

Appendix C

Noise

Appendix C1

The Assessment of Environmental Noise (General)

Sound Pressure Level

Sound pressure is initially measured in Pascal's (Pa). Humans can hear several orders of magnitude in sound pressure levels, so a more convenient scale is used. This scale is known as the decibel (dB) scale, named after Alexander Graham Bell (telephone guy). It is a base 10 logarithmic scale. When we measure pressure we typically measure the RMS sound pressure.

$$SPL = 10 \log_{10} \left[\frac{P_{RMS}^2}{P_{ref}^2} \right] = 20 \log_{10} \left[\frac{P_{RMS}}{P_{ref}} \right]$$

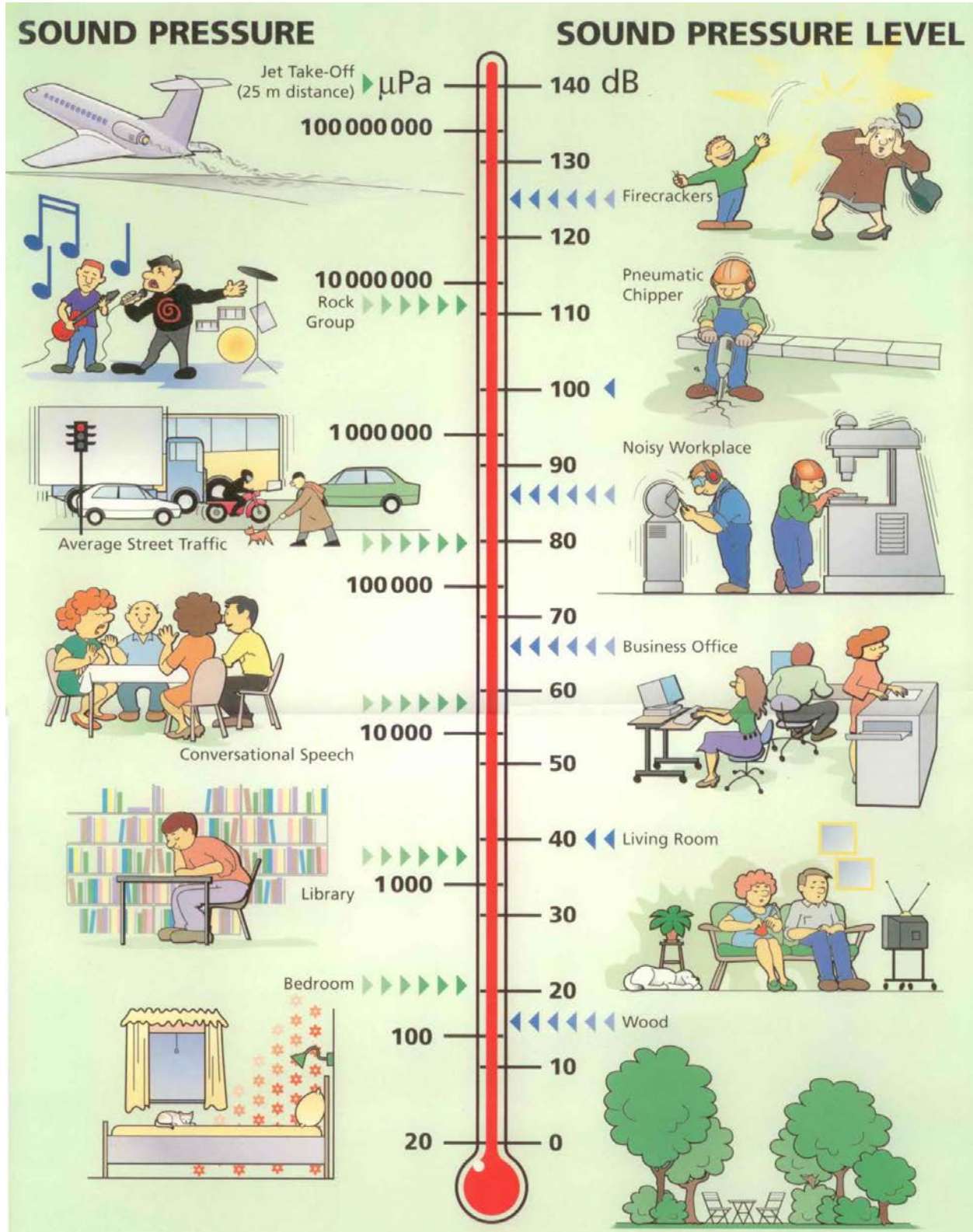
where: SPL = Sound Pressure Level in dB

P_{RMS} = Root Mean Square measured pressure (Pa)

P_{ref} = Reference sound pressure level ($P_{ref} = 2 \times 10^{-5}$ Pa = 20 μ Pa)

This reference sound pressure level is an internationally agreed upon value. It represents the threshold of human hearing for "typical" people based on numerous testing. It is possible to have a threshold which is lower than 20 μ Pa which will result in negative dB levels. As such, zero dB does not mean there is no sound!

In general, a difference of 1 to 2 dB is the threshold for humans to notice that there has been a change in sound level. A difference of 3 dB (factor of 2 in acoustical energy) is perceptible and a change of 5 dB is strongly perceptible. A change of 10 dB is typically considered a factor of 2. This is quite remarkable when considering that 10 dB is 10-times the acoustical energy!



Frequency

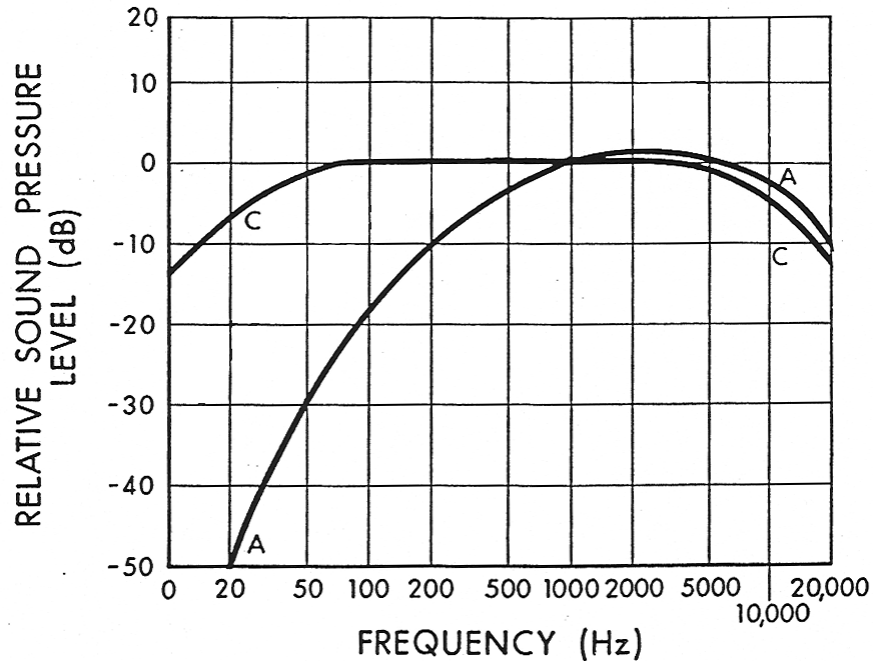
The range of frequencies audible to the human ear ranges from approximately 20 Hz to 20 kHz. Within this range, the human ear does not hear equally at all frequencies. It is not very sensitive to low frequency sounds, is very sensitive to mid frequency sounds and is slightly less sensitive to high frequency sounds. Due to the large frequency range of human hearing, the entire spectrum is often divided into 31 bands, each known as a 1/3 octave band.

The internationally agreed upon center frequencies and upper and lower band limits for the 1/1 (whole octave) and 1/3 octave bands are as follows:

Whole Octave		
Lower Band Limit	Center Frequency	Upper Band Limit
11	16	22
22	31.5	44
44	63	88
88	125	177
177	250	355
355	500	710
710	1,000	1,420
1,420	2,000	2,840
2,840	4,000	5,680
5,680	8,000	11,360
11,360	16,000	22,720

1/3 Octave		
Lower Band Limit	Center Frequency	Upper Band Limit
14.1	16	17.8
17.8	20	22.4
22.4	25	28.2
28.2	31.5	35.5
35.5	40	44.7
44.7	50	56.2
56.2	63	70.8
70.8	80	89.1
89.1	100	112
112	125	141
141	160	178
178	200	224
224	250	282
282	315	355
355	400	447
447	500	562
562	630	708
708	800	891
891	1,000	1,122
1,122	1,250	1,413
1,413	1,600	1,778
1,778	2,000	2,239
2,239	2,500	2,818
2,818	3,150	3,548
3,548	4,000	4,467
4,467	5,000	5,623
5,623	6,300	7,079
7,079	8,000	8,913
8,913	10,000	11,220
11,220	12,500	14,130
14,130	16,000	17,780
17,780	20,000	22,390

Human hearing is most sensitive at approximately 3500 Hz which corresponds to the ¼ wavelength of the ear canal (approximately 2.5 cm). Because of this range of sensitivity to various frequencies, we typically apply various weighting networks to the broadband measured sound to more appropriately account for the way humans hear. By default, the most common weighting network used is the so-called “A-weighting”. It can be seen in the figure that the low frequency sounds are reduced significantly with the A-weighting.



Combination of Sounds

When combining multiple sound sources the general equation is:

$$\Sigma SPL_n = 10 \log_{10} \left[\sum_{i=1}^n 10^{\frac{SPL_i}{10}} \right]$$

Examples:

- Two sources of 50 dB each add together to result in 53 dB.
- Three sources of 50 dB each add together to result in 55 dB.
- Ten sources of 50 dB each add together to result in 60 dB.
- One source of 50 dB added to another source of 40 dB results in 50.4 dB.

It can be seen that, if multiple similar sources exist, removing or reducing only one source will have little effect.

Sound Level Measurements

Over the years a number of methods for measuring and describing environmental noise have been developed. The most widely used and accepted is the concept of the Energy Equivalent Sound Level (L_{eq}) which was developed in the US (1970's) to characterize noise levels near US Air-force bases. This is the level of a steady state sound which, for a given period of time, would contain the same energy as the time varying sound. The concept is that the same amount of annoyance occurs from a sound having a high level for a short period of time as from a sound at a lower level for a longer period of time.

The L_{eq} is defined as:

$$L_{eq} = 10 \log_{10} \left[\frac{1}{T} \int_0^T 10^{\frac{dB}{10}} dT \right] = 10 \log_{10} \left[\frac{1}{T} \int_0^T \frac{P^2}{P_{ref}^2} dT \right]$$

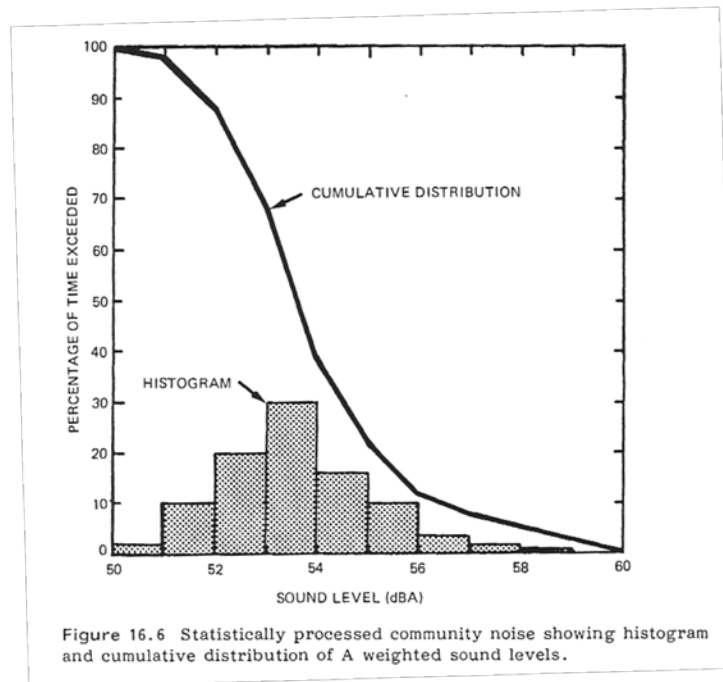
We must specify the time period over which to measure the sound. i.e. 1-second, 10-seconds, 15-seconds, 1-minute, 1-day, etc. **An L_{eq} is meaningless if there is no time period associated.**

In general, there are a few very common L_{eq} sample durations which are used in describing environmental noise measurements. These include:

- L_{eq24} – measured over a 24-hour period;
- $L_{eqNight}$ – measured over the nighttime (typically 22:00 – 07:00);
- L_{eqDay} – measured over the daytime (typically 07:00 – 22:00); and
- L_{DN} - same as L_{eq24} with a 10 dB penalty added to the nighttime.

Statistical Descriptor

Another method of conveying long-term noise levels utilizes statistical descriptors. These are calculated from a cumulative distribution of the sound levels over the entire measurement duration and then determining the sound level at xx% of the time.



Industrial Noise Control, Lewis Bell, Marcel Dekker, Inc. 1994

The most common statistical descriptors are:

- L_{min} – minimum sound level measured;
- L_{01} – sound level that was exceeded only 1% of the time;
- L_{10} – sound level that was exceeded only 10% of the time:
 - good measure of intermittent or intrusive noise;
 - good measure of traffic noise;
- L_{50} – sound level that was exceeded 50% of the time (arithmetic average):
 - good to compare to L_{eq} to determine steadiness of noise;
- L_{90} – sound level that was exceeded 90% of the time:
 - good indicator of typical “ambient” noise levels;
- L_{99} – sound level that was exceeded 99% of the time; and
- L_{max} – maximum sound level measured.

These descriptors can be used to provide a more detailed analysis of the varying noise climate:

- If there is a large difference between the L_{eq} and the L_{50} (L_{eq} can never be any lower than the L_{50}) then it can be surmised that one or more short duration, high level sound(s) occurred during the time period.

- If the gap between the L_{10} and L_{90} is relatively small (less than 15 to 20 dBA) then it can be surmised that the noise climate was relatively steady.

Sound Propagation

In order to understand sound propagation, the nature of the source must first be discussed. In general, there are three types of sources. These are known as 'point', 'line', and 'area'. This discussion will concentrate on point and line sources since area sources are much more complex and can usually be approximated by point sources at large distances.

Point Source

As sound radiates from a point source, it dissipates through geometric spreading. The basic relationship between the sound levels at two distances from a point source is:

$$\therefore SPL_1 - SPL_2 = 20 \log_{10} \left(\frac{r_2}{r_1} \right)$$

where: SPL_1 = sound pressure level at location 1, SPL_2 = sound pressure level at location 2
 r_1 = distance from source to location 1, r_2 = distance from source to location 2

Thus, the reduction in sound pressure level for a point source radiating in a free field is **6 dB per doubling of distance**. This relationship is independent of reflectivity factors provided they are always present. Note that this only considers geometric spreading and does not take into account atmospheric effects. Point sources still have some physical dimension associated with them, and typically do not radiate sound equally in all directions in all frequencies. The directionality of a source is also highly dependent on frequency. As frequency increases, directionality increases.

Examples (note no atmospheric absorption):

- A point source measuring 50 dB at 100 m will be 44 dB at 200 m.
- A point source measuring 50 dB at 100 m will be 40.5 dB at 300 m.
- A point source measuring 50 dB at 100 m will be 38 dB at 400 m.
- A point source measuring 50 dB at 100 m will be 30 dB at 1000 m.

Line Source

A line source is similar to a point source in that it dissipates through geometric spreading. The difference is that a line source is equivalent to a long line of many point sources. The basic relationship between the sound levels at two distances from a line source is:

$$SPL_1 - SPL_2 = 10 \log_{10} \left(\frac{r_2}{r_1} \right)$$

The difference from the point source is that the '20' term in front of the 'log' is now only 10. Thus, the reduction in sound pressure level for a line source radiating in a free field is **3 dB per doubling of distance**.

Examples (note no atmospheric absorption):

- A line source measuring 50 dB at 100 m will be 47 dB at 200 m.
- A line source measuring 50 dB at 100 m will be 45 dB at 300 m.
- A line source measuring 50 dB at 100 m will be 44 dB at 400 m.
- A line source measuring 50 dB at 100 m will be 40 dB at 1000 m.

Atmospheric Absorption

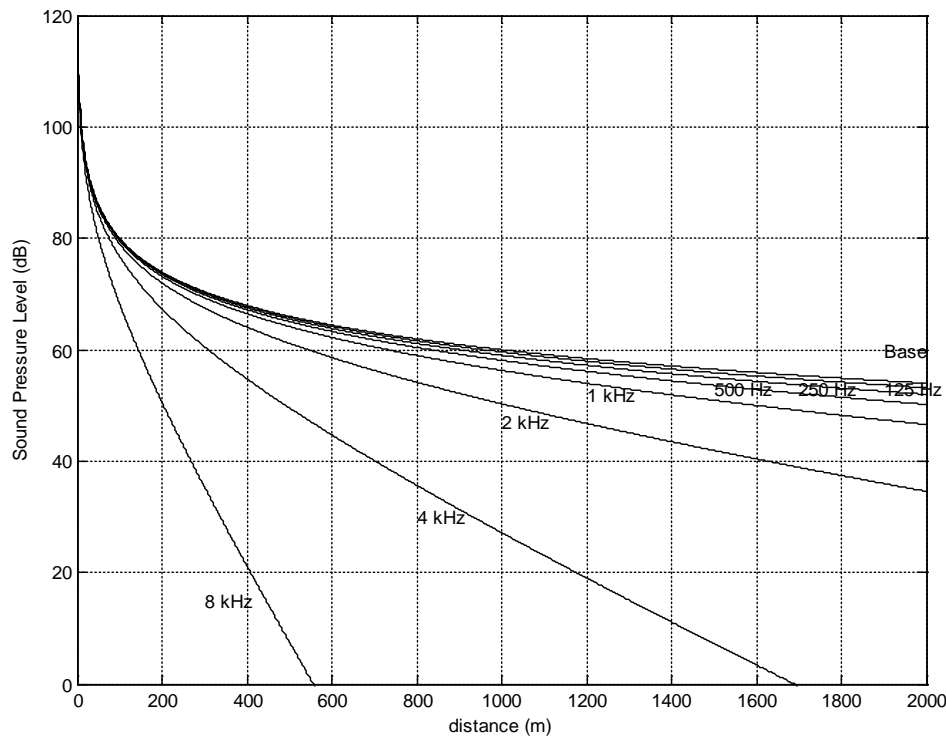
As sound transmits through a medium, there is an attenuation (or dissipation of acoustic energy) which can be attributed to three mechanisms:

- 1) *Viscous Effects* – Dissipation of acoustic energy due to fluid friction which results in thermodynamically irreversible propagation of sound.
- 2) *Heat Conduction Effects* – Heat transfer between high and low temperature regions in the wave which result in non-adiabatic propagation of the sound.
- 3) *Inter Molecular Energy Interchanges* – Molecular energy relaxation effects which result in a time lag between changes in translational kinetic energy and the energy associated with rotation and vibration of the molecules.

The following table illustrates the attenuation coefficient of sound at standard pressure (101.325 kPa) in units of dB/100 m.

Temperature °C	Relative Humidity (%)	Frequency (Hz)					
		125	250	500	1000	2000	4000
	20	0.06	0.18	0.37	0.64	1.40	4.40
30	50	0.03	0.10	0.33	0.75	1.30	2.50
	90	0.02	0.06	0.24	0.70	1.50	2.60
	20	0.07	0.15	0.27	0.62	1.90	6.70
20	50	0.04	0.12	0.28	0.50	1.00	2.80
	90	0.02	0.08	0.26	0.56	0.99	2.10
	20	0.06	0.11	0.29	0.94	3.20	9.00
10	50	0.04	0.11	0.20	0.41	1.20	4.20
	90	0.03	0.10	0.21	0.38	0.81	2.50
	20	0.05	0.15	0.50	1.60	3.70	5.70
0	50	0.04	0.08	0.19	0.60	2.10	6.70
	90	0.03	0.08	0.15	0.36	1.10	4.10

- As frequency increases, absorption tends to increase.
- As Relative Humidity increases, absorption tends to decrease.
- There is no direct relationship between absorption and temperature.
- **The net result of atmospheric absorption is to modify the sound propagation of a point source from 6 dB/doubling-of-distance to approximately 7 to 8 dB/doubling-of-distance (based on anecdotal experience)**



Atmospheric Absorption at 10°C and 70% RH

Meteorological Effects

There are many meteorological factors which can affect how sound propagates over large distances. These various phenomena must be considered when trying to determine the relative impact of a noise source either after installation or during the design stage.

Wind

- Can greatly alter the noise climate away from a source depending on direction.
- Sound levels downwind from a source can be increased due to refraction of sound back down towards the surface. This is due to the generally higher velocities as altitude increases.

- Sound levels upwind from a source can be decreased due to a “bending” of the sound away from the earth’s surface.
- Sound level differences of ± 10 dB are possible depending on severity of wind and distance from source.
- Sound levels crosswind are generally not disturbed by an appreciable amount.
- Wind tends to generate its own noise, however, and can provide a high degree of masking relative to a noise source of particular interest.

Temperature

- Temperature effects can be similar to wind effects.
- Typically, the temperature is warmer at ground level than it is at higher elevations.
- If there is a very large difference between the ground temperature (very warm) and the air aloft (only a few hundred meters) then the transmitted sound refracts upward due to the changing speed of sound.
- If the air aloft is warmer than the ground temperature (known as an *inversion*) the resulting higher speed of sound aloft tends to refract the transmitted sound back down towards the ground. This essentially works on Snell’s law of reflection and refraction.
- Temperature inversions typically happen early in the morning and are most common over large bodies of water or across river valleys.
- Sound level differences of ± 10 dB are possible depending on gradient of temperature and distance from source.

Rain

- Rain does not affect sound propagation by an appreciable amount unless it is very heavy.
- The larger concern is the noise generated by the rain itself. A heavy rain striking the ground can cause a significant amount of highly broadband noise. The amount of noise generated is difficult to predict.
- Rain can also affect the output of various noise sources such as vehicle traffic.

Summary

- In general, these wind and temperature effects are difficult to predict.
- Empirical models (based on measured data) have been generated to attempt to account for these effects.
- Environmental noise measurements must be conducted with these effects in mind. Sometimes it is desired to have completely calm conditions, other times a “worst case” of downwind noise levels are desired.

Topographical Effects

Similar to the various atmospheric effects outlined in the previous section, the effect of various geographical and vegetative factors must also be considered when examining the propagation of noise over large distances.

