3.9 Noise

The proposed Cogeneration Project is located in Whatcom County near Blaine, Washington. Noise levels are regulated by the State of Washington under the Washington Administrative Code (WAC) 173-60.

In May and June 2001, Golder Associates conducted Bbaseline noise level monitoring was conducted at fifteen locations in the vicinity of the Cogeneration Project site. See Golder Associates, Inc., Noise Impact Analysis (June 2002). The baseline monitoring measured existing noise from both steady-state and transient sources. Steady-state sounds are essentially constant in the environment, such as the steady wind, creeks, the wave action of the sea, and industrial sources that operate at fairly constant levels such as the Chemco facility and the Refinery. Examples of transient noise sources are vehicular traffic, wind gusts, airplanes, animals, trains, and other human-caused disturbances. In order to avoid private property access issues, ambient noise monitoring was performed along public roads, in close proximity to the transient noise generated by vehicular traffic. The results of this background noise level monitoring indicate that the noise levels are currently low, and are significantly influenced by transient sources, especially vehicular traffic.

Golder Associates then used aA noise sound-propagation computer model was then used to estimate noise sound levels that would be generated by the Cogeneration Project, as it was originally proposed, based on information provided by Duke Fluor Daniel to BP (Duke Fluor Daniel 2001). Both standard A-weighted sound levels and low-frequency octave band sound levels were modeled.

In September 2002, Hessler Associates used a sound-propagation model to estimate the sound levels that would be generated by the Cogeneration Project as it has been modified. (Appendix K, Hessler Associates, Technical Memorandum, Summary of Noise Modeling Methodology and Results, March 2003.) The modeling was based upon sound power level information for the various sources of noise developed almost entirely from field measurements of similar equipment at other power generation facilities. This section continues to rely upon the baseline noise monitoring data obtained by Golder in 2001, but now incorporates the sound level modeling results provided by Hessler.

The cumulative effect of existing noise sources and the Cogeneration Project would is expected to result in a slight increase in noise levels at some receptor locations. However, only two one receptors location is are expected to experience an increase above background that will be perceivable to the human ear, and those that receptors is are not a residential locations.

A detailed Noise Impact Analysis Report was prepared and is included in the ASC as Part III, Appendix K.

The Nature of Noise

Noise is present in every environment, and the measurement of noise levels, along with evaluation of the results, is important in determining the impacts to surrounding areas from construction and operation of facilities. Sound is caused by compression waves traveling through air, resulting in vibrations. These vibrations can be influenced by a variety of factors, including physical barriers, moisture content in the air, absorption by materials in the environment, and the influence of existing sounds.

Sound originates when a body moves back and forth rapidly enough to send a coursing wave through the medium in which it is vibrating. Noise is an interruption of that wave. There are several ways to measure noise; the most common is to use the A-weighted sound level, as this most closely imitates the human ear's ability to detect noise. Table 3.9-1 provides definitions for terms that will be used throughout this section.

TABLE 3.9-1

Definitions of Sound-Related Terms

A-Weighted Sound Level	The human ear does not respond equally to all sounds in a medium. The A-weighted decibel scale assigns weights to different frequencies based on how they are perceived by the human ear. ~~The A-weighted sound level is also called the noise level.~~ Sound level meters have an A-weighting network for measuring the A-weighted sound level.
C-Weighted Sound Level	The C-weighted scale is only slightly weighted at low and high frequencies, and for many measurements is used interchangeably with the linear or un-weighted sound level. SPL meters with a C-weighting filter are intended for measuring sound levels with significant low frequency content~~fairly loud~~ ~~sound pressures, such as 85 dB or greater~~. These filters were originally used relative to occupational hazards and industrial noise exposure.
Decibel	The decibel (abbreviated dB) is a measure, on a logarithmic scale, of the magnitude of a particular quantity (such as sound pressure, sound power, intensity) with respect to a standard reference value (0.0002 microbars for sound pressure and 10^{-12} watt for sound power). Decibels can only be added logarithmically.
Frequency	Frequency is the number of times per ~~sound~~ second that ~~the sine wave of sound~~ a signal repeats itself, or that the sine wave of a vibrating object repeats itself. Frequency is expressed in Hertz (Hz).
Hertz	Unit measurement of frequency, equivalent to cycles per second.
Sound Level ~~(Noise Level)~~	The weighted sound pressure level obtained by use of a sound level meter having a standard frequency-filter for attenuating part of the sound spectrum.

