The HMTA requires that carriers report accidental releases of hazardous materials to DOT at the earliest practical moment. Other incidents that must be reported include deaths, injuries requiring hospitalization, and property damage exceeding $50,000.

Occupational Safety and Health Administration

Process Safety Management (PSM), 29 CFR 1910.119. Under this section, facilities which use, store, manufacture, handle, process, or move hazardous materials are required to:

- Conduct employee safety training;
- Have an inventory of safety equipment relevant to potential hazards;
- Have knowledge on use of the safety equipment;
- Prepare an illness prevention program;
- Provide hazardous substance exposure warnings;
- Prepare an emergency response plan; and
- Prepare a fire prevention plan.

In addition, 29 CFR 1910.119, Process Safety Management (PSM) of Highly Hazardous Chemicals, specifically requires prevention program elements to protect workers at facilities that have toxic, flammable, reactive or explosive materials. Prevention program elements are aimed at preventing or minimizing the consequences of catastrophic releases of chemicals and include process hazard analyses, formal training programs for employees and contractors, investigation of equipment mechanical integrity, and an emergency response plan.

Worker Health and Safety, 29 CFR 1910. OSHA implements regulations under 29 CFR 1910 to ensure employers provide a healthy and safe work environment which included informing employees of workplace hazards (Hazard Communication, 29 Code of Federal Regulations 1910.1200). The goal is to
make sure employers provide their workers a place of employment free from recognized hazards to safety and health, such as exposure to toxic chemicals, excessive noise levels, mechanical dangers, heat or cold stress, or unsanitary conditions (along with CalOSHA in California). OSHA 1910 contains several standards that describe requirements for the safe management of hazards associated with processes using, storing, manufacturing, handling, or moving highly hazardous chemicals onsite. It emphasizes the management of hazards through an established comprehensive program that integrates technologies, procedures, and management practices, including communication.

- 1910.119 (Subpart H) - Process Safety Management of Highly Hazardous Chemicals
- 1910.120 (Subpart H) - Hazardous Waste Operations and Emergency Response.
- 1910 Subpart N - Materials Handling and Storage

### 4.7.2.2 California Laws and Regulations

The following State laws address gas and liquid pipelines, oil and gas facilities, and hazardous materials and waste. An overview of their implementation is discussed below.

**California Health and Safety Code**

- Division 20, Chapter 6.5, §25100-25249, Hazardous Waste Control;
- Division 20, Chapter 6.95, §25500, et seq. Hazardous Materials Management Plan and Community Right-to-Know and Hazardous Materials Release Response Plans and Inventory (Business Plan Program);
- Proposition 65 Compliance, H&SC §25249.5 et seq.;
- H&SC §§25340-25392, Carpenter-Presley-Tanner Hazardous Substance Account Act; and

**California Code of Regulations (CCR)**

- Title 8, §1529, Asbestos Construction Standard;
- Title 8, §1532.1, Lead Construction Standard;
- Title 8, §5189, Accidental Release Plan (ARP);
- Title 8, §5192, Accidental Release Plan (ARP);
- Title 14, Division 2, Department of Conservation;
- Title 19, §2729, Employee Training Program;
- Title 22, Division 4, Chapter 30, Hazardous Wastes;
- Title 22, Division 4.5, §§66260-67786, Hazardous Waste Requirements; and
- Title 22, §66265.50-.56, Contingency/Emergency Response Plan.

**Oil Facilities Department of Conservation, Division of Oil, Gas and Geothermal Resources (DOGGR)**

The Division of Oil, Gas, and Geothermal Resources (DOGGR) was formed in 1915 to regulate oil and gas activities with uniform laws and regulations. The Division supervises the drilling, operation, maintenance, and plugging and abandonment of onshore and offshore (in State waters) oil, gas, and geothermal wells, to prevent damage to: (1) life, health, property, and natural resources; (2) underground and surface waters suitable for irrigation or domestic use; and (3) oil, gas, and geothermal reservoirs.

DOGGR responsibilities are detailed in Section 3000 of the California Public Resources Code and Title 14, Chapter 4 of the California Code of Regulations. These regulations address issues such as well spacing, blow-out prevention devices, casing requirements, plugging and abandonment of wells, maintenance of facilities and safety systems, inspection frequency and reporting requirements.
**California Pipeline Safety Act of 1981**

This Act gives regulatory jurisdiction to the State Fire Marshal for the safety of all intrastate hazardous liquid pipelines and all interstate pipelines used for the transportation of hazardous or highly volatile liquid substances. The law establishes the governing rules for interstate pipelines to be the federal Hazardous Liquid Pipeline Safety Act and federal pipeline safety regulations.

Recent amendments require pipelines to include means of leak prevention and cathodic protection, with acceptability to be determined by the State Fire Marshal. All new pipelines must also be designed to accommodate passage of instrumented inspection devices (smart pigs) through the pipeline.


The purpose of General Order No. 112-F is to establish, in addition to the Federal Pipeline Safety Regulations, minimum requirements for the design, construction, quality of materials, locations, testing, operations and maintenance of facilities used in the gathering, transmission and distribution of gas to safeguard life or limb, health, property and public welfare and to provide that adequate service will be maintained by gas Operators under the jurisdiction of the CPUC. General Order No. 112-F is incorporated in addition to the Federal Pipeline Safety Regulations, specifically, Title 49 of the Code of Federal Regulations (49 CFR), Parts 191, 192, 193, and 199, which also govern the Design, Construction, Testing, Operation, and Maintenance of Gas Piping Systems in the State of California. General Order No. 112-F does not supersede the Federal Pipeline Safety Regulations, but rather supplements the Federal Regulations.

**California Accidental Release Prevention (CalARP) Program**

The CalARP program mirrors the federal Risk Management Program (RMP), except that it adds external events and seismic analysis to the requirements and includes facilities with lower inventories of materials. A CalARP or Risk Management Plan (RMP, federal requirements) is a document prepared by the owner or operator of a stationary source containing detailed information including:

- Regulated substances held onsite at the stationary source;
- Offsite consequences of an accidental release of a regulated substance;
- The accident history at the stationary source;
- The emergency response program for the stationary source;
- Coordination with local emergency responders;
- Hazard review or process hazard analysis;
- Operating procedures at the stationary source;
- Training of the stationary source’s personnel;
- Maintenance and mechanical integrity of the stationary source’s physical plant; and
- Incident investigation.

**Hazardous Waste Control Law (HWCL)**

The HWCL is administered by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). DTSC has adopted extensive regulations governing the generation, transportation, and disposal of hazardous wastes. These regulations impose cradle-to-grave requirements for handling hazardous wastes in a manner that protects human health and the environment. The HWCL regulations establish requirements for identifying, packaging, and labeling hazardous wastes. They prescribe management practices for hazardous wastes; establish permit requirements for hazardous waste treatment, stor-
Hazardous Materials Management Planning

The Office of Emergency Services (OES), in support of local government, coordinates overall State agency response to major disasters. The Office is responsible for assuring the State’s readiness to respond to and recover from natural, manmade, and war-caused emergencies, and for assisting local governments in their emergency preparedness, response, and recovery efforts. During major emergencies, OES may call upon all State agencies to help provide support. Due to their expertise, the California National Guard, California Highway Patrol (CHP), Department of Forestry and Fire Protection, Conservation Corps, Department of Social Services, and Caltrans are the agencies most often asked to respond and assist in emergency response activities.

Hazardous Materials Transportation in California

California regulates the transportation of hazardous waste originating or passing through the State in Title 13 of the California Code of Regulations. The California Highway Patrol (CHP) and Caltrans have primary responsibility for enforcing Federal and State regulations and responding to hazardous materials transportation emergencies. The CHP enforces materials and hazardous waste labeling and packing regulations that prevent leakage and spills of material in transit and provide detailed information to cleanup crews in the event of an incident. Vehicle and equipment inspection, shipment preparation, container identification, and shipping documentation are all part of the responsibility of the CHP. The CHP conducts regular inspections of licensed transporters to ensure regulatory compliance. Caltrans has emergency chemical spill identification teams at locations throughout the State.

Hazardous waste must be regularly removed from generating sites by licensed hazardous waste transporters. Transported materials must be accompanied by hazardous waste manifests.

Hazardous Materials Worker Safety

California Occupational Safety and Health (CALOSHA) Act requires that employers have an effective Injury and Illness Prevention Program (IIPP) which includes training and instruction on safe work practices. Additionally, the program should include a system for the employer to communicate with the employee with the aim of recognizing and reporting health and safety hazards.

4.7.2.3 County Regulations

Santa Barbara County has established a number of programs and plans to address oil and gas operations in the County.

Petroleum Code

This code sets forth specific regulations for onshore oil and gas development that are intended to protect the health, safety, public welfare, physical environment and natural resources of the County. Sections 25-21 through 25-43 include specific requirements for well design, hazardous emission control, fire prevention, and well and equipment spacing, abandonment and restoration procedures. The Petroleum Code also provides for annual County inspections of lease sites, tanks and well sites, including associated pipelines, to ascertain conformity with the standards set forth in the Code. Wells and tanks are required to be
located at least 200 feet from any major street, highway, railroad track, or building as per the SBC Petroleum Code Section 25-21. No oil and gas production well or related facilities shall be permitted within 300 feet of an occupied residence (SBC Code section 35-153).

**Systems Safety and Reliability Review Committee (SSRRC)**

SSRRC was established by the Santa Barbara County Board of Supervisors to provide additional technical project design review to ensure the protection of persons, property and the general public welfare. The SSRRC is also the delegated technical authority to ensure oil and gas related technical consistency with applicable state and federal regulations. The SSRRC is responsible for identifying and requiring correction of possible design and operational hazards for oil and gas projects prior to construction, during project operations, and for project modifications.

The goal of SSRRC review is to substantially reduce the risks of project-related hazards that may result in loss of life and injury and/or damage to property and the natural environment. This process occurs through the review and approval of project designs and plans, and facility inspections. The SSRRC consists of representatives from Planning and Development Department (Energy & Minerals and Building & Safety Divisions), County Fire Department, Environmental Health Services Hazardous Materials Unit (CUPA), Air Pollution Control District and County Executive Office (Office of Emergency Services). Other County departments participate for specific issues as needed. The SSRRC may employ a third-party technical review to help identify and correct possible design and construction hazards and to ensure mitigation of potential public risk prior to construction and for subsequent design modifications. The SSRRC also oversees the development and implementation of a Safety Inspection, Maintenance, and Quality Assurance Program (SIMQAP). The SIMQAP is a guidance document that identifies a facility’s safety-related features, processes and procedures. SSRRC oversight and preparation of a SIMQAP may be required for specific projects as conditions of approval by the County decision-makers. Additionally, the SSRRC conducts annual safety audits of facilities subject to SSRRC oversight. These safety audits can include review of Process Hazards Analysis (PHAs), Process and Instrumentation Diagrams (P&IDs), and all other components as specified in the project’s SIMQAP.

**4.7.2.4 Other Applicable Guidelines, National Codes and Standards**

The following is a list of professional association codes and standards which also may be incorporated into federal, State and local regulations by reference.

- Safety and Corrosion Prevention Requirements — ASME, NACE International (formerly National Association of Corrosion Engineers), ANSI, API
- ASME & ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings;
- ASME & ANSI B16.9, Factory-Made Wrought Steel Butt Welding Fittings;
- ASME & ANSI B31.1a, Power Piping;
- NACE Standard RP0190-95, Item No. 53071. Standard Recommended Practice External Protective Coatings for Joints, Fittings, and Valves on Metallic Underground or Submerged Pipelines and Piping Systems;
- NACE Standard RP0169-96, Item No. 53002. Standard Recommended Practice Control of External Corrosion on Underground or Submerged Metallic Piping Systems;
4.7 HAZARDOUS MATERIALS/RISK OF UPSET

- NACE MR-01-75, ISO 15156, Petroleum and natural gas industries – Materials for use in H2S-containing environments in oil and gas production, Parts 1, 2 and 3;

- API 49, Recommended Practice for Drilling and Well Service Operations Involving Hydrogen Sulfide

- API 54, Recommended Practice for Occupational Safety for Oil and Gas Well Drilling and Servicing Operations

- API 510 Pressure Vessel Inspection Code;

- API 570 Piping Inspection Code, applies to in-service metallic piping systems used for the transport of petroleum products;

- API 572 Inspection of Pressure Vessels;

- API 574 Inspection Practices for Pipe System Components;

- API 575 API Guidelines and Methods for Inspection of Existing Atmospheric and Low-pressure Storage Tanks;

- API 576 Inspection of Pressure-Relieving Devices;

- API 651 Cathodic Protection of Aboveground Storage Tanks;

- API 2610, Design, Construction, Operation, Maintenance, and Inspection of Terminal & Tank Facilities;

- API Spec 12B – Bolted Tanks for Storage of Production Liquids.

- API 653, Tank Inspection, Repair, Alteration, and Reconstruction, addresses the following issues:
  - Tank suitability for service;
  - Brittle fracture considerations;
  - Inspections;
  - Materials;
  - Design considerations;
  - Tank repair and alteration;
  - Dismantling and reconstruction;
  - Welding;
  - Examination and testing;
  - Marking and recordkeeping;
  - Pertinent issues related to tank inspections in API 653 are summarized below;
  - External inspections by an authorized inspector every 5 years;
  - Ultrasonic inspections of shell thickness every 5 years (when corrosion rate not known);
  - Internal bottom inspection every 10 years, if corrosion rates not known; and
  - Appendix C – detailed checklists for in-service and out-of-service inspections.

Fire and Explosion Prevention and Control, National Fire Protection Agency (NFPA) Standards

- NFPA 30 Flammable and Combustible Liquids Code and Handbook

- NFPA 11 Foam Extinguishing Systems

- NFPA 12 A&B Halogenated Extinguishing Agent Systems

- NFPA 15 Water Spray Fixed Systems

- NFPA 20 Centrifugal Fire Pumps

- NFPA 70 National Electrical Code

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4.7.2.5 Fire Risk, Prevention and Protection

For unincorporated areas of the County, as well as smaller cities with cooperative agreements with the County, fires in the County are generally the responsibility of the Santa Barbara County Fire Department (SBCFD).

California Fire Code (CFC) Section 5706.3 of Chapter 57, Flammable and Combustible Liquids contains specific requirements for the drilling, operation and maintenance of oil and natural gas wells. This section specifically addresses well and equipment locations, clearances, sumps, storage tanks, signs, and other related provisions. There are no requirements for local hydrants or wharf type connections for fire protection at well site locations.

Principal fire protection requirements for the proposed well pad sites include the following, based upon CFC and SBCFD fire prevention standards:

- Road access, design and maintenance, including Knox box provisions, to comply with SBCFD Development Standards. New and existing emergency access roads must meet SBCFD requirements, including the following:
  - Primary fire access roads to be 24 feet in width and 13’-6” vertical clearance, minimum. Secondary fire access roads to be 20 feet in width and 13’-6” vertical clearance, minimum.
  - Fire lanes shall be provided as set forth in CFC Section 902.
  - Fire access to be provided within 150 feet of outside building perimeter.
  - Fire access road to be able to support 40,000 pound emergency vehicles.
  - Install Knox box with proper access at the main entrance gate as required by SBCFD standards.

- Brush and vegetation clearance must be maintained in accordance SBCFD Standard 6, Clearances must be as follows:
  - Ground areas must be kept free of weeds, trash and other combustible materials.
  - Remove vegetation within 10 feet from power poles.
  - Remove flammable vegetation within 10 feet from roads, or reduce to a maximum of 4” stubble height.
  - Remove vegetation within 30 feet from structures, tanks and containment areas (exception: vegetation less than 18” in height above the ground need not be removed where necessary to stabilize the soil and prevent erosion.)

