

5.9 NOISE

5.9.1 BACKGROUND

Noise is generally defined as unwanted or objectionable sound that interferes with normal activities or otherwise diminishes the quality of the environment. Sound levels are measured on a logarithmic scale and expressed in decibels on the A-weighted scale (dBA). Most sounds do not consist of a single frequency, but rather a broad band of frequencies with different sound levels. The human ear, however, does not respond uniformly to sounds at all frequencies, being less sensitive to low and high frequencies than to medium frequencies that correspond with human speech (County of Santa Barbara, 1998).

Vibrations are caused by some of the same activities as noise. Instead of being transmitted through the air, vibrations are transmitted through solid matter, such as earth. They are perceived through touch, whereas noise is perceived through hearing. Since soils and other solid materials have varying transmission properties, the effects of vibrations differ widely from location to location. Vibrations are measured in m/sec^2 , which is a unit of acceleration (URS, 1986).

Both sound levels and intensity of vibrations diminish as distance from the source increases, known as geometrical divergence. For a point source of sound in free space, the rate at which the sound attenuates is inversely proportional to the square of distance from the source (A.D. Little, 1985). This means that sound level will drop 6 dB each time the distance from the source is doubled. A stream of vehicles on a busy highway represents a "line" source of sound. The rate of attenuation for a line source is different from that of a point source. The sound level from a busy highway will drop only about 3 dB for each doubling of distance (A.D. Little, 1985).

Air and ground absorption of sound waves will further attenuate sound levels. The rate at which these factors attenuate sound depends on frequency, content of the sound, air temperature, relative humidity, terrain, and type of ground cover. Atmospheric absorption is most effective over long distances and at high frequencies. Foliage increases the ground absorption of sound.

Topography can provide shielding of sound sources as well as sound amplification. Surface elevation changes can increase or decrease the 6-decibel reduction caused by geometrical divergence.

Wind speed and direction, atmospheric turbulence, and thermal gradients all influence the long-distance propagation of sound. Their effects are complex and difficult to quantify. Thermal inversions in the late evening and early morning hours can, by refracting downwards sound waves that would in normal conditions propagate upwards into the atmosphere, produce noticeable effects by increasing the intensity of the sound propagating into areas that would not otherwise be affected. This enhancement of the propagation frequently is more effective for low frequency "rumbles" than for higher frequencies because of the effects of atmospheric absorption (A.D. Little, 1996).

In addition to location, noise also varies with the time of day as a result of concentrations of human activities and natural receptors. The duration of noise and the time period during which it occurs are important values in determining the impact of noise on sensitive land uses, such as residential dwellings,

medical care facilities, educational facilities, libraries, churches, and places of public assembly. Day-Night Average Level (DNL)¹ and Community Noise Equivalent Level (CNEL)² are noise indices that attempt to take into account differences in intrusiveness between daytime and nighttime noises. L_{dn} and CNEL are typically within one dBA of each other and are essentially interchangeable (County of Santa Barbara, 1998).

5.9.2 REGIONAL OVERVIEW

Intrusive noise sources within the Study Area include highways, railroads, aircraft activities, and industrial facilities. Secondary sources include agricultural machinery and recreational activities, such as dune buggies (URS, 1986). Noise levels along primary and secondary roadways (e.g., U.S. Highway 101, State Route (SR) 135, SR 1, SR 246, SR 192, SR 166, and SR 154) can be in excess of 65 dBA CNEL at 50 feet from nearest travel lane centerline. Vehicle noise along the U.S. 101 corridor is greater than 70 dBA CNEL at 50 feet from the nearest travel lane centerline. Airport noise exposure contours are predictable from the number and type of aircraft using the airport, magnitude and duration of each flyover, flight paths, and time of day when the flights occur. The Study Area contains three airports, one each at Lompoc, Vandenberg Air Force Base, and Santa Maria.

The only sources of appreciable vibration in the area are the Southern Pacific and Santa Maria Valley railways. Any major construction project involving grading or pile driving activities would be a temporary contributor (URS, 1986).

A significant increase in local ambient noise level would likely be associated with the construction and operation of a new or expanded onshore oil and gas facility. Noise attributed to construction and abandonment activities would be considered temporary impacts. However, long-term noise and vibration impacts would occur from various processing units and general operations at both new and expanded facilities. Vehicle traffic associated with oil and gas facilities would be another source for consideration.