The level of sound that a person perceives is related to the magnitude and frequency of sound ~~of noise levels or loudness~~, which is referred to as sound pressure level (SPL) with units in decibels (dB). To account for the effect of how the human ear perceives sound pressure, at moderate to low levels, sound pressure levels are adjusted for frequency (or pitch). A-weighting (dBA), which adjusts measurements for the approximate response of the human ear to low-frequency SPLs (i.e. below 1,000 hertz [Hz]) and high-frequency SPLs (i.e., above 1,000 Hz), is the most commonly used scale. The "A-weighted" scale accounts for the human perception of a doubling of loudness as an increase of 10 dBA. Therefore, a 60-dBA sound level will sound twice as loud as a 50-dBA. Table 3.9-2 provides typical sound levels of familiar sources and activities.

Table 3.9-2

Typical Sound Levels and Subjective Human Impressions of Sound Source

Sound Source	Sound Level (dBA)
Aircraft: Near the Plane	140
Elevated Train	120
Industrial Plant	100
Auto Horn at 25 ft.	100
Jazz Band	85 to 100
Loud Stereo	90
Aircraft: Residence Near Airport	80 to 90
Person Shouting	80
Noisy Household	75 and up
Truck at 25 ft.	75
Busy Street at Curb	70
Dense Traffic at 200 ft.	65
Office Conversation	60
Average Conversation	50
Quiet Household	40
~~Quiet~~ Whispered Conversation	35 ~~25~~

Natural or Spatial Sound Attenuation

Natural sound barriers between noise sources and a proposed building location may exist. Small hills and significant elevation differences will often lower the noise level enough to reduce the sound control requirements of a facility. The orientation of buildings on a site can also affect the sound conditions. The distance between the noise source and the receptors, for example, is a significant factor. In addition, the orientation of the buildings can be used as a sound barrier if the areas requiring quiet are located at the greatest distance from the largest noise-producing equipment.

Noise Regulations

Federal Noise Regulations

Other than Occupational Safety and Health Administration (OSHA) regulations governing sound exposure by workers at the Cogeneration Project, there are no federal noise regulations applicable to the Cogeneration Project.

Washington State Department of Ecology Noise Standards

Chapter 173-60 of the Washington Administrative Code (WAC) specifies maximum environmental noise levels. These limits apply in all areas of the State of Washington. The limits are based on the environmental designation for noise abatement (EDNA) of the noise source and the receiving property. In general, the EDNA designations conform to zoning ordinances as follows:

- Residential Zones – Class A EDNA
- Commercial Zones – Class B EDNA
- Industrial Zones – Class C EDNA

The maximum permissible environmental noise levels are summarized in Table 3.9-3.

TABLE 3.9-3

State of Washington
Maximum Permissible Environmental Noise Levels (dBA)

EDNA of Noise Source	**Maximum Level at Receiving Property (dBA)**		
	EDNA Class A	**EDNA Class B**	**EDNA Class C**
Class A	55	57	60
Class B	57	60	65
Class C	60	65	70

The regulation includes two adjustments to the levels in Table 3.9-3. The limits are reduced by 10 dBA at night (10 p.m. to 7 a.m.) for Class A EDNA (residential) receiving property. The limits are also increased by 5 dBA for 15 minutes in one hour, or by 10 dBA for 5 minutes in one hour, or by 15 dBA for 1.5 minutes in one hour. These are equivalent to the L_{25}, $L_{8.3}$, and $L_{2.5}$ statistical noise descriptors, respectively. Noise from temporary construction activities is exempt from all limits, except for those that apply to noise received in Class A (residential) EDNAs at night (10 p.m. to 7 a.m.).

