

4.2 HAZARDOUS MATERIALS/RISK OF UPSET

4.2.1 Environmental Setting

4.2.1.1 Regional Overview

The Central Coast area has a number of oil and gas fields located onshore and offshore. The California Division of Oil, Gas, and Geothermal Resources indicates that there are 61 active fields within Ventura, Santa Barbara, San Luis Obispo, Monterey, Santa Cruz, and Santa Clara counties. In addition, there are a total of 19 Federal Outer Continental Shelf oil and gas production platforms located with both the Santa Barbara Channel and Santa Maria Basin.

The Project site has supported oil and gas production for over a century. Currently the site contains approximately 131 inactive and previously abandoned oil wells, five 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 and 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.

4.2.1.2 Historical Operations and Legacy Fill Materials

The Project site has been utilized for oil and gas production activities for over 100 years. In the East Area 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 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 Project site are attributed to these early years of oil production operations.

In 1984, the 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 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. All of the oil wells at the Project site attributed to Aera or its predecessor companies are currently listed as plugged and abandoned (Division of Oil, Gas, and Geothermal Resources, 2013), with the exception of four non-producing test wells (Victory G1, G3, and G7 as well as Field Fee G2) that were drilled in 2012 in support of reservoir sampling and testing efforts.

In 2001, Tetra Tech, Inc. prepared a document titled *Environmental Assessment Report, Canyons 1, 2, 3, 4, and 11, East Area of the Cat Canyon Oil Field, Santa Barbara County, California*, dated April 2001 (Tetra Tech, Inc., 2001). The report documented asphalt-like material visible at the surface on the hillsides and in the canyons located within the Project site

(Figure 4.2-1 – Legacy Fill Areas). It was concluded that this material was deposited as part of early oil production, processing, and storage methods dating back to 1909. The additional legacy fill areas depicted on Figure 4.2-1, including Canyons 5, 6, 7, 8, 9, and 10, were delineated based on aerial photos (Tetra Tech, 2000) and were not assessed as part of the 2001 study.

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.

4.2.2 Regulatory Setting

The Project will be subject to the following primary Federal, State, and local regulations pertaining to hazardous materials use and/or storage.

4.2.2.1 Federal Laws and Regulations:

- 40 Code of Federal Regulations Parts 109, 110, 112, 113, and 114, pertain to the need for a Spill Prevention Control & Countermeasures Plan;
- U.S. Environmental Protection Agency implements: the Hazardous Waste Handling Requirements (Resource Conservation and Recovery Act and Associated Hazardous and Solid Waste Amendments, 40 Code of Federal Regulations 260), Asbestos and Lead National Emissions Standards for Hazardous Air Pollutants, 40 Code of Federal Regulations 61 Subpart M), Emergency Planning and Community Right-to-Know Act (Title III of the Superfund Amendments and Reauthorization Act of 1986), and
- Occupational Safety and Health Act implements: Worker Health and Safety (29 Code of Federal Regulations et seq.) and Hazard Communication (29 Code of Federal Regulations 1910.1200).

4.2.2.2 State of California Laws and Regulations:

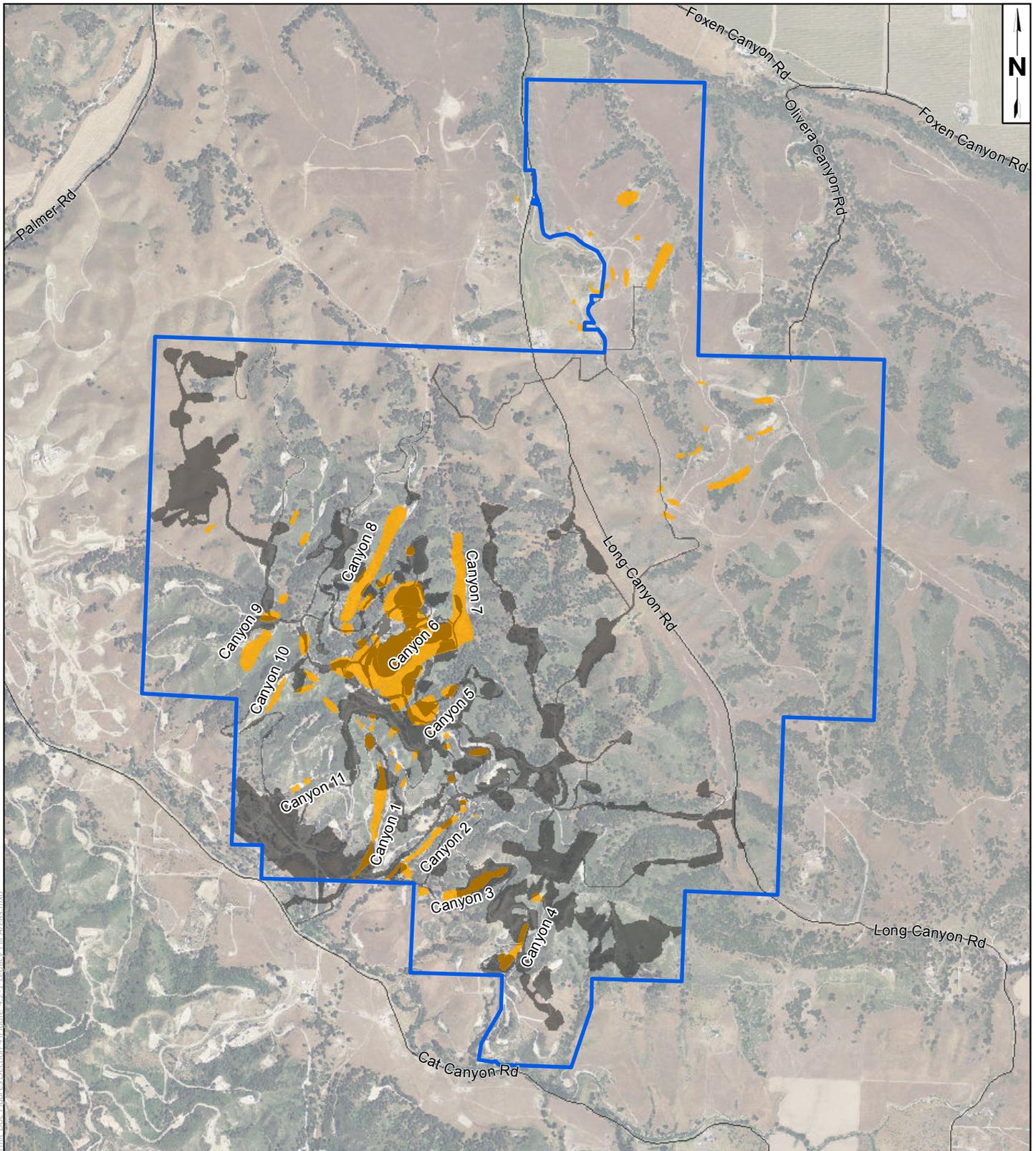
- California Health and Safety Code;
- California Fire Code;
- California Code of Regulations;
- California Department of Conservation Division of Oil, Gas and Geothermal Resources (Section 3000 of the California Public Resources Code and Title 14, Chapter 4 of the California Code of Regulation);
- Hazardous Waste Control Law;
- Hazardous Materials Management Planning;
- Hazardous Materials Transportation in California;
- Hazardous Material Worker Safety, California Occupational Safety and Health Act; and