Only particular types of land uses listed in the Santa Barbara County Comprehensive Plan Noise Element are considered when measuring the effects of noise. These noise-sensitive land uses in the Study Area should be identified when locating potential onshore oil and gas facility sites. Noise may have a variety of consequences for a person's physical, mental, or social wellbeing. Auditory effects of noise include hearing loss and interference with communication. Non-auditory effects include physiological reactions, interference with sleep, adverse affects on human performance, and annoyance. The following list summarizes known sensitive noise receptors in the Study Area:

- single-family residences, including mobile home parks
- multi-family residences, including apartments, condominiums, hotels, and motels

¹ Day-Night Average Level: The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of ten decibels to sound levels occurring during the nighttime from 10 P.M. to 7 A.M.

² Community Noise Equivalent Level: The average equivalent A-weighted sound level during a 24-hour day, obtained after the addition of five decibels to sound levels occurring during the evening from 7 P.M. to 10 P.M. and the addition of ten decibels to sound levels occurring from 10 P.M. to 7 A.M.

- educational facilities, such as schools, libraries, and daycare facilities
- medical facilities, such as residential care facilities and hospitals
- public assembly places, such as churches and theaters, and
- recreational sites, such as parks and beaches.

5.9.3 CONSTRAINTS

Oil and gas facilities produce noise from trucks, pumps, process equipment, horns, alarms, and communication systems. Pump sounds are usually ongoing, while horns and alarms are sporadic. Most complaints from residents near oil facilities are due to the communication and alarm systems. Construction of an oil or gas facility can cause significant short-term noise impacts.

5.9.4 POLICIES

Transportation facilities (e.g. airports, railroads, and major roadways) are generally the most significant sources of noise in Santa Barbara County. An onshore oil and gas facility could contribute substantially to existing levels of ambient noise in some areas. When locating potential sites for an industrial facility, existing noise regulations, and known or anticipated noise-sensitive receptors must be considered carefully and mitigated, as necessary. Noise abatement can be addressed either at the source or at the point of reception. Reducing noise at its source is generally preferable to the alternative, as necessary adjustments can be included during a project's design phase.

Noise Regulations

Noise is regulated at the federal, state, and local levels. Local policies tend to implement the federal and state guidelines, based on local conditions and special requirements.

The following recommended County policies from the Noise Element of the General Plan concentrate in these areas.

The facility shall comply with all standards established in the Noise Element of the Comprehensive Plan and no residents or educational facility shall be subject to greater than a 9 dB increment above baseline in ambient noise level.

Noise Element Policy 1:

In the planning of land use, 65 dB Day-Night Average Sound Level should be regarded as the maximum exterior noise exposure compatible with noise-sensitive uses unless noise mitigation features are included in project designs.

Noise Element Policy 2:

Noise-sensitive land uses should be considered to include:

- a) Residential, including single and multifamily dwellings, mobile home parks, dormitories, and similar uses.
- b) Transient lodging, including hotels, motels, and similar uses.
- c) Hospitals, nursing homes, convalescent hospitals, and other facilities for long-term medical care.
- d) Public or private educational facilities, libraries, churches, and places of public assembly.

Noise Element Policy 3:

For protection of sensitive activities, as well as the airports, noise-sensitive land uses, other than hotels and motels insulated to the level prescribed in the State Noise Insulation Standards, should not be permitted within the 65 dB CNEL contour of any airport as projected in the County Airport Land Use Plan. In no case shall institutional land uses, such as schools, hospitals, convalescent homes, and other in-patient health care facilities, be permitted within the boundaries of such 65 dB CNEL contour.

Noise Element Policy 4:

Residential use should be avoided within the 65 dB CNEL contour of any airport and under airport traffic patterns.

Noise Element Policy 5:

Noise-sensitive uses proposed in areas where the Day-Night Average Sound Level is 65 dB or more should be designed so that interior noise levels attributable to exterior sources do not exceed 45 dB L_{DN} when doors and windows are closed. An analysis of the noise insulation effectiveness of proposed construction should be required, showing that the building design and construction specifications are adequate to meet the prescribed interior noise standard.

Noise Element Policy 6:

Residential uses proposed in areas where the Day-Night Average Sound Level is 65 dB or more should be designed so that noise levels in exterior living spaces will be less than 65 dB L_{DN} . An analysis of proposed projects should be required, indicating the feasibility of noise barriers, site design, building orientation, etc., to meet the prescribed exterior noise standard.