Topography

- One of the most important factors in sound propagation.
- Can provide a natural barrier between source and receiver (i.e., if berm or hill in between).
- Can provide a natural amplifier between source and receiver (i.e., large valley in between or hard reflective surface in between).
- Must look at location of topographical features relative to source and receiver to determine importance (i.e., small berm 1 km away from source and 1km away from receiver will make negligible impact).

Grass

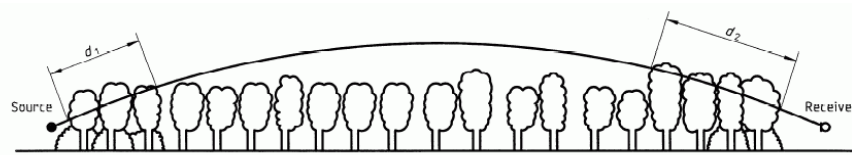
- Can be an effective absorber due to large area covered.
- Only effective at low height above ground. Does not affect sound transmitted direct from source to receiver if there is line of sight.
- Typically less absorption than atmospheric absorption when there is line of sight.
- Approximate rule of thumb based on empirical data is:

$$A_g = 18 \log_{10}(f) - 31 \quad (dB/100m)$$

where: A_g is the absorption amount.

Trees

- Provide absorption due to foliage.
- Deciduous trees are essentially ineffective in the winter.
- Absorption depends heavily on density and height of trees.
- No data found on absorption of various kinds of trees.
- Large spans of trees are required to obtain even minor amounts of sound reduction.
- In many cases, trees can provide an effective visual barrier, even if the noise attenuation is negligible.



NOTE — $d_t = d_1 + d_2$

For calculating d_1 and d_2 , the curved path radius may be assumed to be 5 km.

Figure A.1 — Attenuation due to propagation through foliage increases linearly with propagation distance d_t through the foliage

Table A.1 — Attenuation of an octave band of noise due to propagation a distance d_t through dense foliage

Propagation distance d_t m	Nominal midband frequency Hz							
	63	125	250	500	1 000	2 000	4 000	8 000
$10 \leq d_t \leq 20$	Attenuation, dB: 0		1	1	1	1	2	3
$20 \leq d_t \leq 200$	Attenuation, dB/m: 0.02		0.03	0.04	0.05	0.06	0.08	0.09

Tree/Foliage attenuation from ISO 9613-2:1996

Bodies of Water

- Large bodies of water can provide the opposite effect to grass and trees.
- Reflections caused by small incidence angles (grazing) can result in larger sound levels at great distances (increased reflectivity, Q).
- Typically air temperatures are warmer high aloft since air temperatures near water surface tend to be more constant. Result is a high probability of temperature inversion.
- Sound levels can “carry” much further.

Snow

- Covers the ground for approximately 1/2 of the year in northern climates.
- Can act as an absorber or reflector (and varying degrees in between).
- Freshly fallen snow can be quite absorptive.
- Snow which has been sitting for a while and hard packed due to wind can be quite reflective.
- Falling snow can be more absorptive than rain, but does not tend to produce its own noise.
- Snow can cover grass which might have provided some means of absorption.
- Typically sound propagates with less impedance in winter due to hard snow on ground and no foliage on trees/shrubs.

Appendix C2

Sound Levels of Familiar Noise Sources

Used with Permission Obtained from the AER Directive 038 (February 2007)

Source¹	Sound Level (dBA)
Bedroom of a country home	30
Soft whisper at 1.5 m	30
Quiet office or living room	40
Moderate rainfall	50
Inside average urban home	50
Quiet street	50
Normal conversation at 1 m	60
Noisy office	60
Noisy restaurant	70
Highway traffic at 15 m	75
Loud singing at 1 m	75
Tractor at 15 m	78-95
Busy traffic intersection	80
Electric typewriter	80
Bus or heavy truck at 15 m	88-94
Jackhammer	88-98
Loud shout	90
Freight train at 15 m	95
Modified motorcycle	95
Jet taking off at 600 m	100
Amplified rock music	110
Jet taking off at 60 m	120
Air-raid siren	130

¹ Cottrell, Tom, 1980, *Noise in Alberta*, Table 1, p.8, ECA80 - 16/1B4 (Edmonton: Environment Council of Alberta).

Used with Permission Obtained from the AER Directive 038 (February 2007)

Sound Levels Generated by Common Appliances

Source ²	Sound level at 3 feet (dBA)
Freezer	38-45
Refrigerator	34-53
Electric heater	47
Hair clipper	50
Electric toothbrush	48-57
Humidifier	41-54
Clothes dryer	51-65
Air conditioner	50-67
Electric shaver	47-68
Water faucet	62
Hair dryer	58-64
Clothes washer	48-73
Dishwasher	59-71
Electric can opener	60-70
Food mixer	59-75
Electric knife	65-75
Electric knife sharpener	72
Sewing machine	70-74
Vacuum cleaner	65-80
Food blender	65-85
Coffee mill	75-79
Food waste disposer	69-90
Edger and trimmer	81
Home shop tools	64-95
Hedge clippers	85
Electric lawn mower	80-90

² Reif, Z.F., and P.M. Vermeulen,. 1979. "Noise from domestic appliances, construction, and industry," Table 1, p.166, in Jones, H. W., ed., *Noise in the Human Environment*, vol. 2, ECA79-SP/1 (Edmonton: Environment Council of Alberta).

Appendix C3

Noise Modelling Parameters

Jackfish 1 Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
SG-1320 A	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 B	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 C	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 D	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 E	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 F	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 A	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 B	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 C	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 D	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 E	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 F	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 A	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 B	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 C	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 D	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 E	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 F	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
H-2650 A	Glycol heater casing	Glycol Area	2	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 B	Glycol heater casing	Glycol Area	2	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 A	Glycol heater stack	Glycol Area	7	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 B	Glycol heater stack	Glycol Area	7	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 A	Glycol heater draft fan	Glycol Area	2	Axial fan	20	1	95.2	0.0	95.2
H-2650 B	Glycol heater draft fan	Glycol Area	2	Axial fan	20	1	95.2	0.0	95.2
E-2600 A	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 B	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 C	Glycol coolers (each pair)	Glycol Area	5	Axial Fan	30	2	105.0	0.0	105.0

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
E-2600 D	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 E	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 F	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 G	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 H	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 I	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 J	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 K	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 L	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
	HP BFW pumps	Steam Gen Bldg.	2	Centrifugal	1864	3	112.4	18.8	93.6
	LP BFW booster pumps	Steam Gen Bldg.	2	Centrifugal	336	3	110.2	18.8	91.4
	Disposal injection pump	Water Trt Bldg.	2	Centrifugal	448	2	108.8	18.8	90.0
	Oil products pumps	Water Trt Bldg.	2	Centrifugal	187	2	107.6	18.8	88.8
	Glycol circulation pumps	Glycol Building	2	Centrifugal	93	4	109.7	18.8	90.9
	Eductor supply pump	Disposal Wtr Pmp Bldg.	2	Centrifugal	75	2	106.4	18.8	87.6
	Desand flush pump	Disposal Wtr Pmp Bldg.	2	Centrifugal	75	1	103.4	18.8	84.6
	VRU compressor	VRU Building	2	Reciprocating	200	1	113.9	22.6	91.3
	Transformer 10 MVA	Electrical	5	Transformer	10 MVA	1	96.8	0.0	96.8
	Transformer 6.5 MVA	Electrical	5	Transformer	6.5 MVA	1	92.8	0.0	92.8

Jackfish 1 Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
Glycol heater casing	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater casing	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater stack	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater stack	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater draft fan	96.0	99.0	99.0	96.0	93.0	89.0	86.0	83.0	75.0
Glycol heater draft fan	96.0	99.0	99.0	96.0	93.0	89.0	86.0	83.0	75.0
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
HP BFW pumps	104.6	105.6	106.6	107.6	106.6	108.6	105.6	101.6	95.6
LP BFW booster pumps	102.4	103.4	104.4	105.4	104.4	106.4	103.4	99.4	93.4
Disposal injection pump	101.0	102.0	103.0	104.0	103.0	105.0	102.0	98.0	92.0
Oil products pumps	99.8	100.8	101.8	102.8	101.8	103.8	100.8	96.8	90.8
Glycol circulation pumps	101.9	102.9	103.9	104.9	103.9	105.9	102.9	98.9	92.9
Eductor supply pump	98.6	99.6	100.6	101.6	100.6	102.6	99.6	95.6	89.6
Desand flush pump	95.6	96.6	97.6	98.6	97.6	99.6	96.6	92.6	86.6
VRU compressor	104.0	100.0	105.0	104.0	102.0	105.0	110.0	107.0	100.0
Transformer 10 MVA	93.4	99.4	101.4	96.4	96.4	90.4	85.4	80.4	73.4
Transformer 6.5 MVA	89.4	95.4	97.4	92.4	92.4	86.4	81.4	76.4	69.4

Jackfish 2 Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
SG-1320 A	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 B	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 C	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 D	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 E	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 F	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 A	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 B	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 C	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 D	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 E	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 F	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 A	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 B	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 C	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 D	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 E	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 F	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
H-2650 A	Glycol heater casing	Glycol Area	2	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 B	Glycol heater casing	Glycol Area	2	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 A	Glycol heater stack	Glycol Area	7	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 B	Glycol heater stack	Glycol Area	7	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 A	Glycol heater draft fan	Glycol Area	2	Axial fan	20	1	95.2	0.0	95.2
H-2650 B	Glycol heater draft fan	Glycol Area	2	Axial fan	20	1	95.2	0.0	95.2
E-2600 A	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 B	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 C	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
E-2600 D	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 E	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 F	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 G	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 H	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 I	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 J	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 K	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 L	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
	HP BFW pumps	Steam Gen Bldg.	2	Centrifugal	1864	3	112.4	18.8	93.6
	LP BFW booster pumps	Steam Gen Bldg.	2	Centrifugal	336	3	110.2	18.8	91.4
	Disposal injection pump	Water Trt Bldg.	2	Centrifugal	448	2	108.8	18.8	90.0
	Oil products pumps	Water Trt Bldg.	2	Centrifugal	187	2	107.6	18.8	88.8
	Glycol circulation pumps	Glycol Building	2	Centrifugal	93	4	109.7	18.8	90.9
	Eductor supply pump	Disposal Wtr Pmp Bldg.	2	Centrifugal	75	2	106.4	18.8	87.6
	Desand flush pump	Disposal Wtr Pmp Bldg.	2	Centrifugal	75	1	103.4	18.8	84.6
	VRU compressor	VRU Building	2	Reciprocating	200	1	113.9	22.6	91.3
	Transformer 10 MVA	Electrical	5	Transformer	10 MVA	1	96.8	0.0	96.8
	Transformer 6.5 MVA	Electrical	5	Transformer	6.5 MVA	1	92.8	0.0	92.8

Jackfish 2 Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
Glycol heater casing	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater casing	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater stack	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater stack	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater draft fan	96.0	99.0	99.0	96.0	93.0	89.0	86.0	83.0	75.0
Glycol heater draft fan	96.0	99.0	99.0	96.0	93.0	89.0	86.0	83.0	75.0
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
HP BFW pumps	104.6	105.6	106.6	107.6	106.6	108.6	105.6	101.6	95.6
LP BFW booster pumps	102.4	103.4	104.4	105.4	104.4	106.4	103.4	99.4	93.4
Disposal injection pump	101.0	102.0	103.0	104.0	103.0	105.0	102.0	98.0	92.0
Oil products pumps	99.8	100.8	101.8	102.8	101.8	103.8	100.8	96.8	90.8
Glycol circulation pumps	101.9	102.9	103.9	104.9	103.9	105.9	102.9	98.9	92.9
Eductor supply pump	98.6	99.6	100.6	101.6	100.6	102.6	99.6	95.6	89.6
Desand flush pump	95.6	96.6	97.6	98.6	97.6	99.6	96.6	92.6	86.6
VRU compressor	104.0	100.0	105.0	104.0	102.0	105.0	110.0	107.0	100.0
Transformer 10 MVA	93.4	99.4	101.4	96.4	96.4	90.4	85.4	80.4	73.4
Transformer 6.5 MVA	89.4	95.4	97.4	92.4	92.4	86.4	81.4	76.4	69.4

Jackfish 3 Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
SG-1320 A	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 B	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 C	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 D	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 E	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 F	OTSG casing	Steam Gen Bldg.	3	Boiler	94400	1	101.1	0.0	101.1
SG-1320 A	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 B	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 C	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 D	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 E	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 F	OTSG stack	Steam Gen Bldg.	29	Boiler	94400	1	101.1	0.0	101.1
SG-1320 A	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 B	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 C	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 D	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 E	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
SG-1320 F	OTSG draft fan	Steam Gen Bldg.	5	Axial fan	100	1	99.2	0.0	99.2
H-2650 A	Glycol heater casing	Glycol Area	2	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 B	Glycol heater casing	Glycol Area	2	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 A	Glycol heater stack	Glycol Area	7	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 B	Glycol heater stack	Glycol Area	7	Boiler	1 BHP	1	85.7	0.0	85.7
H-2650 A	Glycol heater draft fan	Glycol Area	2	Axial fan	20	1	95.2	0.0	95.2
H-2650 B	Glycol heater draft fan	Glycol Area	2	Axial fan	20	1	95.2	0.0	95.2
E-2600 A	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 B	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 C	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
E-2600 D	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 E	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 F	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 G	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 H	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 I	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 J	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 K	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
E-2600 L	Glycol coolers (each pair)	Glycol Area	5	Axial fan	30	2	105.0	0.0	105.0
	HP BFW pumps	Steam Gen Bldg.	2	Centrifugal	1864	3	112.4	18.8	93.6
	LP BFW booster pumps	Steam Gen Bldg.	2	Centrifugal	336	3	110.2	18.8	91.4
	Disposal injection pump	Water Trt Bldg.	2	Centrifugal	448	2	108.8	18.8	90.0
	Oil products pumps	Water Trt Bldg.	2	Centrifugal	187	2	107.6	18.8	88.8
	Glycol circulation pumps	Glycol Building	2	Centrifugal	93	4	109.7	18.8	90.9
	Eductor supply pump	Disposal Wtr Pmp Bldg.	2	Centrifugal	75	2	106.4	18.8	87.6
	Desand flush pump	Disposal Wtr Pmp Bldg.	2	Centrifugal	75	1	103.4	18.8	84.6
	VRU compressor	VRU Building	2	Reciprocating	200	1	113.9	22.6	91.3
	Transformer 10 MVA	Electrical	5	Transformer	10 MVA	1	96.8	0.0	96.8
	Transformer 6.5 MVA	Electrical	5	Transformer	6.5 MVA	1	92.8	0.0	92.8
P-010-A/B/C	Group pump	Well pad	3	Centrifugal	400.0	2	108.6	0.0	108.6
P-020	Test pump	Well pad	2	Centrifugal	187.0	1	104.6	10.0	94.6
K-050 A/B	Instrument air compressor	Well pad	3	Reciprocating	22.0	1	104.3	0.0	104.3
	Well-pair (each)	Well pad	2	Piping/valves	N/A	1	88.2	0	88.2

Jackfish 3 Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG casing	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG stack	109.6	108.6	103.6	97.6	96.6	94.6	92.6	92.6	92.6
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
OTSG draft fan	100.0	103.0	103.0	100.0	97.0	93.0	90.0	87.0	79.0
Glycol heater casing	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater casing	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater stack	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater stack	89.0	89.0	88.0	86.0	83.0	80.0	77.0	74.0	71.0
Glycol heater draft fan	96.0	99.0	99.0	96.0	93.0	89.0	86.0	83.0	75.0
Glycol heater draft fan	96.0	99.0	99.0	96.0	93.0	89.0	86.0	83.0	75.0
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
Glycol coolers (each pair)	105.8	108.8	108.8	105.8	102.8	98.8	95.8	92.8	84.8
HP BFW pumps	104.6	105.6	106.6	107.6	106.6	108.6	105.6	101.6	95.6
LP BFW booster pumps	102.4	103.4	104.4	105.4	104.4	106.4	103.4	99.4	93.4
Disposal injection pump	101.0	102.0	103.0	104.0	103.0	105.0	102.0	98.0	92.0
Oil products pumps	99.8	100.8	101.8	102.8	101.8	103.8	100.8	96.8	90.8
Glycol circulation pumps	101.9	102.9	103.9	104.9	103.9	105.9	102.9	98.9	92.9
Eductor supply pump	98.6	99.6	100.6	101.6	100.6	102.6	99.6	95.6	89.6
Desand flush pump	95.6	96.6	97.6	98.6	97.6	99.6	96.6	92.6	86.6
VRU compressor	104.0	100.0	105.0	104.0	102.0	105.0	110.0	107.0	100.0
Transformer 10 MVA	93.4	99.4	101.4	96.4	96.4	90.4	85.4	80.4	73.4
Transformer 6.5 MVA	89.4	95.4	97.4	92.4	92.4	86.4	81.4	76.4	69.4
Group pump	100.8	101.8	102.8	103.8	102.8	104.8	101.8	97.8	91.8
Test pump	86.8	87.8	88.8	89.8	88.8	90.8	87.8	83.8	77.8
Instrument air compressor	94.4	90.4	95.4	94.4	92.4	95.4	100.4	97.4	90.4
Well-pair (each)	85.0	79.7	81.3	72.4	78.8	78.8	81.5	83.5	79.6

STF Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
Blend booster pump	TSF Site	2	Centrifugal	261	1	104.4	0	104.4
Blend booster pump	TSF Site	2	Centrifugal	261	1	104.4	0	104.4
Blend booster pump	TSF Site	2	Centrifugal	261	1	104.4	0	104.4
Diluent booster pump	TSF Site	2	Centrifugal	186	1	104.8	0	104.8
Diluent booster pump	TSF Site	2	Centrifugal	186	1	104.8	0	104.8
Diluent booster pump	TSF Site	2	Centrifugal	186	1	104.8	0	104.8

STF Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Blend booster pump	93.8	94.8	95.8	97.8	97.8	100.8	97.8	93.8	87.8
Blend booster pump	93.8	94.8	95.8	97.8	97.8	100.8	97.8	93.8	87.8
Blend booster pump	93.8	94.8	95.8	97.8	97.8	100.8	97.8	93.8	87.8
Diluent booster pump	94.2	95.2	96.2	98.2	98.2	101.2	98.2	94.2	88.2
Diluent booster pump	94.2	95.2	96.2	98.2	98.2	101.2	98.2	94.2	88.2
Diluent booster pump	94.2	95.2	96.2	98.2	98.2	101.2	98.2	94.2	88.2

Pike 1 Phase 1a/1b Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
AG-3180 A	Oil removal filter agitator	BU-3000	2	Motor	44.7	1	103.0	19.3	83.7
AG-3180 B	Oil removal filter agitator	BU-3000	2	Motor	44.7	1	103.0	19.3	83.7
AG-3180 C	Oil removal filter agitator	BU-3000	2	Motor	44.7	1	103.0	19.3	83.7
AG-3340 A	Lime softener filter agitator	BU-3000	2	Motor	44.7	1	103.0	19.3	83.7
AG-3340 B	Lime softener filter agitator	BU-3000	2	Motor	44.7	1	103.0	19.3	83.7
AG-3340 C	Lime softener filter agitator	BU-3000	2	Motor	44.7	1	103.0	19.3	83.7
E-2600 A	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 B	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 C	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 D	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 E	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 F	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 G	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 H	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 J	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 K	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 L	Glycol aerial cooler	Glycol Area	7.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
GE-1650 A/B	Emergency generator	BU-1650	4	Diesel Genset	1500.0	1	122.1	15.8	106.3
H-2650 A	Glycol trim heater stack	Glycol Area	6.7	Heater	933 BHP	1	97.6	0.0	97.6
K-2650 A	Glycol trim heater combustion air blower	Glycol Area	3	Blower Fan	44.7	1	99.4	0.0	99.4
H-2650 B	Glycol trim heater stack	Glycol Area	6.7	Heater	933 BHP	1	97.6	0.0	97.6
K-2650 B	Glycol trim heater combustion air blower	Glycol Area	3	Blower Fan	44.7	1	99.4	0.0	99.4
K-2700 A	SRU gas compressor	BU-2710	2	Reciprocating	59.7	1	108.7	22.6	86.1
K-2700 B	SRU gas compressor	BU-2720	2	Reciprocating	59.7	1	108.7	22.6	86.1
K-2700 C	SRU gas compressor	BU-2730	2	Reciprocating	59.7	1	108.7	22.6	86.1
P-1100 A	LP BFW pump	BU-1000	2	Centrifugal	596.8	1	106.1	18.8	87.3
P-1100 B	LP BFW pump	BU-1000	2	Centrifugal	596.8	1	106.1	18.8	87.3
P-1100 C	LP BFW pump	BU-1000	2	Centrifugal	596.8	1	106.1	18.8	87.3
P-1110 A	Backwash regen pump	BU-1000	2	Centrifugal	93.0	1	103.7	18.8	84.9
P-1110 B	Backwash regen pump	BU-1000	2	Centrifugal	93.0	1	103.7	18.8	84.9
P-1110 C	Backwash regen pump	BU-1000	2	Centrifugal	93.0	1	103.7	18.8	84.9
P-1170 A	HP BFW pump	BU-1000	2	Centrifugal	2237.0	1	107.8	18.8	89.0

