

5.1 PUBLIC SAFETY AND HAZARDOUS MATERIALS

5.1.1 BACKGROUND

Oil spills, fires, explosions, and toxic substance releases are major hazards associated with onshore processing facilities and support operations, including storage and transportation of oil, gas and associated byproducts. Fires that occur as a result of an upset in a facility or pipeline can also lead to hazards such as wildfires in rural areas. This section discusses the potential public and environmental safety hazards associated with oil and gas processing and storage. The potential for and magnitude of consequences associated with these hazards combine to represent the risk of these facilities. This section also addresses the ability to minimize risks to public safety by mitigating these hazards through decisions regarding processing facility siting and methods of hydrocarbon storage and transportation.

The most significant risk to the public associated with a new processing facility and associated pipelines would be the transportation and processing of natural gas. The risks to public health and safety from hazards associated with natural gas are greater than the risks associated with crude oil. This analysis assumes that gas processing facilities and gas pipelines are collocated with oil processing facilities and oil pipelines. Therefore, concentrating on minimizing the risk associated with the gas facilities adequately addresses the risk to public health and safety from oil related hazards.

Without detailed data on actual proposed development, it is not possible to quantify specific hazard zones and risk contours. Site specific hazard modeling would be required at the time of any development application review.

5.1.2 REGIONAL OVERVIEW

Oil and gas production, storage, and processing activities have been present in Santa Barbara County for almost a century. In the first part of the twentieth century, many areas of the County became the focus of intensive exploration, including areas in and near Summerland, Gaviota Coast, Santa Maria/Orcutt, Guadalupe, Casmalia, Cat Canyon, and Cuyama. Several oil and gas processing facilities are currently located along the Gaviota coast and abandoned oil wells are present throughout the County. Processing of oil and gas from offshore production in Santa Barbara County currently occurs at five locations: the Carpinteria Oil and Gas Plant, the Ellwood Oil Facility, Las Flores Canyon, Gaviota Oil and Gas Plant, and the Lompoc Oil and Gas Plant. In addition, there are over 500 miles of natural gas pipelines, carrying raw, sales, and fuel gas to various destinations traversing through both urban and rural areas (Bercha, 1996).

Hazards associated with oil production and storage facilities include the risk of fire, explosion, and/or toxic gas release. Hydrocarbon and petrochemical contaminants may also be associated with past processing activities. Soil contamination can be associated with old wells, flowlines, pipelines, tanks, and sumps. Hazard frequencies and consequences have been developed for the Las Flores Canyon facility, the Gaviota Oil and Gas Plant, and the Lompoc Oil and Gas Plant.

A hazardous material is defined as any substance that could produce physical damage to the environment and/or cause deleterious effects upon human health (Title 22, CCR). A material may be classified as hazardous if it is flammable, combustible, explosive, corrosive, strongly oxidizing, toxic, radioactive, and/or has an extreme pH. Because of these properties, hazardous materials require careful handling to avoid potential damage or injury. Hazardous materials are considered to be hazardous wastes once they have been used and are ready for disposal or recycling.

The California Highway Patrol and the California Department of Transportation (CalTrans) regulate transportation of hazardous materials. Hazardous material storage and use is regulated through the State Hazardous Material Management Act (HMMA) through the preparation of Hazardous Material Business Plans (HMBPS). These regulations are locally implemented by the County Fire Protection Services Division. Storage of hazardous materials in underground storage tanks is regulated by the Regional Water Quality Control Board and storage, treatment and disposal of hazardous waste is regulated by the California EPA Department of Toxic Substances Control (DTSC).

Potential Hazards and Event Consequences

This section describes the potential hazards associated with a oil and gas pipelines.

Pipeline Failures

Pipeline failures can generally occur as a result of one of five factors:

1. Internal corrosion (especially for lines in sour service);
2. External corrosion, generally induced by faulty protective systems or by lack of corrosion protection in cased crossings beneath roads and railways;
3. External third party impacts, generally resulting from construction activities;
4. Structural failures and mechanical defects; and
5. Natural hazards such as seismic events or subsidence.

Of the five common failure modes, external impacts, corrosion, and mechanical failure are the most common. Internal corrosion can be mitigated somewhat by regular maintenance, systematic pigging, and use of corrosion inhibitors.