Whatcom County Noise Ordinance

The Whatcom County Code (Title 20 Zoning) includes general prohibitions against noise as a nuisance or annoyance. It also defines some acts that are declared unnecessary noises. However, none apply to the normal operation of a power generation facility. There are no numerical limits in the Whatcom County Code, and all references are to the State code. Therefore, the limits in WAC 173-60 will be used to evaluate the estimated noise effects in the area from the operation of the proposed facility.

3.9.1 Existing Conditions

The Cogeneration Project is located adjacent to the Refinery on property zoned Heavy Impact Industrial. The lands are contained in the Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone, as defined in the Whatcom County Comprehensive Plan (May 20, 1997). The Cherry Point Major Industrial Urban Growth Area/Port Industrial Zone is approximately 6,500 acres, of which approximately 2,500 acres are currently occupied by heavy impact industries.

A 337-foot buffer would exist between the centerline of Grandview Road and the north boundary of the Cogeneration Project site. The site, which will be entirely within BP property, is surrounded by a minimum of 0.5 mile of industrial land use zones, and is at least 0.5 miles from the nearest BP property boundary.

Surrounding industrial properties include the Chemco wood treatment plant, located approximately 0.75 mile to the east, and the Praxair industrial gas plant, which is located less than a mile to the south. A PSE peaking station is located west of Jackson Road across from the Refinery. Recreational areas in the vicinity include the Birch Bay State Park, located 2 miles to the northwest of the Project site, and Lake Terrell, which is 2 miles to the southeast. Other properties beyond BP property boundaries are mostly farms with open fields for cattle and other livestock uses. The two closest residential properties in the vicinity are located about 0.75 miles to the east-southeast and 0.75 miles to the north of the Project site, respectively. A church is located about 1.2 miles to the west-northwest of the Project site.

BP owns all of the undeveloped property surrounding the proposed Cogeneration Project, including 33-acre project site. The site lies in a geographic area in Whatcom County designated as the Mountain View Upland, which is characterized as a hilly region with a maximum elevation of just less than 400 feet above mean sea level. Surface water bodies in the vicinity include Lake Terrell, Terrell Creek and other small creeks and ditches, and several wetlands that occur due to poor drainage and low-permeability soils. The landscape surrounding the site is generally flat agricultural fields with interspersed stands of deciduous and coniferous trees.

3.9.1.1 Existing Sound Levels

A comprehensive background noise-monitoring study was performed by Golder Associates, Inc. to assess the existing (background) noise levels in the project area prior to the construction and operation of the Project. The field effort to collect the background noise level data was conducted on May 31 and June 7, 2001. The background noise-monitoring program was performed at the property boundaries of the Refinery, at the proposed Project site, and at the nearest residences.

In order to avoid private property access issues, noise monitoring was performed on public property along public roads, in close proximity to the transient noise generated by vehicular traffic. The results of this baseline noise level monitoring indicate that the background levels are relatively low, and are significantly influenced by transient sources, especially vehicular traffic. If sampling had been performed on private property further the road, at particular homes for example, the influence of passing vehicles would be reduced.

Noise level monitoring was conducted at fifteen locations in the vicinity of the Project site, and at one location on BP property near the proposed Project site. The locations are described in Table 3.9-4.