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
P-1170 B	HP BFW pump	BU-1000	2	Centrifugal	2237.0	1	107.8	18.8	89.0
P-1170 C	HP BFW pump	BU-1000	2	Centrifugal	2237.0	1	107.8	18.8	89.0
P-1800 A/B	Utility BFW pumps	BU-1000	2	Centrifugal	30.0	2	105.2	18.8	86.4
P-2190	FWKO interface recycle pump	BU-2000	2	Centrifugal	55.0	1	103.0	18.8	84.2
P-2240	HP liquids relief pump	BU-2000	2	Centrifugal	11.1	1	100.9	18.8	82.1
P-2600 A	Glycol circulation pump	BU-2040	2	Centrifugal	298.4	1	105.2	18.8	86.4
P-2600 B	Glycol circulation pump	BU-2040	2	Centrifugal	298.4	1	105.2	18.8	86.4
P-2600 C	Glycol circulation pump	BU-2040	2	Centrifugal	298.4	1	105.2	18.8	86.4
P-3100 A/B	Recycle tank pumps	BU-3000	2	Centrifugal	22.0	2	104.8	18.8	86.0
P-3120 A/B	Skim oil pumps	BU-1000	2	Centrifugal	14.9	2	104.3	18.8	85.5
P-3140 A	IGF eductor supply pump	Near BU-3040	2	Centrifugal	75.0	1	103.4	0.0	103.4
P-3140 B	IGF eductor supply pump	Near BU-3040	2	Centrifugal	75.0	1	103.4	0.0	103.4
P-3160 A	IGF discharge pump	Near BU-3040	2	Centrifugal	93.3	1	103.7	0.0	103.7
P-3160 B	IGF discharge pump	Near BU-3040	2	Centrifugal	93.3	1	103.7	0.0	103.7
P-3160 C	IGF discharge pump	Near BU-3040	2	Centrifugal	93.3	1	103.7	0.0	103.7
P-3170 A/B	IGF Froth pumps	BU-3000	2	Centrifugal	14.9	2	104.3	18.8	85.5
P-3190 A/B	HLS feed pumps	BU-3020	2	Centrifugal	112.0	2	107.0	18.8	88.2
P-3220 A/B	Sludge pumps	BU-3000	2	Centrifugal	22.4	2	104.9	18.8	86.1
P-3380 A	WAC feed pump	BU-3000	2	Centrifugal	186.5	1	104.6	18.8	85.8
P-3380 B	WAC feed pump	BU-3000	2	Centrifugal	186.5	1	104.6	18.8	85.8
P-3380 C	WAC feed pump	BU-3000	2	Centrifugal	186.5	1	104.6	18.8	85.8
P-3390 A/B/C	Neutralized waste pumps	BU-3000	2	Centrifugal	14.9	3	106.1	18.8	87.3
P-3460 A/B	Lime slurry pumps	BU-3000	2	Centrifugal	29.8	2	105.2	18.8	86.4
P-3480 A/B	Magox slurry pumps	BU-3000	2	Centrifugal	29.8	2	105.2	18.8	86.4
P-3590 A	Disposal water injection pump	BU-4020	2	Centrifugal	149.0	1	104.3	18.8	85.5
P-3590 B	Disposal water injection pump	BU-4020	2	Centrifugal	149.0	1	104.3	18.8	85.5
P-3740 A/B	Sludge transfer pumps	BU-3000	2	Centrifugal	22.4	2	104.9	18.8	86.1
P-3770 A/B/C	Blowdown water booster pumps	BU-1000	2	Centrifugal	22.5	3	106.6	18.8	87.8
P-3780 A	Blowdown water injection pump	BU-1000	2	Centrifugal	336.0	1	105.4	18.8	86.6
P-3780 B	Blowdown water injection pump	BU-1000	2	Centrifugal	336.0	1	105.4	18.8	86.6
P-3800 A/B	Slop oil pumps	BU-3040	2	Centrifugal	30.0	2	105.2	18.8	86.4
P-4110 A/B/C	Dilbit recycle pumps	BU-4400	2	Centrifugal	74.5	3	108.2	18.8	89.4

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
P-4130 A	Diluent supply pump	BU-4400	2	Centrifugal	223.8	1	104.8	18.8	86.0
P-4130 B	Diluent supply pump	BU-4400	2	Centrifugal	223.8	1	104.8	18.8	86.0
P-4400 A	Shipping booster pumps	BU-4400	2	Centrifugal	261.0	1	105.0	18.8	86.2
P-4400 B	Shipping booster pumps	BU-4400	2	Centrifugal	261.0	1	105.0	18.8	86.2
P-4400 C	Shipping booster pumps	BU-4400	2	Centrifugal	261.0	1	105.0	18.8	86.2
P-8250	Flash treater recycle pump	BU-8240	2	Centrifugal	18.6	1	101.6	18.8	82.8
P-8260	Dilbit transfer pump	BU-8240	2	Centrifugal	22.4	1	101.9	18.8	83.1
P-8430 A	Blowdown pond pump	Pond	2	Centrifugal	30.0	1	102.2	0.0	102.2
P-8430 B	Blowdown pond pump	Pond	2	Centrifugal	30.0	1	102.2	0.0	102.2
P-8430 C	Blowdown pond pump	Pond	2	Centrifugal	30.0	1	102.2	0.0	102.2
P-8900 A/B/C	Gas boot sales oil pump	BU-8900	2	Centrifugal	93.0	3	108.5	18.8	89.7
P-8920 A/B	Light hydrocarbon recycle pump	BU-8900	2	Centrifugal	75.0	2	106.4	18.8	87.6
K-1600 A	Instrument air compressor	BU-1600	3	Reciprocating	1311.2	1	122.1	22.6	99.5
K-1600 B	Instrument air compressor	BU-1600	3	Reciprocating	1311.2	1	122.1	22.6	99.5
PK-3740	Sludge centrifuge	BU-3000	2	Centrifuge	103.7	1	106.7	19.3	87.4
H-8240A	Flash treater heater stack	BU-8240	8.5	Heater	210 BHP	1	95.0	0.0	95.0
H-8240A	Flash treater heater stack	BU-8240	8.5	Heater	210 BHP	1	95.0	0.0	95.0
K-8600 A	VRU Compressor	BU-8600	3	Reciprocating	318.4	1	115.9	22.6	93.3
K-8800 A	Gas boot compressor	BU-8800	2	Reciprocating	150.0	2	115.7	22.6	93.1
SG-1320 A	HP steam generator stack	BU-1000	27	Heater	92500.0	1	101.0	0.0	101.0
K-1350 A	OTSG combustion air blower	BU-1000	3	Blower fan	261.0	1	101.4	0.0	101.4
MU-1000 A	Steam gen bldg. air make-up unit	BU-1000	12	Make-up fan	30.0	1	98.0	0.0	98.0
SG-1320 B	HP steam generator stack	BU-1000	27	Heater	92500.0	1	101.0	0.0	101.0
K-1350 B	OTSG combustion air blower	BU-1000	3	Blower fan	261.0	1	101.4	0.0	101.4
MU-1000 B	Steam gen bldg. air make-up unit	BU-1000	12	Make-up fan	30.0	1	98.0	0.0	98.0
SG-1320 C	HP steam generator stack	BU-1000	27	Heater	92500.0	1	101.0	0.0	101.0
K-1350 C	OTSG combustion air blower	BU-1000	3	Blower fan	261.0	1	101.4	0.0	101.4
MU-1000 C	Steam gen bldg. air make-up unit	BU-1000	12	Make-up fan	30.0	1	98.0	0.0	98.0

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
SG-1320 D	HP steam generator stack	BU-1000	27	Heater	92500.0	1	101.0	0.0	101.0
K-1350 D	OTSG combustion air blower	BU-1000	3	Blower fan	261.0	1	101.4	0.0	101.4
MU-1000 D	Steam gen bldg. air make-up unit	BU-1000	12	Make-up fan	30.0	1	98.0	0.0	98.0
SG-1320 E	HP steam generator stack	BU-1000	27	Heater	92500.0	1	101.0	0.0	101.0
K-1350 E	OTSG combustion air blower	BU-1000	3	Blower fan	261.0	1	101.4	0.0	101.4
MU-1000 E	Steam gen bldg. air make-up unit	BU-1000	12	Make-up fan	30.0	1	98.0	0.0	98.0
SG-1320 F	HP steam generator stack	BU-1000	27	Heater	92500.0	1	101.0	0.0	101.0
K-1350 F	OTSG combustion air blower	BU-1000	3	Blower fan	261.0	1	101.4	0.0	101.4
MU-1000 F	Steam gen bldg. air make-up unit	BU-1000	12	Make-up fan	30.0	1	98.0	0.0	98.0
n/a	Transformer	Substation	4	Transformer	42.0	1	101.2	0.0	101.2
n/a	Transformer	Substation	4	Transformer	42.0	1	101.2	0.0	101.2
n/a	Transformer	Substation	4	Transformer	42.0	1	101.2	0.0	101.2
	Overall well pad (typical 10 wellpairs)	Well pad	3	n/a	n/a	1	111.3	0	110.4

Pike 1 Phase 1a/1b Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Oil removal filter agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Oil removal filter agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Oil removal filter agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Lime softener filter agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Lime softener filter agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Lime softener filter agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol aerial cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Emergency generator	115.8	115.8	120.8	123.8	118.8	116.8	113.8	107.8	101.8
Glycol trim heater stack	100.9	100.9	99.9	97.9	94.9	91.9	88.9	85.9	82.9
Glycol trim heater combustion air blower	100.2	103.2	103.2	100.2	97.2	93.2	90.2	87.2	79.2
Glycol trim heater stack	100.9	100.9	99.9	97.9	94.9	91.9	88.9	85.9	82.9
Glycol trim heater combustion air blower	100.2	103.2	103.2	100.2	97.2	93.2	90.2	87.2	79.2
SRU gas compressor	98.8	94.8	99.8	98.8	96.8	99.8	104.8	101.8	94.8
SRU gas compressor	98.8	94.8	99.8	98.8	96.8	99.8	104.8	101.8	94.8
SRU gas compressor	98.8	94.8	99.8	98.8	96.8	99.8	104.8	101.8	94.8
LP BFW pump	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
LP BFW pump	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
LP BFW pump	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
Backwash regen pump	95.9	96.9	97.9	98.9	97.9	99.9	96.9	92.9	86.9
Backwash regen pump	95.9	96.9	97.9	98.9	97.9	99.9	96.9	92.9	86.9
Backwash regen pump	95.9	96.9	97.9	98.9	97.9	99.9	96.9	92.9	86.9
LP BFW pump	100.0	101.0	102.0	103.0	102.0	104.0	101.0	97.0	91.0
LP BFW pump	100.0	101.0	102.0	103.0	102.0	104.0	101.0	97.0	91.0
LP BFW pump	100.0	101.0	102.0	103.0	102.0	104.0	101.0	97.0	91.0
Utility BFW pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
FWKO interface recycle pump	95.2	96.2	97.2	98.2	97.2	99.2	96.2	92.2	86.2
HP liquids relief pump	93.1	94.1	95.1	96.1	95.1	97.1	94.1	90.1	84.1
Glycol circulation pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Glycol circulation pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Glycol circulation pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Recycle tank pumps	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Skim oil pumps	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
IGF eductor supply pump	95.6	96.6	97.6	98.6	97.6	99.6	96.6	92.6	86.6
IGF eductor supply pump	95.6	96.6	97.6	98.6	97.6	99.6	96.6	92.6	86.6
IGF discharge pump	95.9	96.9	97.9	98.9	97.9	99.9	96.9	92.9	86.9

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
IGF discharge pump	95.9	96.9	97.9	98.9	97.9	99.9	96.9	92.9	86.9
IGF discharge pump	95.9	96.9	97.9	98.9	97.9	99.9	96.9	92.9	86.9
IGF froth pumps	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
HLS feed pumps	99.2	100.2	101.2	102.2	101.2	103.2	100.2	96.2	90.2
Sludge pumps	97.1	98.1	99.1	100.1	99.1	101.1	98.1	94.1	88.1
WAC feed pump	96.8	97.8	98.8	99.8	98.8	100.8	97.8	93.8	87.8
WAC feed pump	96.8	97.8	98.8	99.8	98.8	100.8	97.8	93.8	87.8
WAC Feed Pump	96.8	97.8	98.8	99.8	98.8	100.8	97.8	93.8	87.8
Neutralized waste pumps	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
Lime slurry pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Magox slurry pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Disposal water injection pump	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
Disposal water injection pump	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
Sludge transfer pumps	97.1	98.1	99.1	100.1	99.1	101.1	98.1	94.1	88.1
Blowdown water booster pumps	98.8	99.8	100.8	101.8	100.8	102.8	99.8	95.8	89.8
Blowdown water injection pump	97.6	98.6	99.6	100.6	99.6	101.6	98.6	94.6	88.6
Blowdown water injection pump	97.6	98.6	99.6	100.6	99.6	101.6	98.6	94.6	88.6
Slop oil pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Dilbit recycle pumps	100.4	101.4	102.4	103.4	102.4	104.4	101.4	97.4	91.4
Diluent supply pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Diluent supply pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Shipping booster pumps	97.2	98.2	99.2	100.2	99.2	101.2	98.2	94.2	88.2
Shipping booster pumps	97.2	98.2	99.2	100.2	99.2	101.2	98.2	94.2	88.2
Shipping booster pumps	97.2	98.2	99.2	100.2	99.2	101.2	98.2	94.2	88.2
Flash treater recycle pump	93.8	94.8	95.8	96.8	95.8	97.8	94.8	90.8	84.8
Dilbit transfer pump	94.1	95.1	96.1	97.1	96.1	98.1	95.1	91.1	85.1
Blowdown pond pump	94.4	95.4	96.4	97.4	96.4	98.4	95.4	91.4	85.4
Blowdown pond pump	94.4	95.4	96.4	97.4	96.4	98.4	95.4	91.4	85.4
Blowdown pond pump	94.4	95.4	96.4	97.4	96.4	98.4	95.4	91.4	85.4
Gas boot sales oil pump	100.7	101.7	102.7	103.7	102.7	104.7	101.7	97.7	91.7
Light hydrocarbon recycle pump	98.6	99.6	100.6	101.6	100.6	102.6	99.6	95.6	89.6
Instrument air compressor	112.2	108.2	113.2	112.2	110.2	113.2	118.2	115.2	108.2
Instrument air compressor	112.2	108.2	113.2	112.2	110.2	113.2	118.2	115.2	108.2
Sludge centrifuge	94.0	94.0	97.0	99.0	102.0	102.0	101.0	96.0	88.0
Flash treater heater stack	98.3	98.3	97.3	95.3	92.3	89.3	86.3	83.3	80.3
Flash treater heater stack	98.3	98.3	97.3	95.3	92.3	89.3	86.3	83.3	80.3
VRU compressor	106.0	102.0	107.0	106.0	104.0	107.0	112.0	109.0	102.0
Gas boot compressor	105.8	101.8	106.8	105.8	103.8	106.8	111.8	108.8	101.8
HP Steam generator stack	109.5	108.5	103.5	97.5	96.5	94.5	92.5	92.5	92.5
OTSG combustion air blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
Steam gen bldg. air make-up unit	98.8	101.8	101.8	98.8	95.8	91.8	88.8	85.8	77.8
HP steam generator stack	109.5	108.5	103.5	97.5	96.5	94.5	92.5	92.5	92.5
OTSG combustion air blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Steam gen bldg. air make-up unit	98.8	101.8	101.8	98.8	95.8	91.8	88.8	85.8	77.8
HP steam generator stack	109.5	108.5	103.5	97.5	96.5	94.5	92.5	92.5	92.5
OTSG combustion air blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
Steam gen bldg. air make-up unit	98.8	101.8	101.8	98.8	95.8	91.8	88.8	85.8	77.8
HP steam generator stack	109.5	108.5	103.5	97.5	96.5	94.5	92.5	92.5	92.5
OTSG combustion air blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
Steam gen bldg. air make-up unit	98.8	101.8	101.8	98.8	95.8	91.8	88.8	85.8	77.8
HP steam generator stack	109.5	108.5	103.5	97.5	96.5	94.5	92.5	92.5	92.5
OTSG combustion air blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
Steam gen bldg. air make-up unit	98.8	101.8	101.8	98.8	95.8	91.8	88.8	85.8	77.8
HP steam generator stack	109.5	108.5	103.5	97.5	96.5	94.5	92.5	92.5	92.5
OTSG combustion air blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
Steam gen bldg. air make-up unit	98.8	101.8	101.8	98.8	95.8	91.8	88.8	85.8	77.8
Transformer	100.8	103.8	105.8	100.8	100.8	94.8	89.8	84.8	77.8
Transformer	100.8	103.8	105.8	100.8	100.8	94.8	89.8	84.8	77.8
Transformer	100.8	103.8	105.8	100.8	100.8	94.8	89.8	84.8	77.8
Overall well pad (typical 10 wellpairs)	102.7	102.5	103.9	104.5	103.5	105.5	104.5	101.5	95.6

Jackfish Project Area Pad Expansion Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
P-010	API 610 Centrifugal pump	Well pad	2	Centrifugal	149.0	1	104.3	0.0	104.3
P-011	Seal Flush Barrier Fluid Pump	Well pad	1	Centrifugal	2.3	1	98.9	0.0	98.9
E-011	Seal Flush Barrier Fluid Aerial Cooler	Well pad	2	Aerial Cooler	4.0	1	94.0	0.0	94.0
PK-050	Air compressor	Well pad	1	Reciprocating	11.2	1	101.4	22.6	78.8
P-350	Methanol injection pump (< 5 HP)	Well pad	1	Centrifugal	0.8	1	97.4	0.0	97.4
SF-110	Electrical Room Supply Fan	Well pad	3	Fan	0.3	1	84.4	0.0	84.4
SF-111	Electrical Room Supply Fan	Well pad	3	Fan	1.5	1	90.6	0.0	90.6
EF-112	Instrument Air Room Exhaust Fan	Well pad	3	Fan	0.3	1	84.4	0.0	84.4
EF-113	Instrument Air Room Exhaust Fan	Well pad	3	Fan	1.1	1	89.6	0.0	89.6
	Well-pair (each)	Well pad	2	Piping / Valves	N/A	6	96.0	0	96.0

Jackfish Project Area Pad Expansion Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
API 610 Centrifugal pump	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
Seal Flush Barrier Fluid Pump	91.1	92.1	93.1	94.1	93.1	95.1	92.1	88.1	82.1
Seal Flush Barrier Fluid Aerial Cooler	94.8	97.8	97.8	94.8	91.8	87.8	84.8	81.8	73.8
Air compressor	91.5	87.5	92.5	91.5	89.5	92.5	97.5	94.5	87.5
Methanol injection pump (< 5 HP)	89.6	90.6	91.6	92.6	91.6	93.6	90.6	86.6	80.6
Electrical Room Supply Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Electrical Room Supply Fan	91.4	94.4	94.4	91.4	88.4	84.4	81.4	78.4	70.4
Instrument Air Room Exhaust Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Instrument Air Room Exhaust Fan	90.4	93.4	93.4	90.4	87.4	83.4	80.4	77.4	69.4
Well-pair (each)	92.8	87.5	89.1	80.2	86.6	86.6	89.3	91.3	87.4

Pike 2 Project Noise Source Sound Power Levels (Re 10⁻¹² Watts)

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
AG-3180 A	Oil Removal Filter Agitator	BU-3020	5	Motor	44.7	1	103.0	19.3	83.7
AG-3180 B	Oil Removal Filter Agitator	BU-3020	5	Motor	44.7	1	103.0	19.3	83.7
AG-3180 C	Oil Removal Filter Agitator	BU-3020	5	Motor	44.7	1	103.0	19.3	83.7
AG-3340 A	Lime Softener Filter Agitator	BU-3000	5	Motor	44.7	1	103.0	19.3	83.7
AG-3340 B	Lime Softener Filter Agitator	BU-3000	5	Motor	44.7	1	103.0	19.3	83.7
AG-3340 C	Lime Softener Filter Agitator	BU-3000	5	Motor	44.7	1	103.0	19.3	83.7
E-2600 A	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 B	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 C	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 D	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 E	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 F	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 G	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 H	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 J	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 K	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
E-2600 L	Glycol Aerial Cooler	Glycol	4.5	Aerial Cooler	37.0	2	104.8	0.0	104.8
GE-1650 A	Emergency Generator	BU-1650	4	Diesel Genset	1500.0	1	122.1	15.8	106.3
GE-1650 B	Emergency Generator	BU-1650	4	Diesel Genset	1500.0	1	122.1	15.8	106.3
EF-1650 A	Emergency Generator Building Exhaust Fan	BU-1650	4	Exhaust Fan	0.3	1	84.4	0.0	84.4
EF-1650 B	Emergency Generator Building Exhaust Fan	BU-1650	4	Exhaust Fan	0.3	1	84.4	0.0	84.4
EF-1651 A	Emergency Generator Building Exhaust Fan	BU-1650	4	Exhaust Fan	0.2	1	83.4	0.0	83.4
EF-1651 B	Emergency Generator Building Exhaust Fan	BU-1650	4	Exhaust Fan	0.2	1	83.4	0.0	83.4
H-2650 A	Glycol Trim Heater	Glycol	6.7	Heater	1020 BHP	1	97.7	0.0	97.7
K-2650 A	Glycol Trim Heater Combustion Air Blower	Glycol	3	Blower Fan	44.7	1	99.4	0.0	99.4
H-2650 B	Glycol Trim Heater	Glycol	6.7	Heater	1020 BHP	1	97.7	0.0	97.7
K-2650 B	Glycol Trim Heater Combustion Air Blower	Glycol	3	Blower Fan	44.7	1	99.4	0.0	99.4
SG-1320 A	OTSG 1 Stack	BU-1000	28.3	Heater	84300.0	1	100.4	0.0	100.4
K-1350 A	OTSG Combustion Air Blower	BU-1000	3	Blower Fan	261.0	1	101.4	0.0	101.4

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
K-1330 A	OTSG 'A/C/E' CO Monitor Purge Air Blower	BU-1000	7	Blower Fan	0.8	1	85.2	0.0	85.2
K-1360 A	Scanner Cooling Air Blower	BU-1000	7	Blower Fan	3.2	1	90.2	0.0	90.2
SG-1320 B	OTSG 2 Stack	BU-1000	28.3	Heater	84300.0	1	100.4	0.0	100.4
K-1350 B	OTSG Combustion Air Blower	BU-1000	3	Blower Fan	261.0	1	101.4	0.0	101.4
K-1340 B	OTSG 'A/C/E' NOx Monitor Purge Air Blower	BU-1000	7	Blower Fan	0.8	1	85.2	0.0	85.2
K-1360 B	Scanner Cooling Air Blower	BU-1000	7	Blower Fan	3.2	1	90.2	0.0	90.2
SG-1320 C	OTSG 3 Stack	BU-1000	28.3	Heater	84300.0	1	100.4	0.0	100.4
K-1350 C	OTSG Combustion Air Blower	BU-1000	3	Blower Fan	261.0	1	101.4	0.0	101.4
K-1330 C	OTSG 'A/C/E' CO Monitor Purge Air Blower	BU-1000	7	Blower Fan	0.8	1	85.2	0.0	85.2
K-1360 C	Scanner Cooling Air Blower	BU-1000	7	Blower Fan	3.2	1	90.2	0.0	90.2
SG-1320 D	OTSG 4 Stack	BU-1000	28.3	Heater	84300.0	1	100.4	0.0	100.4
K-1350 D	OTSG Combustion Air Blower	BU-1000	3	Blower Fan	261.0	1	101.4	0.0	101.4
K-1340 D	OTSG 'A/C/E' NOx Monitor Purge Air Blower	BU-1000	7	Blower Fan	0.8	1	85.2	0.0	85.2
K-1360 D	Scanner Cooling Air Blower	BU-1000	7	Blower Fan	3.2	1	90.2	0.0	90.2
SG-1320 E	OTSG 5 Stack	BU-1000	28.3	Heater	84300.0	1	100.4	0.0	100.4
K-1330 E	OTSG 'A/C/E' CO Monitor Purge Air Blower	BU-1000	7	Blower Fan	261.0	1	101.4	0.0	101.4
K-1350 E	OTSG Combustion Air Blower	BU-1000	3	Blower Fan	0.8	1	85.2	0.0	85.2
K-1360 E	Scanner Cooling Air Blower	BU-1000	7	Blower Fan	3.2	1	90.2	0.0	90.2
SG-1320 F	OTSG 6 Stack	BU-1000	28.3	Heater	84300.0	1	100.4	0.0	100.4
K-1350 F	OTSG Combustion Air Blower	BU-1000	3	Blower Fan	261.0	1	101.4	0.0	101.4
K-1340 F	OTSG 'A/C/E' NOx Monitor Purge Air Blower	BU-1000	7	Blower Fan	0.8	1	85.2	0.0	85.2
K-1360 F	Scanner Cooling Air Blower	BU-1000	7	Blower Fan	3.2	1	90.2	0.0	90.2
MU-1000 A	Steam Gen Bldg. Air Make-Up Unit	BU-1000	7	Fan	30.0	1	101.0	0.0	101.0
MU-1000 B	Steam Gen Bldg. Air Make-Up Unit	BU-1000	7	Fan	30.0	1	101.0	0.0	101.0
MU-1000 C	Steam Gen Bldg. Air Make-Up Unit	BU-1000	7	Fan	30.0	1	101.0	0.0	101.0
MU-1000 D	Steam Gen Bldg. Air Make-Up Unit	BU-1000	7	Fan	30.0	1	101.0	0.0	101.0
MU-1000 E	Steam Gen Bldg. Air Make-Up Unit	BU-1000	7	Fan	30.0	1	101.0	0.0	101.0