- Exceptions:
  (a) If protected species vegetation occurs within the clearance areas noted above, coordination between the County approved biologist, ERG and the SBCFD is to take place to ensure that disturbance to protected species is limited or avoided per environmental regulations.
  - Electrical grounding or bonding must be provided in accordance with NFPA 30. This will apply to all tanks and associated piping at the site.
  - A means to quickly shut down the facility in the event of an emergency shall be provided. Emergency operations procedures shall be developed and provided to the SBCFD for inclusion in their emergency response plans.
  - Provide accessible, well-labeled emergency gas line shutoff valves on supply lines to all gas-fired equipment at the site.
Portable Fire Extinguishers with a minimum rating of 20-A:B:C shall be provided where required by SBCFD, at a maximum of 75’ between extinguisher locations. Extinguishers mounted on trucks may be approved in lieu of fixed locations if approved by the SBCFD in site-specific locations.

- Provide premises identification at the main gate entrance to the facility in accordance with SBCFD Standard 2. Provide site MSDS sheets in secure box or container at main gate entrance for SBCFD use in an emergency.

- All new tanks holding hazardous, toxic, flammable or combustible liquids are to be provided with NFPA 704 identification, with markings located where they can be readily seen by the SBCFD on approach from fire department access roads.

- A pre-incident plan is to be developed and provided to SBCFD. Items addressed in the plan should include but not be limited to the following:
  - Staging area for emergency vehicle response
  - Plans to handle the accumulation and drainage of fire suppression water
  - Traffic control plan
  - Mutual aid agreement
  - Established training at site
  - Documentation of all Hazardous Materials on-site
  - Site fire protection to include fire protection water storage, hydrants, pressurized lines, fire pumps and associated fire protection systems if required, per SBCFD, CFC, NFPA and API standards.

Further, the Santa Barbara County Petroleum Office has established annual inspection criteria for oil and gas well and facility sites (http://sbcountyplanning.org/energy/petroleum/codes.asp). These criteria include the following:

- Vegetation and Debris:
  - No vegetation permitted within the diked or bermed areas or within the following minimum distances:
    - 30 feet of any or loading rack
    - 30 feet of any heater or similar ignition source
  - The tank battery and surrounding area shall be maintained free from trash and debris.
  - Idle pipe and equipment may be neatly stacked out of the way.
  - No vegetation permitted on location for active producing or injection wells.
  - Idle wells shall be free from vegetation for a ten-foot minimum radius around the wellhead.

### 4.7.3 Environmental Thresholds

Santa Barbara County adopted Public Safety Thresholds in August 1999. The County incorporated these thresholds into its Environmental Thresholds and Guidelines Manual (Santa Barbara County, 2015). The thresholds provide three zones — green, amber, and red — for guiding a determination of significance or insignificance, based on the estimated frequency and consequences of an accident that would cause fatalities or serious injuries to the public. In addition, a Safety Element Supplement was adopted in February 2000 (Santa Barbra County, 2000) covering hazardous materials (Santa Barbara County, 2000). The Safety Element defines unacceptable risk in a manner that guides consistent and sound land-use decisions involving hazardous facilities. The Safety Element also defines criteria applicable to new development as well as to modifications to existing development if those modifications increase risk. The public safety thresholds do not address risk of environmental damage. The threshold applied in previous EIRs for risk of significant environmental impact due to accidental spills is as follows: an impact of spills would be
significant if operations would increase the probability or volume of oil spills into the environment. Sections 4.3 (Biological Resources) and 4.9 (Surface/Groundwater Resources) address environmental impacts of an oil spill. In addition, the public safety thresholds do not apply to occupational safety. Occupational risk, which is governed by State and federal OSHA standards, is considered to be more voluntary and is generally judged according to more lenient standards of significance than those used for involuntary exposure.

To identify the significance of Project impacts to public safety, the County requires an analysis of risks to the public for projects that involve the storage or transport of hazardous materials. The County determines if a Quantitative Risk Analysis and Report should be performed by applying a four-step screening methodology, as follows:

1. Certain facilities, such as major produced gas pipelines and gas processing facilities that support off-shore oil and gas facilities, will automatically be subject to quantitative risk analysis and the risk thresholds;

2. For facilities not included in step one, staff first determines the hazard zone based on the threshold levels of concentration for the particular hazardous materials involved and reasonably worst-case accidents. Levels of concentration for most chemicals are identified by the State. The hazard zones for materials commonly used in the County will be determined. Any hazard zone that encompasses other potentially inhabitable land uses triggers step three, inclusive of non-hazardous development (other than a single-family residence) proposed within the hazard zone of an existing hazardous facility. Otherwise, the Project is not considered to have a significant impact due to acute exposure to hazardous materials;

3. If the hazard zone encompasses off-site receptors, staff then calculates the Individual Risk for the hazardous material(s) involved, based on the probability of an accident occurring, and proceeds to Step four. Calculations may be pre-determined based on existing information or will be accomplished by a qualified risk analyst; and

4. County staff adjusts the Individual Risk to reflect conditional probabilities, called the Individual Specific Risk. Such probabilities address factors such as number of hours in the day in which someone is present in the hazard zone. A measurement of one in a million (1 x 10^-6) on an annual basis indicates sufficient evidence to trigger the risk thresholds and a comprehensive risk analysis.

The County required a Quantitative Risk Analysis (QRA) be prepared by the Applicant in order to compare the risks of injury and fatality to the County thresholds. Using modeling, a QRA provides a comparison with existing County threshold tables (Table 4.7-1, County of Santa Barbara Potential Significance Classes for Risk and Figure 4.7-1, Santa Barbara County Fatality and Injury Risk Thresholds) in order to determine the potential level of impact. The QRA modelling produces the injury and fatality risk profiles of a project. These profiles are depicted as F/N (Frequency/Number) curves plotted on the societal risk graphs and which fall in the green, amber, or red zone. The County’s significance thresholds are described in Table 4.7-1 and depicted graphically in Figure 4.7-1. The following QRAs were prepared for the proposed Project and are provided in Appendix J:

- **Oil Field**: East Cat Canyon Oil Field Redevelopment Project Facility Quantitative Risk Assessment Update, March 2016 and updated March and May 2018 (Dixon 2016/18).

- **Truck Transportation**: East Cat Canyon Oil Field Redevelopment Project Transportation Quantitative Risk Assessment, January 2017 and updated May 2018 (Dixon 2017/2018) and Addendum to East Cat Canyon Oilfield Redevelopment Project Transportation Quantitative Risk Assessment (Dixon May 2018).

- **Natural Gas Pipeline**: East Cat Canyon Oil Field Redevelopment Project SoCalGas Natural Gas Pipeline Quantitative Risk Assessment, January 2018 (MRS 2018a)
Figure 4.7-1. Santa Barbara County Fatality and Injury Risk Thresholds
### Table 4.7-1. County of Santa Barbara Potential Significance Classes for Risk

<table>
<thead>
<tr>
<th>Impact Classification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class I Impacts</td>
<td>Class I applies to adverse impacts that the County considers unavoidable and significant (i.e., cannot be mitigated to insignificance via feasible measures). The County considers a societal risk spectrum that falls in the red or amber zones after application of all feasible mitigation to be unavoidable. Unreasonable risk shall be determined for each project individually, based on policies provided in the Safety Element and other relevant policies and codes. Lacking any such determination, project approval requires a statement of overriding considerations by the applicable authority, showing that the benefits of the proposed development exceed its adverse impacts to public safety.</td>
</tr>
<tr>
<td>Class II Impacts</td>
<td>Class II applies to adverse impacts that the County considers significant but avoidable through application of feasible mitigation (i.e., mitigation can render the impact to be less than significant). The County considers a societal risk spectrum that falls in either the red or amber zones to be a significant impact. Such risk is considered a Class II impact if application of feasible mitigation is sufficient to lower the risk spectrum so that it falls fully within the green zone.</td>
</tr>
<tr>
<td>Class III Impacts</td>
<td>Class III applies to adverse impacts that the County considers to be less than significant for purposes of complying with CEQA. The County considers a societal risk spectrum that falls completely in the green zone to be a Class III, less than significant impact to public safety and no mitigation is required for purposes of compliance with CEQA.</td>
</tr>
</tbody>
</table>

Source: Summarized from Santa Barbara Environmental Thresholds and Guidelines Manual, Revised 2015

#### 4.7.3.1 County Fire Development Standards

The following County Fire Department standards are applied in evaluating impacts associated with the proposed Project:

- The emergency response thresholds include Fire Department staff standards of one on-duty firefighter per 4000 persons (generally 1 engine company per 12,000 people, assuming three firefighters per station). The emergency response time standard is approximately 5 to 6 minutes.

- The ability of the County’s engine companies to extinguish fires (based on maximum flow rates through hand-held line) meets state and national standards assuming a 5,000- square foot structure. Therefore, in any portion of the Fire Department’s response area, all structures over 5,000 square feet are an unprotected risk (a significant impact) and therefore should have internal fire sprinklers.

- Access road standards include a minimum width (depending on number of units served and whether parking would be allowed on either side of the road), with some narrowing allowed for driveways. Cul-de-sac diameters, turning radii and road grade must meet minimum Fire Department standards based on project type.

- Two means of egress may be needed and access must not be impeded by fire, flood, or earthquake. A potentially significant impact could occur in the event any of these standards is not adequately met.

#### 4.7.3.2 Emergency and Safety Plans

**Spill Contingency and Safety Plans**

Post-construction surface drainage would follow existing onsite drainage patterns and be directed to the north as surface flow through storm water conveyance systems and would discharge at points located at the Project site boundary, as outlined within the Project’s Storm Water Pollution Prevention Plan. In addition, any spills on the site would also be contained, both within process system walls/berms around equipment and site walls/berms around the central processing facility. Process walls/berms would be designed to contain at least 110 percent of the largest vessel plus the precipitation generated by a 100-year storm event.
Appropriate safety programs that would comply with existing regulations would be developed and implemented, and include preparation of a Hazardous Materials Business Plan; a Spill Prevention, Control, & Countermeasures Plan; a worker’s safety program; the Aera Construction Safety Handbook; an emergency response plan (see below); a plant safety program; facility standard operating procedures; and a Control of Work Process. Additionally, the Project would require Land Use Approval for Construction Permits, DOGGR oversight, and compliance with regulations including Assembly Bill 1960 (spill prevention).

**Emergency Action Plan and Fire Protection Plan**

Aera is currently working with a certified fire protection engineer to develop an Emergency Action Plan and Fire Protection Plan for the Project site. The plan will be written in accordance with Occupational Safety and Health Administration and Code of Federal Regulations under Title 8 and Title 29 for Emergency Action and Fire Prevention Plans as well as Santa Barbara County Fire Protection Development Standards. The primary goal of the Emergency Action Plan and Fire Protection Plan is the safety of workers during a workplace emergency. The Emergency Action Plan and Fire Protection Plan will describe the roles and responsibilities of the facility’s responsible official, supervisors, employees, and emergency response teams to respond to various emergency scenarios. It will outline fire prevention/suppression equipment, as well as evacuation procedures to be followed to ensure safety of employees and the surrounding community.

**Emergency Response Plan**

Aera would develop an Emergency Response Plan specifically tailored to both the construction and operational portions of the proposed Project. The Project emergency response plan would include crisis management and business resumption planning in order to provide for the safety of workers and the general public, as well as the protection of the environment and property in the event of a major event. The intention of the plan is to initiate measures in advance to reduce potential dangers, impacts, and losses related to potential events associated with oil and gas operations. The plan would define what would constitute an event, the appropriate organizational response team, and the location of the company emergency operations center from which management will make response decisions.

The onsite manager, or supervisor, or his/her designated representative or “person in charge” would be responsible for notifications to 911, the Santa Barbara County Hazardous Materials Unit, State Office of Emergency Services, all personnel working at the facility at the time and the nearby community in the event of a hazardous materials release/emergency shut-down. A minor event may be dealt with by the onsite cleanup crew; onsite personnel who have been trained in spill cleanup. A major event may require the assistance of offsite personnel or a cleanup contractor. In order to prevent potential incidents, all responsible measures will be taken to stop or limit the release of hazardous materials or waste, including measures such as stopping operations, collecting or containing released materials, and removing or isolating containers. Emergency response equipment would be inspected regularly to ensure that equipment is available and in good working order if required. The facility would be equipped with a combustion-fired backup generator in order to operate critical equipment in the event of a major power failure.

**4.7.4 Environmental Impacts and Mitigation Measures**

This section discusses the proposed Project’s potential risk of upset, hazardous materials, and fire impacts related to oil field development and operations (see Section 4.7.4.1), and power line and natural gas pipeline construction and operations (see Sections 4.7.4.2 and 4.7.4.3, respectively). Applicant Avoidance and Minimization Measures (AMMs) related to safe facility operations, including the handling of hazardous materials and emergency response procedures, are presented below and in Appendix C.
Table 4.7-2. Applicant Proposed Avoidance and Minimization Measures Related to Hazardous Materials/Risk of Upset

<table>
<thead>
<tr>
<th>AMM No.</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZ-1</td>
<td><strong>Aera Environmental Health and Safety Program.</strong> During construction and operation of the facilities, Aera will be responsible for implementation of a site-specific Environmental Health and Safety Program. The program will include training to orient workers and contractors to the safety procedures that are to be implemented on-site.</td>
</tr>
<tr>
<td>HAZ-2</td>
<td><strong>Built-In Safety Devices.</strong> The design and engineering of the facilities will include control systems to be installed on applicable equipment, piping, valves, tanks, etc. Aera will maintain records documenting that all facilities are built to specification and that all temporary systems equipped with safety devices are functional.</td>
</tr>
<tr>
<td>HAZ-3</td>
<td><strong>Inspection and Maintenance Program.</strong> Aera will implement an inspection and maintenance program during Project operations to assure good operating condition and inspected and tested at regular intervals in accordance with California Department of Conservation Division of Oil, Gas and Geothermal Resources (Assembly Bill 1960) requirements and good oilfield practices. Records showing the present status and history of each well safety device installed will be maintained by Aera personnel, including dates, details and the results of inspections, tests and repairs. These records will be kept on-site for documentation and reference purposes.</td>
</tr>
<tr>
<td>HAZ-4</td>
<td><strong>Emergency Response Plan.</strong> Prior to operations on-site, a site-specific Emergency Response Plan will be developed by Aera in order to provide for the safety of employees, customers, and the public. The plan will include specific response procedures and required notifications to 911, the Santa Barbara County Hazardous Materials Unit, the State Office of Emergency Services and all personnel working at the facility at the time in the event of a hazardous materials release/emergency shut-down. In accordance with the Emergency Response Plan, Aera personnel will inspect and maintain records of emergency response equipment at regular intervals to ensure that equipment is available and in good working order. These records will be kept on-site for documentation and reference purposes.</td>
</tr>
<tr>
<td>HAZ-5</td>
<td><strong>Operational Hazardous Materials Management/Transportation (Business) Plan.</strong> A site-specific Operational Hazardous Materials Management/Transportation (Business) Plan will be developed by Aera to comply with State and Federal regulations contained within the Resource Conservation and Recovery Act policies. The Business Plan will specify chemical and solid waste handling procedures for personnel responsible for handling or hauling materials and wastes generated on-site. The Business Plan will be routed to the Santa Barbara County Environmental Health Services for review prior to Project operations.</td>
</tr>
<tr>
<td>HAZ-6</td>
<td><strong>Spill Contingency Plan.</strong> In accordance with Assembly Bill 1960, prior to operations on-site Aera will develop a site-specific Spill Contingency Plan. The Spill Contingency Plan will include information such as emergency contact telephone numbers, available personal safety equipment, a quick action checklist for use during initial stages of a spill response and a list of required local, State and Federal agency notifications. Additionally, the plan will include a map of the production facilities which will label and identify tanks, equipment, pipelines, access roads for emergency response, sumps and catch basins, and volume of tanks and storage containers. Further, a list will be provided of all chemicals for which a Material Safety Data Sheet are required and their location. In accordance with the Spill Contingency Plan, Aera personnel will maintain records of spill response equipment at regular intervals to ensure that equipment is available. These records will be kept on-site for documentation and reference purposes.</td>
</tr>
<tr>
<td>HAZ-7</td>
<td><strong>Spill Prevention, Control, &amp; Countermeasures Plan.</strong> As outlined within Code of Federal Regulations 40 Section 112.9 (Spill Prevention, Control, and Countermeasure Plan Requirements for onshore oil production facilities) and Section 112.10 (Spill Prevention, Control, and Countermeasure Plan requirements for onshore oil drilling and workover facilities), prior to operations on-site Aera Energy LLC will develop a Spill Prevention Control and Countermeasures to mirror the Spill Contingency Plan and include specific prevention controls included within the design of the facility to ensure that potential releases will not flow into waterways. Aera Energy LLC will conduct regular inspections of these drainage. Aera Energy LLC will maintain records documenting the results of these inspections. The plan will also include countermeasures in the planning stages as far as engineering controls where adequate containment of an oil release will be provided. Additionally, the plan will address and document the regularity of inspections to verify that the equipment is functioning properly and make repairs promptly as necessary.</td>
</tr>
<tr>
<td>HAZ-8</td>
<td><strong>Beneficial Re-use Plan.</strong> In order to address on-site and off-site reuse of petroleum-hydrocarbon containing soil encountered during initial grading and site preparation activities, Aera has developed a Beneficial Re-use Plan (Appendix K). At each Re-Use Source Site, excavated soil with total petroleum hydrocarbon concentrations in excess of concentrations specified by the Santa Barbara County Environmental Health Services Lease Restoration Program, will be either transported and processed on-site at the Re-Use Site for preparation for use as on-site road material, transported to Aera Energy LLC's Belridge road-mix facility for re-use, or disposed off-site at the Santa Maria Regional Landfill under the Non-Hazardous Impacted Soil program.</td>
</tr>
</tbody>
</table>
Table 4.7-2. Applicant Proposed Avoidance and Minimization Measures Related to Hazardous Materials/Risk of Upset