Vessel Failures and Pig Receivers

Oil spills and gas leaks may result if an oil pig receiver or launcher inadvertently opens while under pressure. Human error, mechanical failure, and/or control systems failure can cause this. Vessel failures can be spontaneously or externally induced, resulting in a spill or gas release. Either scenario can lead to a plant fire. A boiling liquid, expanding vapor explosion (BLEVE) can be caused by an external fire. A BLEVE is a vessel rupture resulting from metal fatigue and internal overpressurization. If the vessel is relatively long and cylindrical in shape, part of the tank may “rocket” into the air while spraying burning gases and liquids. Pieces of such tanks have been known to travel up to 5,000 feet in BLEVEs involving railroad tank cars.¹

¹ Handbook of Chemical Hazard Analysis Procedure, FEMA, DOT, EPA

Fires and various impact damages have occurred at the landing points of larger pieces. A BLEVE may occur regardless of whether the vessel's contents are flammable or nonflammable.

Hydrogen Sulfide Emissions

A sour gas leak during the transportation of sour gas or in the gas and crude oil sweetening process could lead to H₂S emissions into the atmosphere. A leak could result from corrosion, construction, mechanical or structural defects or externally induced hazards. A leak of sour gas that does not ignite will form a vapor cloud that is both flammable and toxic. A release of pure H₂S would produce a cloud that travels close to ground level since H₂S is denser than air. Such a cloud would travel downwind and dispersion would occur through jet mixing (in the event of a pressurized release), through gravity, and through atmospheric turbulence, depending on the meteorological conditions (Arthur D. Little, 1984). H₂S can become fatal in concentrations of 700 - 900 parts per million with an acute short term exposure (Arthur D. Little, 1993)².

Sulfur Dioxide Emissions

A fire in the sulfur storage area can result in the emission of sulfur dioxide into the atmosphere. Sulfur dioxide is fatal in concentrations of 400 to 500 parts per million or more.

NGL/LPG Storage Vessel Failure or Loading Incident

A spontaneous or seismic-induced rupture in a LPG or NGL storage tank will result in a release and possibly a fire. LPG and NGL loading incidents, such as breakage of a loading hose, can lead to a leak or fire, and can initiate BLEVEs in storage tanks or LPG/NGL trucks. Loading incidents can result from mechanical defects and/or human error.

NGL/LPG Truck Transportation Incident

The public hazards associated with the transportation of NGL/LPGs often present a significant risk associated with a gas processing facility. An incident could result in spills and or explosions (BLEVEs) on routes between a processing facility and the NGL/LPG's final destination.

Wildland Fires

Oil and gas facilities may subject the surrounding area to a higher risk of wildland fire due to the potential for upset at the facility or along the pipeline routes. A wildland fire occurring in the rural areas could have serious regional effects. Most of the rural areas in the North County are considered to be high fire risk areas due to the high fuel loads (dense vegetation) and distance from emergency services.

² See Section 5.11, Air Quality for further discussion of the physiological effects of exposure to hydrogen sulfide.

5.1.3 CONSTRAINTS

Siting a hazardous facility in an area with minimal exposure to the public represents the most effective means of minimizing risk of upset. The most constrained areas within the study area are logically the urban areas and other areas with dense populations. These areas should be avoided. Pipelines from the production area (offshore) to the processing facility would be transporting sour gas and can present significant hazards to public safety. Therefore, the pipeline network should be designed to minimize pipeline length and to avoid both urban areas and major public roads or transportation corridors. Consideration must also be given to the potential NGL trucking routes from facilities to US 101. At grade crossings of major roads should be kept to a minimum to reduce the potential for collisions. In summary, the most constrained areas for the purposes of siting an oil and gas processing facility with respect to public hazards and risk would be:

- Urbanized or highly populated areas
- Locations east of significant transportation corridors (Hwys 1, 135, US 101)
- Locations accessed by less than adequate roadways for the purposes of NGL Truck Routes
- Locations farther from platform and landfall locations

Conversely, the most unconstrained areas are those that are very rural and unpopulated in nature. Sites that do not require pipelines across populated areas or significant transportation corridors are also preferred. Given the size of the study area and the availability of rural sites, any urban area should be eliminated from consideration for locating an oil and gas processing facility. In addition, serious consideration of potential pipeline hazards should be incorporated into any decision to locate a processing facility for offshore oil and gas on the east side of a major transportation route (i.e. highways and freeways).