- Asbestos and Lead (regulated by the California Division of Occupational Safety and Health).

4.2.2.3 County of Santa Barbara Regulations:

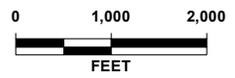
- Petroleum Code; and
- Other applicable Guidelines, National codes and Standards such as: American Society of Mechanical Engineers, National Association of Corrosion Engineers, American National Standards Institute, American Petroleum Institute, and the National Fire Protection Association Standards.

PAGE LEFT INTENTIONALLY BLANK



- Aera Energy LLC Property
- Legacy Area (TetraTech 2000 & 2001 Reports)
- Project Footprint
- Impact Area

Source: TetraTech 1999-2000, TetraTech 2000-2001, NAIP 2012, County of Santa Barbara, TJCross 8-20-14
 Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
 Notes: This map was created for informational and display purposes only



PROJECT NAME: EAST CAT CANYON OIL FIELD REDEVELOPMENT PROJECT	
PROJECT NUMBER: 1002-0455	DATE: September 2014

LEGACY FILL AREAS

**FIGURE
4.2-1**

Z:\Kristin\GIS Maps\Map Project\East_Cat_Canyon\Permit_Doc_Figures\Section 4\Figure 4.2-1 Legacy Fill Areas.mxd

PAGE LEFT INTENTIONALLY BLANK

4.2.3 Impact Assessment Standards

4.2.3.1 California Environmental Quality Act

Impacts resulting from a risk of upset are evaluated pursuant to the California Environmental Quality Act Appendix G. The Project will result in a significant impact related to hazardous materials if it:

- Creates a significant hazard to workers, the public, or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials, or involve the use, production, or disposal of materials that pose a hazard to people in the area affected; or
- Creates the risk of accidental explosion or accidental release of hazardous materials.

4.2.3.2 Public Safety and Risk of Upset

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 utilizing a four-step screening methodology during the preparation of an initial study. This screening process includes the following steps:

1. Certain facilities, such as major produced gas pipelines and gas processing facilities that support offshore 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 through 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 (1×10^{-6}) on an annual basis indicates sufficient evidence to trigger the risk thresholds and a comprehensive risk analysis.

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 (1×10^{-6}) on an annual basis indicates sufficient evidence to trigger the risk thresholds and a comprehensive risk analysis. The County may then require a Quantitative Risk Analysis in order to compare risk of injury and fatality to thresholds included within the County of Santa Barbara Environmental Thresholds and Guidelines Manual (2008).