<table>
<thead>
<tr>
<th>AMM No.</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZ-9</td>
<td>Vehicle Impact Protection. Vehicle impact protection will be installed at piping as needed and at well sites in order to prevent unanticipated release of materials during loading/unloading.</td>
</tr>
<tr>
<td>HAZ-10</td>
<td>Loading/Unloading Supervision. Truck flow and loading rack supervision will be required by Aera for loading and unloading of crude oil.</td>
</tr>
<tr>
<td>HAZ-11</td>
<td>Site Security. Aera will provide site security and video surveillance of the Project site.</td>
</tr>
</tbody>
</table>

4.7.4.1 Oil Field Development & Operation

Risk of Upset

Oil field development and operation could result in potential risk to the public through hazards from well development and oil field operations (see Impact RISK-1), and truck transport of light or blended crude oil (see Impact RISK-2).

Impact RISK-1: The proposed Project could generate risks to public safety by exposing the public to produced gas releases from the oil field gathering pipelines, and gas treatment plant.

A Quantitative Risk Assessment (QRA) for the Aera East Cat Canyon Oil Field was prepared by Dixon Risk Consulting (2016) (see Appendix J). The QRA was prepared in accordance with the requirements of the Santa Barbara County Planning and Development Department which specify thresholds for significant impacts to public safety. These thresholds focus on short-term risks associated with well drilling, stimulations, production and processing of produced fluids involving significant quantities of hazardous materials. In this case, the significant hazardous materials associated with the proposed Project are produced oil, produced gas, and purchased natural gas to be provided to the proposed Project site via the proposed natural gas pipeline.

The oil field QRA reviewed the proposed Project operations to identify potential hazards to the public of flammable and/or toxic releases. Hazards considered during operation included loss of well control, production, gathering lines, fuel lines, and processing and storage. For each identified hazard scenario, an assessment was made of the maximum potential release and distance to off-site and on-site public populations. All other scenarios, even though they could produce on-site impacts in the immediate vicinity such as fires, steam or toxic hazards, were considered to be outside the scope of this QRA. The risk to the public was assessed using the Santa Barbara County Threshold Criteria. The scope of the QRA also does not cover non-public onsite population.

The QRA evaluated the probability of a range of potential accidents, including estimates of how the surrounding community will be affected by each potential accident, and then quantified the risk of the proposed facilities to the surrounding community in terms of the likelihood of one or more injury or fatality. The range of potential accidents includes the following:

- **Toxic Vapor Cloud (H₂S).** Toxic vapor cloud risks associated with the proposed Project could occur due to exposure to the Project’s raw produced gas which was assumed in the QRA to have a hydrogen sulfide (H₂S) concentration of 100,000 parts per million (ppm) (prolong exposure to H₂S levels above 100 ppm can prove toxic). The Project’s raw produced gas, once treated by one of the compressor plants, would have a maximum H₂S concentration of 20 ppm which is below the 30 ppm level of concern.
(LOC). Produced water was excluded from the toxic vapor cloud analysis since its H$_2$S concentration is approximately 1-2 ppm.

**Flammable Vapor Cloud Explosion.** A vapor cloud explosion could occur when there is a sudden release of a large quantity of flammable vapor that encounters an ignition source. Typically, this occurs when a vessel, containing a superheated and pressurized liquid, ruptures.

**Vapor Cloud Flash Fire.** Vapor cloud fires occur when there is a delayed igniting of a flammable gas cloud with ignition occurring when the cloud reaches a suitable ignition source.

**Jet Fire.** A jet fire is a turbulent diffusion flame resulting from the combustion of a gaseous fuel continuously released with some significant momentum in a particular direction or directions. Jet fire consequences are estimated based on size/diameter of release, meteorological conditions, pressures and temperatures of the gaseous fuel, and the possible impact population.

**Pool Fire.** Pool fires could result from crude oil spills. Consequences from crude oil pool fires are a function of the crude oil spill volume, crude oil spill area and spill radius, thermal radiation impact distances and areas, and the possible impacted population within the thermal impact areas.

The risk assessment methodology utilized the following steps:

- Identify potential release scenarios;
- Quantify the likelihood of these scenarios;
- Determine the consequences and potential impact on the public;
- Combine the likelihood and consequences to calculate the societal risk, presented as a risk profile;
- Assess the risk of significant injury/fatality against the Santa Barbara County risk profile criteria; and
- Develop potential mitigation measures to reduce public risk profile to less than significant, if necessary.

**Project Risk:** The F-N Curve Figures 4.7-2 (fatalities) and 4-7-3 (serious injuries) presented in the proposed Project QRA show the overall public safety risks associated with the proposed Project relative to the County’s thresholds. Based upon the QRA analysis, the proposed Project poses overall risks that fall within the green zone (Class III impact) of the County’s thresholds, as shown in the two QRA figures presented below. Specific accident scenarios analyzed in the QRA are discussed following these figures.

**Accident Impact Distances:** QRA Table 4-1 (Table 4.7-3), summarizes the maximum impact distance for significant injury by hazard type for the accident scenarios evaluated. The distances for fatality are less than those shown in the table.

The risks associated with oil field operations for the range of potential accidents presented above are discussed below.

### Table 4.7-3. Maximum Impact Distances

<table>
<thead>
<tr>
<th>Hazard Category</th>
<th>Maximum Impact Distance for a Significant Injury (feet)$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil Pool Fire</td>
<td>240</td>
</tr>
<tr>
<td>Jet Fire</td>
<td>200 for Natural Gas Pipeline</td>
</tr>
<tr>
<td>Vapor Cloud Explosion</td>
<td>0$^a$</td>
</tr>
<tr>
<td>Vapor Cloud Flash Fire</td>
<td>Blended Crude Spill: 430; Gas Lines: 200</td>
</tr>
<tr>
<td>Toxic Vapor Cloud (H$_2$S)</td>
<td>620</td>
</tr>
<tr>
<td>Toxic Vapor Cloud (H$_2$S), short duration</td>
<td>1400</td>
</tr>
</tbody>
</table>

$^a$ - The significant injury threshold was not exceeded.

$^b$ - Limiting hazard impact criteria for fire radiation is 5kW/m$^2$, for flash vapor fire is ½ LFL, for short duration toxicity is 100 ppm, and longer duration exposure is 30 ppm.
Figure 4.7-2. Aera East Cat Canyon Risk Profile – Public Safety Fatality Risks
(Source: Facility QRA Update, May 2018)
Figure 4.7-3. Aera East Cat Canyon Risk Profile – Public Safety Serious Injury Risks
(Source: Facility QRA Update, May 2018)
Toxic Vapor Cloud (H$_2$S)

The field produced gas can contain from 1.5 to 10 mole % (15,000 to 100,000 ppm) of hydrogen sulfide (H$_2$S); H$_2$S can pose a toxicity health risk at concentrations of about 100 ppm depending on the duration of exposure. The oil field QRA addressed the hazards from H$_2$S in the field-produced gas systems. Maximum toxic hazard impact distances for the worst case scenarios, and the distances to nearest public population are summarized in Table 4.7-4, assuming an initial concentration of H$_2$S in the raw produced gas of 10% (100,000 ppm).

**Table 4.7-4. Toxic Hazard Distance and Nearest Population**

<table>
<thead>
<tr>
<th>Source</th>
<th>Fatality Impact Distance</th>
<th>Injury Impact Distance</th>
<th>Fatality Impact Distance</th>
<th>Injury Impact Distance</th>
<th>Nearest Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Station</td>
<td>670</td>
<td>1,400</td>
<td>Not Provided</td>
<td>Not Provided</td>
<td>Residence 4,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-Aera Well 620</td>
</tr>
<tr>
<td>Produced Gas Treatment Plant (PGTP)</td>
<td>440</td>
<td>1,000</td>
<td>Not Provided</td>
<td>Not Provided</td>
<td>Residence 4,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-Aera Well 940</td>
</tr>
<tr>
<td>Tank Vapor Recovery (TVR) Line</td>
<td>500</td>
<td>1,100</td>
<td>Not Provided</td>
<td>Not Provided</td>
<td>Residence 2,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-Aera Well 540</td>
</tr>
<tr>
<td>8&quot; Gathering Line</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
<td>340</td>
<td>620</td>
<td>Residence 3,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-Aera Well 100</td>
</tr>
</tbody>
</table>

Source: ECCRP QRA Tables 2.1, 5.3, & 5.4

The short duration impact distances presented in Table 4.7-4 are for piping or vessel catastrophic failure at the source. The Group Station is where physical separation of the produced fluids (oil, gas, water) takes place, and the Produced Gas Treatment Plant (PGTP) removes sulfur from the process gas. The Tank Vapor Recovery (TVR) lines are after compression of the vapors from the crude storage tanks. A comparison of the impact distances with the population distances shows that residential population is well outside the impact zone. However, there are non-Aera well sites inside the proposed Project site which are within injury impact zone and one near the Group Station that is in the fatality impact zone. The QRA does account for non-Aera personnel servicing wells as part of the public population.

The worst case continuous duration toxic vapor release is a loss of containment scenario in an 8-inch gathering line with an impact distance of 620 feet; the impact distance for the smaller 3-inch gathering lines is 150 feet due to lower flow rates. The closest residence is at a distance of 3,800 feet, and the closest non-Aera well site is 100 feet. Since the 8-inch gathering lines will be located closer to the central area of the site, Cat Canyon Road would be well outside of the 620 feet impact distance; smaller gathering lines are located closer to the site boundaries, but no closer to Cat Canyon Road than approximately 900 feet (see Figure 2-9). The potential for a toxic vapor cloud impact to the general public at residential property or public road locations from produced gas releases is less than significant based on the QRA assessment (Class III). Continuous releases from pipes greater than 2 inches in diameter (e.g. major compressor plant piping, major corridor piping, etc.) have the potential for significant onsite impacts due to the hydrogen sulfide content. As required by AMM HAZ-2, the design and engineering of the facilities will include control systems to be installed on applicable equipment, piping, valves, tanks, etc. In addition, the Applicant will maintain records documenting that all facilities are built to specification and that all temporary systems equipped with safety devices are functional.
**Flammable Vapor Cloud Explosion**

The oil field QRA treated field fuel gas analysis data shows that the proposed Project field gas is composed of predominately methane. The QRA consequence model assumes a gas composition of 55 mole % methane and 17% C2 to C6+ as the released material. This gas composition is capable of an explosion if there is sufficient material within the flammable vapor cloud and/or partial confinement for the flame front to accelerate.

The assumption was made in the QRA that the high level of water in the gathering lines, and resulting steam from the release, would dilute the flammable release and prevent any flammable mixture from developing, eliminating the possibility of ignition of a flammable gas cloud. An analysis (MRS 2018b) was performed to validate this assumption. The analysis concluded that the released vapor/gas is either not flammable or close to the flammability limit, and that the flammability would rapidly drop to below ½ the lower flammability limit (LFL), so a flammable vapor cloud with ignition would not be expected. Therefore, the flammable vapor cloud explosion risk for the field gathering pipelines and processing equipment is less than significant (Class III).

**Vapor Cloud Flash Fire**

The vapor cloud flash fire hazard from gas lines and treatment facilities was considered in the QRA. Flash fires occur when there is a delayed igniting of a flammable gas cloud, with ignition occurring when the cloud reaches a suitable ignition source. A flash fire can cause serious burn injuries and/or fatalities to anyone exposed to it.

As presented in Table 4.7-3 above, the significant injury maximum impact distance for a vapor cloud flash fire for the blended crude storage area is 430 feet, and 200 feet for the fuel gas lines. According to the QRA, the distance to the nearest residence from the blended crude storage location is 2,000 feet, and to the public road is 500 feet. The distance to the nearest residence from the fuel gas line is 2,400 feet. Since the maximum impact distances for vapor flash fire are less than the distances to public population, the public impact from vapor cloud flash fire is considered less than significant (Class III).

**Jet Fire**

If ignited, a pressurized gas release results in a jet fire. Jet fire thermal radiation is quite intense, but the impact is also fairly localized, extending only 200 feet from the source for a significant injury (see Table 4.7-3) for the natural gas pipeline. The gathering and treated gas piping within the oil field operates at lower pressure (~30 psig) and in the case of the gathering lines, the release will be accompanied by flashing steam which will make it less likely to immediately ignite. Therefore, fire hazard consideration was limited to that posed by flammable vapor cloud for these lines (see above). Also, there is ample distance to nearby residences and public roadways as discussed above. Therefore, the jet fire risk to the general public is considered to be less than significant (Class III).

**Crude Oil Pool Fire**

The thermal radiation impact from crude oil pool fires is limited to a maximum impact distance of 240 feet (see Table 4.7-3 above) and does not pose a health risk to the general public, since the crude oil pool fire would be contained within the Aera East Cat Canyon Oil Field. The risk to oil field workers is minimized by the use of fire retardant clothing and evacuation procedures. A person in the immediate vicinity of the fire when it ignites might be at risk of burns, perhaps seriously if contact with the oil occurred prior to ignition. The direct risk to the public due to an oil fire is less than significant (Class III). If an oil fire was to occur, required emergency procedures would be implemented. See Mitigation Measures (MM) RISK-2
through RISK-4, and FIRE-1 for emergency response procedures. See Impact HAZ-2 for a discussion of potential sulfur dioxide release during crude oil pool fires.

**Mitigation Measures**

In addition to the proposed AMMs, the following mitigation measures are required for the development of plans to minimize possible release of hazardous materials, including crude oil, during operations and identify effective response procedures in the event of a spill or other upset conditions. While these plans are developed in response to regulatory requirements, the proposed mitigation measures will ensure that assumptions used in the proposed Project QRAs are captured as necessary within the spill prevention and emergency response plans, state and federal regulatory requirements, as well as give Santa Barbara County an opportunity to review and approve plan content.