TABLE 3.9-4

Noise Monitoring Locations

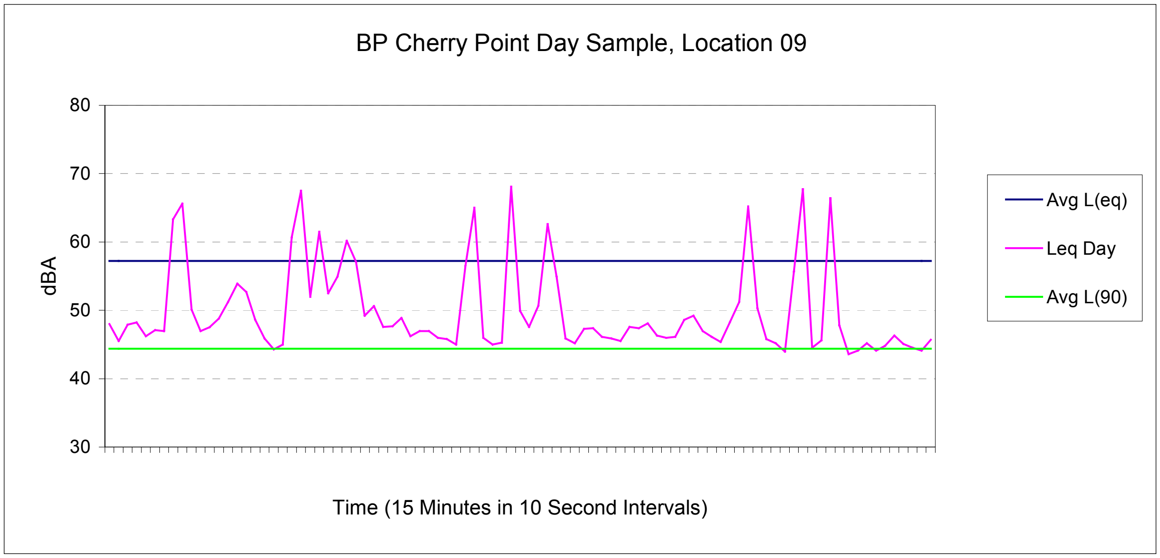
Location Number	Description
1	On Grandview Road, in front of the Chemco Plant, 0.69 miles northeast of the Cogeneration Project
2	Northwest corner of the 4-way stop at Aldergrove Road and Kickerville Road intersection, 1.26 miles southeast of the Cogeneration Project.
3	Aldergrove Road at entrance to PraxAir facility, 0.82 miles south of the Cogeneration Project.
4	Southeast corner of 2-way stop at Aldergrove Road and Jackson Road intersection, 1.37 miles southwest of Cogeneration Project.
5	At Cascade Natural Gas regulator station on west side of Jackson Road, 1.11 miles southwest of Cogeneration Project. (The regulator was not operating.)
6	Southeast corner of 4-way stop at Grandview Road and Jackson Road intersection, 1.10 miles west of Cogeneration Project.
7	West side of Jackson Road at Birch Bay Community Church, 1.22 miles northwest of the Cogeneration Project.
8	Southwest corner of 3-way stop at Grandview Road at Pt. Whitehorn, 2.08 miles west of the Cogeneration Project.
9	Northwest corner of Jackson Road and Helweg, 1.44 miles northwest of Cogeneration Project.
10	In front of residence at 4570 Bay Road, 1.20 miles north of Cogeneration Project.
11	Northwest corner of 4-way stop at Kickerville Road and Bay Road, 1.48 miles northeast of Cogeneration Project.
12	Intersection of Grandview Road and Blaine Road, on south side of street, 300 feet north of Cogeneration Project site.
13	West side of Blaine Road, north of Grandview Road, at turnout 0.51 miles north of the Cogeneration Project.
14	Northwest corner of Kickerville Road and Brown Road, 1 mile east – southeast of the Cogeneration Project, near the residence closest to the Project site.
15	Birch Bay State Park, near park entrance, 1.92 miles northwest of Cogeneration Project.
Project Site	Open field on BP property, south of Grandview, and west of the Refinery.