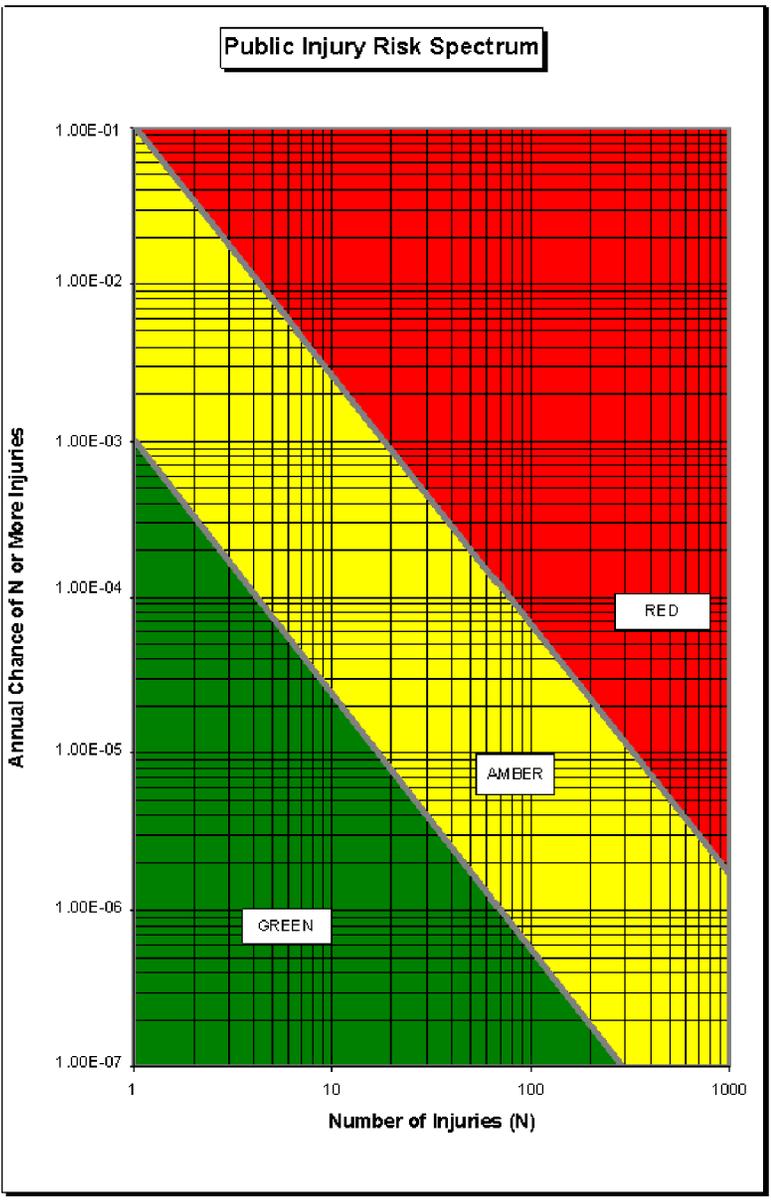
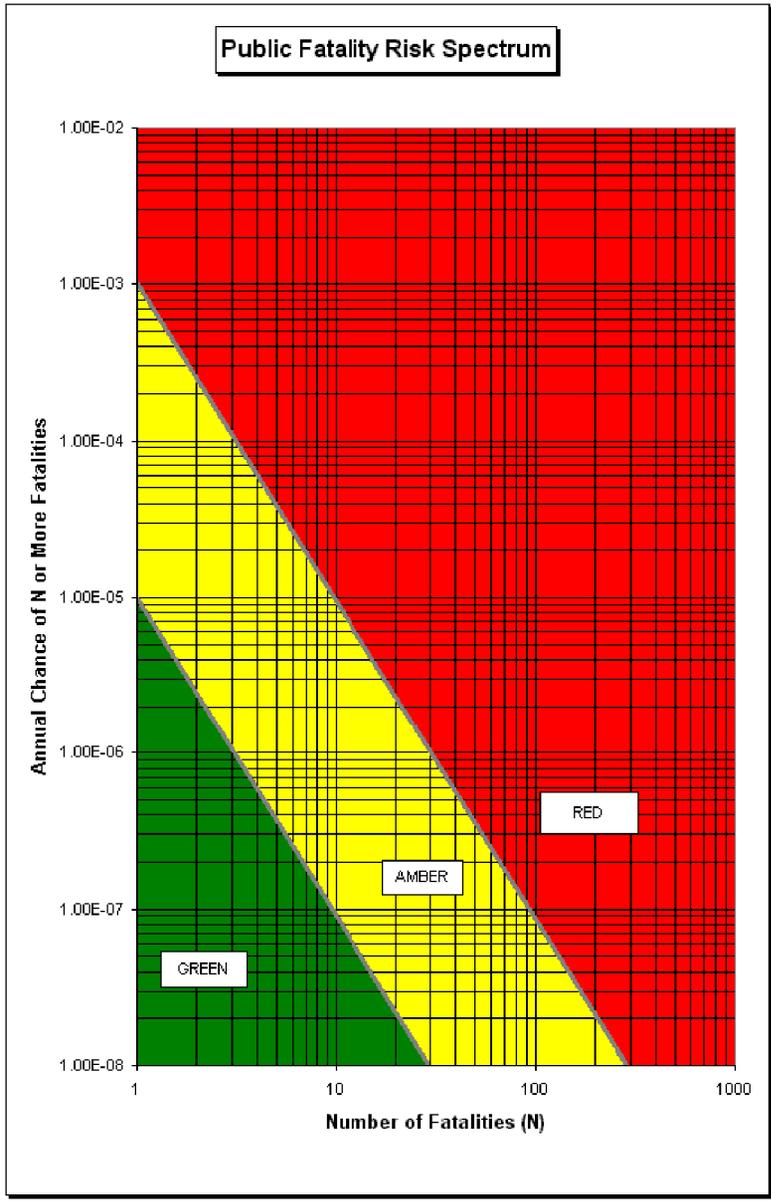
Furthermore, modeling, like that conducted within a typical Quantitative Risk Analysis, is required to provide a comparison with existing County threshold tables (Table 4.2-1 County of Santa Barbara Potential Significance Classes for Risk and Figure 4.2-2 – Santa Barbara County Fatality and Injury Risk Thresholds) as discussed within the County of Santa Barbara Environmental Thresholds and Guidelines Manual (2008) in order to determine the potential level of impact.

Table 4.2-1. County of Santa Barbara Potential Significance Classes for Risk

Impact Classification	Description
Class 1 Impacts	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 an 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.
Class 2 Impacts	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 insignificant). 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.
Class 3 Impacts	Class III applies to adverse impacts that the County considers to be insignificant 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, insignificant impact to public safety and no mitigation is required for purposes of compliance with CEQA.