**MM RISK-1 Emergency Response Plan.** Emergency Response Plans are required by various agencies and codes including (US EPA (EPCRA) and California Health and Safety Codes (Division 20, Chapter 6.5) They require local agencies to regulate the storage and handling of hazardous materials and requires development of a plan to mitigate the release of hazardous materials. Businesses that handle any of the specified hazardous materials must submit to government agencies (i.e., fire departments), an inventory of the hazardous materials, an emergency response plan, and an employee training program.

The Applicant shall develop an Emergency Response Plan that addresses the hazard and impact scenarios identified in the Oil Field QRA and Transportation Crude Oil Risk Analysis that complies with federal and State requirements. This Emergency Response Plan shall specifically provide instructions for first responders and fire fighters on how to approach a light, produced, or blended crude oil fire. The produce crude oil contains 6.8% total sulfur and the blended crude oil product contains 5.4% sulfur by weight. A pool fire of sour crude oil will also result in combustion gases that contain sulfur dioxide (SO2). The federal Emergency Response Planning Guidelines (ERPG-3) exposure limit for SO2 is 25 ppm (https://response.restoration.noaa.gov/oil-and-chemical-spills/chemical-spills/resources/emergency-response-planning-guidelines-erpgs.html). The training requirement of the Emergency Response Plan shall cover the health effects of exposure to SO2 vapors, as well as HAZMAT awareness training on the potential chemical hazards present at the site, including sulfur dioxide exposure during a fire, for local emergency response personnel (fire, medical, etc.).

The Emergency Response Plan shall address the implementation of a system of flammable and/or toxic gas detectors with adequate coverage to detect flammable and toxic gas releases at multiple locations, including a policy to have employees and contractors working in the field to wear portable hydrogen sulfide monitors.

**PLAN REQUIREMENTS and TIMING:** The Emergency Response Plan shall be submitted to P&D for review and approval prior to issuance of the Zoning Clearance.

**MONITORING:** P&D shall monitor the implementation of the Emergency Response Plan process during construction and operations.

**MM RISK-2 Oil Spill Contingency Plan (OSCP).** An OSCP shall be prepared for Project operations that specifically includes Project features and procedures, including:

a. Best management practices to minimize the potential for a release of hazardous materials (e.g., secondary containment and proper crude storage).
b. Training for maintenance and service personnel in appropriate handling of hazardous materials and how to contain spills or leaks

c. Prompt control and cleanup of spills and proper disposal of any contaminated soil.

**PLAN REQUIREMENTS and TIMING:** The OSCP shall be submitted to P&D for review and approval prior to issuance of the Zoning Clearance.

**MONITORING:** P&D shall verify implementation of the approved OSCP through records review and site inspection as needed throughout Project operations.

**MM RISK-3**

**Spill Prevention Control and Countermeasures (SPCC) Plan.** A SPCC Plan shall be prepared that includes features and procedures for Project facilities to prevent crude oil or other oil product discharges from occurring, in accordance with State and federal requirements. These procedures shall include, but are not limited to, pipeline and valve integrity testing program elements and frequencies for produced fluids gathering lines.

**PLAN REQUIREMENTS and TIMING:** The SPCC Plan shall be submitted to P&D for review and approval prior to issuance of the Zoning Clearance.

**MONITORING:** P&D shall verify implementation of the approved SPCC Plan through records review and site inspection as needed throughout Project operations.

**Impact RISK-2:** The proposed Project could generate risks to public safety by exposing the public to hazards from truck transport of light crude oil (LCO) and blended crude oil product.

The Project as currently proposed would truck blended produced crude oil to the Aera Belridge facility in Kern, where the blended produced crude oil will be unloaded into storage tanks, prior to transport via pipeline to refineries. Light crude oil (LCO) (approximately 29 API) will be imported to the proposed Project site by truck to from Belridge to facilitate produced crude oil (7.6 to 9 API) dehydration and treatment and meet transportation requirements for oil export (12 API). The LCO will be blended into the produced fluids at the Aera East Cat Canyon Oil Treating Plant, and the blended produced oil stored in atmospheric tanks prior to transportation off-site by truck.

A Transportation Crude Oil Risk Analysis (TQRA 2017) was performed to evaluate the risk to the public from exposure to hazardous materials under upset conditions during transport. The following impact analysis discussion addresses the public risk impact due to truck transport of proposed Project-related LCO and blended crude oil, and resultant pool fires and vapor fire risks in the event of an accident.

Transportation risks were calculated for two alternate highway routes to/from the Aera Belridge facility. The highway route to Belridge using U.S. Highway 101 / State Route 46 has a 25% lower accident rate than the route using State Routes 166 / 33. The route via U.S. Highway 101 / State Route 46 is longer by about 8 miles but uses primarily four lane divided highways which have a lower accident rate than the two-lane State Route 166. The use of U.S. Highway 101 / State Route 46 was selected as the preferred route (TQRA 2017).

Three potential access routes to/from the Aera East Cat Canyon Oil Field central processing facility to U.S. Highway 101 have been compared for accident risk and suitability for truck traffic. The routes use rural two lanes roads which provide access to ranchland, farmland, vineyards, oil developments, and some small housing areas. These road segments are described in Table 2.1 and shown on Figure 2.1 of the TQRA (see Appendix J), as well as Table 4.10-6 and Figure 4.10-2 in Section 4.10, Transportation and Traffic. The local access route using the Clark Avenue / U.S. Highway 101 junction has the lowest potential accident risk.
rate and also the shortest route length with limited paved shoulders. This access route was selected as the preferred route for transportation of crude oil (TQRA 2017).

The following crude oil truck route to and from the Aera East Cat Canyon Oil Field and the Aera Belridge facility in Kern County was selected as having the lowest truck accident rate per trip:

<table>
<thead>
<tr>
<th>Route Description</th>
<th>Route Length (miles)</th>
<th>Average Accident Rate per 10^6 Miles</th>
<th>Truck Accident Rate per Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aera East Cat Canyon Oil Field to/from Aera Belridge via Cat Canyon Road/Dominion Road/Clark Avenue (Option 1) via U.S. 101 / SR 46 / SR 33 (Option B)</td>
<td>140.4</td>
<td>0.33</td>
<td>4.6 x 10^{-5}</td>
</tr>
</tbody>
</table>

Source: Transportation Crude Oil Risk Analysis (TQRA 2017)

The selected route length is 140.4 miles long. The number of daily laden truck trips is 116, including 95 blended crude truck trips and 21 LCO truck trips. The annual laden trips are 42,340.

The properties of the LCO and blended crude product used in the TQRA are provided in Table 4.7-6.

<table>
<thead>
<tr>
<th>Property</th>
<th>Light Crude Oil</th>
<th>Blended Produced Crude Oil^1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Flammability Limit (LFL) % mol</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Upper Flammability Limit (UFL) % mol</td>
<td>7.8</td>
<td>7.8</td>
</tr>
<tr>
<td>Reid Vapor Pressure (RVP) @ 100°F (psi)</td>
<td>3.5</td>
<td>1.6</td>
</tr>
<tr>
<td>Specific Gravity 60/60</td>
<td>0.882</td>
<td>0.986</td>
</tr>
<tr>
<td>API Gravity</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Transportation Temperature (°F)</td>
<td>80</td>
<td>190</td>
</tr>
</tbody>
</table>

^1 - Produced Crude Oil blended with 22% Light Crude Oil to reduce the density from API gravity 7.6 to 12

Source: TQRA 2017 Table 4.1

The Project proposes to transport the produced crude oil product, which will be blended with LCO, by truck to the Aera Belridge facility in Kern County. Belridge LCO will be trucked in the opposite direction for blending with the produced Aera East Cat Canyon Oil Field crude. There is a risk that a trucking accident could result in a spill of its cargo and a subsequent fire. The fire potential is greater with low flash point petroleum fractions. Fractions with a flash point < 100°F (38°C) are defined as flammable liquids.

The Applicant has not provided flash point data for either the LCO or the diluted crude oil. Recently, the National Academies Press (NAP-2016) has published a book, “Spills of Diluted Bitumen from Pipelines”, which contains flash point information on a range of crudes and diluted bitumen. Because crude oil is a blend of light and heavier hydrocarbons, it “weathers” off the lighter materials at the beginning of a spill. Weathering decreases the flash point of the oil as the more volatile components are released.

The gravity benchmark between light and medium crude oil varies somewhat by world producing regions, with a range of API Gravity of 30 to 37 (0.83 specific gravity [SG]) and above is considered light crude oil. The Belridge LCO has a SG of 0.876 (29 API) according to assay report provided by the Applicant, which is a medium crude, but near the borderline of a light. The following table from the NAP book provides some flash point information.
Table 4.7-7. Flash Point (°C) Comparison of Typical Crude Oils

<table>
<thead>
<tr>
<th>Type of Crude Oil</th>
<th>Flash Point Before Release</th>
<th>Flash Point After Initial Weathering (mass % loss in weathering)</th>
<th>Flash Point After Additional Weathering (mass % loss in weathering)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Crude&lt;sup&gt;1&lt;/sup&gt;</td>
<td>≤ 30</td>
<td>23 (25%)</td>
<td>95 (64%)</td>
</tr>
<tr>
<td>Medium Crude&lt;sup&gt;2&lt;/sup&gt;</td>
<td>-10</td>
<td>33 (10%)</td>
<td>&gt;100 (32%)</td>
</tr>
<tr>
<td>Heavy Crude&lt;sup&gt;3&lt;/sup&gt;</td>
<td>-3</td>
<td>67 (10%)</td>
<td>&gt;95 (19%)</td>
</tr>
<tr>
<td>Diluted Bitumen&lt;sup&gt;4&lt;/sup&gt;</td>
<td>≤ 35</td>
<td>&gt;60 (15%)</td>
<td>&gt;70 (30%)</td>
</tr>
<tr>
<td>Bitumen</td>
<td>&gt; 100</td>
<td>&gt;100 (1%)</td>
<td>&gt;110 (2%)</td>
</tr>
</tbody>
</table>

Data in degrees centigrade.
1 - Scotia Light  
2 - West Texas Intermediate  
3 - Sockeye Sour  
4 - Cold Lake blend

What is noteworthy from Table 4.7-8, is that most raw crude oils, some weathered crude oils, and diluted bitumen blends have an initial flash point < 100°F (38°C). The Aera raw crude oil will be blended with Belridge LCO to reduce the viscosity for transport. Therefore, it is reasonable to assume that a truck load of LCO or diluted Aera East Cat Canyon crude oil has the potential to ignite during an accident involving a spill. Hence, the pool fires were one of the primary hazards considered in the TQRA. According to Table 4.7-6, the LCO and blended product also have flammability limits between 1.4 and 7.8%. So, vapor flash fire hazard was also analyzed.

All of the trucks transporting light crude oil from the Aera Belridge facility will return carrying blended produced oil. At full production, the total number of daily one-way trips, both laden and unladen, has been estimated as follows:

Table 4.7-8. Crude Oil Import/Export Number of Daily One-Way Trips

<table>
<thead>
<tr>
<th>Crude Oil Import/Export</th>
<th>Average Number of One-Way Trucks Trips per Day (Full Capacity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Crude Trucks from Belridge, Laden</td>
<td>21</td>
</tr>
<tr>
<td>Produced Crude Trucks to Belridge, Laden,</td>
<td>95</td>
</tr>
<tr>
<td>Trucks to East Cat Canyon from Belridge Unladen</td>
<td>74</td>
</tr>
<tr>
<td>Total Belridge Laden Trips</td>
<td>116</td>
</tr>
</tbody>
</table>

**Truck Pool Fire Risk**

Section 3 of the TQRA provides the basis for vehicle accident rates. Route specific accident rates were developed by an analysis of five years of California data obtained from the CHP SWITRS database, for years 2009 to 2013. This accident data was categorized by road segment for the proposed truck routes. Local influences on accident data associated with road access, road gradients, visibility and weather are inherently included within these route specific accident rates.

Accident rates have been calculated by route segment for both vehicles and trucks, with the exception of the Aera East Cat Canyon Project access roads (Cat Canyon Road, Dominion Road, and Clark Road). Insufficient data was available on the number of truck accidents per segment for the local access roads to be statistically significant, and no average daily truck counts were available. Vehicle accident rates on each local segment have been calculated, and these rates adjusted for average California vehicle to truck accident ratios to provide an estimate of the average truck accident rate. The calculated vehicle and truck accident rates by route section are summarized in Table 4.7-9 as follows:
4.7 HAZARDOUS MATERIALS/RISK OF UPSET

Table 4.7-9. Route Selection Failure Rate

<table>
<thead>
<tr>
<th>Route</th>
<th>Description</th>
<th>Vehicle Accident Rate per 10^6 Miles</th>
<th>HM Class 3 Truck Accident Rate per 10^6 Miles</th>
<th>HM Class 3 Truck Accident Rate per Trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local Option 1</td>
<td>East Cat Canyon to Betteravia Rd junction via Clark Ave / U.S. 101 (north routes)</td>
<td>1.8</td>
<td>0.53</td>
<td>6.7 x 10^{-5}</td>
</tr>
<tr>
<td>A</td>
<td>East Cat Canyon Betteravia / U.S. 101 junction to Belridge facility via SR 166 / SR 33</td>
<td>1.2</td>
<td>0.43</td>
<td>5.2 x 10^{-5}</td>
</tr>
<tr>
<td>B</td>
<td>East Cat Canyon Betteravia / U.S. 101 junction to Belridge facility via U.S. 101 / SR 46 / SR 33</td>
<td>0.98</td>
<td>0.31</td>
<td>3.9 x 10^{-5}</td>
</tr>
</tbody>
</table>

Rates are given for Local Option 1 and Route Options A and B. Combining Local Option 1 with Route B (the lower rate route) gives a per trip accident rate of 4.6 x 10^{-5}.

By applying the highway accident and incident statistics described in Section 3 of the TQRA, the frequency of truck accidents along the entire route length, and the frequency of small and large pool fires is presented in Table 4.7-10. The estimate of fire frequency incorporates the probability that a truck accident results in a release of crude oil, spill size, and ignition probability.

Table 4.7-10. Frequency of Crude Oil Fires Due to a Laden Truck Accident

<table>
<thead>
<tr>
<th>Truck Route to/from Belridge*</th>
<th>Route Length (miles)</th>
<th>Average Accident Rate per 10^6 miles</th>
<th>Truck Accident Rate per Trip</th>
<th>Number of Daily Laden trips</th>
<th>Number of Annual Laden trips</th>
<th>Trucks Accidents per Year</th>
<th>Frequency of Large Fire per year (non-mitigated)</th>
<th>Frequency of Small Fire per year (non-mitigated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>140.4</td>
<td>0.33</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.6 x 10^{-5}</td>
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<td>116</td>
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<td>2.00</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>1.0 x 10^2 (1 in 98 years)</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.5 x 10^{-3} (1 in 660 years)</td>
<td></td>
</tr>
</tbody>
</table>

*One-way

As presented in the TQRA, a large pool fire has the potential to cause injury or fatality if those involved in an accident, or public on an adjacent property, are unable to escape quickly. Fatalities and injuries may extend up to 170 or 230 feet respectively from the release source. Small pool fires are assumed to impact only those on the road.