The 65 dB L_{DN} standard for exterior living areas may be exceeded for the conversion of apartment units to condominiums if the following findings may be made:

- a) The units were constructed prior to 5 March 1979, the original adoption date of the Comprehensive Plan Noise Element;

- b) The measures necessary to reduce the noise exposure in exterior living areas below 65 dB L_{DN} would be technically infeasible, prohibitively expensive, and/or aesthetically undesirable;
- c) Noise levels in interior living areas will not exceed 45 dB L_{DN} ;
- d) Any prospective buyer of a converted unit shall be notified, prior to entering any sale contract, if any private or common exterior living areas associated with the unit for sale are exposed to noise levels of 65 dB L_{DN} or greater. The specific details of this notice shall be established in a condition of approval of the tentative parcel or tract map for the condominium conversion;
- e) Any converted units and associated common areas subject to airport noise exposures of 65+ dB L_{DN} shall be subject to an aviation noise easement acceptable to the airport operator;
- f) The State Department of Real Estate's Public Report for the converted units shall disclose that the units are within a 65+ dB L_{DN} (or CNEL) noise area, shall identify the primary source(s) of noise affecting the units, and shall refer to any aviation noise easement required by subparagraph 'e' of this Policy.

Noise Element Policy 9:

Noise level limits, applicable to new noise sources, should be incorporated into all commercial and industrial zoning districts and into conditional use permit requirements.

With regard to industrial facilities, Santa Barbara County's regulations specify 75 dB L_{dn} as the maximum volume of sound measured at any point along the property line of an industrial facility. In addition, in no case may sound levels exceed 65 dB (A) CNEL at the location of any nearby noise-sensitive uses. Noise mitigating features must be included in the project design to satisfy these standards. The Santa Barbara County Noise Element (of the Comprehensive Plan) identifies some design recommendations for controlling noise levels from an industrial facility.

California Administrative Code, Title 24 (Noise Insulation Standards) requires that the interior noise level of all new multi-family residences must be 45 dB L_{dn} or below. In addition, if the exterior noise level is greater than 60 dB L_{dn} , CAC Title 24 requires the preparation of an acoustical analysis showing that the proposed design will limit the interior noise level to the 45 dB L_{dn} requirement. Limits for noise generated by licensed motor vehicles traveling on public roads are established by state law and are contained in the California Vehicle Code (County of Santa Barbara, 1998).

Coastal Plan policies regarding industrial and Energy Development

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 that 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:

- 4). The facility shall comply with all standards established in the Noise Element of the Comprehensive Plan and no residents or educational facility shall be subject to greater than a 9 dB increment above baseline in ambient noise level.

1991 Gas Processing Facility Screening and Siting Criteria:

Siting Criteria:

1. Avoid noise impacts to sensitive areas (e.g., hospitals, residential areas, churches, and schools).

5.9.5 DISCUSSION

The ideal place to site an oil or gas processing facility, with regard to noise impacts, is in a canyon far from sensitive receptors. Canyons are better sites than flat areas because the topography tends to block noise. Noise attenuates as distance from the source increases, making sites that are removed from urban areas preferential to those sites near urban areas.

Facilities that use public address systems to communicate cause more noise impacts than facilities that use personal communication devices. It is possible to mitigate noise impacts by placing a condition on a facility permit that calls for the use of personal communication devices.

A processing facility or refinery would generally be considered a significant source of intrusive noise, requiring mitigation measures to minimize the noise levels. Therefore, selection of potential future sites must consider the location of such a facility with respect to any nearby receptors. Those sites that are already impacted by noise-producing factors, such as an existing processing facility, may be favored over a site without any existing noise impacts. Noise-sensitive uses in the Study Area should be given highest priority for avoidance when identifying potential onshore oil and gas facility sites. All of the potential sites identified in section 6 of this study are located in canyons far from urban or residential areas, where noise problems should be minimized.

If development is proposed in the future for any of the recommended sites, baseline noise levels should be established. The cumulative noise increase from a new or expanded facility would need to be determined as part of the development review process. This information would be necessary to establish mitigation measures to minimize noise impacts to the maximum extent feasible.

5.9.6 REFERENCES

Arthur D. Little, Inc. 1985. Union Oil Project/Exxon Project Shamrock and Central Santa Maria Basin Area Study: Final Environmental Impact Statement/Environmental Impact Report. Prepared for County of Santa Barbara, U.S. Minerals Management Service, California State Lands Commission, California Coastal Commission, and California Office of Offshore Development.

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North County Siting Study

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