Source: Modified from Santa Barbara Environmental Thresholds and Guidelines Manual, 2008

Z:\Kreim\GIS\Maps\Map_Protect\East_Cat_Canyon\Permit_Doc_Figures\Section_4\Figure_4.2-2 - SBC Fatality and Injury Risk Thresholds.mxd



Source: Santa Barbara County Planning and Development, 2008

PROJECT NAME: EAST CAT CANYON OIL FIELD REDEVELOPMENT PROJECT
PROJECT NUMBER: 1002-0455
DATE: September 2014

SANTA BARBARA COUNTY FATALITY AND INJURY RISK THRESHOLDS

FIGURE 4.2-2

The general methodology behind the completion of a Quantitative Risk Analysis and the data collected is detailed within Figure 4.2-3 – Process of Developing a Quantitative Risk Analysis.

4.2.4 Project-Specific Quantitative Risk Analysis (Assessment).

In order to meet the County requirement, a Quantitative Risk Assessment report was prepared on behalf of the Project by Dixon Risk Consulting (2014) (Appendix R). The Quantitative Risk Assessment evaluated the probability of a range of potential accidents, including estimates on 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 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 the public risk profile to insignificant, if necessary.

As indicated, the Quantitative Risk Assessment provides an estimate of the risks, which tends to err on the side of conservatism (Appendix R).

4.2.5 Impact Analysis

The following assessment of hazardous materials impacts includes a discussion of the potential for encountering petroleum hydrocarbon-containing soils based on previous site assessments; as well as the potential for temporary and permanent impacts resulting from the introduction of hazardous materials during Project construction and operation activities.

4.2.5.1 Legacy Fill Materials

The Project will require grading within areas that are known to contain existing petroleum hydrocarbon-containing soils as detailed within Section 4.2.1.1. Based on the results of the 2001 assessment report (Tetra Tech Inc, 2001), there are no indications of hazardous concentrations of chemicals of potential concern at the legacy fill areas. As such, a Soil Beneficial Re-use Plan (Appendix K) has been prepared for the Project to address on-site and off-site reuse of petroleum-hydrocarbon containing soils that are anticipated to be encountered throughout the initial development of the Project site. It is estimated that approximately 265,000 cubic yards and 34 acres of total petroleum hydrocarbon-containing soil will be disturbed as part of the Project (Appendix K). Specifically, the petroleum-hydrocarbon containing soils will be used as road sub-base, road base, and/or final road surfaces associated with the Project activities. Implementation of Project-Incorporated Avoidance and Minimization Measures

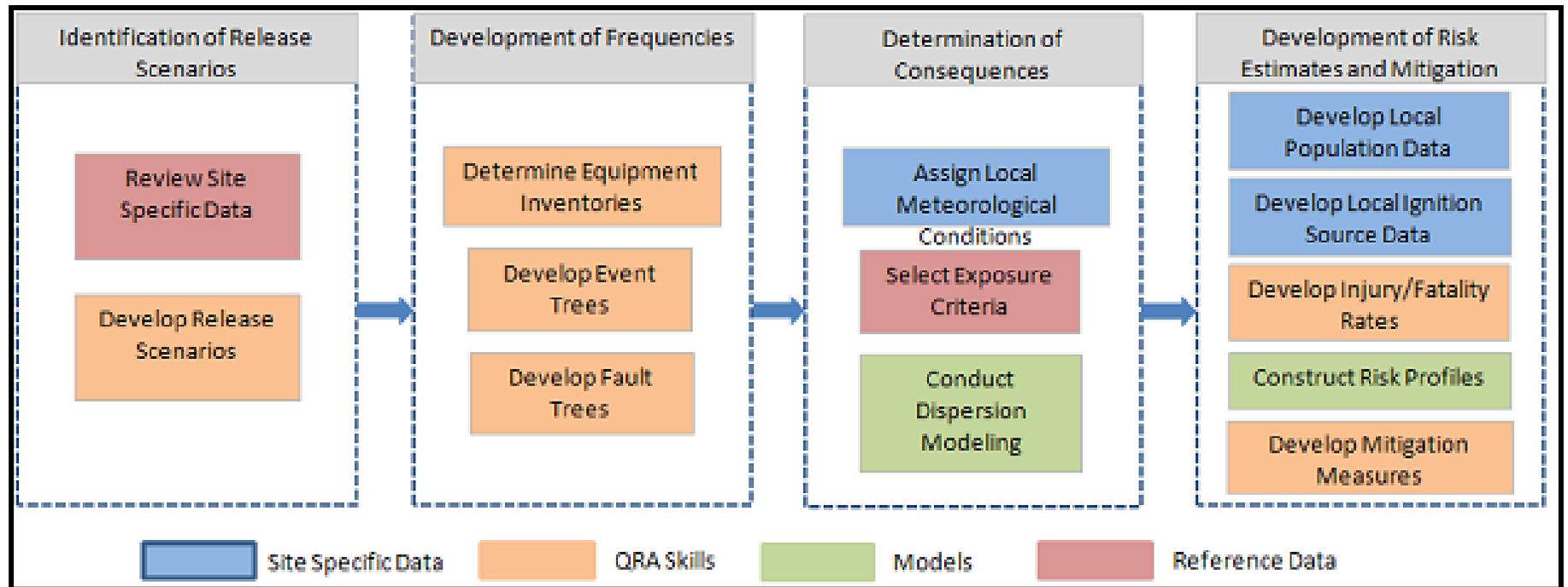
(Section 4.2.5; Beneficial Re-use Plan) will reduce potential impacts resulting from petroleum hydrocarbon-containing soils to less than significant.