**Truck Vapor Fire Risk**

Flash fire impact due to flammable vapor from a crude oil spill was not considered in the risk profiles for public impact since the flammable vapor cloud area generated after a crude oil spill is relatively small compared to the pool fire radiation hazard area. Flammable vapor cloud and pool fire hazard areas were calculated to determine the extent of each hazard. A comparison of the impact areas is shown in Tables 4.7-11 and 4.7-12, respectively. The pool fire hazard areas are larger than the vapor cloud hazards and resulted in greater threats to nearby populations. The reason is that energy from a pool fire radiates in 360 degrees and has the potential to impact greater a population, whereas the flammable vapor cloud dimensions are generally narrower and more directional depending on the wind direction and stability class. Note, however, that at night when weather conditions are more stable and wind speeds average 1.5 meters/second (m/s) (and reach a NOAA Pasquill stability class F/1.5, [https://ready.arl.noaa.gov/](https://ready.arl.noaa.gov/))
The flammable vapor hazard areas for blended crude are comparable to pool fire radiation hazard areas.

The calculated pool fire and flammable vapor cloud hazard areas presented in Tables 4.7-11 and 4.7-12 are only applicable for the calculation of off-road casualties. On-road casualties have been calculated by application of historical incident data which accounts for fire incidents.

The main hazard to the public is during the daytime when more people are outside and weather conditions are usually neutral with average wind speeds 4 meter/second (m/s) (NOAA Pasquill stability class D/4). For this period, the pool fire radiation hazard areas are much larger than those for the flammable vapor fire hazard. During the evening when weather conditions are more stable (F/1.5) and the flammable vapor cloud area is larger, the off-road population is mostly sheltered inside buildings. The population distribution and density assumed for the analysis is provided in Tables 2.3 and 2.4 of the TQRA (see Appendix J) and shows some outside off-road population.

<table>
<thead>
<tr>
<th>Table 4.7-11. Flammable Vapor Hazard Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Source</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Light Crude Release</td>
</tr>
<tr>
<td>To pavement</td>
</tr>
<tr>
<td>Blended Crude Release</td>
</tr>
<tr>
<td>To pavement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 4.7-12. Pool Fire Hazard Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Release Source</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Large Crude Oil Truck Release</td>
</tr>
<tr>
<td>Crude Release</td>
</tr>
<tr>
<td>To Pavement</td>
</tr>
</tbody>
</table>

**Societal Risk Profile**

The Santa Barbara County (SBC) societal risk profile has been established to evaluate the acceptability of hazardous material facilities or activities, for public risk of serious injury and fatality. The threshold criteria adopted are generally applicable to fixed installations when the hazard potential and public exposure are present 24/7 and the extent of the population is limited to that within the impact range of the facility. When considering vehicle hazardous material transportation risk, the situation is not static. The risk to the public only exists when the vehicle transporting the hazard is present at a given segment of the route. Also, the population at risk is more geographically spread out and variable. To deal with these variables, the TQRA utilized an alternate methodology with follows approaches used in the UK and Nederland’s. The risk of serious injury and fatality has been calculated for on and off-road populations, then combined to calculate the risk per one-kilometer segment lengths. Transportation route 1 Km segment with the highest calculated risk is selected for developing the societal risk profiles. In addition, the TQRA considered available mitigation to reduce risks associated with the truck transport of LCO and blended crude oil.

Section 5 of the TQRA (Appendix J) describes and quantifies various practices and systems to mitigate trucking hazards. The reduction factor credits for the different systems and practices are presented in Table 5.14 of the TQRA. Aera proposes to use contract carriers to haul crude oil for the proposed Project.
The mitigation measures summarized in Table 4.7-13 below have been selected for implementation in the TQRA, and the risk reduction applied to the base truck transportation incident rates to develop the mitigated societal risk profiles presented in Figures 4.7-4 and 4.7-5 which show that the mitigated fatality and injury risks are within the less than significant risk zones, respectively. Based on the risk profiles, the public safety risk of transporting LCO and blended crude oil produced by the proposed Project is less than significant with implementation of MM RISK-4 (Class II).

Table 4.7-13. Transportation Hazard Mitigation Measures

<table>
<thead>
<tr>
<th>Mitigation Measure</th>
<th>Collision Risk Reduction (%)</th>
<th>Non-collision Risk Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driver Selection</td>
<td>8</td>
<td>—</td>
</tr>
<tr>
<td>Driver Training</td>
<td>2.4</td>
<td>—</td>
</tr>
<tr>
<td>Loading / Unloading Procedure Training and Equipment</td>
<td>—</td>
<td>25</td>
</tr>
<tr>
<td>Modern Vehicles with Electronic Driver Vehicle Inspection Report / Maintenance</td>
<td>1.5</td>
<td>25</td>
</tr>
<tr>
<td>Driver Behavior Management (dual-sided dashboard video cameras)</td>
<td>12.5</td>
<td>—</td>
</tr>
<tr>
<td>Geographic Information Management System</td>
<td>4.3</td>
<td>—</td>
</tr>
<tr>
<td>Roll Stability Control (RSC)</td>
<td>0.7</td>
<td>—</td>
</tr>
<tr>
<td>TOTAL</td>
<td>29</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: ECC TQRA, January 2017

Mitigation Measure

**MM RISK-4 Truck Hazard Mitigation Plan.** A Truck Hazard Mitigation Plan shall be prepared that addresses the various aspects of truck operation safety, including: carrier qualifications, driver selection and training, vehicle inspection/maintenance, approved travel routes, truck loading/unloading procedures, and use of onboard safety systems. In addition, incident and annual reporting procedures shall be included.

**PLAN REQUIREMENTS and TIMING:** The Truck Hazard Mitigation Plan shall be submitted to P&D for review and approval prior to issuance of the Zoning Clearance.

**MONITORING:** P&D shall verify implementation of the approved Truck Hazard Mitigation Plan through review of incident and annual reports, and site inspection as needed throughout Project operations.

Hazardous Materials

**Impact HAZ-1: Release of Hazardous Materials during Construction, including Well Drilling**

**Construction Equipment.** Hazardous materials that would be used during project construction activities include gasoline, diesel fuel, oil, lubricants, paint and small quantities of solvents. Small volumes of these materials would be temporarily stored on-site. To minimize the potential for a release, all handling and storage of these materials would be conducted in accordance with oil field best management practices including secondary containment and proper storage of materials in accordance with federal, State, and local codes and standards. All maintenance and service personnel would be trained in the appropriate handling of these materials and how to contain spills or leaks. Any spills would be promptly cleaned up, and contaminated soil disposed of in accordance with the applicable State and federal requirements. Implementation of MM RISK-3, Spill Prevention Control and Countermeasure (SPCC) Plan, would reduce potential impacts resulting from construction-related hazardous materials to less than significant (Class II).
Figure 4.7-4. Transportation Risk of Hazmat Fatality Profile – Public Safety Fatality Risks
(Source: Transportation QRA, May 2018)
Figure 4.7-5. Transportation Risk of Hazmat Serious Injury Profile – Public Safety Serious Injury Risks
(Source: Transportation QRA, May 2018)
Well Drilling Program. Releases during drilling activities can occur due to surface equipment failures, such as ruptured hoses or failed valves, or can be due to an uncontrolled release from a well, commonly referred to as a blowout.

The purpose of blow out prevention equipment is to reduce the frequency and severity of potential blowouts. These devices are installed on the top of the well and can close the well hole by shutting a valve or “shearing” off the drilling pipe, if the drilling pipe is in the hole. The use of blow out prevention equipment is required by regulating agencies when wells are being drilled or serviced. However, like all equipment, there are times when the blow out prevention equipment does not function properly, or the configuration is such that the blow out prevention equipment does not stop the well flow. For a blowout to occur, the drill would need to pass through a pressurized reservoir. A reservoir that does not have sufficient pressure to flow to the surface cannot have a blowout. Based on the reservoir pressures measured in the existing four data gathering wells, pressures that will be encountered in the proposed Project drilling program are not anticipated be sufficient to produce a sustained, blowout type scenario. As such, no significant impact related to hazardous materials during well drilling is anticipated (Class III).


During operations, the proposed Project would generate crude oil and produced gas and water which contain naturally occurring chemicals that in the appropriate concentration are detrimental to human health. In addition, during operations and maintenance, chemicals will be brought on site to facilitate operations.

Produced Crude, Gas, and Water. The proposed Project will utilize steam injection for recovery of hydrocarbons. The facilities will produce and process produced fluids including crude oil, produced gas and water. The produced crude oil will be blended with 22% lighter crude imported from Aera’s Belridge facility in Kern County and stored on-site awaiting transport. The produced gas, which contains up to 10% H₂S (100,000 ppm), will be treated to remove sulfur components and water before use as fuel gas for the steam generation boilers. Likewise, the produced water will be treated so that it can be used in the steam generators. The produced crude oil and gas pose a hazard to the public from release of flammable and toxic materials, as discussed below. Potential biological and water quality impacts that could result from an accidental release of produced water is discussed in Sections 4.3 (Biological Resources) and 4.9 (Surface and Groundwater Quality).

The risk of operational upset was analyzed in a Quantitative Risk Assessment (QRA) for oil field operations [Appendix J]. The QRA for the oil field reviewed the proposed Project operations to identify potential hazards to the public of flammable and/or toxic releases. Hazards considered during operation included loss of well control, production, gathering lines, fuel lines, and processing and storage. For each identified hazard scenario, an assessment was made of the maximum potential release and distance to off-site and on-site public populations. All other scenarios, even though they could produce on-site impacts in the immediate vicinity such as fires, steam or toxic hazards, were considered to be outside the scope of this QRA. The risk to the public was assessed using the Santa Barbara County Threshold Criteria. The risk the public risk of injury or fatality was determined to be less than significant (see Figures 4.7-2 and 4.7-3).

As stated above, the QRA does not address the risk to the non-public onsite population, which includes the developer’s employees and contractors. The produced gas is quite “sour” with a projected H₂S concentration range of 1.5 to 10 mol % (100,000 ppm). This is well above the US OSHA IDLH level for hydrogen sulfide of 100 ppm for 30 minute exposure, and the HSE Dangerous Dose; LD₅₅ of 800 ppm for < 5 minute exposure, and Dangerous Load; LD₅₀ of 1300 ppm at 5 min (HSE). If a produced gas release is ignited, there is also potential exposure to sulfur dioxide (SO₂) in the combustion products.
This potential also exists for a crude oil pool fire, as the total sulfur content of the Aera East Cat Canyon unblended crude oil is 6.81% by weight based on core analysis of a test well. For transport by truck, the native crude is blended with a light (API 29) crude oil to a mixture of 22% light and 78% native (TQRA report). Based on this ratio and the total sulfur content of each crude, the blended crude oil total sulfur content is 5.4% by weight. Hence, a crude oil pool fire also has the potential to release SO₂; thereby, potentially exposing the public and non-public. However, the combustion gases created during a crude oil pool fire will dilute the plume and create thermal lift, limiting the hazard impact levels. An analysis for crude oil pool fires indicates (Figure 1, MRS 2018) that the ground level concentration near the center of an East Cat Canyon crude oil pool fire is not more than 0.1 ppm. The peak ground level value for SO₂ is modeled to be 0.48 ppm at a distance of close to 3 km from the crude oil fire, as the plume has cooled and mixed with ambient air as it moves downwind. These concentrations are substantially below the Emergency Response Planning Guidelines (ERPG) levels that could cause serious injury or fatality (3-25 ppm). Flame jets produce turbulent plumes and entrain large quantities of air, therefore the toxic hazard impact, if any, is expected to be limited to an area near the flame.

Therefore, no public impact is expected due to the distances of offsite populations; non-public oil field workers represent the population at most risk from the produced gas (10% H₂S) toxicity hazard. Implementation of regulatory requirements, proposed AMMs, and MMs HAZ-1, RISK-2 through RISK-4, and FIRE-1 would reduce potential risks associated with H₂S and SO₂ to less than significant (Class II).

Use of Processing Chemicals. The proposed Project will require the use of processing chemicals on-site and would generate byproducts as a result of the production and processing of produced oil and gas which are hazardous. Bulk chemicals would be imported and delivered by truck for use on-site throughout the life of the Project, while by products would be exported off site. Specifically, the following hazardous materials would be used/generated:

- Salt Import for water softening;
- Caustic import for use at production group station and water cleaning plant;
- Produced sand export;
- Sulfur cake export;
- SulfaTreat Media; and
- Spent SulfaTreat Media.

These chemicals are solids and do not pose acute risk to workers or the public if handled properly. SulfaTreat contains crystalline silica which may cause eye, skin, and respiratory tract irritation over short-term exposures; however, long term inhalation of particulates may cause lung damage, including cancer. Workers are expected to wear appropriate Personal Protective Equipment (PPE) when handling this material.

These chemicals and produced crude oil would be stored on-site in vessels, tanks, and various ancillary processing equipment located within the facilities at seven primary separate locations, including the central processing facilities and tank batteries. All new tanks, vessels, and equipment to be utilized in the central processing facilities and the tank batteries that will store or process hazardous materials are included within Project Equipment List. Please refer to Section 2.0 (Project Description) for a more detailed description of the development, processing equipment, and plot plans for each of the various Project facilities.

If a release were to occur on-site, in storage or in use, potential impacts to proposed Project site personnel, biological resources, water quality, and on-site soils could occur. In order to mitigate the potential for an on-site release resulting from the use and storage of hazardous materials during proposed Project
operations, all hazardous materials at the proposed Project site would be stored in appropriate tanks with the required secondary containment, including berms around processing areas. Hazardous materials storage vessels would be designed in conformance with the applicable laws and regulations as outlined within Section 4.2.2 (Regulatory Setting). Bulk materials would be stored in tanks or containers made of materials compatible with the intended contents. Small quantity chemicals (generally 55 gallons or less) would be stored in their original delivery containers to minimize risk of upset. Plant personnel would be properly trained in the handling, use, and cleanup of hazardous materials used at the plant, and in procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials would be stored on the proposed Project site.

As required by MM RISK-3, an SPCC Plan would be prepared and implemented to comply with the requirements of Part 112, Oil Pollution Prevention of the Code of Federal Regulations Title 40 (40 CFR). Part 112 establishes the requirements for procedures, methods, and equipment to assist in preventing the discharge of oil or diesel or any material containing oil from entering into or upon the navigable waters of the United States or adjoining shorelines. Part 112 applies to those owners or operators of non-transportation-related onshore and offshore facilities engaged in drilling, producing, gathering, processing, refining, transferring, distributing, or consuming oil, diesel or oil products. Additionally, the proposed Project will require land use approvals for construction permits, California Department of Conservation Division of Oil, Gas and Geothermal Resources oversight, and compliance with regulations including those regulations required in Assembly Bill 1960 (9/29/2008). With the implementation of the noted regulatory requirements and preparation and implementation of an SPCC Plan (MM RISK-3), the risk of hazardous material releases during operations and maintenance is considered to be less than significant (Class II). Potential biological and water quality impacts that could result from an accidental release of hazardous materials are discussed in Sections 4.3 (Biological Resources) and 4.9 (Surface and Groundwater Quality).

Mitigation Measure

MM HAZ-1 Corrosion Control and Inspection Program. Because the produced fluids will contain appeasable levels of hydrogen sulfide and sour water, corrosion in the gathering lines and equipment can be expected. A Corrosion Control and Inspection Program specifically focused on maintaining the mechanical integrity of the affected pipelines and processing equipment in sour service shall be prepared and implemented.

PLAN REQUIREMENTS and TIMING: The Corrosion Control and Inspection Program shall be submitted to P&D for review and approval prior to issuance of the Zoning Clearance.

MONITORING: P&D shall monitor the implementation of the Corrosion Control and Inspection Program during construction and operations.

Fire Risk

The proposed Project oil field site is located within a high wild fire hazard area. Construction and operation of proposed oil wells and ancillary facilities present new ignition sources that could potentially start a fire. Likewise, oil field operations could also present a fire hazard under upset conditions.

Impact FIRE-1: Introduction of Development into an Existing High Fire Hazard Area

The proposed Project would include the development and operation of 248 new thermally enhanced production wells on 72 new well, as well as, development and operation of the central processing facility, six steam generators, and ancillary facilities. An additional 48 wells for disposal and other uses will be devel-
oped for a total of 296 wells. New roads would be developed to access proposed well pads and other project work areas. The proposed well pads and equipment sites are generally level or gently sloping. Development of the 72 new pads and associated roadways would require clearing of vegetation and associated grading.