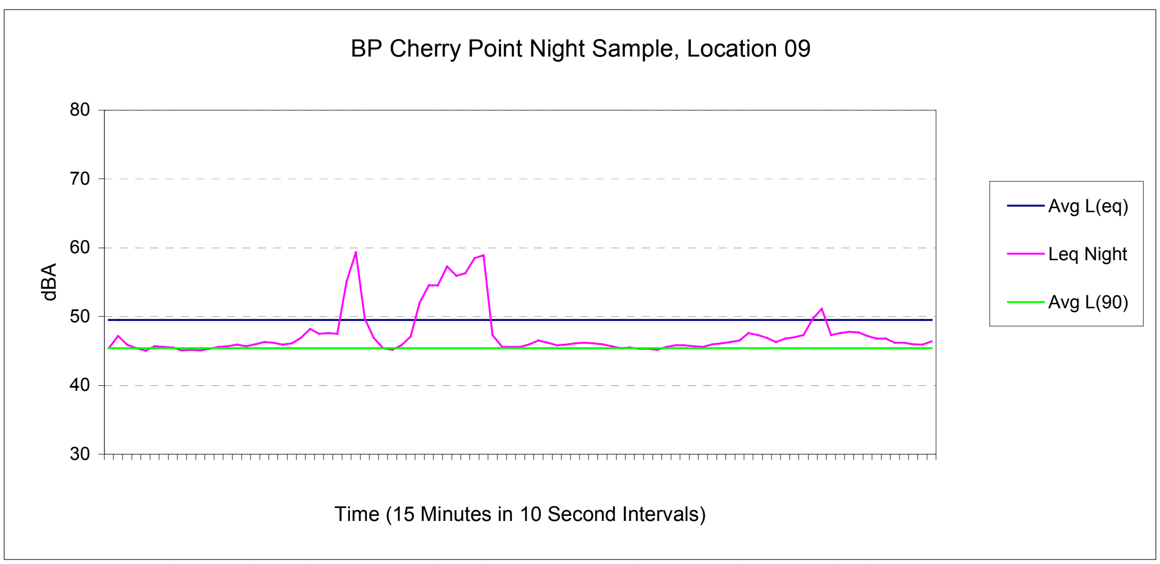
Locations No. 1 through No. 15 were monitored for two periods of 15 minutes, once in the hours defined as "day" (7 a.m. through 10 p.m.), and once in the hours defined as "night" (10 p.m. through 7 a.m.). The Project site was monitored for a period of 24 hours. There were no unusual natural environmental circumstances such as heavy wind or rain that would have influenced the measurements.

Two types of existing ambient noise were monitored during the data collection. The first type of noise is steady state noise, which is essentially constant in the background of the environment. Background noise in the vicinity of the project includes the steady wind, creeks, the wave action of the sea, and nearby industrial sources. The steady state component of ambient background noise is illustrated in the following graph, which is one of the complete set of graphs provided in Part III, Appendix K. The steady-state noise is the relatively constant baseline, which is approximately the L_{90} noise level (90% of the noise is above the L_{90}). Appendix K Technical Report on Noise provides more detail and explanation of noise levels.

The second type of noise monitored during the data collection was transient noise, with sources that include vehicular traffic, wind gusts, airplanes, animals, trains, and other human-caused disturbances. The significant influence of this transient noise can be seen in the above graphical representation as the peaks.

It should be noted that noise generated by vehicles at many of the sampling areas was very noticeable during the monitoring and had an influence on the values measured. The overall effect of the transient vehicular traffic resulted in an increase of the equivalent (L_{eq}) at each of the monitoring locations.





As an example, in the above graphs the magenta line in the graph shows L_{eq} measurements taken over a 15 minute interval during the day and night at noise monitoring location 9. The average of these measurements (average L_{eq}) is shown by the blue line at approximately 57 dBA during the day, and 49 dBA at night. The green line shows the average L_{90} for this interval of about 45 dBA, which approximates background sound level in the absence of transient noise sources such as traffic, animals, or human-caused disturbances. The average contribution of transient noise is the difference between the average L_{90} and average L_{eq}, or 4 to 12 dBA.

The results of the noise measurements indicated that the background sound levels including transient noise in the areas surrounding the proposed Cogeneration Project range from a low of 47.2 dBA to a maximum of 67.5 dBA during the day, and range from a low of 38.6 dBA to a maximum of 65.3 dBA during the night.

3.9.2 Environmental Impacts of the Proposed Action

3.9.2.1 Construction

Construction of the Cogeneration Project is expected to be typical of other industrial plant construction projects in terms of schedule, mobilization, site preparation, utility development, and heavy equipment movement, clearing of roadways and right-of-ways, and installation of the new facility components. The levels of noise produced during this process are anticipated to vary depending on the construction phase underway.

Noise associated with construction activities is highly variable and is exempt from Washington State noise standards, so no construction-phase noise modeling was conducted.