Therefore the most unconstrained areas for such a facility would be:

- Rural, unpopulated areas in close proximity to the pipeline land fall.
- Areas with close proximity to major transportation corridors for the purposes of safer transportation of natural gas liquids (NGLs).
- Adequate distance from essential emergency services in case of upset at the facility or along the pipeline routes.

5.1.4 POLICIES

The County has adopted a *Hazardous Waste Element*, which contains goals and policies pertaining to the management of hazardous waste in addition to a *Safety Element*. Policies relating to public hazards and risk from hazardous facilities are also contained in the Land Use Element and Local Coastal Plan. Consideration of consistency with all relevant policies has been incorporated into defining areas that are constrained and unconstrained with respect to potential development of an oil and gas facility, associated pipelines, and potential NGL trucking routes.

Safety Element Supplement Policies: On October 27, 1999 the Planning Commission recommended that the Board of Supervisors adopt amendments to the Safety Element of the Comprehensive Plan. These amendments include policies to guide land use decisions for proposed development with potential significant impacts to public safety due to exposure to acutely hazardous materials. The Board of Supervisors will consider these amendments on February 1, 2000. These recommended public safety policies are presented in two chapters. The first chapter addresses stationary facilities that handle hazardous materials and are fixed in location to a single site (i.e. a gas processing facility). The second chapter focuses on gas pipelines, which are fixed in location to a corridor. These policies seek to minimize the offsite risk associated with the hazardous facilities and restrict any development that may pose an unacceptable risk as defined in the Public Safety Thresholds.

These policies would apply to the following oil and gas facilities, in addition to other hazardous facilities:

- Gas processing facilities, including gas stripping associated with oil processing subject to discretionary land-use permits pursuant to Chapter 35 of the Santa Barbara County Code.
- Facilities dedicated to production, processing, storage, or transportation of natural gas liquids subject to discretionary land-use permits pursuant to Chapter 35 of the Santa Barbara County Code, unless such storage is limited to a single container with a maximum capacity of 10,000 gallons or less and does not require refilling more than once weekly.
- Oil storage tanks subject to discretionary land-use permits pursuant to Chapter 35 of the Santa Barbara County Code, except for (1) floating-roof tanks, and (2) tanks that store 5,000 barrels or less and are located more than one-half mile from a populated area as defined in this Supplement.
- Oil refineries.

The following coastal plan policies address hazardous facilities, and would apply to any new oil and gas development.

Public Resources Code Section 30250(b):

Where feasible, new hazardous industrial development shall be located away from existing developed areas.

Public Resources Code Section 30253:

New development shall:

1. Minimize risks to life and property in areas of high geologic, flood, and fire hazard.

Oil Storage Facility Environmental Goals:

- 1). To ensure public health and safety, human exposure to risk of an accident at the tank farm shall be limited to an aggregate of 240 person-hours per day on average, exclusive of facility employees, within one half (1/2) mile of the proposed facility;

Coastal Plan Policies

Policy 6-9:

Applicants for oil and gas processing facilities shall prepare and keep updated emergency response plans to deal with the potential consequences of hydrocarbon leaks or fires. These emergency response plans shall be approved by the County's Emergency Services Coordinator and Fire Department.

Policy 6-13C:

The oil storage facility site shall further meet or exceed each of the environmental goals described below. Where the best available siting and project design alternatives do not meet these goals, compensating offsite mitigation may be allowed except for on-site factors directly affecting public health and safety. Sites and facilities, which do not require offsite mitigation, are preferred to those that do, except in those cases in which an offsite mitigation program in combination with the proposed facility configuration is more environmentally preferable than reasonable alternatives.

Oil Storage Facility Environmental Goals:

- 1). To ensure public health and safety, human exposure to risk of an accident at the tank farm shall be limited to an aggregate of 240 person-hours per day on average, exclusive of facility employees, within one half (1/2) mile of the proposed facility;

1991 Siting Gas Processing Facilities: Siting and Screening Criteria

The following adopted screening and siting criteria from the 1991 Siting Gas Processing Facilities Study address public safety concerns when siting new gas processing facilities. Any new facility that may be developed shall be consistent with these criteria. The analysis following this section incorporates the intent of these siting criteria.