Construction specifications would be developed based on site-specific data (e.g., geotechnical information, site topography, environmental limitations, etc.). Areas within the surveyed Project disturbance limits would be cleared of all vegetation and other deleterious material utilizing heavy equipment. Where appropriate, vegetation would be chipped and utilized for soil stabilization on slopes less than 10 percent. Road and pad locations would be rough graded and compacted, balancing excavation and embankment volumes of soil (to the extent feasible) to within rough grade tolerances.

Construction and operation of new well/steam generator pads, wells, tanks, heaters and associated equipment, pipelines, and roadways would present new ignition sources that could potentially start a structure or brush fire within a high fire hazard area. The principal process hazard at the steam generator sites would likely involve a gas fuel supply or burner failure at one or more units, resulting in a continuous natural gas fueled fire. Gas pipeline failure could also result in a natural gas fueled fire. Loss of containment in the raw produced gas piping is also a potential fire source. A spill of light crude oil (LCO) during truck unloading or diluted product crude during truck loading that ignites is another potential fire source. The blended produced crude oil is storage at 190°F according to the analysis in the TQRA report, which makes the likelihood of ignition similar to LCO. Without suitable fire prevention and protection measures, the ignition of native vegetation could also lead to a wild fire. The Impact RISK-2 trucking analysis indicates the likelihood of a fire due to trucking of LCO or blended produced crude oil is less than significant.

The project site must abide by California Fire Code and Santa Barbara County standards to prevent and respond to accidents that could cause a fire. In accordance with Santa Barbara Fire Department Development Standards, vegetation removal is required within 10 feet of power poles and within 30 feet from structures. Additionally, flammable vegetation within 10 feet of roadways is required to be removed or reduced to a maximum of 4 inches of stubble. Therefore, the proposed equipment and well pad sites, including above-ground gas pipelines, would be kept devoid of vegetation which limits the fire risk. In addition, MM FIRE-1 provides for the development and implementation of a Fire Protection Master Plan for the proposed Project as presented in the Collings & Associates March 8, 2016 memorandum to Aera (see Appendix J). The Plan shall include measures such as the construction of and/or improvements to access roads, the development of an onsite stored water system, and the placement of portable fire extinguishers at the well sites. In addition, County Fire Department inspections would occur on a regular basis, and emergency response procedures would be in place. Finally, proposed Applicant AMMs include development and implementation of an Environmental Health and Safety Program, Inspection and Maintenance Program, and Emergency Response Plan.

There are four fire stations within close proximity to the Aera East Cat Canyon Oil Field. The nearest is County Station 23 located in the town of Sisquoc, which is 3.9 miles or approximately 8 minutes from the project area. Station 21 in Orcutt, Station 22 in Santa Maria, and Station 24 in Los Alamos are further away, but can provide backup capabilities if necessary (see map of surrounding fire stations at http://www.sbcfire.com/wp-content/uploads/2012/05/station-map.pdf).

Impacts resulting from well and ancillary facility construction and operation in a high fire hazard area would be less than significant (Class II) with implementation of proposed AMMs, MM FIRE-1, and implementation of County Fire Department vegetation abatement requirements, inspections, and established emergency response procedures.
Mitigation Measure

MM FIRE-1: Fire Protection Master Plan. A Fire Protection Master Plan shall be developed for the Project site, including the proposed power line and natural gas pipeline. The Plan shall address proposed construction and operations activities and shall include, but is not limited to the following requirements:

- Road access, design and maintenance, including Knox box provisions, to comply with SBCFD Development Standards. New and existing emergency access roads must meet SBCFD requirements, including the following:
  - Primary fire access roads to be 24 feet in width and 13'-6” vertical clearance, minimum.
  - Secondary fire access roads to be 20 feet in width and 13'-6” vertical clearance, minimum.
  - Fire lanes shall be provided as set forth in CFC Section 902.
  - Fire access to be provided within 150 feet of outside building perimeter.
  - Fire access road to be able to support 40,000-pound emergency vehicles.

- Install Knox box with proper access at the main entrance gate as required by SBCFD standard. Brush and vegetation clearance must be maintained in accordance SBCFD Standard 6. Clearances must be as follows:
  - Ground areas must be kept free of weeds, trash and other combustible materials
  - Remove vegetation within 10 feet from power poles
  - Remove flammable vegetation within 10 feet from roads or reduce to a maximum of 4” stubble height.
  - Remove vegetation within 30 feet from structures, tanks and containment areas (exception: vegetation less than 18” in height above the ground need not be removed where necessary to stabilize the soil and prevent erosion.)
  - Exceptions: (a) If protected species vegetation occurs within the clearance areas noted above, coordination between the County approved biologist, ERG and the SBCFD is to take place to ensure that disturbance to protected species is limited or avoided per environmental regulations.

- Electrical grounding or bonding must be provided in accordance with NFPA 30. This will apply to all tanks and associated piping at the site.

- A means to quickly shut down the facility in the event of an emergency shall be provided. Emergency operations procedures (EOP) shall be developed and provided to the SBCFD for inclusion in their emergency response plans.

- Provide accessible, well-labeled emergency gas line shutoff valves on supply lines to all gas fired equipment at the site.

- Portable Fire Extinguishers with a minimum rating of 20-A:B:C shall be provided where required by SBCFD, at a maximum of 75’ between extinguisher locations. Extinguishers mounted on trucks may be approved in lieu of fixed locations if approved by the SBCFD in site specific locations.
• Provide premises identification at the main gate entrance to the facility in accordance with SBCFD Standard 2. Provide site MSDS sheets in secure box or container at main gate entrance for SBCFD use in an emergency condition.

• All new tanks holding hazardous, toxic, flammable or combustible liquids are to be provided with NFPA 704 identification, with markings located where they can be readily seen by the SBCFD on approach from fire department access roads.

• A pre-incident plan is to be developed and provided to SBCFD. Items addressed in the plan should include but not be limited to the following:
  - Staging area for emergency vehicle response
  - Plans to handle the accumulation and drainage of fire suppression water
  - Traffic Control Plan
  - Mutual Aid Agreement
  - Established training at site
  - Documentation of all Hazardous Materials on-site

• Site fire protection to include fire protection water storage, hydrants, pressurized lines, fire pumps and associated fire protection systems if required, per SBCFD, CFC, NFPA and API standards.

• Identify the fire safety and prevention procedures to be implemented during construction including, but not limited to:
  - Fire tools specific to the fire risk of the construction task and equipment to be used (i.e. fire extinguishers, shovels, water trucks, etc.).
  - Weather forecasts shall be monitored on a daily basis and modification of construction activities in response to fire risk levels (i.e. Red Flag Warning Days), including additional fire abatement measures (use of welding curtain, etc.).
  - Qualified personnel may be designated to act as Fire Marshall during construction in order to ensure that appropriate fire prevention safety activates are occurring.
  - Training of personnel on evacuation routes and procedures to take if a fire is started.

**PLAN REQUIREMENTS and TIMING:** The Fire Protection Master Plan shall be submitted to the SBCFD and P&D for review and approval prior to issuance of the Zoning Clearance. The Plan shall include the specifications listed above and shall be implemented during construction and operation of the Project.

**MONITORING:** SBCFD and P&D staff shall perform site inspections throughout the project lifetime.

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**Impact FIRE-2: Introduction of Development into an Area without Adequate Water Pressure, Fire Hydrants, or Adequate Access for Fire Fighting**

The proposed Project includes a dedicated fire water storage (tank) supply system. A fresh water storage tank would be sized at minimum of 3,000 barrels (126,000 gallons), and strategically placed within the proposed Project site. A portion of the fresh water tank volume would be dedicated to fire water storage. The tank would be placed at an elevation adequate to meet water pressure requirements set forth by the Santa Barbara County Fire Department. Additionally, improvements to the proposed Project site to ensure proper emergency access will be conducted based on Santa Barbara County Fire Department standards.
Given proposed onsite fire abatement facilities, and the implementation of MM FIRE-1, a less than significant impact with respect to water pressure, availability, and access for fire-fighting would result (Class II).

Impact FIRE-3: Introduction of Development that will Hamper Fire Prevention Techniques such as Controlled Burns or Backfiring in High Fire Hazard Areas.

The County Fire Department does not conduct controlled burns or similar fire suppression activities in the Garey-Sisquoc area because the region is predominantly occupied with irrigated agricultural fields and small, rural townships. In accordance with Santa Barbara Fire Department Development Standards, ground areas within the vicinity of the proposed Project site will be kept free of weeds, trash, and other combustible materials. Specifically, vegetation will be removed from within 10 feet of power poles and within 30 feet from structures. Flammable vegetation will be removed or reduced to a maximum of 4 inches of stubble within 10 feet from roads. With implementation of these regulatory requirements and other measures required in MM FIRE-1, development of the proposed Project oil field would not be expected to hamper application of fire prevention techniques and would therefore be Less than significant (Class III).

Impact FIRE-4: Development of Structures beyond Safe Fire Department Response Time.

The proposed Aera East Cat Canyon Oil Field is located within a safe response time of the County Fire Departments. The nearest County Fire Station 23 is located in the town of Sisquoc, which is 3.9 miles from the proposed Project area. Fire Station 23 is staffed by one Captain, one Engineer and one Firefighter. According to the Santa Barbara County Fire Department, the existing response time to the proposed Project site is approximately seven to eight minutes. There are three additional stations near the proposed Project area which include: Station 21 in Orcutt, Station 22 in Santa Maria, and Station 24 in Los Alamos (see map of surrounding fire stations at [http://www.sbcfire.com/wp-content/uploads/2012/05/station-map.pdf](http://www.sbcfire.com/wp-content/uploads/2012/05/station-map.pdf)).

The proposed Project well development would not introduce any components that would change fire department response time and has been designed to improve site access through construction of and/or improvements of site access roads in accordance with Santa Barbara Fire Department Development Standards. In addition, MM FIRE-1 requires an onsite stored water system and the placement of portable fire extinguishers at the well sites. Impacts to existing fire department response times are considered to be less than significant (Class III).

4.7.4.2 Power Line Construction and Operation

The proposed Project includes the construction of a new, approximately 0.3-mile 115 kilovolt (kV) power line to interconnect Pacific Gas and Electric Company’s (PG&E’s) Sisquoc–Santa Ynez 115 kV power line to a new Aera-owned substation, located within the central processing facility.

Risk of Upset

There are no risk of upset impacts associated with power line construction or operation, other than those described below under Hazardous Materials and Fire Risk.
Hazardous Materials

Impact HAZ-1: Release of Hazardous Materials during Construction, including Well Drilling

Hazardous materials that would be used during power line construction activities include gasoline, diesel fuel, oil, lubricants, paint and small quantities of solvents. Small volumes of these materials would be temporarily stored in the proposed power line staging areas. To minimize the potential for a release, all handling and storage of these materials would be conducted in accordance with oil field best management practices including secondary containment and proper storage of materials in accordance with federal, State, and local codes and standards. Any spills would be promptly cleaned up, and contaminated soil disposed of in accordance with the applicable State and federal requirements. Implementation of regulatory requirements and MM RISK-3, SPCC Plan, would reduce potential impacts resulting from construction-related hazardous materials to less than significant (Class II).


Periodic maintenance activities on the power line could require the use of hazardous materials as identified for construction (see Impact HAZ-1 above). Implementation of regulatory requirements and MM RISK-3, SPCC Plan, would reduce potential impacts resulting from maintenance-related hazardous materials to less than significant (Class II). No hazardous materials would be required for power line operations.

Fire Risk

Impact FIRE-1: Introduction of Development into an Existing High Fire Hazard Area

The proposed 115 kV power line would serve as a tap from the existing Sisquoc–Santa Ynez 115 kV Power Line to the Aera owned 115/12.47 kV substation within the oil field central processing facility. The proposed power line would traverse the southern boundary of the oil field, cross Cat Canyon Road, and continue through existing oil development areas to the Sisquoc-Santa Ynez 115 kV Power Line. Although design is preliminary, installation of up to approximately ten tubular steel poles or light-duty steel poles is anticipated, as well as the removal of approximately five existing single-circuit wood poles from the Sisquoc–Santa Ynez 115 kV Power Line. The proposed Project has been designed to satisfy the requirements of the PG&E’s Transmission Interconnection Handbook and meet all applicable California Independent System Operator and Western Electricity Coordinating Council standards.

There are four fire stations within close proximity to the Aera East Cat Canyon Oil Field and proposed 115 kV power line. The nearest is County Station 23 located in the town of Sisquoc, which is 3.9 miles or approximately 8 minutes from the project area. Station 21 in Orcutt, Station 22 in Santa Maria, and Station 24 in Los Alamos are further away, but can provide backup capabilities if necessary.

Given that the proposed power line is a minor expansion of the existing Sisquoc–Santa Ynez 115 kV Power Line; the power line would be designed and operated in accordance with industry and regulatory standards, County fire stations are located in close proximity to the power line; and that MM FIRE-1, Fire Protection Master Plan, would be implemented, power line construction and operation fire risk impacts are considered to be less than significant (Class II).
Impact FIRE-2: Introduction of Development into an Area without Adequate Water Pressure, Fire Hydrants, or Adequate Access for Fire Fighting

The proposed oil field includes a dedicated fire water storage (tank) supply system that would service the central processing facility, including the 115/12.47 kV substation. Further, in accordance with Santa Barbara Fire Department Development Standards, vegetation will be removed from within 10 feet of power poles and flammable vegetation will be removed or reduced to a maximum of 4 inches of stubble within 10 feet from roads, as well as other vegetation clearance requirements for active oil field operations. Cat Canyon Road would provide emergency access to the proposed power line, as well as oil field access roads.

The proposed power line is within a safe response time of several County Fire Departments as presented above. Given that lands traversed by the power line would be maintained in accordance with Santa Barbara Fire Department Development Standards, the proposed oil field fire water storage supply system would service the northern portion of the line, Cat Canyon Road and oil field access roads would provide adequate access to the power line for emergency response, and the power line is in close proximity of several fire stations with adequate response times, impacts of power line construction and operations associated with water pressure, availability, and access for fire-fighting is considered less than significant (Class II) with the implementation of MM FIRE-1.

Impact FIRE-3: Introduction of Development that will Hamper Fire Prevention Techniques such as Controlled Burns or Backfiring in High Fire Hazard Areas.

The County Fire Department does not conduct controlled burns or similar fire suppression activities in the Garey-Sisquoc area because the region is predominantly occupied with irrigated agricultural fields and small, rural townships. As proposed, the 115 kV power line would be installed within the Aera East Cat Canyon Oil Field and within existing oil development areas to the south. Development of the proposed power line would not be expected to hamper application of fire prevention techniques and would therefore be Less than significant (Class III).

Impact FIRE-4: Development of Structures beyond Safe Fire Department Response Time.

As previously discussed, the proposed power line is located within a safe response time of the County Fire Departments. The nearest County Fire Station 23 is located in the town of Sisquoc, which is 3.9 miles from the proposed Project area. According to the Santa Barbara County Fire Department, the existing response time to the proposed Project site is approximately seven to eight minutes. There are three additional stations near the proposed Project area which include: Station 21 in Orcutt, Station 22 in Santa Maria, and Station 24 in Los Alamos. Given that the proposed power line is a minor expansion of the existing 115 kV Sisquoc-Santa Ynez 115 kV Power Line; would be placed within existing and future oil development areas; County fire stations are located in close proximity to the power line; and that MM FIRE-1, Fire Protection Master Plan, would be implemented, no significant impact to existing fire department response times would result (Class III).