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
MU-1000 F	Steam Gen Bldg. Air Make-Up Unit	BU-1000	7	Fan	30.0	1	101.0	0.0	101.0
SF-1000 A	Steam Generation Bldg. Supply Fan	BU-1000	6.7	Fan	1.4	1	90.4	0.0	90.4
SF-1000 B	Steam Generation Bldg. Supply Fan	BU-1000	6.7	Fan	1.4	1	90.4	0.0	90.4
SF-1000 C	Steam Generation Bldg. Supply Fan	BU-1000	6.7	Fan	1.4	1	90.4	0.0	90.4
SF-1000 D	Steam Generation Bldg. Supply Fan	BU-1000	6.7	Fan	1.4	1	90.4	0.0	90.4
SF-1000 E	Steam Generation Bldg. Supply Fan	BU-1000	6.7	Fan	1.4	1	90.4	0.0	90.4
SF-1000 F	Steam Generation Bldg. Supply Fan	BU-1000	6.7	Fan	1.4	1	90.4	0.0	90.4
EF-1000 A	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
EF-1000 B	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
EF-1000 C	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
EF-1000 D	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
EF-1000 E	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
EF-1000 F	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
EF-1000 G	Steam Generation Bldg. Annex Exhaust Fan	BU-1000	5	Exhaust Fan	2.2	1	91.9	0.0	91.9
AHU-1010	MCC Bldg. Air Handling Unit	BU-1010	5	Fan	15.0	1	98.6	0.0	98.6
GT-1200	Gas Turbine Inlet	BU-1200	4	Gas Turbine	35900	1	103.5	0.0	103.5
GT-1200	Gas Turbine Casing	BU-1200	4	Gas Turbine	35900	1	107.4	0.0	107.4
GT-1200	Gas Turbine Generator	BU-1200	3	Gas Turbine	35900	1	108.4	0.0	108.4
H-1900	HRSO Stack	BU-1900	30	Gas Turbine	35900	1	115.2	0.0	115.2
E-1200	GTG Glycol Aerial Cooler	BU-1200	4	Aerial Cooler	15.0	1	98.6	0.0	98.6
P-1900A	HRSO HP BFW Pumps	BU-1900	2	Centrifugal	1118.6	1	106.9	18.8	88.1
P-1900B	HRSO HP BFW Pumps	BU-1900	2	Centrifugal	1118.6	1	106.9	18.8	88.1
P-1100 A	LP BFW Pump	BU-1000	2	Centrifugal	596.8	1	106.1	18.8	87.3
P-1100 B	LP BFW Pump	BU-1000	2	Centrifugal	596.8	1	106.1	18.8	87.3
P-1100 C	LP BFW Pump	BU-1000	2	Centrifugal	596.8	1	106.1	18.8	87.3
P-1110 A/B/C	Backwash Regen Pumps	BU-1000	2	Centrifugal	93.0	3	108.5	18.8	89.7
P-1170 A	HP BFW Pump	BU-1000	2	Centrifugal	2610.0	1	108.0	18.8	89.2
P-1170 B	HP BFW Pump	BU-1000	2	Centrifugal	2610.0	1	108.0	18.8	89.2

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
P-1170 C	HP BFW Pump	BU-1000	2	Centrifugal	2610.0	1	108.0	18.8	89.2
P-1800 A/B	Utility BFW Pumps	BU-1000	2	Centrifugal	30.0	2	105.2	18.8	86.4
P-2190	FWKO Interface Recycle Pump	BU-2000	2	Centrifugal	55.0	1	103.0	18.8	84.2
P-2240	HP Liquids Relief Pump	BU-2000	2	Centrifugal	11.1	1	100.9	18.8	82.1
P-2600 A	Glycol Circulation Pump	BU-2040	2	Centrifugal	410.0	1	105.6	18.8	86.8
P-2600 B	Glycol Circulation Pump	BU-2040	2	Centrifugal	410.0	1	105.6	18.8	86.8
P-2600 C	Glycol Circulation Pump	BU-2040	2	Centrifugal	410.0	1	105.6	18.8	86.8
EF-2000 A	Process Building Exhaust Fan	BU-2000	0.7	Exhaust Fan	0.9	1	88.9	0.0	88.9
EF-2000 B	Process Building Exhaust Fan	BU-2000	1.27	Exhaust Fan	0.9	1	88.9	0.0	88.9
EF-2010 A	Process Building Exhaust Fan	BU-2000	5.7	Exhaust Fan	0.7	1	88.2	0.0	88.2
EF-2010 B	Process Building Exhaust Fan	BU-2000	3.55	Exhaust Fan	0.7	1	88.2	0.0	88.2
EF-2010 C	Process Building Exhaust Fan	BU-2000	4.2	Exhaust Fan	0.7	1	88.2	0.0	88.2
EF-2005 A	Process Building Sample Skid Exhaust Fan	BU-2000	0.5	Exhaust Fan	0.7	1	88.2	0.0	88.2
EF-2005 B	Process Building Sample Skid Exhaust Fan	BU-2000	0.5	Exhaust Fan	0.7	1	88.2	0.0	88.2
EF-2005 C	Process Building Sample Skid Exhaust Fan	BU-2000	0.5	Exhaust Fan	0.7	1	88.2	0.0	88.2
EF-2005 D	Process Building Sample Skid Exhaust Fan	BU-2000	0.5	Exhaust Fan	0.7	1	88.2	0.0	88.2
SF-2040	Glycol Building Fan	BU-2040	3.56	Exhaust Fan	0.1	1	81.5	0.0	81.5
SF-2045 A	Glycol Building Fan	BU-2040	3.57	Exhaust Fan	0.7	1	87.9	0.0	87.9
SF-2045 B	Glycol Building Fan	BU-2040	3.57	Exhaust Fan	0.7	1	87.9	0.0	87.9
P-2330 A/B	Field Gas Condensate Recycle Pumps	BU-2000	2	Centrifugal	29.8	2	105.2	18.8	86.4
EF-2810 A	SRU Building Exhaust Fan	BU-2810	4	Exhaust Fan	0.6	1	87.2	0.0	87.2
EF-2810 B	SRU Building Exhaust Fan	BU-2810	4	Exhaust Fan	0.6	1	87.2	0.0	87.2
K-2900	DRU Compressor	BU-2900	2	Reciprocating	746.0	1	119.6	22.6	97.0
P-2900 A/B	DRU Pumps	BU-2900	2	Centrifugal	11.0	2	103.9	18.8	85.1
P-3100 A/B	Recycle Tank Pumps	BU-3040	2	Centrifugal	22.0	2	104.8	18.8	86.0
P-3120 A/B	Skim Oil Pumps	BU-3040	2	Centrifugal	14.9	2	104.3	18.8	85.5
P-3140 A/B	IGF Eductor Supply Pump	Near BU-3040	5	Centrifugal	75.0	2	106.4	0.0	106.4
P-3160 A/B/C	IGF Discharge Pumps	BU-3040	5	Centrifugal	93.3	3	108.5	18.8	89.7
P-3170 A/B	IGF Froth Pumps	BU-3040	2	Centrifugal	14.9	2	104.3	18.8	85.5

Tag	Description	Location	Height (m)	Model/ Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
P-3190 A/B/C	HLS Feed Pumps	BU-3020	2	Centrifugal	134.0	3	109.0	18.8	90.2
P-3220 A/B	Sludge Pumps	BU-3000	2	Centrifugal	22.4	2	104.9	18.8	86.1
P-3380 A	WAC Feed Pump	BU-3000	2	Centrifugal	223.7	1	104.8	18.8	86.0
P-3380 B	WAC Feed Pump	BU-3000	2	Centrifugal	223.7	1	104.8	18.8	86.0
P-3380 C	WAC Feed Pump	BU-3000	2	Centrifugal	223.7	1	104.8	18.8	86.0
P-3390 A/B/C	Neutralized Waste Pumps	BU-3000	2	Centrifugal	14.9	3	106.1	18.8	87.3
P-3460 A/B	Lime Slurry Pumps	BU-3000	2	Centrifugal	29.8	2	105.2	18.8	86.4
P-3480 A/B	Magox Slurry Pumps	BU-3000	2	Centrifugal	29.8	2	105.2	18.8	86.4
P-3580 A/B	Disposal Water Recycle Pump	BU-3000	2	Centrifugal	11.2	2	104.0	18.8	85.2
P-3740 A/B	Sludge Transfer Pumps	BU-3000	2	Centrifugal	22.4	2	104.9	18.8	86.1
P-3770 A/B	Blowdown Water Booster Pumps	BU-3020	2	Centrifugal	22.4	2	104.9	18.8	86.1
P-3780 A	Blowdown Water Injection Pump	BU-4020	2	Centrifugal	336.0	1	105.4	18.8	86.6
P-3780 B	Blowdown Water Injection Pump	BU-4020	2	Centrifugal	336.0	1	105.4	18.8	86.6
P-3800 A/B	Slop Oil Pumps	BU-3020	2	Centrifugal	30.0	2	105.2	18.8	86.4
AHU-3001	Water Treatment Bldg. Lab AHU	BU-3000	5	Fan	15.0	1	98.6	0.0	98.6
SF-3000 A	Water Treatment Bldg. Supply Fan	BU-3000	7	Fan	1.9	1	91.4	0.0	91.4
SF-3000 B	Water Treatment Bldg. Supply Fan	BU-3000	7	Fan	1.9	1	91.4	0.0	91.4
SF-3000 C	Water Treatment Bldg. Supply Fan	BU-3000	7	Fan	1.9	1	91.4	0.0	91.4
SF-3000 D	Water Treatment Bldg. Supply Fan	BU-3000	7	Fan	1.9	1	91.4	0.0	91.4
EF-3020 A	ORF Building Exhaust Fan	BU-3020	7	Exhaust Fan	0.9	1	88.8	0.0	88.8
EF-3020 B	ORF Building Exhaust Fan	BU-3020	7	Exhaust Fan	0.9	1	88.8	0.0	88.8
EF-3025 A	ORF Building Exhaust Fan	BU-3020	7	Exhaust Fan	0.5	1	86.9	0.0	86.9
EF-3025 B	ORF Building Exhaust Fan	BU-3020	7	Exhaust Fan	0.5	1	86.9	0.0	86.9
EF-3040 A	Disposal Water Treatment Building Exhaust Fan	BU-3040	5.3	Exhaust Fan	0.6	1	87.1	0.0	87.1
EF-3040 B	Disposal Water Treatment Building Exhaust Fan	BU-3040	5.3	Exhaust Fan	0.6	1	87.1	0.0	87.1
EF-3045	Disposal Water Treatment Building Exhaust Fan	BU-3040	5.3	Exhaust Fan	0.3	1	85.0	0.0	85.0

Pike 2 Project Noise Source Sound Power Levels (Re 10⁻¹² Watts) (cont'd)

Description	Location	Height (m)	Model/Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
Synbit Recycle Pumps	BU-4000	2	Centrifugal	74.5	3	108.2	18.8	89.4
Diluent Supply Pump	BU-4000	2	Centrifugal	223.8	1	104.8	18.8	86.0
Diluent Supply Pump	BU-4000	2	Centrifugal	223.8	1	104.8	18.8	86.0
Shipping Booster Pump	BU-4400	2	Centrifugal	298.3	1	105.2	18.8	86.4
Shipping Booster Pump	BU-4400	2	Centrifugal	298.3	1	105.2	18.8	86.4
Shipping Booster Pump	BU-4400	2	Centrifugal	298.3	1	105.2	18.8	86.4
Shipping Booster Pump	BU-4400	2	Centrifugal	298.3	1	105.2	18.8	86.4
Diluent Pump Building Exhaust Fan	BU-4000	5.5	Exhaust Fan	0.2	1	83.6	0.0	83.6
Diluent Pump Building Exhaust Fan	BU-4000	5.5	Exhaust Fan	0.2	1	83.6	0.0	83.6
Diluent Pump Building Exhaust Fan	BU-4000	5.5	Exhaust Fan	0.5	1	86.8	0.0	86.8
Diluent Pump Building Exhaust Fan	BU-4000	5.5	Exhaust Fan	0.5	1	86.8	0.0	86.8
Disposal Waster Injection Pump Building Exhaust Fan	BU-4020	3.9	Exhaust Fan	0.2	1	84.1	0.0	84.1
Disposal Waster Injection Pump Building Exhaust Fan	BU-4020	5	Exhaust Fan	0.9	1	88.9	0.0	88.9
Disposal Waster Injection Pump Building Exhaust Fan	BU-4020	5	Exhaust Fan	0.3	1	84.4	0.0	84.4
Diluent Pipeline Pumps	BU-4020	2	Centrifugal	56.0	2	106.1	18.8	87.3
Shipping Booster Building Exhaust Fan	BU-4000	3.1	Exhaust Fan	0.2	1	83.8	0.0	83.8
Shipping Booster Building Exhaust Fan	BU-4000	0.75	Exhaust Fan	0.2	1	83.8	0.0	83.8
Shipping Booster Building Exhaust Fan	BU-4000	3.35	Exhaust Fan	1.0	1	89.3	0.0	89.3
Shipping Booster Building Exhaust Fan	BU-4000	3.35	Exhaust Fan	1.0	1	89.3	0.0	89.3
Flash Treater Recycle Pump	BU-8240	2	Centrifugal	18.6	1	101.6	18.8	82.8
Dilbit Transfer Pumps	BU-8240	2	Centrifugal	22.4	2	104.9	18.8	86.1
Flash Treater Stack	BU-8240	5.6	Heater	215 BHP	1	95.0	0.0	95.0
Flash Treater Combustion Air Blower	BU-8240	2	Blower Fan	11.2	1	94.6	0.0	94.6
Flash Treater Stack	BU-8240	5.6	Heater	215 BHP	1	95.0	0.0	95.0
Flash Treater Combustion Air Blower	BU-8240	2	Blower Fan	11.2	1	94.6	0.0	94.6
Blowdown Pond Pump	Pond	2	Centrifugal	30.0	1	102.2	0.0	102.2
Blowdown Pond Pump	Pond	2	Centrifugal	30.0	1	102.2	0.0	102.2

Description	Location	Height (m)	Model/Type	Rating (kW)	# Units	Equipment Sound Power Level (dBA)	Building Attenuation (dBA)	Overall Sound Power Level (dBA)
Blowdown Pond Pump	Pond	2	Centrifugal	30.0	1	102.2	0.0	102.2
FKOD Building Supply Fan	BU-8300	2.4	Fan	0.1	1	81.8	0.0	81.8
FKOD Building Supply Fan	BU-8300	3.4	Fan	0.3	1	84.7	0.0	84.7
Instrument Air Packages	BU-1600	10	Reciprocating	155.0	2	115.8	22.6	93.2
Lime Feed Package	BU-2040	8	Centrifugal	62.3	1	103.2	18.8	84.4
Magox Feed Package	BU-2040	8	Centrifugal	62.3	1	103.2	18.8	84.4
Soda-Ash Package	Area 3000	8	Centrifugal	62.3	1	103.2	0.0	103.2
Sludge Centrifuge Package	BU-3000	2	Centrifugal	108.3	1	103.9	18.8	85.1
VRU Package Area-3000	BU-8600	6	Reciprocating	318.4	1	115.9	22.6	93.3
VRU Package Area-4000	BU-8600	6	Reciprocating	612.2	1	118.8	22.6	96.2
Start-up Liquids Pump	Well pad	2	Centrifugal	149.0	1	104.3	18.8	85.5
Seal Flush Barrier Fluid Pump	Well pad	2	Centrifugal	2.2	1	98.9	18.8	80.1
Seal Flush Barrier Fluid Aerial Cooler	Well pad	2	Aerial Cooler	3.7	1	93.8	0.0	93.8
Instrument Air Compressor	Well pad	2	Reciprocating	11.2	2	104.4	22.6	81.8
Super Heater Combustion Air Blower	Well pad	2.5	Blower Fan	18.6	1	96.4	0.0	96.4
Electrical Room Supply Air Fan	Well pad	3	Fan	0.3	1	84.4	0.0	84.4
Electrical Room Supply Air Fan	Well pad	3	Fan	1.5	1	90.6	0.0	90.6
Instrument Air Room Exhaust Air Fan	Well pad	3	Exhaust Fan	0.3	1	84.4	0.0	84.4
Instrument Air Room Exhaust Air Fan	Well pad	3	Exhaust Fan	1.1	1	89.6	0.0	89.6