In WAC 173-60-050 the following are exempt from the maximum permissible environmental noise levels provisions of between the hours of 7:00 a.m. and 10:00 p.m.:

- Sounds created by the installation or repair of essential utility services.

The following are exempt from the 10-dBA reductions between the hours of 10:00 p.m. and 7:00 a.m. for Class A EDNAs:

- Noise from electrical substations and existing stationary equipment used in the conveyance of water, waste water, and natural gas by a utility, and
- Noise from existing industrial installation which exceed the standards and which, over the previous three years, have consistently operated in excess of 15 hours per day as a consequence of process necessity and/or demonstrated routine normal operation.

The following are exempt from the maximum permissible environmental noise levels for Class A EDNAs between the hours of 10:00 p.m. and 7:00 a.m.

- Sounds originating from temporary construction sites as a result of construction activity.

Construction of the Cogeneration Project is, therefore, exempt from state regulatory noise limits.

3.9.2.2 Operation

Hessler Associates used a sound propagation computer program, Cadna/A®, to predict the sound leveles that would be generated by operation of the Cogeneration Project.

Cadna/A® was developed specifically for acoustically modeling power plants. Noise sources were entered into the model as octave band sound power levels. Noise sources were treated as either point sources (exhaust stack exits), area sources (walls, etc.) or line sources (pipes, etc.). The program calculates sound propagation by accounting for geometric spreading and propagation through the atmosphere, across the terrain, and around buildings or obstacles.

~~The operational noise impact evaluation was performed using a noise propagation computer program, Noisecalc, which was developed to assist with noise propagation calculations for major noise sources. Noise sources are entered into the model as octave band SPLs. Coordinates, either rectangular or polar, can be specified by the user. All noise sources are assumed to be point sources; line sources can be simulated by several point sources. Sound propagation is calculated by accounting for hemispherical spreading and three other user-identified attenuation options:~~

- ~~Atmospheric attenuation,~~
- ~~Path specific attenuation, and~~
- ~~Barrier attenuation.~~

~~Atmospheric attenuation is calculated using the data specified by the Calculation of the Absorption of Sound by the Atmosphere (ANSI, 1999). Path-specific attenuation can be specified to account for the effects of vegetation, foliage, and wind shadow. Directional source characteristics and reflection can be simulated using path-specific attenuation. Attenuation due to barriers can be included in the model by giving the coordinates of the barrier. Barrier attenuation is calculated by assuming an infinitely long barrier perpendicular to the source-receptor path. Total and A-weighted SPLs are calculated. Background noise levels can be incorporated into the program and are used to calculate overall SPLs.~~

3.9.2.3 Modeling Results

The noise impact modeling predicted the ~~maximum noise~~ expected sound levels to be produced by the Cogeneration Project with and without background noise levels. ~~Atmospheric attenuation was assumed for all sites.~~ Background noise levels measured during the noise study were included in the predicted maximum SPLs calculated for each of the 15 receptors.

Hessler Associates performed this modeling in September 2002 based on the current wet cooling tower design and configuration of the Cogeneration Project. The primary noise-generating equipment consisted of three gas turbine generators (CTGs), one steam turbine generator (STG), three-heat recovery steam generators (HRSGs), and a cooling tower. Modeling assumed that the CTGs and STG are housed within standard, acoustically treated enclosures (but not within buildings). Besides the main components, other equipment that could generate potentially significant noise levels, such as boiler feed pumps, circulating water pumps, main transformers, and various steam lines were included in the model. To ensure the modeling was conservative, no attenuation factors were included in the modeling for existing or future vegetation or topographical features between the Cogeneration Project and the receptor locations.