4.7.4.3 Natural Gas Pipeline Construction and Operation

Risk of Upset

As part of the Aera East Cat Canyon Redevelopment Project, SoCal Gas will construct, operate, and maintain an 8-inch diameter natural gas transmission pipeline to feed natural gas to the proposed East Cat Canyon Project site. The proposed 8-inch gas pipeline to the proposed East Cat Canyon Project site will
follow a 14-mile route as shown in Figure 4.7-6. The pipeline will start at the SoCal Gas main transmission pipeline at Graciosa Canyon Divide Station, and then travel east under roadways and road shoulders through the community of Orcutt, under US Highway 101, and under rural road easements to the proposed Aera East Cat Canyon Project site. Land uses along the pipeline route range from oil and gas development, agriculture, to residential and commercial, with population densities highest in the community of Orcutt.

![Figure 4.7-6. Pipeline Route to Proposed Aera East Cat Canyon Project Site](image)

SoCal Gas staff will construct, operate and maintain the new pipeline, including routine maintenance and inspection. SoCal Gas will also respond to emergency situations in accordance with their operating and maintenance procedures. These procedures include emergency planning, on-call response, and incident reporting.

Three-automatic shut-off valves will be provided with supervisory control and data acquisition (SCADA) equipment. Flow measurements at the inlet and outlet of the natural gas pipeline will measure the volume of gas coming in and going out and if they detect a difference indicating a loss of gas, the SCADA system can shut down the pipeline and close the automatic isolation valves. This system is installed to detect and prevent a catastrophic loss of gas and can also detect releases of a small amount of gas over long periods of time.

**Impact RISK-3: The proposed Project could generate risks to public safety by exposing the public to hazards from releases of natural gas from the SoCal Gas natural gas pipeline.**

The SoCalGas Natural Gas Pipeline Quantitative Risk Assessment (PQRA) (January 2018) was prepared to evaluate the risk to the public from release of natural gas from the proposed pipeline (see Appendix J).
Sensitive Populations

The proposed natural gas pipeline route was surveyed on local maps and by driving the route to identify potentially sensitive populations. Five schools are identified to be within 0.25 miles (1,500 feet) of the proposed route, and there are also three churches located along the route. The identified schools and churches are listed in Table 4.7-14.

<table>
<thead>
<tr>
<th>Population Type</th>
<th>Pipeline to Property Line</th>
<th>Facility Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>100 feet</td>
<td>Delta Charter High School and Santa Barbara County Regional Occupational Program (ROP)-North School</td>
<td>4893 Bethany Lane, Santa Maria</td>
</tr>
<tr>
<td>School</td>
<td>210 feet</td>
<td>St Louis de Montfort Catholic School</td>
<td>5095 Harp Road, Santa Maria</td>
</tr>
<tr>
<td>School</td>
<td>660 feet</td>
<td>Patterson Road Elementary School</td>
<td>400 Patterson Road, Santa Maria</td>
</tr>
<tr>
<td>School</td>
<td>500 feet</td>
<td>Orcutt Academy K-8 and High School</td>
<td>610 Pinal Avenue, Santa Maria</td>
</tr>
<tr>
<td>School</td>
<td>1,300 feet</td>
<td>Ralph Dunlap Elementary School</td>
<td>1220 Oak Knoll Road, Santa Maria</td>
</tr>
<tr>
<td>Church</td>
<td>15 feet</td>
<td>Central Coast Missionary Baptist Church</td>
<td>598 E. Clark Avenue, Santa Maria</td>
</tr>
<tr>
<td>Church</td>
<td>15 feet</td>
<td>South Valley Community Church</td>
<td>1054 E. Clark Avenue, Santa Maria</td>
</tr>
<tr>
<td>Church</td>
<td>15 feet</td>
<td>St Louis de Montfort Catholic School</td>
<td>1190 E. Clark Avenue, Santa Maria</td>
</tr>
</tbody>
</table>

Accidental Natural Gas Release & Ignition

The PQRA evaluated the probability of a range of potential accidents, including estimates of how the surrounding community could be affected by a vapor cloud explosion/flash fire or jet fire resulting from the accidental release and ignition of natural gas from a rupture or hole in the proposed pipeline, and then quantified the risk of the proposed facilities to the surrounding community in terms of the likelihood of one or more injury or fatality. The release hazards were identified and quantified by a review of pipeline incidents. Pipeline failures in the US that meet the reporting threshold are recorded in the US DOT PHMSA database. Releases have been categorized by size as follows:

- Pipeline Releases:
  - Pinhole / Crack
  - Hole
  - Rupture

- Releases from ancillary equipment

A pinhole/crack release is likely to percolate through the soil to the surface and dissipate without forming a flammable vapor cloud. Small holes and pinhole/cracks are very unlikely to result in public casualties or property damage and were not considered further in the PQRA.

A hole release may result in damage if the hole is large enough to remove the covering soil and/or pavement, or if the pipeline is exposed due to excavation for nearby, unrelated construction or maintenance activities. On ignition, a sustained jet fire or crater fire may occur.

The primary hazard to the public is associated with a pipeline rupture, which would involve a release through a large hole, close to the pipeline diameter. A rupture may occur suddenly and explosively, throwing debris a significant distance and causing a crater. If the release is ignited, there may be an initial fireball that can cause casualties and extensive property damage due to the high heat radiation. The escaping gas will continue to burn as a crater fire until the gas supply is shut off.

Pipeline failures due to ruptures or holes can result from the following causes. Percentage of failures by cause for U.S. pipelines is noted as follows:
Incidents associated with ancillary equipment such as valves and metering may result in a hole sized release. These have been assessed separately from pipeline pipe hazards and may include weld failure, material defects, external corrosion, and vehicle impacts of above ground valve and metering equipment.\(^1\)

Release of flammable natural gas may result in one or more of several different hazards, depending on the size of release. Two accident release scenarios have been evaluated:

- A rupture equal in area to the pipeline diameter which results in:
  - Immediate ignition with a fireball then subsequent crater fire.
  - Delayed ignition with crater fire.
  - High energy gas release blast wave, then un-ignited dispersion of buoyant vapor.

- A leak equal in area to a 1-inch diameter hole or greater which results in:
  - Ignition with jet or crater fire.
  - Un-ignited dispersion of vapor.

Methane vapors in open conditions are not typically explosive, although an expansion burst may occur due to the rapid release of high pressure vapor from a pipeline rupture. An expansion burst may have a similar impact and may be heard as an explosion. For natural gas pipelines, the possibility of a significant flash fire resulting from delayed remote ignition is extremely low due to the buoyant nature of the vapor. Released vapors will disperse upward away from potential ignition sources. Therefore, the hazards associated with a delayed ignition are a crater fire or sustained jet.

Impact distances for the release hazards considered are summarized in Table 4.7-15. The maximum hazard impact distances for injury and fatality are from fireball thermal radiation, followed by crater fire radiation.

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Release Quantity</th>
<th>Hazard Distance from Release (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>High Casualty*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fatality*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Injury*</td>
</tr>
<tr>
<td>Pipeline Rupture</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fireball</td>
<td>2,600 lb in 5 secs</td>
<td>100</td>
</tr>
<tr>
<td>Crater Fire</td>
<td>Initial release rate 35,000 lb/min</td>
<td>82</td>
</tr>
<tr>
<td>Blast – Indoor Hazard</td>
<td>Pipeline burst energy</td>
<td>25</td>
</tr>
<tr>
<td>Blast – Outdoor Hazard</td>
<td>Pipeline burst energy</td>
<td>—</td>
</tr>
<tr>
<td>Pipeline Hole Releases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crater Fire 2-inch hole</td>
<td>1,100 lb/min</td>
<td>20</td>
</tr>
<tr>
<td>Crater Fire 1-inch hole</td>
<td>270 lb/min</td>
<td>-w</td>
</tr>
</tbody>
</table>

\(^1\) Vehicle impact accounts for 60% of incidents associated with ancillary equipment.
Fire radiation hazards:
- High casualty level = 11,000 Btu/hr-ft² (35 kW/m²)
- Potential fatality = 3,200 Btu/hr-ft² (10 kW/m²)
- Potential injury = 1,600 Btu/hr-ft² (5 kW/m²)

Fireball radiation hazards:
- High casualty level = fireball radius
- Potential totality = equivalent dose of 3,200 Btu/hr-ft² (10 kW/m²) for 40 seconds
- Potential injury = equivalent dose of 1,600 Btu/hr-ft² (5 kW/m²) for 40 seconds

Blast overpressure hazards indoors:
- High casualty level = greater than 6 psi overpressure
- Potential fatality = 3 psi to 6 psi overpressure
- Potential injury = greater than 1 psi overpressure

Blast overpressure hazards outdoors:
- Potential fatality = greater than 10 psi overpressure
- Potential injury = greater than 6 psi overpressure

Release Frequency and Injury Probability

The likelihood of a pipeline failure was estimated from published national and international data. In the event of a pipeline failure and natural gas release, a serious injury or fatality to the public may occur on ignition of a flammable release. Section 5.10 of the PQRA provides a substantial amount of information on sources and methods for determining ignition probabilities for pipeline ruptures and leaks, which support the selection of values used for determining hazard outcomes. The ignition probability assigned for a large leak or rupture is 8% or 0.08. This probability was uniformly applied for all pipeline route segments.

Santa Barbara County Societal Risk Profiles

The public risk of a hazardous release from the proposed 8-inch SoCal Gas pipeline has been calculated in terms of the public risk of serious injury and fatality due to a pipeline rupture or hole release. The acceptability of these risks has been evaluated against the Santa Barbara County societal risk threshold criteria for total public risk along the pipeline route. The risks are calculated by combining the likelihood of a release, the hazard impacts of the event, and the number of persons potentially exposed at different segments of the route.

The probabilities of various outcomes were estimated using event tree analysis, as discussed below.

The probabilities of the various hazard outcomes of a natural gas pipeline rupture were determined by an event tree as follows:
- Fireball and crater fire 0.04 (4%)
- Crater fire 0.04 (4%)
- Blast overpressure and vapor dispersion 0.92 (92%)

The probabilities for a pipeline hole release based on event tree are as follows:
- 2-inch hole crater fire 0.03 (3%)
- Vapor dispersion 0.97 (97%)

In the PQRA, the total risk along the pipeline route due to the consequences associated with a pipeline rupture or hole release has been calculated by summing the risk of serious injury and fatality for each pipeline segment. Risk profiles for the combined length of the pipeline route are shown as F-N curves in Figures 4.7-7 and 4.7-8 against the SBC threshold acceptability criteria. The overall fatality and serious injury risks to the public due to accidental natural gas release and ignition are within the zones of less than significant (Class III).
Figure 4.7-7. Risk Profile for SoCal Gas Natural Gas Pipeline Fatality – Public Safety Fatality Risks
(Source: Natural Gas Pipeline Draft QRA, January 2018)
Figure 4.7-8. Risk Profile for SoCal Gas Natural Gas Pipeline Serious Injury – Public Safety Serious Injury Risks
(Source: Natural Gas Pipeline Draft QRA, January 2018)
California Department of Education (CDE) Protocols

The proposed pipeline route passes within 1500 feet of five schools (see Table 4.7-14), so the PQRA included an assessment of the safety hazard, following California Department of Education (CDE) protocols, to assess the acceptability of the risk. Appendix D of the PQRA presents the results of the CDE protocol analysis for the closest school to the pipeline route (100 feet). Risk levels are in the CDE acceptable criteria category as well, and therefore, risk hazards to schools are considered less than significant (Class III).

Toxic Vapor Cloud (H2S)

The purchased gas to be transported in the natural gas pipeline contains negligible hydrogen sulfide (H2S); to protect public health, the State Air Resources Board (ARB) adopted a standard of 0.03 ppm over a one-hour average (ARB 2009). Further, SoCal Gas Rule 30, Section I contains specifications on the quality of the gas received into the system and these specifications include limits for sulfur compounds as well as for other constituents contained in the natural gas. Therefore, the toxic vapor cloud risk for the natural gas pipeline is less than significant (Class III).

Pinhole/Crack Releases

As previously noted, releases from small holes and pinhole/cracks are likely to percolate through the soil to the surface and dissipate without forming a flammable vapor cloud, so therefore are very unlikely to result in public casualties or property damage and for this reason were not considered in the PQRA since the PQRA and associated analysis is based upon a more conservative scenario of pipeline rupture. However, the issue with pinhole/crack leaks is associated with leaks where sometimes not all the gas percolates to the surface, and can follow along other buried pipelines (water, sewer) into buildings where an explosive atmosphere develops. The pipeline segments under Garciosa, Orcutt, and Clark Roads have been identified a DOT Class 3. Class 3 segments are locations with 46 or more buildings intended for human occupancy or where the pipeline lies within 100 yards of any building or small, well-defined outside area occupied by 20 or more people during normal use.

More rigorous safety requirements are prescribed as the population density (i.e., Classification) increases. These requirements include depth of cover, pipe wall thickness, MAOP, pipeline design factor, valve spacing, frequency of inspection and frequency of leak surveys. The determination of the pipeline design factor is specified in 49 CFR 192.105 and essentially determines the allowed design pressure of the pipeline with all other factors (steel yield strength, pipeline diameter, wall thickness) being the same. For a higher-Class area, such as an area with high populations, the pipeline is required, through the use of a lower design factor, to operate at a lower pressure than it would be allowed in less populated areas.

In 2003, the Office of Pipeline Safety (OPS) implemented the Integrity Management Program (IMP). The IMP, described in 49 CFR 192 Subpart O, requires pipeline operators to assess, identify, and address the safety of pipeline segments that are located in areas where the consequences of a pipeline failure could be significant. These are called High Consequence Areas (HCAs). DOT Class 3 locations are considered HCAs. Under the IMP, pipeline operators are required to: identify all segments of the pipeline that pass through a high consequence area, conduct a baseline assessment of the integrity of these segments,

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2 Rule 30, Section I.c., Hydrogen Sulfide: The gas shall not contain more than twenty-five hundredths (0.25) of one (1) grain of hydrogen sulfide, measured as hydrogen sulfide, per one hundred (100) standard cubic feet (4 ppm). The gas shall not contain any entrained hydrogen sulfide treatment chemical (solvent) or its by-products in the gas stream.
address any safety issues, reassess the integrity of the pipeline at intervals not to exceed 5 years, and establish performance measures to assess the program’s effectiveness.

Given the US DOT regulations governing the design and mechanical integrity programs for gas pipeline segments in high population density areas and the small leakage rate, the risk to the public from pinholes and cracks is Class III Insignificant (Class III).

Regulatory Oversight

The pipeline will be designed, constructed, operated, and maintained in accordance with all applicable regulatory requirements, including:

- United States Department of Transportation (US DOT), Title 49 of the Code of Federal Regulations (CFR) Section 192, Transportation of Natural and Other Gas by Pipeline.
- California Public Utility Commission (CPUC) standards, General Order 112-F.

The underground pipeline will consist of steel pipe with the following design characteristics:

- Maximum Allowable Operating Pressure (MAOP) = 500 psig
- Delivery pressure to ECC Project site = 50 to 300 psig
- Nominal Pipeline Size (NPS) = 8 inches (0.203 meters)
- Minimum wall thickness = 0.322 inches (8.2 millimeters)
- Steel pipe grade API 5L X-52
- Pipeline design factor < 0.2

The pipeline will be installed within a trench approximately 42 inches below the surface in rural areas, and 60 inches below the surface through the town of Orcutt. The pipeline depth is proposed to increase to 60 inches before passing through the town of Orcutt, up to US Highway 101. After the pipeline passes under the highway, the depth of cover will be nominally 42 inches along the rural road easements to the Project site. This exceeds the minimum 36-inch depth of cover required by the US DOT. Horizontal directional drilling (HDD) will be used for crossing under US Highway 101. The pipeline will be installed a minimum 35 feet under Highway 101 for a length of approximately 1,650 feet.