4.2.5.2 Hazardous Materials - Construction

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. All maintenance and service personnel will be trained in the appropriate handling of these materials and how to contain spills or leaks. Any spills will be promptly cleaned up, and contaminated soil disposed of in accordance with the applicable State and Federal requirements. Implementation of Project-Incorporated Avoidance and Minimization Measures (Section 4.2.5; Oil Spill Contingency Plan) will reduce potential impacts resulting from construction-related hazardous materials to less than significant.

4.2.5.3 Hazardous Materials - 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 use of blow out prevention equipment reduces the frequency and severity of 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. 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 the four data gathering wells installed previously, pressures that will be encountered in the 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.



PROJECT NAME: EAST CAT CANYON OIL FIELD REDEVELOPMENT PROJECT	
PROJECT NUMBER: 1002-0455	DATE: September 2014

PROCESS OF DEVELOPING A QUANTITATIVE RISK ANALYSIS

FIGURE 4.2-3

4.2.5.4 Hazardous Materials- Operations and Maintenance

Hazardous Materials Use and Storage. The Project 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. Processing chemicals will be trucked in and waste will be trucked out as further detailed in the “Bulk Chemical Import and Waste Hauling” section below. The Project will utilize and store these chemicals as detailed in the following sections. Additionally, the facility will process and store produced crude oil on-site in vessels, tanks, and various ancillary processing equipment located within the facility at two primary separate locations including the central processing facility and production group station. All tanks, vessels, and equipment to be utilized in the central processing plant and the production group station that will store or process hazardous materials are included within Table 4.2-2 – Hazardous Materials Use and Storage – Equipment List. Please refer to Section 2 (Project Description) for a more detailed description of the development, processing equipment, and plot plans for each of the various Project facilities.

Table 4.2-2. Hazardous Materials Use and Storage - Equipment List

ID Tag	Description	Plant	Capacity	Size
V1010	De-gassing Vessel	PGS	23,000 BPD	8'-0" DIA x 30'-0" (SS)
V1210	De-gassing Vessel	PGS	23,000 BPD	8'-0" DIA x 30'-0" (SS)
V1040	FWKO	OCP	18,000 BPD	12'-0" DIA x 60'-0" S/S
V1060	Electrostatic Coalescer	OCP	6,000 BPD	12'-0" DIA x 60'-0" S/S
V1070	Scrubber	OCP		
V1220	Desanding Vessel	OCP	18,000 BPD	8'-0" DIA x 16'-0" S/S
V1230	Desanding Vessel	OCP	18,000 BPD	8'-0" DIA x 16'-0" S/S
V1240	FWKO	OCP	18,000 BPD	12'-0" DIA x 60'-0" S/S
V1260	Electrostatic Coalescer	OCP	6,000 BPD	12'-0" DIA x 60'-0" S/S
V1270	Scrubber	OCP		
T2040	Tank	LOS	6,500 BBL	44'-0" DIA x 24'-0" H
T2050	Tank	LOS	6,500 BBL	44'-0" DIA x 24'-0" H
T2170	Tank	COS	10,000 BBL	55'-0" DIA x 24'-0" H
T2180	Tank	COS	10,000 BBL	55'-0" DIA x 24'-0" H
T7030	Sludge Tank	SCP	1,500 gpm	24'-0" DIA x 36'-0" (6'-0" Cone)
T7070	Skim Oil Tank	SCP	1,000 BBL	21'-6" DIA x 16'-0"
T7140	Sludge Tank	SCP	1,500 gpm	24'-0" DIA x 36'-0" (6'-0" Cone)
T7180	Skim Oil Tank	SCP	1,000 BBL	21'-6" DIA x 16'-0"

Table 4.2-2. Hazardous Materials Use and Storage - Equipment List

ID Tag	Description	Plant	Capacity	Size
V7340	Electrostatic Coalescer	SCP	6,000 BPD	12'-0" DIA x 60'-0" S/S (OAL)
V9560	Tank	CPP	100 BBL	6'-0" DIA x 20'-0" S/S
V9600	Tank	CPP	100 BBL	6'-0" DIA x 20'-0" S/S
PGS - Production Group Station OCP - Oil Cleaning Plant LOS - Light Oil Storage COS - Crude Oil Storage SCP - Solids Concentration Plant BBL - Barrels per Day		gpm - gallons per minute DIA - diameter H - Height S/S - Standard (typical) Size		

If a release were to occur on-site, in storage or in use, potential impacts to Project site personnel (Public Safety and Risk of Upset), 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 the 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 as outlined within Section 4.2.2 (Regulatory Setting). Bulk materials will be stored in tanks or containers made of materials compatible with the intended contents. Small quantity chemicals (generally 55 gallons or less) will be stored in their original delivery containers to minimize risk of upset. 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 on the Project site.

Appropriate safety programs as detailed within the Project-Incorporated Avoidance and Minimization Measures will be developed addressing hazardous materials storage locations, emergency response procedures, employee training requirements, inspection and maintenance programs, hazard recognition, fire prevention, first-aid/emergency medical procedures, hazardous materials release containment/control procedures, hazard communications training, personal protective equipment training, and release reporting requirements. These programs will also include preparation of a Hazardous Materials Business Plan in compliance with the California Hazardous Materials Release Response Plans and Inventory Act, a Spill Prevention, Control, & Countermeasures Plan in compliance with 40 Code of Federal Regulations Parts 109, 110, 112, 113, and 114, a workers safety program, the Aera Construction Safety Handbook, an emergency response plan, a plant safety program, facility standard operating procedures, and a Control of Work Process. Additionally, the Project will require Land Use Approval for Construction Permits, California Department of Conservation Division of Oil, Gas and Geothermal Resources oversight, and compliance with regulations including Assembly Bill 1960 (spill prevention).