Pike 2 Noise Source Octave Band Sound Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Oil Removal Filter Agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Oil Removal Filter Agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Oil Removal Filter Agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Lime Softener Filter Agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Lime Softener Filter Agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Lime Softener Filter Agitator	90.3	90.3	93.3	95.3	98.3	98.3	97.3	92.3	84.3
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Glycol Aerial Cooler	105.6	108.6	108.6	105.6	102.6	98.6	95.6	92.6	84.6
Emergency Generator	115.8	115.8	120.8	123.8	118.8	116.8	113.8	107.8	101.8
Emergency Generator	115.8	115.8	120.8	123.8	118.8	116.8	113.8	107.8	101.8
Emergency Generator Building Exhaust Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Emergency Generator Building Exhaust Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Emergency Generator Building Exhaust Fan	84.2	87.2	87.2	84.2	81.2	77.2	74.2	71.2	63.2
Emergency Generator Building Exhaust Fan	84.2	87.2	87.2	84.2	81.2	77.2	74.2	71.2	63.2
Glycol Trim Heater	101.0	101.0	100.0	98.0	95.0	92.0	89.0	86.0	83.0
Glycol Trim Heater Combustion Air Blower	100.2	103.2	103.2	100.2	97.2	93.2	90.2	87.2	79.2
Glycol Trim Heater	101.0	101.0	100.0	98.0	95.0	92.0	89.0	86.0	83.0
Glycol Trim Heater Combustion Air Blower	100.2	103.2	103.2	100.2	97.2	93.2	90.2	87.2	79.2
OTSG 1 Stack	108.9	107.9	102.9	96.9	95.9	93.9	91.9	91.9	91.9
OTSG Combustion Air Blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
OTSG 'A/C/E' CO Monitor Purge Air Blower	86.0	89.0	89.0	86.0	83.0	79.0	76.0	73.0	65.0
Scanner Cooling Air Blower	91.0	94.0	94.0	91.0	88.0	84.0	81.0	78.0	70.0
OTSG 2 Stack	108.9	107.9	102.9	96.9	95.9	93.9	91.9	91.9	91.9
OTSG Combustion Air Blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
OTSG 'A/C/E' NOx Monitor Purge Air Blower	86.0	89.0	89.0	86.0	83.0	79.0	76.0	73.0	65.0
Scanner Cooling Air Blower	91.0	94.0	94.0	91.0	88.0	84.0	81.0	78.0	70.0
OTSG 3 Stack	108.9	107.9	102.9	96.9	95.9	93.9	91.9	91.9	91.9
OTSG Combustion Air Blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
OTSG 'A/C/E' CO Monitor Purge Air Blower	86.0	89.0	89.0	86.0	83.0	79.0	76.0	73.0	65.0
Scanner Cooling Air Blower	91.0	94.0	94.0	91.0	88.0	84.0	81.0	78.0	70.0
OTSG 4 Stack	108.9	107.9	102.9	96.9	95.9	93.9	91.9	91.9	91.9
OTSG Combustion Air Blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
OTSG 'A/C/E' NOx Monitor Purge Air Blower	86.0	89.0	89.0	86.0	83.0	79.0	76.0	73.0	65.0
Scanner Cooling Air Blower	91.0	94.0	94.0	91.0	88.0	84.0	81.0	78.0	70.0
OTSG 5 Stack	108.9	107.9	102.9	96.9	95.9	93.9	91.9	91.9	91.9
OTSG 'A/C/E' CO Monitor Purge Air Blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
OTSG Combustion Air Blower	86.0	89.0	89.0	86.0	83.0	79.0	76.0	73.0	65.0
Scanner Cooling Air Blower	91.0	94.0	94.0	91.0	88.0	84.0	81.0	78.0	70.0
OTSG 6 Stack	108.9	107.9	102.9	96.9	95.9	93.9	91.9	91.9	91.9
OTSG Combustion Air Blower	102.2	105.2	105.2	102.2	99.2	95.2	92.2	89.2	81.2
OTSG 'A/C/E' NOx Monitor Purge Air Blower	86.0	89.0	89.0	86.0	83.0	79.0	76.0	73.0	65.0
Scanner Cooling Air Blower	91.0	94.0	94.0	91.0	88.0	84.0	81.0	78.0	70.0
Steam Gen Bldg. Air Make-Up Unit	101.8	104.8	104.8	101.8	98.8	94.8	91.8	88.8	80.8
Steam Gen Bldg. Air Make-Up Unit	101.8	104.8	104.8	101.8	98.8	94.8	91.8	88.8	80.8
Steam Gen Bldg. Air Make-Up Unit	101.8	104.8	104.8	101.8	98.8	94.8	91.8	88.8	80.8
Steam Gen Bldg. Air Make-Up Unit	101.8	104.8	104.8	101.8	98.8	94.8	91.8	88.8	80.8
Steam Gen Bldg. Air Make-Up Unit	101.8	104.8	104.8	101.8	98.8	94.8	91.8	88.8	80.8
Steam Gen Bldg. Air Make-Up Unit	101.8	104.8	104.8	101.8	98.8	94.8	91.8	88.8	80.8
Steam Generation Bldg. Supply Fan	91.2	94.2	94.2	91.2	88.2	84.2	81.2	78.2	70.2
Steam Generation Bldg. Supply Fan	91.2	94.2	94.2	91.2	88.2	84.2	81.2	78.2	70.2
Steam Generation Bldg. Supply Fan	91.2	94.2	94.2	91.2	88.2	84.2	81.2	78.2	70.2
Steam Generation Bldg. Supply Fan	91.2	94.2	94.2	91.2	88.2	84.2	81.2	78.2	70.2
Steam Generation Bldg. Supply Fan	91.2	94.2	94.2	91.2	88.2	84.2	81.2	78.2	70.2
Steam Generation Bldg. Supply Fan	91.2	94.2	94.2	91.2	88.2	84.2	81.2	78.2	70.2
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7
Steam Generation Bldg. Annex Exhaust Fan	92.7	95.7	95.7	92.7	89.7	85.7	82.7	79.7	71.7
MCC Bldg. Air Handling Unit	99.4	102.4	102.4	99.4	96.4	92.4	89.4	86.4	78.4
Gas Turbine Inlet	116.4	108.2	109.1	101.6	100.2	94.0	91.8	98.0	90.1
Gas Turbine Casing	118.4	109.2	110.1	106.6	105.2	99.0	94.8	99.0	100.1
Gas Turbine Generator	115.4	111.0	113.2	108.5	106.1	101.5	99.3	97.3	93.1
HRSO Stack	118.4	112.2	118.1	111.6	109.2	113.0	105.8	95.0	77.1
GTG Glycol Aerial Cooler	99.4	102.4	102.4	99.4	96.4	92.4	89.4	86.4	78.4
HRSO HP BFW Pumps	99.1	100.1	101.1	102.1	101.1	103.1	100.1	96.1	90.1
HRSO HP BFW Pumps	99.1	100.1	101.1	102.1	101.1	103.1	100.1	96.1	90.1
LP BFW Pump	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
LP BFW Pump	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
LP BFW Pump	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
Backwash Regen Pumps	100.7	101.7	102.7	103.7	102.7	104.7	101.7	97.7	91.7
HP BFW Pump	100.2	101.2	102.2	103.2	102.2	104.2	101.2	97.2	91.2
HP BFW Pump	100.2	101.2	102.2	103.2	102.2	104.2	101.2	97.2	91.2
HP BFW Pump	100.2	101.2	102.2	103.2	102.2	104.2	101.2	97.2	91.2
Utility BFW Pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
FWKO Interface Recycle Pump	95.2	96.2	97.2	98.2	97.2	99.2	96.2	92.2	86.2
HP Liquids Relief Pump	93.1	94.1	95.1	96.1	95.1	97.1	94.1	90.1	84.1
Glycol Circulation Pump	97.8	98.8	99.8	100.8	99.8	101.8	98.8	94.8	88.8
Glycol Circulation Pump	97.8	98.8	99.8	100.8	99.8	101.8	98.8	94.8	88.8
Glycol Circulation Pump	97.8	98.8	99.8	100.8	99.8	101.8	98.8	94.8	88.8
Process Building Exhaust Fan	89.7	92.7	92.7	89.7	86.7	82.7	79.7	76.7	68.7
Process Building Exhaust Fan	89.7	92.7	92.7	89.7	86.7	82.7	79.7	76.7	68.7
Process Building Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Process Building Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Process Building Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Process Building Sample Skid Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Process Building Sample Skid Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Process Building Sample Skid Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Process Building Sample Skid Exhaust Fan	89.0	92.0	92.0	89.0	86.0	82.0	79.0	76.0	68.0
Glycol Building Fan	82.3	85.3	85.3	82.3	79.3	75.3	72.3	69.3	61.3
Glycol Building Fan	88.7	91.7	91.7	88.7	85.7	81.7	78.7	75.7	67.7
Glycol Building Fan	88.7	91.7	91.7	88.7	85.7	81.7	78.7	75.7	67.7
Field Gas Condensate Recycle Pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
SRU Building Exhaust Fan	88.0	91.0	91.0	88.0	85.0	81.0	78.0	75.0	67.0
SRU Building Exhaust Fan	88.0	91.0	91.0	88.0	85.0	81.0	78.0	75.0	67.0
DRU Compressor	109.7	105.7	110.7	109.7	107.7	110.7	115.7	112.7	105.7
DRU Pumps	96.1	97.1	98.1	99.1	98.1	100.1	97.1	93.1	87.1
Recycle Tank Pumps	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Skim Oil Pumps	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
IGF Eductor Supply Pump	98.6	99.6	100.6	101.6	100.6	102.6	99.6	95.6	89.6
IGF Discharge Pumps	100.7	101.7	102.7	103.7	102.7	104.7	101.7	97.7	91.7
IGF Froth Pumps	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
HLS Feed Pumps	101.2	102.2	103.2	104.2	103.2	105.2	102.2	98.2	92.2
Sludge Pumps	97.1	98.1	99.1	100.1	99.1	101.1	98.1	94.1	88.1
WAC Feed Pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
WAC Feed Pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
WAC Feed Pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Neutralized Waste Pumps	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
Lime Slurry Pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Magox Slurry Pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Disposal Water Recycle Pump	96.2	97.2	98.2	99.2	98.2	100.2	97.2	93.2	87.2
Sludge Transfer Pumps	97.1	98.1	99.1	100.1	99.1	101.1	98.1	94.1	88.1
Blowdown Water Booster Pumps	97.1	98.1	99.1	100.1	99.1	101.1	98.1	94.1	88.1
Blowdown Water Injection Pump	97.6	98.6	99.6	100.6	99.6	101.6	98.6	94.6	88.6
Blowdown Water Injection Pump	97.6	98.6	99.6	100.6	99.6	101.6	98.6	94.6	88.6
Slop Oil Pumps	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Water Treatment Bldg. Lab AHU	99.4	102.4	102.4	99.4	96.4	92.4	89.4	86.4	78.4
Water Treatment Bldg. Supply Fan	92.2	95.2	95.2	92.2	89.2	85.2	82.2	79.2	71.2
Water Treatment Bldg. Supply Fan	92.2	95.2	95.2	92.2	89.2	85.2	82.2	79.2	71.2
Water Treatment Bldg. Supply Fan	92.2	95.2	95.2	92.2	89.2	85.2	82.2	79.2	71.2
Water Treatment Bldg. Supply Fan	92.2	95.2	95.2	92.2	89.2	85.2	82.2	79.2	71.2
ORF Building Exhaust Fan	89.6	92.6	92.6	89.6	86.6	82.6	79.6	76.6	68.6
ORF Building Exhaust Fan	89.6	92.6	92.6	89.6	86.6	82.6	79.6	76.6	68.6
ORF Building Exhaust Fan	87.7	90.7	90.7	87.7	84.7	80.7	77.7	74.7	66.7
ORF Building Exhaust Fan	87.7	90.7	90.7	87.7	84.7	80.7	77.7	74.7	66.7
Disposal Water Treatment Building Exhaust Fan	87.9	90.9	90.9	87.9	84.9	80.9	77.9	74.9	66.9
Disposal Water Treatment Building Exhaust Fan	87.9	90.9	90.9	87.9	84.9	80.9	77.9	74.9	66.9
Disposal Water Treatment Building Exhaust Fan	85.8	88.8	88.8	85.8	82.8	78.8	75.8	72.8	64.8
Synbit Recycle Pumps	100.4	101.4	102.4	103.4	102.4	104.4	101.4	97.4	91.4

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Diluent Supply Pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Diluent Supply Pump	97.0	98.0	99.0	100.0	99.0	101.0	98.0	94.0	88.0
Shipping Booster Pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Shipping Booster Pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Shipping Booster Pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Shipping Booster Pump	97.4	98.4	99.4	100.4	99.4	101.4	98.4	94.4	88.4
Diluent Pump Building Exhaust Fan	84.4	87.4	87.4	84.4	81.4	77.4	74.4	71.4	63.4
Diluent Pump Building Exhaust Fan	84.4	87.4	87.4	84.4	81.4	77.4	74.4	71.4	63.4
Diluent Pump Building Exhaust Fan	87.6	90.6	90.6	87.6	84.6	80.6	77.6	74.6	66.6
Diluent Pump Building Exhaust Fan	87.6	90.6	90.6	87.6	84.6	80.6	77.6	74.6	66.6
Disposal Waster Injection Pump Building Exhaust Fan	84.9	87.9	87.9	84.9	81.9	77.9	74.9	71.9	63.9
Disposal Waster Injection Pump Building Exhaust Fan	89.7	92.7	92.7	89.7	86.7	82.7	79.7	76.7	68.7
Disposal Waster Injection Pump Building Exhaust Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Diluent Pipeline Pumps	98.3	99.3	100.3	101.3	100.3	102.3	99.3	95.3	89.3
Shipping Booster Building Exhaust Fan	84.6	87.6	87.6	84.6	81.6	77.6	74.6	71.6	63.6
Shipping Booster Building Exhaust Fan	84.6	87.6	87.6	84.6	81.6	77.6	74.6	71.6	63.6
Shipping Booster Building Exhaust Fan	90.1	93.1	93.1	90.1	87.1	83.1	80.1	77.1	69.1
Shipping Booster Building Exhaust Fan	90.1	93.1	93.1	90.1	87.1	83.1	80.1	77.1	69.1
Flash Treater Recycle Pump	93.8	94.8	95.8	96.8	95.8	97.8	94.8	90.8	84.8
Dilbit Transfer Pumps	97.1	98.1	99.1	100.1	99.1	101.1	98.1	94.1	88.1
Flash Treater Stack	98.3	98.3	97.3	95.3	92.3	89.3	86.3	83.3	80.3
Flash Treater Combustion Air Blower	95.4	98.4	98.4	95.4	92.4	88.4	85.4	82.4	74.4
Flash Treater Stack	98.3	98.3	97.3	95.3	92.3	89.3	86.3	83.3	80.3
Flash Treater Combustion Air Blower	95.4	98.4	98.4	95.4	92.4	88.4	85.4	82.4	74.4
Blowdown Pond Pump	94.4	95.4	96.4	97.4	96.4	98.4	95.4	91.4	85.4
Blowdown Pond Pump	94.4	95.4	96.4	97.4	96.4	98.4	95.4	91.4	85.4
Blowdown Pond Pump	94.4	95.4	96.4	97.4	96.4	98.4	95.4	91.4	85.4
FKOD Building Supply Fan	82.6	85.6	85.6	82.6	79.6	75.6	72.6	69.6	61.6
FKOD Building Supply Fan	85.5	88.5	88.5	85.5	82.5	78.5	75.5	72.5	64.5
Instrument Air Packages	105.9	101.9	106.9	105.9	103.9	106.9	111.9	108.9	101.9
Lime Feed Package	95.4	96.4	97.4	98.4	97.4	99.4	96.4	92.4	86.4
Magox Feed Package	95.4	96.4	97.4	98.4	97.4	99.4	96.4	92.4	86.4
Soda-Ash Package	95.4	96.4	97.4	98.4	97.4	99.4	96.4	92.4	86.4
Sludge Centrifuge Package	96.1	97.1	98.1	99.1	98.1	100.1	97.1	93.1	87.1

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
VRU Package Area-3000	106.0	102.0	107.0	106.0	104.0	107.0	112.0	109.0	102.0
VRU Package Area-4000	108.9	104.9	109.9	108.9	106.9	109.9	114.9	111.9	104.9
Start-up Liquids Pump	96.5	97.5	98.5	99.5	98.5	100.5	97.5	93.5	87.5
Seal Flush Barrier Fluid Pump	91.1	92.1	93.1	94.1	93.1	95.1	92.1	88.1	82.1
Seal Flush Barrier Fluid Aerial Cooler	94.6	97.6	97.6	94.6	91.6	87.6	84.6	81.6	73.6
Instrument Air Compressor	94.5	90.5	95.5	94.5	92.5	95.5	100.5	97.5	90.5
Super Heater Combustion Air Blower	97.2	100.2	100.2	97.2	94.2	90.2	87.2	84.2	76.2
Electrical Room Supply Air Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Electrical Room Supply Air Fan	91.4	94.4	94.4	91.4	88.4	84.4	81.4	78.4	70.4
Instrument Air Room Exhaust Air Fan	85.2	88.2	88.2	85.2	82.2	78.2	75.2	72.2	64.2
Instrument Air Room Exhaust Air Fan	90.4	93.4	93.4	90.4	87.4	83.4	80.4	77.4	69.4

Devon Kirby Facility Noise Source Octave Band Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
East Site - North Compressor	113.9	113.0	110.8	113.7	103.6	102.1	100.5	94.2	97.3
East Site - Southeast Compressor	105.7	113.5	114.8	111.0	103.5	101.8	102.3	95.6	91.6
East Site - Southeast Compressor	105.7	113.5	114.8	111.0	103.5	101.8	102.3	95.6	91.6
East Site - Southeast Compressor	105.7	113.5	114.8	111.0	103.5	101.8	102.3	95.6	91.6
East Site - West Compressor	97.7	105.5	106.8	103.0	95.5	93.8	94.3	87.6	83.9
East Site - West Compressor	97.7	105.5	106.8	103.0	95.5	93.8	94.3	87.6	83.9
East Site - West Compressor	97.7	105.5	106.8	103.0	95.5	93.8	94.3	87.6	83.9
West Site - North Compressor Stack	112.0	107.0	108.0	103.0	98.0	102.0	102.0	97.0	97.0
West Site - North Compressor Stack	112.0	107.0	108.0	103.0	98.0	102.0	102.0	97.0	97.0
West Site - North Compressor Stack	112.0	107.0	108.0	103.0	98.0	102.0	102.0	97.0	97.0
West Site - North Compressor Stack	112.0	107.0	108.0	103.0	98.0	102.0	102.0	97.0	97.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - North Compressor Cooler	100.7	107.4	110.2	104.2	103.0	98.0	95.4	86.0	83.0
West Site - Middle Compressor	105.4	109.1	103.3	102.2	95.5	93.4	91.1	84.0	78.0
West Site - Middle Compressor	105.4	109.1	103.3	102.2	95.5	93.4	91.1	84.0	78.0
West Site - Middle Compressor	105.4	109.1	103.3	102.2	95.5	93.4	91.1	84.0	78.0

Enbridge Facility Noise Source Octave Band Power Levels (Re 10⁻¹² Watts)

Description	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	dBA
Christina Lake Project Equipment										
150 HP Booster Pump (x2)	74.6	76.9	83.0	93.5	95.2	94.2	93.8	86.6	85.9	99.4
Athabasca Capacity Expansion Project Equipment										
Enbridge 5,750 HP Mainline Pump in Existing Building (North) (each, x4)	95.5	99.0	94.1	95.5	98.0	96.9	102.0	91.8	91.4	101.4
Enbridge 5,750 HP Mainline Pump in Existing Building (NE / NW) (each, x4)	88.7	96.7	92.4	96.8	97.6	96.4	98.5	91.3	85.7	103.4
Enbridge 5,750 HP Mainline Pump in Existing Building (East / West) (each, x4)	88.0	94.1	93.8	92.9	90.6	90.6	96.0	87.6	84.6	98.0
Enbridge 5,750 HP Mainline Pump in Existing Building (SE / SW) (each, x4)	88.7	96.7	92.4	96.8	97.6	96.4	98.5	91.3	85.7	103.4
Enbridge 5,750 HP Mainline Pump in Existing Building (South) (each, x4)	95.5	99.0	94.1	95.5	98.0	96.9	102.0	91.8	91.4	101.4
Mainline Pump VFD Fan (each, x4)	101.5	101.1	95.4	88.4	90.2	85.7	86.7	83.4	77.5	93.1
Athabasca Pipeline Twinning and Wood Buffalo Expansion Project Equipment										
6,700 HP Mainline Pump in Direction of Gable End of Fabric Structure (each, x4)	99.8	97.7	95.6	93.2	95.1	89.3	85.6	73.5	63.4	95.1
6,700 HP Mainline Pump in Direction of 45 Angle of Fabric Structure (each, x4)	99.3	99.5	100.2	95.6	98.3	92.1	87.1	75.7	63.5	98.0
6,700 HP Mainline Pump in Direction of Long Side of Fabric Structure (each, x4)	104.4	100.1	98.0	96.7	102.3	94.2	86.4	75.8	65.4	100.6
Mainline Pump VFD Fan (each, x4)	101.5	101.1	95.4	88.4	90.2	85.7	86.7	83.4	77.5	93.1

Jackfish 1, 2, 3 Building Dimensions

Tag	Building Name	Length (m)	Width (m)	Height (m)
BU-1000	Steam Generator Building	29.0	89.4	10.8
BU-1010	Steam Generator MCC Building	29.5	14.3	5.3
BU-1600	Instrument Air Compressor Building	12.2	4.7	5.1
BU-1650	Standby Power Generator Building	6.8	15.0	4.4
BU-2000	Process Building	41.8	7.2	6.2
BU-2040	Glycol Building	7.0	12.0	5.0
BU-3000	Water Treatment Building	66.2	31.8	9.7
BU-3020	ORF Building	12.1	34.2	8.3
BU-3040	Disposal Water Pump Building	6.7	48.6	6.7
BU-3060	Barrel Dock Storage Building	3.0	14.5	5.0
BU-4000	Diluent Pump Building	6.9	24.0	6.7
BU-4020	Disposal Water Injection Pump Building	6.7	18.0	7.1
BU-4400	Shipping Booster Pump Building	30.5	7.0	7.7
BU-4410	Electrical Building	11.3	5.8	6.2
BU-7000	Warehouse Building	22.0	32.5	7.0
BU-7010	Operation Office Building	44.6	40.3	6.5
BU-7020	Communication Trailer	4.4	11.7	5.0
BU-7200	Potable Water Building	14.7	6.3	7.6
BU-8240	Flash Treater Building	14.8	6.8	7.4
BU-8300	FKOD Building	6.7	7.2	5.6
BU-8500	Water Treatment MCC Building	14.1	22.4	5.4
BU-8600	VRU Compressor Building	7.0	14.7	8.2
BU-8800	Gas Boot Compressor Building	5.4	12.5	6.1
BU-8900	Crude Stabilization Pump Building	16.5	6.9	7.5

Note:

The buildings are the same for each of the 3 Jackfish Phases.

STF Building Dimensions

Tag	Building Name	Length (m)	Width (m)	Height (m)
B-022	Integrity Metering Building	5.5	5.0	3.0
B-023	Fire Water Building	15.0	6.0	3.0
B-024	MCC / Electrical Building	15.0	7.0	3.0

Pike 1 Phase 1a/1b Building Dimensions

Tag	Building Name	Length (m)	Width (m)	Height (m)
BU-1000	Steam Generation Building	85.1	28.5	10.8
BU-1010	Electrical Building	29.1	13.9	8.6
BU-1600	Instrument Air Compressor Building	12.3	4.7	5.1
BU-1650	Standby Power Generator Building	6.6	14.8	6.7
BU-2000	Process Building	41.6	7.0	6.2
BU-2040	Glycol Building	12.5	7.0	5.0
BU-2710	SRU Compression Building	9.2	6.1	5.9
BU-2720	SRU Compression Building	9.2	6.1	5.9
BU-2730	SRU Compression Building	9.2	6.1	5.9
BU-2810	SRU Contactor Building	16.2	7.2	5.0
BU-3000	Water Treatment Building	66.7	41.0	9.7
BU-3020	ORF Building	12.1	34.4	8.3
BU-3040	Disposal Water Pump Building	6.9	48.3	6.7
BU-4000	Diluent Pump Building	7.0	24.0	6.7
BU-4020	Disposal Water Injection Pump Building	6.7	18.0	7.1
BU-4400	Shipping Booster Pump Building	30.4	7.0	7.7
BU-4410	Electrical Building	11.3	5.8	6.2
BU-8240	Flash Treater Building	14.7	7.0	7.4
BU-8300	FKOD Building	6.5	7.1	5.6
BU-8500	Electrical Building	13.9	22.1	8.6
BU-8600	VRU Compressor Building	7.0	14.8	8.2
BU-8800	Gas Boot Compressor Building	5.5	12.2	6.1
BU-8900	Crude Stabilization Pump Building	16.4	6.9	7.5

Note:

The buildings are the same for each of Phase 1a and Phase 1b.