In addition to the pipeline, SoCal Gas will also construct and maintain appurtenant facilities, including a pressure reduction station at the Graciosa Road Divide Station, two aboveground isolation valves, four underground isolation valves, and a metering station at the terminus of the pipeline. Three of the isolation valves will be automatic shut-off valves with supervisory control and data acquisition (SCADA) equipment.

Given the proposed design, as well as regulatory oversight as discussed above, no additional mitigation measures are required.

Hazardous Materials

Impact HAZ-1: Release of Hazardous Materials during Construction, including Well Drilling

Hazardous materials that would be used during natural gas pipeline construction activities include gasoline, diesel fuel, oil, lubricants, paint and small quantities of solvents. Small volumes of these materials would be temporarily stored in the proposed pipeline staging areas. To minimize the potential for a release, all handling and storage of these materials would be conducted in accordance with oil field best management practices including secondary containment and proper storage of materials in accordance with federal,
State, and local codes and standards. Any spills would be promptly cleaned up, and contaminated soil disposed of in accordance with the applicable State and federal requirements. Implementation of MM RISK-3, SPCC Plan, would reduce potential impacts resulting from construction-related hazardous materials to less than significant (Class II).


See Impact RISK-3 for a discussion of the risks associated with operation of the natural gas pipeline.

### Fire Risk

Natural gas pipeline construction would include the use of welding equipment, and construction equipment and vehicles, which have the potential to be ignition sources. Pipeline operations could also present a fire hazard under upset conditions.

### Impact FIRE-1: Introduction of Development into an Existing High Fire Hazard Area

The proposed natural gas pipeline would be placed below grade within existing roadbeds and shoulders. The pipeline traverses primarily developed and agricultural areas, but portions along Graciosa Road and Dominion/Palmer/Cat Canyon roads traverse more undeveloped environments, but the pipeline would be placed within road beds/shoulders in these areas as well.

On the western end, the nearest County Fire station to the natural gas pipeline alignment is Fire Station 21 located in Orcutt, which is approximately 3 miles, or 8 minutes, from the southwestern terminus of the pipeline alignment, and the response time for this station decreases as the pipeline traverses Orcutt. In addition, Station 22 in Santa Maria, and Station 23 in Sisquoc provide adequate response capabilities as the pipeline travels east. Given that pipeline construction would occur within established road beds/shoulder; County fire stations are located in close proximity to the pipeline; and that MM FIRE-1, Fire Protection Master Plan, would be implemented, **pipeline construction fire-risk impacts are considered to be less than significant (Class II)**. Operational risks associated with the natural gas pipeline are discussed under Impact RISK-3.

### Impact FIRE-2: Introduction of Development into an Area without Adequate Water Pressure, Fire Hydrants, or Adequate Access for Fire Fighting

SoCal Gas will construct an 8-inch diameter natural gas pipeline that will be located under road beds and shoulders. Within the community of Orcutt, hydrants would be available for firefighting purposes. Within agricultural areas, the risk for fire is low given the absence of dry vegetation. As discussed above, the western and eastern ends of the pipeline traverse less developed areas where dry vegetation/fuel is located adjacent to the roadways where the pipeline would be placed. The proposed pipeline is within a safe response time of several County Fire Departments as presented above. Given that the pipeline would be located within road beds/shoulders, providing adequate access for emergency response, is in close proximity of fire stations with adequate response times, and MM FIRE-1, Fire Protection Master Plan, would be implemented, **impacts of natural gas pipeline construction and operations associated with water pressure, availability, and access for fire-fighting is considered less than significant (Class II)** with the implementation of MM FIRE-1.
Impact FIRE-3: Introduction of Development that will Hamper Fire Prevention Techniques such as Controlled Burns or Backfiring in High Fire Hazard Areas.

The County Fire Department does not conduct controlled burns or similar fire suppression activities in the Garey-Sisquoc or Orcutt areas because the region is predominantly occupied with irrigated agricultural fields; small, rural townships; and commercial and residential development. As proposed, the natural gas pipeline would be installed below road beds/shoulders. **With implementation of MM FIRE-1, development of the proposed natural gas pipeline would not be expected to hamper application of fire prevention techniques and would therefore be Less than significant (Class III).**

Impact FIRE-4: Development of Structures beyond Safe Fire Department Response Time.

As previously discussed, the proposed natural gas pipeline is within a safe response time of the County Fire Department. On the western end, the nearest County Fire station to the natural gas pipeline alignment is Fire Station 21 located in Orcutt, which is approximately 3 miles, or 8 minutes, from the southwestern terminus of the pipeline alignment, and the response time for this station decreases as the pipeline traverses Orcutt. In addition, Station 22 in Santa Maria, and Station 23 in Sisquoc provide adequate response capabilities as the pipeline travels east. Given that the pipeline would be placed within established road beds/shoulder; County fire stations are located in close proximity to the pipeline; and that MM FIRE-1, Fire Protection Master Plan, would be implemented, **no significant impact to existing fire department response times would result (Class III).**

### 4.7.5 Cumulative Effects

Section 3.0, including Tables 3-1 and 3-2, as well as Figure 3-1, provides a detailed summary of cumulative scenarios for oil and gas development and non-oil/gas development projects in and around Cat Canyon.

**Risk of Upset**

As shown on Figure 3-1, there are two projects that are in the near vicinity of the proposed Aera East Cat Canyon Project and that are currently under review. These include:

- **ERG West Cat Canyon Revitalization Project**
- **PetroRock UCCB Project**

The ERG and PetroRock are located to the west of the proposed Project (see Figure 3-1). The ERG Project involves the development of 233 enhanced oil development wells, and the PetroRock Project involves development of 231 wells. In addition, there are several smaller oil and gas development projects proposed near the community of Garey. Further, the proposed Plains Line 901 and Line 903 Replacement Project (see Cumulative Project #16) and ExxonMobil Interim Trucking Project (see Cumulative Project #17) would temporarily introduce construction and blended crude oil transport to regional roadways, respectively, but not to the roadways immediately serving the Cat Canyon Oil Field.

The proposed Project’s contribution to cumulative risk of upset impacts for the general public needs to account for ERG’s West Cat Canyon Revitalization Project and PetroRock UCCB Project to determine the impact significance given their immediate proximity to the proposed Project and surrounding population.

- **The ERG Project** is located directly west of the proposed Project. The proposed ERG Project includes 233 oil, injection and water wells; 5 steam generators; and processing facilities. As part of the ERG Project, a 3.5-mile long 8-inch diameter natural gas pipeline that would be constructed, replacing the existing 4-inch line servicing West Cat Canyon. The proposed natural gas pipeline would cross U.S. 101.
The ERG Project proposes use of the Foxen Petroleum Pipeline (FPP) which hasn’t yet been constructed. Until such time the FPP is constructed, or down for maintenance, ERG would truck their blended crude production to the Phillips 66 Santa Maria Pump Station, approximately 15 miles. Regardless if the FPP is operational, light crude oil would be trucked to West Cat Canyon from Kern County and Cuyama area.

The PetroRock UCCB Project is located to the north of the proposed Project, further from the communities of Sisquoc and Garey. The proposed PetroRock Project includes 231 oil, injection and water wells; 5 steam generators; processing facilities, and a 2.7 mile SoCalGas natural gas line which would cross Foxen Canyon Road. The PetroRock Project proposes the use of the FPP once constructed; if FPP is not operation, the PetroRock Project would contribute 64 daily one-way tanker truck trips per day to regional roadways for light crude oil and blended crude transport.

Given the proposed well count and design of the ERG and PetroRock projects, the oil field hazard footprints presented in Table 4.7-3 would be comparable for these projects. A QRA for the ERG Project (ERG 2016), concluded the risk of upset for oil field operations to be less than significant, using Santa Barbara criteria. However, as with the proposed Project (Aera), mitigation has been identified for the ERG Project to ensure that assumptions used into the QRA are incorporated into the project design. In addition, as with the proposed Project, mitigation has been identified that includes additional safety features for the ERG natural gas pipeline. Given that the Aera QRA concluded that risk of upset impacts would occur only within the oil field boundary and due to the low population density (20/sq.mi.) adjacent to the oil field site, the proposed Project’s contribution to cumulative risk impacts to the general public due to oilfield operations would be less than significant.

The ERG Project includes the construction of a 3.5-mile 8-inch natural gas pipeline outside of the ERG lease boundaries that would cross U.S. 101. The PetroRock Project would also require the construction of a new 2.7 mile natural gas pipeline, which would cross Foxen Canyon Road. The proposed Aera Project includes the construction of the 14 mile natural gas pipeline. The cumulative risk impact to the general public due to hazards associated with natural gas pipelines is considered significant, but mitigable (Class II) with implementation of proposed mitigation for the ERG natural gas pipeline and DOT and CPUC regulations (for SoCalGas-owned pipelines – Aera and PetroRock; and ERG southern terminus).

Assuming a scenario where the FPP never gets built or is non-operational, the proposed ERG, Aera, and PetroRock projects would contribute up to 466 one-way tanker truck trips per day for light and blended crude transport, or 19 one-way truck trips per hour. Annual miles traveled for the three projects, would exceed 12 million miles per year, with the majority of these miles being contributed by the Aera Project since all light and blended crude truck trips would travel to/from Kern County. The Aera Transportation QRA concluded that trucking associated with the Aera Project would be less than significant with mitigation (see Impact RISK-2 above). Therefore, the proposed Project’s contribution to cumulative trucking of LCO and blended crude would be less than significant. However, if the FPP never gets built or is non-operational, the cumulative trucking impact of the three combined projects could be significant depending upon the destination of the blended truck trips and resultant vehicle miles (i.e., Santa Maria Pump Station versus Kern County).

**Hazardous Materials**

Currently there are no known oil seeps on the proposed Project site other than legacy soil areas (soils that contain petroleum hydrocarbons due to historic operations; however, based on the results of a 2001 assessment report (Tetra Tech Inc, 2001), there are no indications of hazardous concentrations of chemicals of potential concern. There are no known oil seeps or existing petroleum hydrocarbon containing soils on the ERG site other than soils managed under their existing beneficial reuse program. If
contaminated soils are encountered during construction activities, they would be analyzed for indications of hazardous concentrations of chemicals of potential concern.

Hazardous materials that will be used during project construction activities include gasoline, diesel fuel, oil, lubricants, paint and small quantities of solvents. Small volumes of these materials will be temporarily stored on-site. To minimize the potential for a release, all handling and storage of these materials will be conducted in accordance with oil field best management practices including secondary containment and proper storage of materials in accordance with federal, State, and local codes and standards, and crew training.

Releases during drilling activities can occur due to surface equipment failures, such as ruptured hoses or failed valves, or can be due to an uncontrolled release from a well, commonly referred to as a blowout. The use of blow out prevention equipment reduces the frequency and severity of blowouts. In order for a blowout to occur, the drill would need to pass through a pressurized reservoir. A reservoir that does not have sufficient pressure to flow to the surface cannot have a blowout. Based on the reservoir pressures measured in Cat Canyon production areas, pressures that will be encountered in the cumulative projects are not anticipated to be sufficient to produce a sustained, blowout type scenario.

The cumulative projects will require the use of processing chemicals on-site, as well as the generation of hazardous materials during the production and processing of produced oil and gas. Bulk chemicals will be imported and delivered by truck for use on-site throughout the life of the Project. The projects will utilize and store these chemicals and produced crude oil on-site in vessels, tanks, and various ancillary processing equipment located within the facilities at seven primary separate locations including the central processing facilities and tank batteries. If a release were to occur on-site, in storage or in use, potential impacts to Project site personnel, biological resources, water quality, and soils on-site could occur. In order to mitigate the potential for an on-site release resulting from the use and storage of hazardous materials during project operations, all hazardous materials at each project site will be stored in appropriate tanks with the required secondary containment, including berms around processing areas. Hazardous materials storage vessels will be designed in conformance with the applicable laws and regulations plant personnel will be properly trained in the handling, use, and cleanup of hazardous materials used at the plant, and in procedures to be followed in the event of a leak or spill. Adequate supplies of appropriate cleanup materials will be stored at each project site. SPCC Plans will be prepared for each project as well.

Cumulative hazardous materials impacts are considered to be less than significant with the project adherence to regulatory requirements.

**Fire**

The proposed Project, in conjunction with other planned and pending projects in the vicinity would result in an incremental increase in the creation of temporary and permanent fire hazard activities. All projects within fire hazard areas which have the potential for the risk of fire must have a Fire Protection Plan which is submitted to the County Fire Department and Planning and Development for approval. County Fire vegetation abatement and access requirements would be implemented and verified through ongoing inspections. Additionally, existing Fire Stations in Sisquoc, Orcutt, Santa Maria, and Los Alamos provide fire protection services in the cumulative project region.

Given MM FIRE-1 and that proposed Project facilities are all located within acceptable fire response times and access to Project facilities is readily available, the proposed Project's contribution to cumulative fire risk impacts is less than significant (Class III).
## 4.7.6 Mitigation Monitoring Program

### Table 4.7-16. Mitigation Monitoring and Reporting Plan

<table>
<thead>
<tr>
<th>MM #</th>
<th>MM Title</th>
<th>Monitoring/Reporting Action</th>
<th>Timing &amp; Method of Verification</th>
<th>Agency or County Responsibilities</th>
<th>Applicant Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of Upset</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RISK-1</td>
<td>Emergency Response Plan (ERP)</td>
<td>Prepare and implement ERP</td>
<td>Prior to issuance of Zoning Clearance</td>
<td>P&amp;D review and approval. P&amp;D staff to monitor implementation.</td>
<td>Prepare and submit Aera East Cat Canyon ERP. Implement ERP requirements for the life of the Project.</td>
</tr>
<tr>
<td>RISK-2</td>
<td>Oil Spill Contingency Plan (OSCP)</td>
<td>Prepare and implement OSCP</td>
<td>Prior to issuance of Zoning Clearance</td>
<td>P&amp;D review and approval. P&amp;D staff to monitor implementation.</td>
<td>Prepare and submit Aera East Cat Canyon OSCP. Implement OSCP requirements for the life of the Project.</td>
</tr>
<tr>
<td>RISK-3</td>
<td>Spill Prevention Control &amp; Counter-measure Plan (SPCC)</td>
<td>Prepare and implement SPCC</td>
<td>Prior to issuance of Zoning Clearance</td>
<td>P&amp;D review and approval. P&amp;D staff to monitor implementation.</td>
<td>Prepare and submit Aera East Cat Canyon SPCC. Implement SPCC requirements for the life of the Project.</td>
</tr>
<tr>
<td>RISK-4</td>
<td>Truck Hazard Mitigation Plan</td>
<td>Prepare and implement Truck Hazard Mitigation Plan</td>
<td>Prior to issuance of Zoning Clearance</td>
<td>P&amp;D shall review and approve the plan. P&amp;D shall review incident and annual reports.</td>
<td>Prepare a Truck Hazard Mitigation Plan for LCO and blended trucking. Implement Plan requirements for the life of the Project.</td>
</tr>
</tbody>
</table>

### Hazardous Materials

| HAZ-1   | Corrosion Control and Inspection Program | Prepare and implement Corrosion Control and Inspection Program | Prior to issuance of Zoning Clearance | P&D review and approval. P&D staff to monitor implementation.             | Prepare and submit Aera East Cat Canyon Corrosion Control and Inspection Program. Implement Program requirements for the life of the Project. |

### Fire Protection

| FIRE-1 | Fire Protection Master Plan preparation and implementation | Prior to issuance of Zoning Clearance. | County Fire shall review and approve the plan. County Fire shall enforce the requirements of the Plan throughout the life of the Project. | Prepare a Fire Protection Plan to include existing and new facilities and any additional fire safety features (e.g., access roads, adequate onsite fire water supply, updated emergency procedures) as required by the Fire Department. Implement Plan requirements for the life of the Project. |