Per County requirements, Aera has prepared a Quantitative Risk Assessment in order to identify the significance of impacts to public safety associated with Project operations. The

Quantitative Risk Assessment will be submitted to the County in support of the Project permit application and for use in the California Environmental Quality Act analysis.

Bulk Chemical Import and Waste Hauling. Bulk chemicals will be imported and delivered by truck for use on-site throughout the life of the Project. Specifically, the following hazardous materials will be utilized:

- 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.

4.2.5.5 Quantitative Risk Assessment

Based upon the Project site conditions (including existing development and adjacent property uses, and meteorological conditions); in combination with ten potential hazard scenarios that could be created as a result of the Project, an assessment of predicted release frequencies was provided within the Quantitative Risk Assessment. The potential size of the release has been estimated using published generic failure rate data. The data has been generated from incident records gathered over a variety of installations and therefore represents an industry average. The likelihood of failure for each potential release source as summarized within the Quantitative Risk Assessment is provided in Table 4.2-3 – Summary of Predicted Release Frequencies. The engineering and administrative design criteria, such as motor vehicle safety precautions and equipment reliability was not taken into account to estimate these risks. Engineering design and safety protocols reduce the individual risk and overall risk factors.

Table 4.2-3. Summary of Predicted Release Frequencies

Release Source	Release Size	Release Frequency (per year)	Likelihood
Loss of Well Control			
Production	Blowout	4.5 x 10 ⁻³	1 in 222 years
Well Servicing	Blowout	3.9 x 10 ⁻²	1 in 26 years
Well Idle	Blowout	2.0 x 10 ⁻³	1 in 500 years
Gathering Lines	Medium	7.8 x 10 ⁻²	1 in 13 years
	Large/Rupture	3.9 x 10 ⁻²	1 in 26 years
Group Separation Station			
Group Separator	Medium	2.1 x 10 ⁻⁴	1 in 4,800 years

Table 4.2-3. Summary of Predicted Release Frequencies

Release Source	Release Size	Release Frequency (per year)	Likelihood
Group Separator	Large/Rupture	3×10^{-5}	1 in 33,000 years
Release to Vent	Production flow rate	2×10^{-2}	1 in 50 years
Oil and Gas Transfer Lines			
Production Gas	Medium	2.4×10^{-3}	1 in 420 years
Production Gas	Large/Rupture	1.2×10^{-3}	1 in 830 years
Produced Gas Treating Plant	Medium	3.3×10^{-4}	1 in 3,000 years
	Large/Rupture	4.5×10^{-5}	1 in 22,000 years
Emergency Flare	Large Unignited	1×10^{-2}	1 in 100 years
Fuel Gas Lines	Medium	1.1×10^{-3}	1 in 910 years
	Large/Rupture	5.3×10^{-4}	1 in 1,900 years
Crude Oil Storage Tanks			
Storage Tank	Medium	4.4×10^{-3}	1 in 227 years
Storage Tank	Large/Rupture	2×10^{-3}	1 in 500 years
Tank Overfill	Production or Loading Rate	4×10^{-3}	1 in 250 years
Tank Boil Over	Boiling Oil Ejected from Tank	1.6×10^{-4}	1 in 6,300 years
Crude Oil Loading/Unloading			
Loading/Unloading	Large/Rupture	1.9×10^{-1}	1 in 5 years
Truck Collision	Major Tank Failure	2.1×10^{-2}	1 in 48 years

Source: Dixon, 2014

The scenario with the most probability to occur during the life of the Project is crude oil loading/unloading with a frequency of 1.9×10^{-1} or approximately 1 in 5 years for a large release. This scenario is based on a loading/unloading error or an on-site truck vehicle collision that causes a rupture or leak of the tanker on-site.

The next most likely scenario would be with respect to the gathering lines with a medium release having the potential frequency of 7.8×10^{-2} or approximately 1 in 13 years or a large rupture in the gathering lines, with a frequency of 3.9×10^{-2} or 1 in 26 years. From reported data, small releases were predominantly caused by corrosion leaks. Larger releases were more often caused by third party impact or interference and construction or material defect.

A well control (blowout) scenario has a project frequency of 3.9×10^{-2} or 1 in 26 years. A blowout is defined as an uncontrolled release from a well. Most well control problems are either quickly controlled by the normal safety equipment, or result in a minor release and are not included in the "blowout" category in published incident data. It is important to note that the likelihood of a well failure resulting in an oil spill at Cat Canyon Oil Field is expected to be lower

than industry average due to the following: the oil is highly viscous, reservoir pressure is low, and the liquid does not flow to the surface without lift assistance (e.g. a pump) (Dixon, 2014).

The consequence of those potential releases with respect to human populations has also been presented within the Quantitative Risk Assessment. Potential hazards associated with an accidental release have been based upon material properties from potential production at the facility predicted from well test data and production data from similar oil fields.