Pike 2 Building Dimensions

Tag	Building Name	Length (m)	Width (m)	Height (m)
BU-1000	Steam Generation Building	114.0	28.6	13.3
BU-1010	Electrical Building	35.0	14.0	9.8
BU-1600	Instrument Air Compressor Building	12.2	4.7	5.8
BU-1650	Standby Power Generator Building	14.8	6.6	7.3
BU-2000	Process Building	53.9	7.0	8.0
BU-2040	Glycol Building	12.5	7.0	9.6
BU-3000	Water Treatment Building	86.7	32.1	13.3
BU-3020	ORF Building	34.0	11.8	9.5
BU-3040	Disposal Water Pump Building	24.0	7.0	7.7
BU-4000	Diluent Pump Building	24.0	7.0	7.3
BU-4020	Disposal Water Injection Pump Building	18.0	7.0	8.4
BU-4400	Shipping Booster Pump Building	30.0	7.0	8.5
BU-4410	Electrical Building	11.0	6.0	6.7
BU-7000	Warehouse Building	73.0	39.0	9.5
BU-7010	Operation Office Building	91.5	49.2	13.2
BU-7020	Communication Trailer	11.8	4.6	5.4
BU-7200	Potable Water Building	24.4	12.0	8.4
BU-7210	Fire Water Pump Building	6.7	4.3	4.4
BU-2xxx	DRU Building	12.0	7.0	9.5
BU-1xxx	Cogen Building	21.5	7.3	6.0
BU-8240	Flash Treater Building	17.6	7.0	8.7
BU-8300	FKOD Building	6.0	6.0	7.2
BU-8500	Electrical Building	22.0	14.0	9.8
BU-8600	VRU Compressor Building Area 4000	16.0	7.0	9.5
BU-8100	VRU Compressor Building Area 3000	16.0	7.0	9.5
BU-2810	SRU Contactor Building	17.1	7.1	6.2

Enbridge Building Dimensions

Building	Length (m)	Width (m)	Height (m)
Christina Lake and Athabasca Capacity Expansion Buildings			
19-ESB-1	21.5	10.5	4.2
19-UPB-1	29.0	11.6	6.0
621-BLDG-1	10.0	6.5	4.2
33-ESB-1	10.3	9.0	3.0
19-VFD-1	3.5	7.2	3.0
19-VFD-2	3.5	7.2	3.0
19-VFD-3	3.5	7.2	3.0
19-VFD-4	3.5	7.2	3.0
ACE Pumphouse	20.0	9.2	6.0
Athabasca Pipeline Twinning and Wood Buffalo Expansion Buildings			
45-UPB-1	41.8	18.8	13.0
45-BLDG-1	10.6	4.6	5.1
45-BLDG-2	10.6	4.6	5.1
45-BLDG-3	10.6	4.6	5.1
45-BLDG-4	10.6	4.6	5.1
45-ESB-1	22.0	6.0	5.1
621-BLDG-1	10.0	9.2	6.0
420-BLDG-1	8.3	6.0	6.0

Building Sound Level Attenuation

	31.5 Hz	63 HZ	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz
Typical Building	3	6	9	12	15	20	25	30	30

Jackfish 1, 2, 3 Tank Dimensions

Tag	Tank Name	Diameter (m)	Height (m)
T-1100		21.0	12.2
T-3100	Recycle Tank	11.3	12.2
T-3110	Skim Tank	36.9	6.4
T-3190	De-Oiled Produced Water Storage Tank	25.8	14.6
T-3390		16.0	9.8
T-3770		11.6	9.8
T-3800	Slop Tank	11.6	9.8
T-4100	Shipping Tank	14.6	12.2
T-4110A	Off-Spec Tank A	21.1	14.6
T-4110B	Off-Spec Tank B	21.1	14.6
T-4130	Diluent Storage	14.6	12.2

Note:

The tanks are the same for each of the three Jackfish Phases.

STF Tank Dimensions

Tag	Tank Name	Diameter (m)	Height (m)
S-100A	Blend Storage Tank	58.1	18.3
S-100B	Blend Storage Tank	58.1	18.3
S-100C	Diluent Storage Tank	29.3	18.3
S-300A	Fire Water Storage Tank	3.7	5.0

Pike 1 Phase 1a/1b Tank Dimensions

Tag	Tank Name	Diameter (m)	Height (m)
T-1100	BFW Storage Tank	21.0	7.0
T-2100	Reverse Demulsifier Tank	3.7	6.1
T-2150	Demulsifier Tank	3.7	6.1
T-2640	Glycol Makeup Tank	6.1	5.0
T-2830	Fresh Scavenger Tank	4.6	9.8
T-2840	Spent Scavenger Tank	4.6	9.8
T-2850	Methanol Tank (Note 1)	3.4	3.7
T-3100	Recycle Tank	11.3	12.2
T-3110	Skim Tank	36.9	6.4
T-3190	Deoiled Produced Water Storage Tank	25.8	14.6
T-3390	Neutralization Tank	11.6	5.6
T-3580	Neutralized Waste Surge Tank	7.0	5.0
T-3770	Blowdown Disposal Water Storage Tank	11.0	5.6
T-3800	Slop Tank	11.6	9.8
T-4100	Shipping Tank	14.6	12.2
T-4110A	Off-spec Tank A	21.1	14.6
T-4110B	Off-spec Tank B	21.1	14.6
T-4130	Diluent Storage Tank	14.6	12.2
T-8420	Startup Blowdown Tank	7.2	5.0

Note:

The tanks are the same for each of Phase 1a and Phase 1b

Pike 2 Tank Dimensions

Tag	Tank Name	Diameter (m)	Height (m)
T-2100	Reverse demulsifier tank	3.7	6.1
T-2150	Demulsifier tank	3.7	6.1
T-2830	Fresh scavenger tank	4.6	9.8
T-2840	Spent scavenger tank	4.6	9.8
T-2850	Methanol Tank	3.4	3.7
T-3100	Recycle tank	11.3	12.2
T-3110	Skim tank	36.9	6.4
T-3190	De-oiled produced water storage tank	25.8	14.6
T-3800	Slop Tank	11.6	9.8
T-4100	Shipping Tank	29.0	12.2
T-4110A	Off-spec Tank A	29.0	14.6
T-4110B	Off-spec Tank B	29.0	14.6
T-4130	Diluent Storage Tank	16.5	12.2

Enbridge Tank Dimensions

Tank	Diameter (m)	Height (m)
301-TK-1	22.8	15.0
302-TK-1	18.3	15.0

Noise Modeling Parameters

Parameter	Value
Modeling Software	CADNA/A (Build 164.4832)
Standard Followed	ISO 9613-2
Ground Sound Absorption Coefficient	0.5
Wind Speed	1 - 5 m/s (3.6 - 18 km/hr)
Wind Direction	Downwind from all sources to all receptors
Temperature	10°C
Humidity	70%
Topography	Used Digital Topographical Information Provided by Client

Appendix C4

Permissible Sound Level Determination

Theoretical 1,500 m and Residential Receptors

Basic Sound Level				Nighttime	Daytime
Proximity to Transportation	Dwelling Density (per Quarter Section of Land)				
	1 - 8 Dwellings	9 - 160 Dwellings	>160 Dwellings		
Category 1	40	43	46	40	40
Category 2	45	48	51		
Category 3	50	53	56		
Basic Sound Level (dBA)				40	40
Time of Day Adjustment					
Time of Day			Adjustment (dBA)		
Night-time adjustment for hours 22:00 - 07:00			0	0	n/a
Day-time adjustment for hours 07:00 - 22:00			+10	n/a	+10
			Time of day adjustment (dBA)	0	+ 10
Class A Adjustments					
Class	Reason for Adjustment			Adjustment (dBA)	
A1	Seasonal Adjustment (Winter)			0 to +5	0
A2	Ambient Monitoring Adjustment			-10 to +10	0
Sum of A1 and A2 cannot exceed maximum of 10 dBA Leq					
			Class A Adjustment (dBA)	0	0
Class B Adjustments					
Class	Duration of Activity			Adjustment (dBA)	
B1	≤ 1 Day			+15	0
B2	≤ 7 Days			+10	0
B3	≤ 60 Days			+5	0
B4	> 60 Days			0	0
Can only apply one of B1, B2, B3, or B4					
			Class B Adjustment (dBA)	0	0
Total Permissible Sound Level (PSL) [dBA]				40	50

Appendix C5

Application Case Noise Source Order Ranking

Theoretical 1,500 m Receptor R-059

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
North Compressor Stack	Devon Kirby West	26.1	26.1	42.4	37.3	31.4	25.5	20.1	23.5	14.3	-27.6
North Compressor Stack	Devon Kirby West	26.1	29.1	42.4	37.2	31.4	25.4	20.1	23.5	14.2	-27.7
North Compressor Stack	Devon Kirby West	26.0	30.8	42.4	37.2	31.4	25.4	20.1	23.5	14.2	-27.9
North Compressor Stack	Devon Kirby West	26.0	32.1	42.4	37.2	31.3	25.4	20.1	23.4	14.1	-28.0
North Compressor Cooler	Devon Kirby West	25.6	33.0	31.4	37.9	32.5	25.0	25.2	19.7	7.9	-38.3
North Compressor Cooler	Devon Kirby West	25.5	33.7	31.3	37.9	32.5	24.9	25.2	19.7	7.8	-38.4
North Compressor Cooler	Devon Kirby West	25.5	34.3	31.3	37.9	32.5	24.9	25.1	19.6	7.8	-38.6
North Compressor Cooler	Devon Kirby West	25.5	34.8	31.3	37.9	32.5	24.9	25.1	19.6	7.7	-38.7
North Compressor Cooler	Devon Kirby West	25.3	35.3	31.2	37.8	32.3	24.8	25.0	19.4	7.4	-39.5
Middle Compressor	Devon Kirby West	20.5	35.4	35.8	39.4	25.3	22.6	17.3	14.7	2.8	-42.1
Middle Compressor	Devon Kirby West	20.5	35.6	35.8	39.3	25.3	22.6	17.3	14.6	2.7	-42.4
North Compressor Cooler	Devon Kirby West	20.4	35.7	20.7	27.2	29.5	22.5	19.8	11.9	-0.7	-48.0
North Compressor Cooler	Devon Kirby West	20.4	35.8	20.6	27.2	29.5	22.4	19.7	11.8	-0.8	-48.3
Middle Compressor	Devon Kirby West	20.4	35.9	35.7	39.3	25.3	22.5	17.2	14.5	2.6	-42.7
North Compressor Cooler	Devon Kirby West	20.3	36.1	20.6	27.2	29.5	22.4	19.7	11.7	-1.0	-48.7
Overall Well pad (Typical 10 wellpairs)	Pike 1	15.7	36.1	18.4	18.0	18.6	17.5	14.2	11.6	-5.3	-69.6
Overall Well pad (Typical 10 wellpairs)	Pike 1	13.9	36.1	17.3	16.9	17.4	16.1	12.5	9.4	-9.6	-81.6
Overall Well pad (Typical 10 wellpairs)	Pike 1	13.6	36.2	17.1	16.7	17.2	15.9	12.2	9.0	-10.3	-83.7
Super Heater Combustion Air Blower	Pike 2	13.0	36.2	16.5	19.5	19.1	15.4	11.8	7.4	-5.7	-49.2
HRSR Stack	Pike 2	12.4	36.2	26.5	19.9	24.3	14.8	9.7	2.3	-43.4	-100.0
Super Heater Combustion Air Blower	Pike 2	12.2	36.2	17.2	20.0	19.6	15.6	11.2	4.4	-8.2	-48.3
Overall Well pad (Typical 10 wellpairs)	Pike 1	12.1	36.2	16.3	15.9	16.3	14.8	10.9	7.1	-13.9	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	11.8	36.2	16.1	15.7	16.1	14.5	10.5	6.6	-14.8	-100.0
WBE_VFD	Enbridge	11.6	36.3	29.9	29.3	15.2	8.6	11.4	5.6	-5.6	-57.0
WBE_Mainline_Pump	Enbridge	11.4	36.3	17.8	17.1	16.7	11.3	12.6	2.5	-15.7	-75.7

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
WBE_Mainline_Pump	Enbridge	11.4	36.3	17.9	17.1	16.7	11.4	12.7	2.5	-13.5	-73.7
WBE_Mainline_Pump	Enbridge	11.3	36.3	17.7	17.0	16.7	11.3	12.5	2.4	-15.8	-76.1
WBE_Mainline_Pump	Enbridge	11.3	36.3	17.8	17.1	16.7	11.3	12.6	2.4	-15.7	-75.9
Overall Well pad (Typical 10 wellpairs)	Pike 1	10.8	36.3	15.6	15.1	15.5	13.7	9.5	5.3	-17.5	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	10.6	36.3	15.5	15.0	15.4	13.6	9.4	5.1	-18.0	-100.0
WBE_VFD	Enbridge	10.2	36.3	29.8	29.2	15.2	7.4	9.6	3.5	-7.8	-59.6
WBE_VFD	Enbridge	9.9	36.4	29.8	29.3	15.2	6.6	9.2	3.3	-8.0	-59.6
WBE_VFD	Enbridge	9.9	36.4	29.9	29.3	15.2	6.3	9.1	3.3	-7.9	-59.4
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	9.0	36.4	14.2	17.0	16.5	12.5	8.0	1.0	-12.1	-54.3
Super Heater Combustion Air Blower	Pike 2	8.7	36.4	14.6	17.4	16.8	12.5	7.6	-0.1	-16.1	-68.8
ACE_5750HP_Pump	Enbridge	8.6	36.4	5.1	12.5	8.3	10.2	8.3	3.2	-8.5	-71.4
Overall Well pad (Typical 10 wellpairs)	Pike 1	8.5	36.4	14.4	13.8	14.0	11.9	7.3	2.1	-24.0	-100.0
ACE_5750HP_Pump	Enbridge	8.4	36.4	5.0	12.4	8.2	10.1	8.1	3.0	-8.9	-72.3
ACE_5750HP_Pump	Enbridge	8.4	36.4	5.1	12.5	8.3	10.1	8.2	3.1	-8.7	-72.0
ACE_5750HP_Pump	Enbridge	8.3	36.4	5.0	12.4	8.2	10.0	8.1	2.9	-8.9	-72.5
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	8.1	36.4	13.5	16.3	15.8	11.6	7.0	-0.2	-14.2	-59.6
Overall Well pad (Typical 10 wellpairs)	Pike 1	7.6	36.4	13.9	13.3	13.5	11.3	6.4	0.8	-26.6	-100.0
Christina Lake 150 HP Booster Pump	Enbridge	7.2	36.4	-9.0	-7.0	-1.6	8.0	7.5	2.2	-13.0	-77.1
Christina Lake 150 HP Booster Pump	Enbridge	7.2	36.4	-9.0	-7.0	-1.6	8.0	7.5	2.2	-13.0	-77.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	6.8	36.4	13.5	12.9	13.0	10.6	5.6	-0.3	-29.0	-100.0
Emergency Generator	Pike 2	6.6	36.4	20.5	16.9	17.0	13.0	-0.7	-18.0	-65.2	-100.0
Emergency Generator	Pike 2	6.5	36.5	20.5	16.9	17.1	12.9	-0.7	-18.0	-64.3	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	6.1	36.5	13.1	12.5	12.6	10.1	4.9	-1.4	-31.2	-100.0
Gas Turbine Generator	Pike 2	6.1	36.5	23.3	18.3	18.6	9.8	1.8	-14.0	-54.9	-100.0

Notes:

Octave band sound levels are linear (i.e., not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Theoretical 1,500 m Receptor R-059 (cont'd)

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Electrical Room Supply Air Fan	Pike 2	6.1	36.5	11.1	14.0	13.5	9.5	5.0	-1.8	-14.7	-56.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	5.8	36.5	11.8	14.6	13.9	9.5	4.6	-3.3	-19.6	-74.1
Overall Well pad (Typical 10 wellpairs)	Pike 1	5.1	36.5	12.6	12.0	11.9	9.2	3.8	-3.0	-34.6	-100.0
Electrical Room Supply Air Fan	Pike 2	5.1	36.5	10.4	13.2	12.7	8.6	4.0	-3.1	-16.8	-61.5
Super Heater Combustion Air Blower	Pike 2	4.9	36.5	11.9	14.7	13.8	9.0	3.4	-5.7	-26.4	-100.0
Super Heater Combustion Air Blower	Pike 2	4.8	36.5	11.9	14.7	13.8	8.9	3.3	-5.8	-26.4	-100.0
North Compressor	Devon Kirby East	4.7	36.5	19.9	18.3	13.8	11.6	-5.5	-20.7	-70.0	-100.0
Instrument Air Room Exhaust Air Fan	Pike 2	4.6	36.5	9.8	12.6	12.1	8.1	3.6	-3.4	-16.7	-59.5
Southeast Compressor	Devon Kirby East	4.6	36.5	11.7	18.7	17.7	8.9	-5.6	-21.1	-68.4	-100.0
Southeast Compressor	Devon Kirby East	4.5	36.5	11.7	18.7	17.7	8.9	-5.6	-21.1	-68.4	-100.0
Southeast Compressor	Devon Kirby East	4.5	36.5	11.6	18.7	17.7	8.9	-5.7	-21.1	-68.5	-100.0
ACE_VFD	Enbridge	4.1	36.5	18.2	17.6	11.2	2.7	4.6	-3.9	-17.1	-74.9
Gas Turbine Casing	Pike 2	4.0	36.5	26.2	16.5	15.5	7.9	0.8	-16.5	-59.4	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	3.6	36.5	11.8	11.2	11.0	8.0	2.2	-5.4	-39.7	-100.0
Instrument Air Room Exhaust Air Fan	Pike 2	3.6	36.5	9.1	11.9	11.4	7.2	2.5	-4.7	-19.0	-65.4
Super Heater Combustion Air Blower	Pike 2	3.3	36.5	10.9	13.6	12.6	7.6	1.6	-8.1	-30.9	-100.0
Super Heater Combustion Air Blower	Pike 2	3.0	36.5	10.7	13.4	12.4	7.3	1.3	-8.6	-31.9	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	2.8	36.5	11.4	10.8	10.5	7.4	1.3	-6.7	-42.6	-100.0
Emergency Generator	Pike 1	2.7	36.5	18.3	14.5	14.1	8.8	-6.6	-28.1	-86.4	-100.0
Electrical Room Supply Air Fan	Pike 2	2.7	36.5	8.7	11.5	10.8	6.4	1.5	-6.3	-22.5	-76.6
ACE_VFD	Enbridge	2.5	36.5	18.1	17.5	11.1	2.6	2.3	-6.4	-19.7	-78.1
ACE_VFD	Enbridge	2.5	36.5	18.1	17.5	11.1	2.6	2.3	-6.3	-19.6	-77.9
Super Heater Combustion Air Blower	Pike 2	2.4	36.5	9.0	11.8	11.0	6.1	1.6	-8.4	-36.4	-100.0
ACE_VFD	Enbridge	2.4	36.5	18.1	17.5	11.1	2.6	2.2	-6.4	-19.8	-78.4
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.9	6.8	-2.0	-17.2	-59.2	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.9	6.8	-2.0	-17.2	-59.2	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.9	6.7	-2.0	-17.2	-59.3	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.9	6.7	-2.0	-17.2	-59.3	-100.0

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.9	6.7	-2.0	-17.3	-59.3	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.8	6.7	-2.0	-17.3	-59.3	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.8	6.7	-2.0	-17.3	-59.3	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.8	6.7	-2.0	-16.1	-58.2	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.8	6.7	-2.0	-17.3	-59.4	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.8	6.7	-2.1	-17.3	-59.4	-100.0
Glycol Aerial Cooler	Pike 2	2.2	36.5	13.3	15.7	13.8	6.7	-2.1	-17.3	-59.4	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	2.1	36.5	9.2	11.9	11.1	6.2	0.5	-8.6	-29.5	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	2.0	36.5	9.2	11.9	11.0	6.1	0.5	-8.7	-29.8	-100.0
Super Heater Combustion Air Blower	Pike 2	2.0	36.5	10.0	12.7	11.7	6.4	0.1	-10.1	-35.0	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	1.9	36.5	11.0	10.3	9.9	6.6	0.2	-8.3	-46.0	-100.0
Start-up Liquids Pump	Pike 2	1.9	36.5	13.4	11.3	8.8	5.8	0.3	-5.5	-23.3	-70.1
Emergency Generator	Pike 1	1.8	36.5	17.8	14.0	13.4	7.8	-8.0	-30.3	-100.0	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	1.8	36.5	10.9	10.2	9.8	6.5	0.1	-8.5	-46.6	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1	1.6	36.5	10.8	10.1	9.7	6.3	-0.2	-8.9	-47.4	-100.0
Instrument Air Room Exhaust Air Fan	Pike 2	1.4	36.5	7.4	10.2	9.6	5.1	0.2	-7.7	-24.3	-79.6
Gas Turbine Inlet	Pike 2	1.0	36.6	24.2	15.4	14.5	2.9	-4.2	-21.6	-62.7	-100.0
Start-up Liquids Pump	Pike 2	1.0	36.6	12.7	10.5	8.0	4.9	-0.6	-6.6	-25.2	-75.0
Super Heater Combustion Air Blower	Pike 2	0.7	36.6	9.2	11.8	10.7	5.1	-1.4	-12.4	-39.4	-100.0
Super Heater Combustion Air Blower	Pike 2	0.6	36.6	9.1	11.7	10.6	5.0	-1.6	-12.6	-39.9	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	0.5	36.6	8.1	10.8	9.9	4.7	-1.3	-11.1	-34.4	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	0.4	36.6	8.1	10.8	9.8	4.7	-1.3	-11.2	-34.5	-100.0
Electrical Room Supply Air Fan	Pike 2	0.1	36.7	5.1	7.9	7.5	3.4	-1.0	-7.7	-20.3	-60.8

Notes:

Octave band sound levels are linear (i.e., not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Theoretical 1,500 m Receptor R-071