1. *Sites must provide a sufficient buffer zone to separate hazardous plant equipment from an existing or proposed land use that serves a population that cannot be quickly evacuated to safety or effectively sheltered in place from a potential hazard. Determination of an appropriate buffer zone shall be accomplished through acceptable risk-analysis methodology, considering the distance of a reasonably worst-case mishap.*
2. *Strategically site the consolidated gas processing facility relatively close to production sites to avoid routing offsite raw gas pipelines through or near populated areas and to reduce the length of the onshore gas pipeline.*
3. *Site so as to limit under-road pipeline casings to the maximum extent feasible.*
4. *Strategically site the consolidated gas processing facility to avoid routing sales gas pipelines through or near urban and other populated areas to the maximum extent feasible*
5. *Site sufficiently close to oil processing, storage, upgrading, refining, or pipeline facilities to accommodate blending of heavier gas liquids with crude oil.*

6. *Avoid sites that would introduce truck transportation of hazardous materials on county or city roadways of high risk, considering the level of population exposure to potential hazards*
7. *Prefer sites in close proximity to the Southern Pacific railway if large volumes of hazardous materials will be shipped via rail.*
39. *Prefer locations at onshore oil fields that are both relatively remote from populated areas while having an adequate infrastructural and emergency services base.*

5.1.5 DISCUSSION

A primary intent of this study is to minimize the risk to public safety from any new facilities and pipelines through appropriate siting. Other mitigation measures and techniques such as Risk Management and Prevention Plans or Best Available Safest Technology (BAST) must also be implemented. In conjunction with siting mitigations, these measures would be imposed on any future oil and gas facilities to reduce the residual safety risks to the maximum extent feasible.

The simplest and most powerful siting measure to minimize risk is to avoid potential public exposure to hazards by siting a facility in a remote, unpopulated area. Minimizing the length of pipeline that travels across the county and intersects populated areas between the landfall and the processing facility should be required. This requirement would guide siting of a facility to the rural areas of the western portion of the Study Area. This requirement is consistent with Public Safety Criterion #2, which calls for siting the facility close to the production sites to avoid routing sour gas through or near populated areas.

The final destination of the products leaving the facility also raises safety concerns, and must be taken into account. The adopted NGL truck route is northbound US 101 to Hwy 166 west. The route from any facility to US 101 would ideally be rural with signalized at-grade crossings connecting the facility. Minimizing the number of NGL truck trips is accomplished by collocating the gas processing and oil processing functions at one facility to allow for blending the maximum amount of NGLs into the oil stream. If the two facilities are separated, either all of the NGLs would be trucked from the site or an additional pipeline would have to be built connecting the oil and gas facilities to accommodate blending into the oil.

5.1.6 REFERENCES

- Arthur D. Little, Inc. 1984. Point Arguello Field and Gaviota Processing Facility Area Study and Chevron/Texaco Development Plans EIR/EIS. Prepared for the County of Santa Barbara, U.S. Minerals Management Service, California State Lands Commission, and California Secretary of Environmental Affairs.
- Arthur D. Little, Inc. 1993. UNOCAL Point Pedernales Project: Final Supplemental Environmental Impact Report. Prepared for Santa Barbara County Department of Planning and Development, Energy Division.
- Bercha International, Inc., May 1996 Santa Barbara Policy Paper on Gas Pipeline Safety

Federal Emergency Management Agency, USDOT, USEPA, Handbook of Chemical Hazard Analysis
Procedures

North County Siting Study

Index

- [Cover and Table of Contents](#)
- [1.0 - Executive Summary](#)
- [2.0 - Introduction](#)
- [3.0 - Potential Future Development](#)
- [4.0 - Existing Facility Infrastructure](#)
- [5.0 - Environmental Constraints Analysis](#)
 - [5.1 - Public Safety and Hazardous Materials](#)
 - [5.2 - Geology and Hydrology](#)
 - [5.3 - Agricultural Resources](#)
 - [5.4 - Biological Resources](#)
 - [5.5 - Visual Resources](#)
 - [5.6 - Cultural Resources](#)
 - [5.7 - Land Use](#)
 - [5.8 - Public Services](#)
 - [5.9 - Noise](#)
 - [5.10 - Circulation](#)
 - [5.11 - Air quality](#)
- [6.0 - Site Analysis](#)
- [7.0 - Conclusions and Recommendations](#)
- [8.0 - Limitations of the Study](#)
- [9.0 - List of Preparers](#)
- [10.0 - Acronyms](#)