As discussed above, Santa Barbara County requires an assessment of the significance of impacts to public safety. Thresholds for the acceptability of risk of fatality or serious injury to the public are defined by the Santa Barbara County societal risk criteria. These thresholds provide three zones of significance; green, amber, and red, for determining the acceptability of involuntary public exposure to acute risks resulting from new or modified developments. As shown within Figures 4.2-4 and 4.2-5, the Quantitative Risk Assessment results show an insignificant impact to public safety (i.e., Green zone), and no mitigation is required for purposes of compliance.

4.2.6 Project-Incorporated Avoidance and Minimization Measures

The facilities and associated equipment will be operated, maintained, and inspected in accordance with the applicable requirements of California Department of Conservation Division of Oil, Gas and Geothermal Resources contained in California Code of Regulation Title 14, and California OSHA Title 8 CCR Petroleum Safety Orders. These regulations specify the types and frequencies of safety inspections and maintenance to be performed. Records documenting compliance with these requirements will be maintained on-site and will be periodically reviewed by Aera personnel to ensure compliance. In addition, safety and compliance inspections/audits of the facilities are performed on a regular basis by California Department of Conservation Division of Oil, Gas and Geothermal Resources.

Additionally, the following Project-incorporated avoidance and minimization measures will be implemented during construction and operations:

- **HAZ-1. Aera Environmental Health and Safety Program.** 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.
- **HAZ-2. Built-In Safety Devices.** 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.
- **HAZ-3. Inspection and Maintenance Program.** 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 (AB 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,

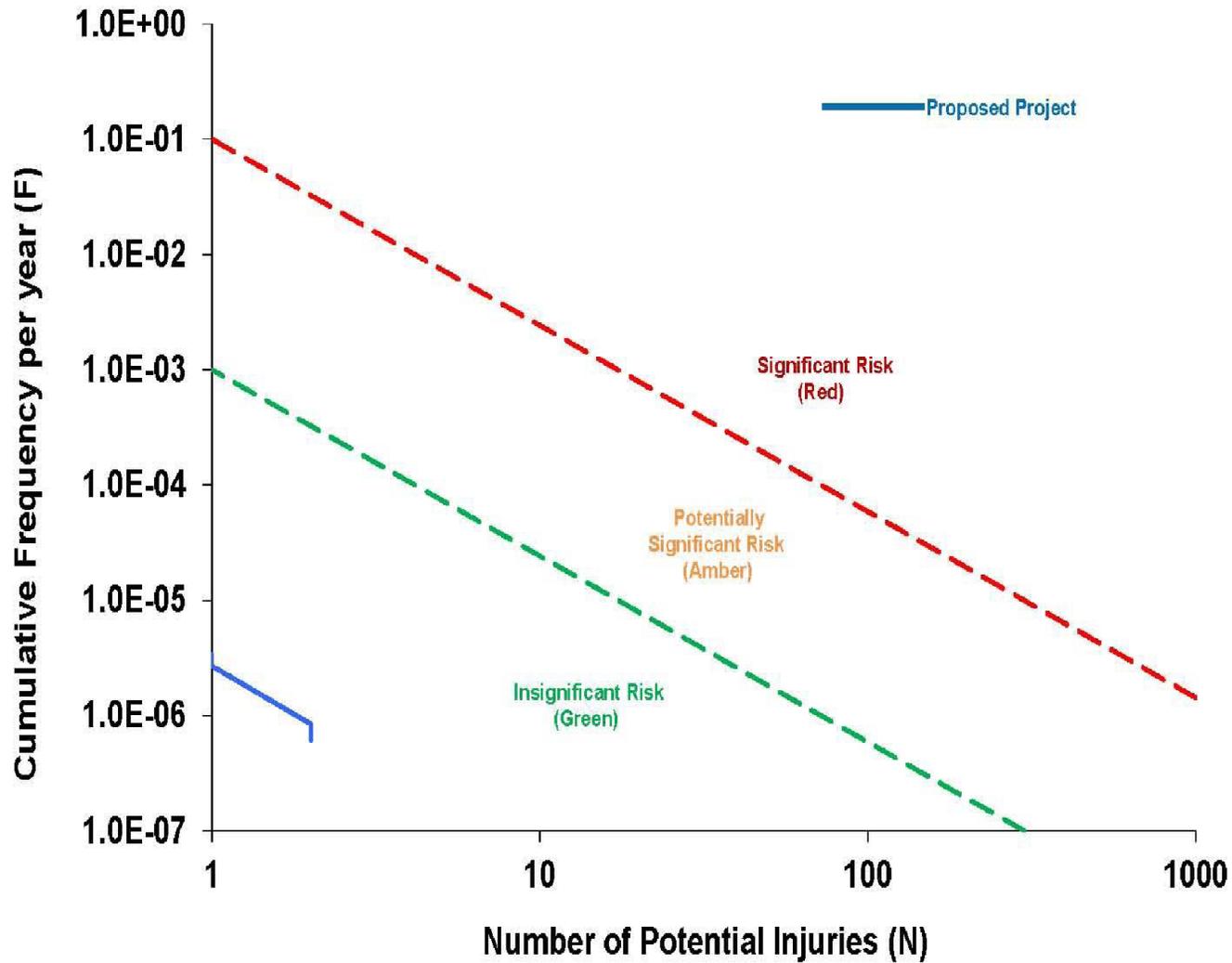
including dates, details and the results of inspections, tests and repairs. These records will be kept on-site for documentation and reference purposes.

- **HAZ-4. Emergency Response Plan.** 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 general public, as well as the protection of property in the event of a major emergency. The Emergency Response Plan will include detailed measures regarding 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.
- **HAZ-5. Operational Hazardous Materials Management/Transportation (Business) Plan.** 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 liquid 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.
- **HAZ-6. Spill Contingency Plan.** In accordance with AB 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.
- **HAZ-7. Spill Prevention, Control, & Countermeasures Plan.** 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 drainages.