~~The modeling was performed for the plant configuration as presented in this ASC. The primary noise-generating equipment will consist of three gas turbine generators (GTGs),~~

~~one steam turbine generator (STG), three heat recovery steam generators (HRSGs), and an air-cooled condenser containing 45 fans. Modeling assumed that the GTGs are housed within a casing, but not within a building. The assumption was made in the model that the STG is enclosed in a building, with sound attenuation such that sound produced from this turbine is reduced to zero at the property boundary on Grandview Road, approximately 900 feet north of the STG. Other equipment that could generate high noise levels includes, three transformers and the selective catalytic reduction (SCR) ammonia pumps. To ensure the modeling was conservative, no attenuation factors were included in the modeling for existing or future vegetation or topographical features between the Cogeneration Project and the receptor site.~~

In the first step of the modeling, ~~estimated~~ base line facility noise levels were calculated at the ~~selected~~ offsite receptors. The baseline analysis assumed standard equipment would be used plant-wide without -any special or unusual improvements specifically intended to reduce far-field noise. ~~were calculated, based on the noise produced by the Cogeneration Project without inclusion of the background sounds.~~ This calculation indicated that the sounds produced by the Cogeneration Project ,e xclusive of any pre-existing background noise, were below the regulatory daytime and nighttime allowable levels. However, to provide additional noise mitigation, silencers were designed into the HRSG exhaust stacks.

In order to further ensure compliance with the regulatory limits, silencers were added to the HRSG stacks because they emerged as prominent sources in the baseline analysis and because they can be more susceptible than most other plant sources to wind-induced effects whereby distant noise levels may temporarily increase at downwind locations. The likelihood that stack noise will be audible at any of the off-site locations has been greatly reduced by the addition of these silencers. The model was then re-run with attenuated stacks and t~~T~~he noise levels expected to be produced by the Cogeneration Project at the fifteen receptors are presented in Table 3.9-5.

TABLE 3.9-5
(REVISED)
Estimated Noise Levels
Produced by the Proposed Cogeneration Project

Receptor Location I=industrial, R=residential	Predicted Noise Level (dBA) (L_{eq})	**Regulatory Limit Day/Night (dBA)**
1 (I)	46.5	70
2 (R)	40.9	60/50
3 (I)	46.3	70
4 (I)	39.4	70
5 (I)	40.1	70
6 (I)	40.5	70
7 (R)	40.3	60/50
8 (R)	33.7	60/50
9 (R)	38.1	60/50
10 (R)	39.9	60/50
11 (R)	39.4	60/50
12 (I)	59.8	70
13 (I)	48.1	70
14 (R)	43.5	60/50
15 (R)	35.3	60/50

All of the modeled noise levels, as produced by the Cogeneration Project, would be well below the regulatory thresholds.

~~The second modeling activity calculated data on the predicted noise levels that would result from the proposed Cogeneration Project noise levels when added to the existing background levels.~~ Next, Hessler Associates estimated the sound levels that would result when the sound from Cogeneration Project was combined with the background ambient sound levels measured by Golder Associates in 2001. This evaluation was conducted to determine if there would be a significant environmental noise impact from the operation of the Cogeneration Project. Table 3.9-6 presents the background levels measured by Golder, the predicted levels at each of the 15 receptors (when added to the background levels), and the magnitude of the increase at each location.

TABLE 3.9-6
(REVISED)

Estimated Noise Levels
Combining Modeled and Background Sources

Receptor Location	Day Noise Level (dBA)				Night Noise Level (dBA)			
	Back-ground	Project Only (Modeled)	Back-ground plus Modeled Level	Difference	Back-ground	Project Only (Modeled)	Back-ground plus Modeled Level	Difference
1 (I)	67.5	46.5	67.5	0.0	65.3	46.5	65.4	0.1
2 (R)	58.4	40.9	58.5	0.1	63.2	40.9	63.2	0.0
3 (I)	61.2	46.3	61.3	0.1	60.4	46.3	60.6	0.2
4 (I)	50.3	39.4	50.6	0.3	52.4	39.4	52.6	0.2
5 (I)	63.0	40.1	63.0	0.0	58.1	40.1	58.2	0.1
6 (I)	60.7	40.5	60.7	0.0	59.2	40.5	59.3	0.1
7 (R)	62.6	40.3	62.6	0.0	55.7	40.3	55.8	0.1
8 (R)	54.7	33.7	54.7	0.0	52.0	33.7	52.1	0.1
9 (R)	57.2	38.1	57.3	0.1	49.5	38.1	49.8	0.3
10 (R)	62.3	39.9	62.3	0.0	53.9	39.9	54.1	0.1
11 (R)	60.7	39.4	60.7	0.0	52.7	39.4	52.9	0.2
12 (I)	63.7	59.8	65.2	1.5	60.9	59.8	63.4	2.5
13 (I)	61.7	48.1	61.9	0.2	56.8	48.1	57.3	0.5
14 (R)	60.0	43.5	60.1	0.1	51.3	43.5	52.0	0.7
15 (R)	47.2	35.2	47.5	0.3	38.6	35.2	40.2	1.6