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
HRSO Stack	Pike 2	30.9	30.9	37.8	34.4	39.3	30.6	27.4	27.6	7.6	-52.4
Emergency Generator	Pike 2	21.1	31.3	30.6	27.4	28.8	27.4	17.5	6.8	-13.9	-73.1
Gas Turbine Generator	Pike 2	20.9	31.7	33.1	28.5	30.1	24.0	19.8	11.5	-3.3	-54.0
Emergency Generator	Pike 2	20.7	32.0	30.6	27.3	28.6	27.1	16.9	5.6	-16.0	-76.2
Gas Turbine Casing	Pike 2	19.2	32.3	36.1	26.7	27.0	22.2	18.9	9.1	-7.7	-52.1
IGF Eductor Supply Pump	Pike 2	19.1	32.5	16.9	17.7	18.5	18.3	17.6	16.2	1.2	-48.6
Glycol Aerial Cooler	Pike 2	17.7	32.6	23.2	26.0	25.4	21.0	16.1	10.6	-5.2	-57.6
Glycol Aerial Cooler	Pike 2	17.4	32.7	23.2	26.0	25.4	21.1	16.2	8.5	-7.2	-59.1
Glycol Aerial Cooler	Pike 2	17.4	32.9	23.2	26.0	25.4	21.1	16.2	8.6	-7.1	-58.9
Glycol Aerial Cooler	Pike 2	17.3	33.0	23.1	25.9	25.3	21.0	16.1	8.4	-7.4	-59.8
Glycol Aerial Cooler	Pike 2	17.3	33.1	23.1	26.0	25.3	21.0	16.1	8.4	-7.4	-59.7
Glycol Aerial Cooler	Pike 2	17.3	33.2	23.2	26.0	25.4	21.0	16.2	8.5	-7.2	-59.3
Gas Turbine Inlet	Pike 2	17.3	33.3	34.2	25.8	28.3	19.4	16.0	5.9	-9.3	-51.7
Glycol Aerial Cooler	Pike 2	17.2	33.4	23.1	25.9	25.3	20.9	16.0	8.3	-7.6	-60.3
Glycol Aerial Cooler	Pike 2	17.2	33.5	23.1	25.9	25.3	20.9	16.0	8.3	-7.6	-60.2
Glycol Aerial Cooler	Pike 2	17.2	33.6	23.1	25.9	25.3	20.9	16.0	8.3	-7.5	-60.0
Glycol Aerial Cooler	Pike 2	17.1	33.7	23.0	25.8	25.2	20.8	15.9	8.2	-7.8	-60.7
Glycol Aerial Cooler	Pike 2	17.1	33.8	23.0	25.9	25.2	20.9	16.0	8.2	-7.7	-60.5
OTSG 5 Stack	Pike 2	16.3	33.9	31.9	30.8	24.8	16.7	15.0	9.8	-4.1	-49.6
OTSG 6 Stack	Pike 2	16.3	34.0	32.0	30.8	24.9	16.8	15.1	9.8	-4.0	-49.3
OTSG 3 Stack	Pike 2	16.2	34.0	31.9	30.7	24.8	16.7	14.9	9.7	-4.3	-50.2
OTSG 4 Stack	Pike 2	16.2	34.1	31.9	30.7	24.8	16.7	15.0	9.7	-4.2	-49.9
OTSG 1 Stack	Pike 2	16.1	34.2	31.8	30.6	24.7	16.6	14.8	9.5	-4.5	-50.8
OTSG 2 Stack	Pike 2	16.1	34.2	31.8	30.6	24.7	16.6	14.9	9.6	-4.4	-50.5
OTSG Combustion Air Blower	Pike 2	15.0	34.3	20.4	23.3	22.7	18.6	13.9	6.5	-8.2	-56.8
OTSG Combustion Air Blower	Pike 2	15.0	34.3	20.5	23.3	22.7	18.5	13.9	6.5	-8.1	-56.5
OTSG Combustion Air Blower	Pike 2	15.0	34.4	20.5	23.3	22.8	18.5	14.0	6.6	-8.2	-56.4
OTSG 'A/C/E' CO Mntr Purge Air Blower	Pike 2	15.0	34.4	20.6	23.4	22.8	18.6	13.9	6.5	-8.2	-56.2
OTSG Combustion Air Blower	Pike 2	15.0	34.5	20.6	23.4	22.9	18.6	13.9	6.6	-8.1	-55.9
OTSG Combustion Air Blower	Pike 2	14.9	34.5	20.4	23.2	22.7	18.6	13.8	6.4	-8.3	-57.1
Steam Gen Bldg. Air Make-Up Unit	Pike 2	14.7	34.6	20.1	23.0	22.4	18.3	13.6	6.2	-8.6	-57.0
Steam Gen Bldg. Air Make-Up Unit	Pike 2	14.7	34.6	20.2	23.0	22.4	18.2	13.6	6.2	-8.5	-56.7
Steam Gen Bldg. Air Make-Up Unit	Pike 2	14.7	34.7	20.2	23.1	22.5	18.3	13.6	6.2	-8.4	-56.2
Soda-Ash Package	Pike 2	14.7	34.7	14.2	15.0	15.5	15.3	12.7	11.5	-2.7	-49.7
Steam Gen Bldg. Air Make-Up Unit	Pike 2	14.6	34.8	20.1	22.9	22.3	18.3	13.5	6.1	-8.8	-57.5
Steam Gen Bldg. Air Make-Up Unit	Pike 2	14.6	34.8	20.1	22.9	22.4	18.3	13.5	6.1	-8.7	-57.2
Steam Gen Bldg. Air Make-Up Unit	Pike 2	14.6	34.8	20.2	23.0	22.5	18.2	13.5	6.2	-8.5	-56.5

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
North Compressor	Devon Kirby East	13.4	34.9	25.2	23.9	20.4	20.6	6.6	-2.4	-30.2	-100.0
Water Treatment Bldg. Lab AHU	Pike 2	13.1	34.9	18.2	21.1	20.5	16.5	12.1	4.9	-9.1	-55.0
Southeast Compressor	Devon Kirby East	12.9	34.9	17.1	24.5	24.6	18.0	6.7	-2.4	-27.8	-100.0
Southeast Compressor	Devon Kirby East	12.8	35.0	17.1	24.5	24.6	18.0	6.7	-2.5	-27.9	-100.0
Southeast Compressor	Devon Kirby East	12.8	35.0	17.1	24.5	24.5	18.0	6.7	-2.5	-27.9	-100.0
Glycol Trim Heater Combustion Air Blower	Pike 2	11.7	35.0	17.7	20.5	19.8	15.5	10.6	2.8	-13.2	-66.2
MCC Bldg. Air Handling Unit	Pike 2	11.7	35.0	17.4	20.2	19.7	15.4	10.6	3.1	-12.1	-62.0
Blowdown Pond Pump	Pike 2	11.5	35.0	11.9	12.7	13.0	12.7	9.8	8.0	-8.0	-62.1
Blowdown Pond Pump	Pike 2	11.5	35.1	11.8	12.7	13.0	12.7	9.7	8.0	-8.1	-62.3
Blowdown Pond Pump	Pike 2	11.5	35.1	11.8	12.6	13.0	12.6	9.7	7.9	-8.1	-62.4
DRU Compressor	Pike 2	9.9	35.1	24.6	17.5	18.9	13.6	6.7	3.2	-9.3	-65.4
Glycol Trim Heater	Pike 2	9.6	35.1	18.5	18.3	16.7	13.3	8.4	1.7	-14.3	-67.2
Glycol Trim Heater	Pike 2	9.6	35.1	18.5	18.3	16.7	13.3	8.4	1.7	-14.3	-67.2
Glycol Trim Heater Combustion Air Blower	Pike 2	9.4	35.1	17.4	20.0	18.9	13.7	7.5	-2.0	-20.2	-75.6
VRU Package Area-4000	Pike 2	9.2	35.1	24.3	17.1	18.5	13.2	6.5	1.1	-10.9	-64.6
Super Heater Combustion Air Blower	Pike 2	8.9	35.2	14.7	17.5	16.9	12.6	7.7	0.0	-15.8	-68.2
Flash Treater Stack	Pike 2	8.1	35.2	16.5	16.3	14.8	11.7	6.9	0.5	-14.5	-63.6
Flash Treater Stack	Pike 2	8.1	35.2	16.5	16.3	14.8	11.7	6.9	0.4	-14.6	-63.7
Flash Treater Combustion Air Blower	Pike 2	7.5	35.2	13.6	16.3	15.7	11.4	6.3	-1.8	-17.8	-68.2

Notes:

Octave band sound levels are linear (i.e., not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Theoretical 1,500 m Receptor R-071 (cont'd)

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Flash Treater Combustion Air Blower	Pike 2	7.4	35.2	13.6	16.3	15.6	11.4	6.2	-2.0	-18.1	-68.6
Super Heater Combustion Air Blower	Pike 2	6.9	35.2	13.4	16.1	15.4	10.8	5.6	-2.7	-20.7	-81.4
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	6.6	35.2	12.4	15.2	14.6	10.3	5.5	-2.1	-17.5	-68.4
VRU Package Area-3000	Pike 2	6.3	35.2	21.4	14.2	15.6	10.3	3.7	-1.8	-13.7	-67.4
Super Heater Combustion Air Blower	Pike 2	6.2	35.2	12.9	15.6	14.9	10.2	4.8	-3.7	-22.6	-86.7
Water Treatment Bldg. Supply Fan	Pike 2	5.8	35.2	11.0	13.8	13.3	9.3	4.8	-2.4	-16.6	-62.6
Super Heater Combustion Air Blower	Pike 2	5.8	35.2	12.6	15.4	14.6	9.9	4.5	-4.2	-23.6	-100.0
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.2	11.0	13.9	13.3	9.3	4.6	-2.8	-17.4	-65.9
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.2	11.1	13.9	13.3	9.3	4.6	-2.8	-17.4	-65.6
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.2	11.1	13.9	13.4	9.3	4.6	-2.8	-17.3	-65.4
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.2	11.2	14.0	13.4	9.2	4.6	-2.7	-17.2	-65.2
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.2	11.2	14.0	13.5	9.2	4.7	-2.7	-17.2	-64.9
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.2	11.2	14.1	13.5	9.3	4.6	-2.7	-17.3	-64.7
Steam Generation Bldg. Annex Exhaust Fan	Pike 2	5.7	35.3	11.3	14.1	13.5	9.3	4.6	-2.7	-17.2	-64.4
Water Treatment Bldg. Supply Fan	Pike 2	5.7	35.3	10.9	13.7	13.2	9.0	4.7	-2.5	-16.8	-63.1
Water Treatment Bldg. Supply Fan	Pike 2	5.5	35.3	10.9	13.7	13.1	9.1	4.5	-2.7	-17.0	-63.5
Water Treatment Bldg. Supply Fan	Pike 2	5.5	35.3	10.8	13.6	13.1	9.1	4.4	-2.8	-17.2	-64.0
Instrument Air Packages	Pike 2	5.5	35.3	20.7	13.5	14.9	9.6	2.8	-2.8	-15.3	-71.4
West Compressor	Devon Kirby East	5.0	35.3	9.2	16.6	16.7	10.2	-1.1	-10.2	-35.3	-100.0
West Compressor	Devon Kirby East	5.0	35.3	9.2	16.6	16.7	10.2	-1.1	-10.1	-35.2	-100.0
West Compressor	Devon Kirby East	5.0	35.3	9.2	16.6	16.7	10.2	-1.1	-10.1	-35.2	-100.0
Synbit Recycle Pumps	Pike 2	4.9	35.3	16.3	14.2	11.6	8.8	3.4	-2.7	-21.7	-72.9
Super Heater Combustion Air Blower	Pike 2	4.7	35.3	11.8	14.6	13.7	8.8	3.2	-5.9	-26.8	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	4.7	35.3	11.0	13.8	13.1	8.6	3.4	-4.8	-22.4	-81.6
Steam Generation Bldg. Supply Fan	Pike 2	4.1	35.3	9.5	12.3	11.8	7.7	3.0	-4.4	-19.2	-67.4

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Steam Generation Bldg. Supply Fan	Pike 2	4.1	35.3	9.5	12.4	11.8	7.6	3.0	-4.4	-19.1	-67.1
Steam Generation Bldg. Supply Fan	Pike 2	4.1	35.3	9.6	12.4	11.9	7.6	3.0	-4.3	-19.0	-66.8
Steam Generation Bldg. Supply Fan	Pike 2	4.1	35.3	9.6	12.4	11.9	7.7	3.0	-4.4	-19.0	-66.6
Backwash Regen Pumps	Pike 2	4.1	35.3	16.0	13.9	11.3	8.2	2.5	-3.9	-23.4	-77.6
HLS Feed Pumps	Pike 2	4.1	35.3	16.3	14.1	11.5	8.4	2.4	-4.4	-25.1	-81.2
Shipping Booster Building Exhaust Fan	Pike 2	4.1	35.3	9.0	11.9	11.4	7.5	3.2	-4.0	-18.0	-63.1
Shipping Booster Building Exhaust Fan	Pike 2	4.1	35.3	9.1	11.9	11.4	7.6	3.1	-4.0	-17.9	-63.0
Scanner Cooling Air Blower	Pike 2	4.0	35.3	9.4	12.3	11.7	7.5	2.9	-4.5	-19.1	-67.0
Steam Generation Bldg. Supply Fan	Pike 2	4.0	35.3	9.4	12.3	11.7	7.7	2.9	-4.5	-19.3	-67.9
Steam Generation Bldg. Supply Fan	Pike 2	4.0	35.3	9.5	12.3	11.7	7.7	2.9	-4.5	-19.3	-67.7
Scanner Cooling Air Blower	Pike 2	3.9	35.3	9.3	12.1	11.6	7.5	2.8	-4.6	-19.5	-68.1
Scanner Cooling Air Blower	Pike 2	3.9	35.3	9.3	12.2	11.6	7.5	2.8	-4.6	-19.4	-67.9
Scanner Cooling Air Blower	Pike 2	3.9	35.3	9.4	12.2	11.6	7.6	2.8	-4.6	-19.3	-67.6
Scanner Cooling Air Blower	Pike 2	3.9	35.3	9.4	12.2	11.7	7.4	2.9	-4.5	-19.2	-67.3
Scanner Cooling Air Blower	Pike 2	3.9	35.3	9.5	12.3	11.7	7.5	2.8	-4.5	-19.1	-66.8
Super Heater Combustion Air Blower	Pike 2	3.9	35.3	11.3	14.0	13.1	8.1	2.3	-7.1	-29.0	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	3.8	35.4	10.4	13.1	12.4	7.7	2.4	-6.1	-24.8	-88.2
HP BFW Pump	Pike 2	3.7	35.4	15.7	13.5	11.0	7.7	2.2	-4.2	-23.7	-77.4
HP BFW Pump	Pike 2	3.7	35.4	15.7	13.5	11.0	7.8	2.1	-4.3	-23.8	-77.3
HP BFW Pump	Pike 2	3.7	35.4	15.7	13.6	11.0	7.8	2.1	-4.2	-23.7	-77.1
Super Heater Combustion Air Blower	Pike 2	3.6	35.4	11.1	13.8	12.8	7.8	1.9	-7.7	-30.2	-100.0
Electrical Room Supply Air Fan	Pike 2	3.5	35.4	9.3	12.1	11.5	7.2	2.3	-5.3	-20.7	-71.5
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	3.4	35.4	10.1	12.9	12.1	7.4	2.1	-6.6	-25.7	-100.0
IGF Discharge Pumps	Pike 2	3.0	35.4	14.8	11.2	6.8	7.8	1.6	-5.1	-25.2	-80.1
Instrument Air Room Exhaust Air Fan	Pike 2	2.8	35.4	8.5	11.3	10.7	6.5	1.7	-5.8	-20.9	-70.3
Shipping Booster Pump	Pike 2	2.7	35.4	13.7	11.5	9.4	6.7	1.2	-4.8	-23.5	-73.4
Disposal Water Treatment Bldg. Exhaust Fan	Pike 2	2.6	35.4	6.3	9.1	8.4	6.6	1.8	-5.9	-21.1	-70.0
Shipping Booster Pump	Pike 2	2.6	35.4	13.7	11.5	9.4	6.7	1.1	-5.0	-23.6	-73.6
Shipping Booster Pump	Pike 2	2.6	35.4	13.7	11.5	9.3	6.6	1.1	-5.0	-23.7	-73.7
Shipping Booster Pump	Pike 2	2.6	35.4	13.6	11.5	9.0	6.6	1.1	-5.0	-23.7	-73.8

Notes:

Octave band sound levels are linear (i.e. not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Theoretical 1,500 m Receptor R-071 (cont'd)

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Super Heater Combustion Air Blower	Pike 2	2.5	35.4	10.4	13.0	12.0	6.8	0.7	-9.4	-33.5	-100.0
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	2.5	35.4	9.5	12.3	11.4	6.6	1.0	-7.9	-28.3	-100.0
Disposal Waster Injection Pump Bldg. Exhaust Fan	Pike 2	2.3	35.4	8.2	11.0	10.4	6.1	1.1	-6.6	-21.8	-70.1
Neutralized Waste Pumps	Pike 2	2.2	35.4	14.0	11.8	9.3	6.1	0.7	-5.5	-24.8	-77.2
ORF Building Exhaust Fan	Pike 2	2.2	35.4	7.8	10.6	10.0	5.8	1.2	-6.3	-21.3	-70.4
ORF Building Exhaust Fan	Pike 2	2.1	35.4	7.8	10.6	10.0	5.7	1.0	-6.5	-21.4	-70.7
Super Heater Combustion Air Blower	Pike 2	2.1	35.4	10.1	12.8	11.7	6.4	0.2	-10.1	-34.9	-100.0
LP BFW Pump	Pike 2	1.8	35.4	13.7	11.5	8.9	5.9	0.1	-6.3	-25.9	-80.2
LP BFW Pump	Pike 2	1.8	35.4	13.7	11.5	8.9	5.9	0.2	-6.2	-25.8	-80.1
Process Building Exhaust Fan	Pike 2	1.8	35.4	7.5	10.4	9.8	5.5	0.6	-6.9	-22.1	-72.7
LP BFW Pump	Pike 2	1.7	35.4	13.6	11.5	8.9	5.9	0.1	-6.3	-25.9	-80.4
Process Building Exhaust Fan	Pike 2	1.7	35.4	7.5	10.4	9.8	5.5	0.3	-6.9	-22.2	-72.8
Magox Slurry Pumps	Pike 2	1.7	35.4	13.3	11.1	8.6	5.6	0.2	-5.9	-24.9	-76.7
Diluent Pump Building Exhaust Fan	Pike 2	1.7	35.4	6.6	9.4	8.9	5.2	0.8	-6.4	-20.3	-65.4
Diluent Pump Building Exhaust Fan	Pike 2	1.7	35.4	6.6	9.4	8.9	5.2	0.7	-6.4	-20.4	-65.3
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	1.7	35.4	9.0	11.7	10.8	5.8	0.1	-9.2	-30.6	-100.0
HRSO HP BFW Pumps	Pike 2	1.6	35.4	13.9	11.7	9.1	5.8	-0.1	-6.6	-27.2	-84.7
Diluent Supply Pump	Pike 2	1.6	35.4	13.0	10.9	8.3	5.5	0.1	-6.0	-25.0	-76.1
Diluent Supply Pump	Pike 2	1.6	35.4	13.0	10.9	8.4	5.5	0.2	-6.0	-24.9	-76.0
Electrical Room Supply Air Fan	Pike 2	1.6	35.4	7.9	10.7	10.0	5.4	0.3	-7.9	-25.4	-84.3
Seal Flush Barrier Fluid Aerial Cooler	Pike 2	1.6	35.4	8.9	11.6	10.7	5.7	0.0	-9.4	-31.0	-100.0
Lime Slurry Pumps	Pike 2	1.3	35.4	13.1	10.9	8.4	5.2	-0.3	-6.4	-25.7	-78.2
Process Building Exhaust Fan	Pike 2	1.1	35.4	6.9	9.7	9.1	4.8	0.0	-7.6	-23.0	-73.5
Process Building Exhaust Fan	Pike 2	1.1	35.4	6.9	9.7	9.1	4.8	0.0	-7.6	-22.8	-73.3
Process Building Exhaust Fan	Pike 2	1.1	35.4	6.9	9.7	9.1	4.8	0.0	-7.6	-22.8	-73.2
WAC Feed Pump	Pike 2	1.0	35.4	12.7	10.6	8.0	5.0	-0.5	-6.7	-26.0	-78.6
WAC Feed Pump	Pike 2	1.0	35.4	12.7	10.5	8.0	5.0	-0.5	-6.7	-26.1	-78.8
WAC Feed Pump	Pike 2	1.0	35.4	12.7	10.5	8.0	5.0	-0.5	-6.8	-26.1	-78.9
Sludge Transfer Pumps	Pike 2	1.0	35.4	12.8	10.6	8.1	4.9	-0.4	-6.6	-25.9	-78.2
Dilbit Transfer Pumps	Pike 2	1.0	35.4	12.1	9.7	6.7	5.8	-0.5	-7.6	-28.3	-84.1
Utility BFW Pumps	Pike 2	0.9	35.4	12.8	10.7	8.1	4.9	-0.7	-7.1	-26.6	-80.6
Sludge Pumps	Pike 2	0.9	35.4	12.7	10.6	8.0	4.8	-0.6	-6.8	-26.1	-78.5
Instrument Air Room Exhaust Air Fan	Pike 2	0.9	35.4	7.1	9.9	9.2	4.8	-0.3	-8.4	-25.5	-82.8
HRSO HP BFW Pumps	Pike 2	0.8	35.4	13.8	11.6	8.8	5.3	-1.1	-8.7	-31.6	-100.0

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Process Building Sample Skid Exhaust Fan	Pike 2	0.7	35.4	6.9	9.7	9.0	4.7	-1.0	-8.1	-23.9	-75.1
Electrical Room Supply Air Fan	Pike 2	0.7	35.5	7.3	10.0	9.3	4.6	-0.7	-9.2	-27.8	-100.0
Process Building Sample Skid Exhaust Fan	Pike 2	0.6	35.5	6.9	9.7	9.0	4.5	-1.0	-8.6	-24.7	-76.1
SRU Building Exhaust Fan	Pike 2	0.6	35.5	5.9	8.7	8.1	3.8	-0.8	-6.3	-21.8	-73.0
SRU Building Exhaust Fan	Pike 2	0.6	35.5	5.8	8.7	8.1	3.8	-0.8	-6.3	-21.9	-73.1
ORF Building Exhaust Fan	Pike 2	0.6	35.5	5.9	8.7	8.5	4.2	-0.5	-8.0	-22.9	-71.9
Super Heater Combustion Air Blower	Pike 2	0.6	35.5	9.1	11.8	10.6	5.1	-1.5	-12.5	-39.7	-100.0
Slop Oil Pumps	Pike 2	0.5	35.5	12.6	10.4	7.8	4.5	-1.1	-7.6	-27.8	-83.2
ORF Building Exhaust Fan	Pike 2	0.5	35.5	5.9	8.7	8.1	4.2	-0.6	-8.0	-23.0	-72.1
Glycol Building Fan	Pike 2	0.4	35.5	6.3	9.1	8.5	4.1	-0.7	-8.4	-24.2	-76.5
Glycol Building Fan	Pike 2	0.4	35.5	6.3	9.1	8.5	4.1	-0.7	-8.4	-24.2	-76.4
Blowdown Water Booster Pumps	Pike 2	0.4	35.5	12.2	10.0	7.7	4.3	-1.8	-6.2	-26.8	-82.8
Electrical Room Supply Air Fan	Pike 2	0.4	35.5	7.0	9.8	9.0	4.4	-1.0	-9.6	-28.6	-100.0
Process Building Sample Skid Exhaust Fan	Pike 2	0.3	35.5	6.9	9.6	8.8	4.3	-1.1	-9.5	-26.2	-78.0
IGF Froth Pumps	Pike 2	0.2	35.5	11.7	9.1	5.7	5.1	-1.4	-8.6	-29.3	-84.9
Disposal Water Recycle Pump	Pike 2	0.2	35.5	11.9	9.8	7.2	4.0	-1.3	-7.4	-26.4	-78.7
Sludge Centrifuge Package	Pike 2	0.2	35.5	11.9	9.8	7.2	4.0	-1.2	-7.3	-26.4	-78.4
Super Heater Combustion Air Blower	Pike 2	0.2	35.5	8.9	11.5	10.3	4.7	-2.0	-13.2	-41.1	-100.0
Glycol Circulation Pump	Pike 2	0.1	35.5	12.4	10.2	7.6	4.3	-1.6	-8.3	-29.1	-87.4
Glycol Circulation Pump	Pike 2	0.1	35.5	12.4	10.2	7.6	4.3	-1.6	-8.3	-29.1	-87.4
Glycol Circulation Pump	Pike 2	0.1	35.6	12.4	10.2	7.6	4.3	-1.6	-8.3	-29.1	-87.3

Notes:

Octave band sound levels are linear (i.e., not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Cabin Receptor