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.

- **HAZ-8. Beneficial Re-use Plan.** 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 (TPH) concentrations in excess of concentrations specified by the Santa Barbara County Environmental Health Services (SBCEHS) 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.
- **HAZ-9. 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.
- **HAZ-10. Loading/Unloading Supervision.** Truck flow and loading rack supervision will be required by Aera for loading and unloading of crude oil.
- **HAZ-11. Site Security.** Aera will provide site security and video surveillance of the Project site.

PAGE LEFT INTENTIONALLY BLANK

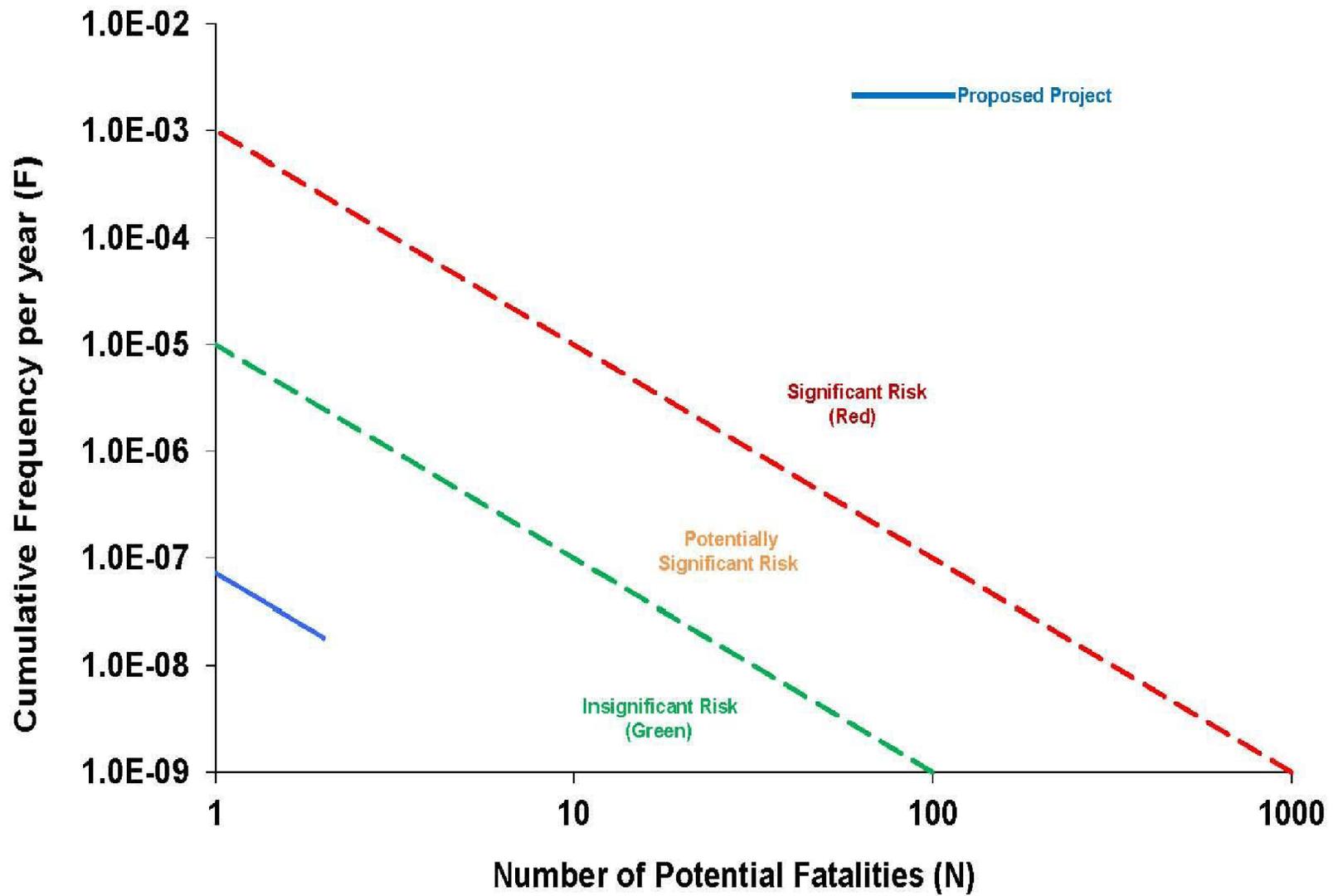


Source: Dixon Risk Consulting, August 2014

PROJECT NAME: EAST CAT CANYON
OIL FIELD REDEVELOPMENT PROJECT
PROJECT NUMBER: 1002-0455
DATE: September 2014

PUBLIC RISK OF INJURY PROFILE
IN COMPARISON TO COUNTY
THRESHOLDS OF SIGNIFICANCE

FIGURE
4.2-4



Z:\Kris\GIS Maps\Map Project\East Cat Canyon\Permit Doc Figures\Section 4\Figure 4.2-5 - Public Risk of Fatality Profile.mxd

Source: Dixon Risk Consulting, August 2014

PROJECT NAME: EAST CAT CANYON OIL FIELD REDEVELOPMENT PROJECT		PUBLIC RISK OF FATALITY PROFILE IN COMPARISON TO COUNTY THRESHOLDS OF SIGNIFICANCE	FIGURE 4.2-5
PROJECT NUMBER: 1002-0455	DATE: September 2014		