Except in carefully controlled laboratory experiments, the human ear cannot perceive a change of 1 decibel (dB). Outside the laboratory, a 3-dB change is considered a just-perceivable difference, and a change of at least 5-dB is usually required before any noticeable change in community response can be expected (Kryter, 1970).

The modeling results in Table 3.9-6 indicate that no receptor would experience a ~~perceivable~~ perceptible increase in noise during the daytime. Only ~~two~~ one receptor~~s~~ would experience a perceivable increase in noise levels at night: Receptors 12 ~~and 15~~. Receptor 12 is located on industrially-zoned BP property immediately across Grandview Road from the proposed Cogeneration Project. ~~Receptor 15, the entrance to Birch Bay State Park, is expected to experience a barely perceivable 3.1 dBA increase in sound levels. Noise levels will remain very low despite this increase. Moreover, Project-related sound is expected to be even lower at campsites within the Park because they are located further from the Project site.~~

~~The modeling also evaluated of low frequency noise. See Part III, Appendix K. The modeling results indicate that the Cogeneration Project will not result in significant low frequency noise.~~

In parrallel with the original Golder modeling study found in Appendix K, the new Hessler modeling also independently evaluated low frequency noise levels at the receptors. In general, the new modeling results indicate that low frequency noise form the Cogeneration Project (C-weighted sound levels and the lower frequency bands) will be similar to or less than the levels reported by Golder for the original project configuration. Consequently, the original conclusion that low frequency noise will not reach perceptibility thresholds at any of the residential receptors remains valid.

3.9.3 Environmental Impacts of the No Action Alternative

Under the No Action Alternative, the Cogeneration Project would not be constructed and sound levels would not be affected.

3.9.4 Mitigation Measures

3.9.4.1 Construction

The following noise mitigation measures will be utilized during the project construction phase:

- Comply with all federal and local regulations on truck and construction equipment noise, and use appropriate mufflers on all engine-driven equipment.
- Limit loud construction activities to daytime hours (7 a.m. to 10 p.m.).

3.9.4.2 Operation

The design and siting of the proposed Cogeneration Project has integrated many noise mitigation measures.

When considering the location and orientation of the proposed Cogeneration Project, many factors, including noise, were evaluated. The Project site would be set back 337 feet from the centerline of the nearest public road, Grandview Road, and this will result in a reduction of noise levels at the road and beyond. The configuration of the Project equipment, which includes the three gas turbine generators in parallel to the south leading away from Grandview, is an orientation that will allow for optimal sound reduction through physical barriers. The equipment noise from the two most southerly generators will be blocked by the presence of the generator closest to Grandview.

The three gas turbine generators and the steam turbine generators will be located within enclosures, which will attenuate sound. The heat recovery steam generator stacks have also been designed with silencers to provide additional noise mitigation.

~~The steam turbine generator, which is perhaps the largest contributor to noise, will be positioned south of the three combustion turbine generators, with its noise contribution effectively reduced by the physical presence of the combustion turbine generators and the housing enclosure that will be constructed around the steam turbine generator. Based on distance and housing, it is anticipated that there will be no noise contribution from the steam turbine generator at Grandview Road, located approximately 900 feet to the north.~~

3.9.5 Cumulative Impacts

As shown by the data provided above, cumulative noise impacts will be minimal.

3.9.6 Significant Unavoidable Adverse Impacts

There will be no significant unavoidable adverse noise impacts from the proposed project.