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	32.5	32.5	33.5	33.3	27.3	26.3	27.4	30.2	24.4	1.7
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	31.7	35.1	34.8	34.6	27.9	27.0	27.7	29.7	21.0	-12.7
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	29.4	36.2	33.4	33.1	26.4	25.3	25.8	27.4	17.2	-22.1
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	27.2	36.7	32.2	31.8	25.0	23.8	24.1	25.2	13.6	-31.6
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	18.7	36.7	20.1	19.8	20.6	19.8	16.9	15.2	1.2	-51.8
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	17.8	36.8	27.1	26.6	19.3	17.2	16.1	14.7	-5.8	-85.1
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	17.3	36.8	19.3	18.9	19.7	18.7	15.6	13.5	-1.8	-59.8
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	17.1	36.9	19.1	18.7	19.5	18.5	15.4	13.3	-2.2	-61.1
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	17.0	36.9	19.1	18.8	19.5	18.5	15.4	13.2	-2.4	-61.4
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	15.2	37.0	18.0	17.6	18.2	17.0	13.7	11.1	-6.3	-72.6
Emergency Generator	Pike 1 Phase A	14.8	37.0	25.9	22.6	23.5	21.3	10.2	-3.0	-32.2	-100.0
Emergency Generator	Pike 1 Phase B	14.5	37.0	25.7	22.3	23.3	21.0	9.8	-3.5	-33.3	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	13.4	37.0	17.0	16.6	17.1	15.7	12.1	8.8	-10.6	-84.6
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	13.0	37.1	16.8	16.4	16.9	15.4	11.7	8.3	-11.7	-87.6
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	11.1	37.1	15.8	15.3	15.7	14.0	9.9	5.7	-16.7	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	10.7	37.1	15.5	15.1	15.4	13.7	9.5	5.2	-17.7	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.6	37.1	18.5	21.2	20.2	14.9	8.7	-1.6	-26.2	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.5	37.1	18.5	21.2	20.1	14.9	8.7	-1.6	-26.3	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.5	37.1	18.5	21.2	20.1	14.8	8.6	-1.6	-26.3	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.5	37.1	18.5	21.2	20.1	14.8	8.6	-1.7	-26.4	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.5	37.1	18.5	21.1	20.1	14.8	8.6	-1.7	-26.5	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.4	37.1	18.5	21.1	20.1	14.8	8.6	-1.7	-26.6	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.4	37.1	18.4	21.1	20.1	14.8	8.5	-1.8	-26.6	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.4	37.2	18.4	21.1	20.0	14.7	8.5	-1.8	-26.7	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.4	37.2	18.4	21.1	20.0	14.7	8.5	-1.8	-26.8	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.4	37.2	18.4	21.1	20.0	14.7	8.5	-1.9	-26.8	-100.0
Glycol Aerial Cooler	Pike 1 Phase A	10.3	37.2	18.4	21.1	20.0	14.7	8.4	-1.9	-26.9	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.3	37.2	18.4	21.0	20.0	14.6	8.4	-2.0	-27.1	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.3	37.2	18.3	21.0	20.0	14.6	8.4	-2.0	-27.1	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.3	37.2	18.3	21.0	19.9	14.6	8.3	-2.0	-27.2	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.2	37.2	18.3	21.0	19.9	14.6	8.3	-2.1	-27.2	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.2	37.2	18.3	21.0	19.9	14.6	8.3	-2.1	-27.3	-100.0

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Glycol Aerial Cooler	Pike 1 Phase B	10.2	37.2	18.3	21.0	19.9	14.5	8.3	-2.1	-27.4	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.2	37.2	18.3	21.0	19.9	14.5	8.3	-2.2	-27.4	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.2	37.2	18.3	20.9	19.9	14.5	8.2	-2.2	-27.5	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.1	37.3	18.3	20.9	19.8	14.5	8.2	-2.2	-27.6	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.1	37.3	18.2	20.9	19.8	14.5	8.2	-2.3	-27.6	-100.0
Glycol Aerial Cooler	Pike 1 Phase B	10.1	37.3	18.2	20.9	19.8	14.5	8.2	-2.3	-27.7	-100.0
HP Steam Generator Stack	Pike 1 Phase A	9.9	37.3	27.6	26.3	20.3	11.3	8.1	0.2	-22.5	-100.0
HP Steam Generator Stack	Pike 1 Phase A	9.9	37.3	27.7	26.4	20.3	11.3	8.2	0.2	-22.4	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	9.9	37.3	15.1	14.6	14.9	13.1	8.7	4.2	-19.8	-100.0
HP Steam Generator Stack	Pike 1 Phase A	9.8	37.3	27.6	26.3	20.2	11.2	8.0	0.0	-22.9	-100.0
HP Steam Generator Stack	Pike 1 Phase A	9.8	37.3	27.6	26.3	20.2	11.2	8.0	0.0	-22.8	-100.0
HP Steam Generator Stack	Pike 1 Phase A	9.8	37.3	27.6	26.3	20.3	11.2	8.1	0.1	-22.6	-100.0
HP Steam Generator Stack	Pike 1 Phase A	9.7	37.3	27.5	26.2	20.2	11.1	7.9	-0.1	-23.0	-100.0

Notes:

Octave band sound levels are linear (i.e., not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Cabin Receptor (cont'd)

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
HP Steam Generator Stack	Pike 1 Phase B	9.7	37.3	27.5	26.2	20.1	11.1	7.9	-0.2	-23.2	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	9.7	37.3	15.0	14.5	14.8	12.9	8.5	3.9	-20.4	-100.0
HP Steam Generator Stack	Pike 1 Phase B	9.6	37.4	27.4	26.1	20.1	11.0	7.8	-0.3	-23.5	-100.0
HP Steam Generator Stack	Pike 1 Phase B	9.6	37.4	27.5	26.2	20.1	11.0	7.8	-0.3	-23.4	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	9.6	37.4	15.0	14.5	14.8	12.9	8.5	3.8	-20.6	-100.0
HP Steam Generator Stack	Pike 1 Phase B	9.5	37.4	27.4	26.1	20.0	10.9	7.7	-0.5	-23.8	-100.0
HP Steam Generator Stack	Pike 1 Phase B	9.5	37.4	27.4	26.1	20.0	10.9	7.7	-0.4	-23.7	-100.0
HP Steam Generator Stack	Pike 1 Phase B	9.5	37.4	27.4	26.1	20.0	11.0	7.7	-0.4	-23.6	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase B	9.3	37.4	22.4	25.1	18.6	12.5	7.4	-0.6	-24.5	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase B	9.3	37.4	22.4	25.1	18.6	12.5	7.4	-0.5	-24.4	-100.0
Transformer	Pike 1 Substation	8.9	37.4	14.8	17.5	18.5	11.5	8.6	-3.0	-27.5	-100.0
Transformer	Pike 1 Substation	8.8	37.4	14.7	17.4	18.5	11.4	8.5	-3.1	-27.8	-100.0
Transformer	Pike 1 Substation	8.7	37.4	14.6	17.3	18.4	11.3	8.4	-3.3	-28.0	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	8.5	37.4	14.4	13.8	14.0	11.9	7.3	2.1	-24.0	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	8.1	37.4	22.5	21.8	13.8	10.3	7.2	1.9	-32.3	-100.0
OTSG Combustion Air Blower	Pike 1 Phase A	8.0	37.4	15.6	18.3	17.3	12.2	6.3	-3.5	-27.0	-100.0
OTSG Combustion Air Blower	Pike 1 Phase A	7.9	37.4	15.5	18.2	17.2	12.2	6.1	-3.8	-27.5	-100.0
OTSG Combustion Air Blower	Pike 1 Phase A	7.9	37.4	15.5	18.2	17.2	12.2	6.1	-3.7	-27.5	-100.0
OTSG Combustion Air Blower	Pike 1 Phase A	7.9	37.4	15.5	18.2	17.2	12.2	6.2	-3.6	-27.3	-100.0
OTSG Combustion Air Blower	Pike 1 Phase A	7.9	37.5	15.6	18.3	17.3	12.1	6.2	-3.6	-27.2	-100.0
OTSG Combustion Air Blower	Pike 1 Phase A	7.9	37.5	15.6	18.3	17.3	12.1	6.2	-3.5	-27.1	-100.0
OTSG Combustion Air Blower	Pike 1 Phase B	7.7	37.5	15.3	18.0	17.0	11.9	6.0	-4.1	-28.3	-100.0
OTSG Combustion Air Blower	Pike 1 Phase B	7.6	37.5	15.3	18.0	17.0	11.9	5.9	-4.2	-28.5	-100.0
OTSG Combustion Air Blower	Pike 1 Phase B	7.6	37.5	15.4	18.0	17.0	12.0	5.8	-4.1	-28.2	-100.0
OTSG Combustion Air Blower	Pike 1 Phase B	7.6	37.5	15.4	18.1	17.0	11.8	5.9	-4.1	-28.2	-100.0
OTSG Combustion Air Blower	Pike 1 Phase B	7.6	37.5	15.4	18.1	17.1	11.9	5.9	-4.0	-28.0	-100.0

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
OTSG Combustion Air Blower	Pike 1 Phase B	7.5	37.5	15.3	18.0	16.9	11.9	5.8	-4.4	-28.5	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	7.5	37.5	13.9	13.3	13.4	11.2	6.3	0.7	-26.8	-100.0
IGF Discharge Pump	Pike 1 Phase A	7.3	37.5	9.2	9.9	9.9	8.9	6.6	2.6	-21.4	-100.0
IGF Discharge Pump	Pike 1 Phase A	7.1	37.5	9.2	9.9	9.8	8.8	6.5	2.3	-22.0	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	6.7	37.5	13.4	12.8	12.9	10.5	5.5	-0.5	-29.4	-100.0
IGF Eductor Supply Pump	Pike 1 Phase A	6.4	37.5	8.9	9.6	9.8	8.6	4.6	2.3	-21.6	-100.0
IGF Discharge Pump	Pike 1 Phase B	6.2	37.5	9.3	10.0	10.0	8.8	5.1	1.2	-22.3	-100.0
IGF Eductor Supply Pump	Pike 1 Phase B	6.0	37.5	8.7	9.4	9.7	8.4	4.3	1.8	-22.5	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	6.0	37.5	13.1	12.5	12.5	10.0	4.8	-1.5	-31.5	-100.0
IGF Eductor Supply Pump	Pike 1 Phase A	5.8	37.5	8.9	9.6	9.8	8.6	4.6	0.6	-23.2	-100.0
Glycol Trim Htr Combustion Air Blower	Pike 1 Phase B	5.8	37.5	13.0	15.7	14.6	9.3	5.0	-5.3	-30.4	-100.0
IGF Eductor Supply Pump	Pike 1 Phase B	5.8	37.5	8.7	9.4	9.4	8.3	4.0	1.5	-23.2	-100.0
Instrument Air Compressor	Pike 1 Phase B	5.6	37.5	22.5	15.2	16.2	10.0	2.2	-5.6	-26.2	-100.0
Instrument Air Compressor	Pike 1 Phase A	5.1	37.5	22.2	14.9	15.9	9.6	1.5	-6.7	-28.1	-100.0
Instrument Air Compressor	Pike 1 Phase A	5.1	37.5	22.3	14.9	15.9	9.7	1.5	-6.7	-28.1	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	5.1	37.5	12.6	12.0	12.0	9.3	3.8	-2.9	-34.4	-100.0
Glycol Trim Htr Combustion Air Blower	Pike 1 Phase A	4.9	37.5	13.0	15.7	14.6	9.3	3.0	-7.4	-32.5	-100.0
Glycol Trim Htr Combustion Air Blower	Pike 1 Phase A	4.9	37.5	13.0	15.7	14.6	9.3	3.0	-7.3	-32.4	-100.0
Instrument Air Compressor	Pike 1 Phase B	4.8	37.5	22.1	14.7	15.7	9.4	1.1	-7.2	-29.1	-100.0

Notes:

Octave band sound levels are linear (i.e. not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Cabin Receptor (cont'd)

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Glycol Trim Htr Combustion Air Blower	Pike 1 Phase B	4.7	37.5	12.8	15.5	14.4	9.0	2.7	-7.7	-33.2	-100.0
Blowdown Pond Pump	Pike 1 Phase B	4.7	37.5	7.5	8.2	8.1	7.0	2.9	0.5	-23.9	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase A	4.6	37.5	12.2	14.9	13.9	8.9	2.9	-7.1	-30.8	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase A	4.6	37.5	12.2	14.9	13.9	8.9	2.9	-7.1	-30.7	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase A	4.6	37.6	12.2	14.9	13.9	8.9	2.9	-7.0	-30.6	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase A	4.6	37.6	12.3	14.9	14.0	8.8	2.9	-7.0	-30.6	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase A	4.6	37.6	12.3	15.0	14.0	8.8	2.9	-7.0	-30.5	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	4.6	37.6	12.3	11.7	11.6	8.8	3.2	-3.8	-36.4	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase A	4.5	37.6	12.1	14.8	13.8	8.9	2.8	-7.1	-30.7	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	4.5	37.6	12.2	11.6	11.5	8.7	3.2	-3.8	-36.3	-100.0
IGF Discharge Pump	Pike 1 Phase B	4.4	37.6	8.9	9.4	9.0	7.3	2.2	0.0	-25.2	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase B	4.1	37.6	11.9	14.6	13.6	8.3	2.3	-7.8	-32.2	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase B	4.1	37.6	12.0	14.6	13.6	8.4	2.4	-7.7	-31.8	-100.0
Blowdown Pond Pump	Pike 1 Phase A	4.0	37.6	7.5	8.2	8.2	6.9	2.8	-1.4	-24.0	-100.0
Blowdown Pond Pump	Pike 1 Phase A	4.0	37.6	7.5	8.2	8.2	6.9	2.8	-1.4	-24.0	-100.0
Blowdown Pond Pump	Pike 1 Phase A	4.0	37.6	7.5	8.2	8.2	6.9	2.8	-1.4	-24.0	-100.0
Steam Gen Bldg. Air Make-Up Unit	Pike 1 Phase B	4.0	37.6	11.9	14.6	13.6	8.3	2.3	-7.9	-32.3	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	4.0	37.6	12.0	11.4	11.2	8.3	2.6	-4.8	-38.4	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	3.9	37.6	12.0	11.3	11.2	8.3	2.5	-4.9	-38.7	-100.0
Blowdown Pond Pump	Pike 1 Phase B	3.7	37.6	7.4	8.1	8.0	6.7	2.5	-1.7	-26.4	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	3.7	37.6	11.9	11.2	11.1	8.1	2.3	-5.2	-39.3	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	3.3	37.6	11.7	11.0	10.8	7.8	1.8	-5.9	-40.8	-100.0
Glycol Trim Heater Stack	Pike 1 Phase A	2.5	37.6	13.7	13.3	11.3	7.0	0.7	-8.7	-33.7	-100.0
Glycol Trim Heater Stack	Pike 1 Phase A	2.4	37.6	13.6	13.3	11.2	6.9	0.6	-8.7	-33.9	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	2.3	37.6	11.2	10.5	10.2	6.9	0.7	-7.6	-44.5	-100.0
Glycol Trim Heater Stack	Pike 1 Phase B	2.2	37.6	13.5	13.1	11.1	6.7	0.4	-9.1	-34.7	-100.0
Glycol Trim Heater Stack	Pike 1 Phase B	2.2	37.6	13.5	13.1	11.1	6.7	0.4	-9.1	-34.7	-100.0
Glycol Trim Heater Stack	Pike 1 Phase B	2.2	37.6	13.5	13.2	11.1	6.7	0.4	-9.1	-34.6	-100.0
IGF Discharge Pump	Pike 1 Phase B	2.2	37.6	8.5	8.4	7.2	4.8	-1.2	-1.3	-26.3	-100.0

Noise Source	Location	dBA	Cumulative Sum (dBA)	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
IGF Discharge Pump	Pike 1 Phase A	2.1	37.6	9.0	9.4	8.6	6.3	0.5	-5.1	-30.5	-100.0
Blowdown Pond Pump	Pike 1 Phase B	2.1	37.6	7.3	7.8	7.5	5.8	0.9	-4.5	-31.0	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	2.0	37.6	11.0	10.3	10.0	6.7	0.3	-8.2	-45.7	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	1.6	37.6	10.8	10.1	9.8	6.4	-0.1	-8.8	-47.1	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	1.6	37.6	10.8	10.1	9.7	6.4	-0.1	-8.8	-47.2	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	1.6	37.6	10.8	10.1	9.8	6.4	-0.1	-8.8	-47.1	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	1.4	37.6	10.7	10.0	9.6	6.2	-0.4	-9.2	-48.1	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	1.1	37.6	10.6	9.8	9.4	5.9	-0.8	-9.8	-49.3	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	1.0	37.6	10.5	9.8	9.4	5.8	-0.8	-9.9	-49.6	-100.0
Overall Well pad (Typical 10 wellpairs)	Pike 1 Well pad	0.8	37.6	10.4	9.7	9.2	5.7	-1.0	-10.2	-50.2	-100.0
Flash Treater Heater Stack	Pike 1 Phase A	0.6	37.6	11.5	11.2	9.2	4.9	-1.1	-10.1	-34.2	-100.0
Flash Treater Heater Stack	Pike 1 Phase A	0.6	37.6	11.5	11.2	9.2	5.0	-1.0	-10.1	-34.2	-100.0
Flash Treater Heater Stack	Pike 1 Phase B	0.5	37.6	11.4	11.1	9.1	4.9	-1.2	-10.2	-34.4	-100.0
Flash Treater Heater Stack	Pike 1 Phase B	0.4	37.6	11.3	11.0	9.0	4.8	-1.3	-10.5	-35.0	-100.0

Notes:

Octave band sound levels are linear (i.e., not A-weighted)

Only those noise sources with dBA sound level contributions greater than or equal to zero shown

Appendix C6

Noise Impact Assessment



Licensee: **Devon Canada Corporation**
 Facility name: **Pike 2 Project**
 Type: **Steam Assisted Gravity Drainage**
 Legal location: **TWP 73 - RG 04, 05, 06 - W4M, TWP 74 - RG 04, 05 - W4M**
 Contact: **Erin Sumner** Telephone: **(403) 213-8146**

1. Permissible Sound Level (PSL) Determination (Directive 038, Section 2)

(Note that the PSL for a pre-1988 facility undergoing modifications may be the sound pressure level (SPL) that currently exists at the residence if no complaint exists and the current SPL exceeds the calculated PSL from Section 2.1.)

Complete the following for the nearest or most impacted residence(s):

Distance from Facility	Direction from Facility	BSL (dBA)	Daytime Adjustment (dBA)	Class A Adjustment (dBA)	Class B Adjustment (dBA)	Nighttime PSL (dBA)	Daytime PSL (dBA)
730 m from Pike 1 Project (as amended)	East	40	10	0	0	40	50
1,500 m	All Directions	40	10	0	0	40	50

2. Sound Source Identification

For the new and existing equipment, identify major sources of noise from the facility, their associated sound power level (PWL) or sound pressure level (SPL), the distance (far or free field) at which it was calculated or measured, and whether the sound data are from vendors, field measurement, theoretical estimates, etc.

New Equipment	Predicted	OR	Measured	Data Source	Distance Calculated or Measured (m)
	X PWL (dBA)		X PWL (dBA)		
	X SPL (dBA)		X SPL (dBA)		
Listed in Appendix III				Measurements / Calculations	

Existing Equipment/ Facility	Predicted	OR	Measured	Data Source	Distance Calculated or Measured (m)
	X PWL (dBA)		X PWL (dBA)		
	X SPL (dBA)		X SPL (dBA)		
Listed in Appendix III				Measurements / Calculations	

3. Operating Conditions

When using manufacturer's data for expected performance, it may be necessary to modify the data to account for actual operating conditions (for example, indicate conditions such as operating with window/doors open or closed). Describe any considerations and assumptions used in conducting engineering estimates:

Equipment assumed to be operating at all times at maximum capacity.

4. Modelling Parameters

If modelling was conducted, identify the parameters used (see Section 3.5.1):

Ground absorption 0.5, Temperature 10°C, Relative Humidity 70%, all receptors downwind, Following ISO 9613.

5. Predicted Sound Level/Compliance Determination

Identify the predicted overall (cumulative) sound level at the nearest of most impacted residence. Typically, only the nighttime sound level is necessary, as levels do not often change from daytime to nighttime. However, if there are differences between day and night operations, both levels must be calculated.

Predicted sound level to the nearest or most impacted residence from new facility (including any existing facilities):

Theoretical 1,500 m Receptor

Modelled L_{eq} -Night = **36.7 dBA**, ASL = **35 dBA**, Overall L_{eq} -Night = **38.9 dBA**, PSL-Night: **40 dBA**

Trapper's Cabin

Modelled L_{eq} -Night = **37.6 dBA**, ASL = **35 dBA**, Overall L_{eq} -Night = **39.5 dBA**, PSL-Night: **40 dBA**

Is the predicted sound level less than the permissible sound level? **YES** If **YES**, go to number 7.

For the Pike 1 Project, mitigation is required to obtain modelled noise level of 37.6 dBA at trapper's cabin. Current mitigation recommendation is to orient the nearest well pad (730 m to the west of the trapper's cabin) such that the building doors point west. The noise model indicates that the noise levels at the trapper's cabin should be below 40 dBA until well pads start to encroach within approximately 1,200 m. At such time, Devon will revisit the noise model to determine the specific noise mitigation required to maintain a noise level below 40 dBA at the trapper's cabin based on more detailed well pad locations and pad site orientation.

6. Compliance Determination/Attenuation Measures

(a) If 5 is **NO**, identify the noise attenuation measures the licensee is committing to:

Predicted sound level to the nearest or most impacted residence from the facility (**with** noise attenuation measures):

N/A

Is the predicted sound level less than the permissible sound level? **YES** If **YES**, go to number 7.

(b) If 6 (a) is **NO** or the licensee is not committing to any noise attenuation measures, the facility is not in compliance. If further attenuation measures are not practical, provide the reasons why the measures proposed to reduce the impacts are not practical.

Note: If 6 (a) is NO, the Noise Impact Assessment must be included with the application filed as non-routine.

7. Explain what measures have been taken to address construction noise.

Advising nearby residents of significant noise sources and appropriately scheduling.

Mufflers on all internal combustion engines.

Taking advantage of acoustical screening.

Limiting vehicle access during night-time.

8. Analyst's Name: Steven Bilawchuk, M.Sc., P.Eng.

Company: **ACI Acoustical Consultants Inc.**

Title: **Director**

Telephone: **780-414-6373** Date: **October 18, 2018**