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AN ACOUSTICAL STUDY
OF THE PROPOSED SECHELT AGGREGATES PLANT

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SECHELT AGGREGATES LIMITED

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Project: 1132.861

86 08

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AN ACOUSTICAL STUDY OF THE PROPOSED SECHELT AGGREGATES PLANT, SECHELT, B.C.

EXECUTIVE SUMMARY

Barron & Associates was retained by Sechelt Aggregates to study the effects of sound emissions from the proposed Sechelt Aggregates plant on the Sechelt Community. The field work involved identifying and quantifying the sound levels from all major sources at different locations in the community and comparing those levels to the existing background sound in the Sechelt area.

Equipment sound measurements were made at Hillside Aggregates, Port Mellon, B.C., and Producers Aggregates, Albert Head, B.C., during July and August, 1986. Special attention was paid to the actual pieces of equipment to be moved to the Sechelt location. Background sound measurements consisted of both 24 hour and "spot" measurements made in the community area during July, 1986.

The results of the study have shown that the pit development has been planned so that most equipment is sited so as to preclude the need to install special sound attenuators. The primary crusher and the barge loading conveyor are readily amenable to sound attenuation by simple enclosures to result in virtually no adverse impact on the Sechelt community.

INTRODUCTION

Barron & Associates was retained by Sechelt Aggregates on 86 06 06 to conduct a study on the effect of sound emissions from the proposed Sechelt Aggregate Plant on the Sechelt Community.

The following study set out to identify and quantify the major sound sources at the proposed Sechelt Aggregate Plant and then to estimate the expected sound levels in the neighbouring Sechelt community. The measured and estimated sound levels have provided baseline data from which the predicted sound levels from the Aggregate plant has been assessed and the effect of necessary sound attenuation.

METHODS

On 86 07 21 and 22, three continuous 24 hour measurements were made to determine the existing community sound levels in the Sechelt area (See Figure No. 1). The three locations were as follows:

1. Forefront of Trail Bay (east end) near the Cottage Community
2. Native Band Office across from Sechelt Hospital
3. Native subdivision (north end) on the east side of Porpoise Bay.

Specifics of the areas typified by the measurement locations are defined in section "D" of the Results.

During the same time period short term "spot" background sound measurements were made both during the day and late at night. Spot measurement locations included:

1. Forefront of Trail Bay (center) at the foot of Trail Avenue.
2. New development at the Trail Avenue hill overlooking the west side of Porpoise Bay.

Fixed and mobile equipment measurements were made 86 07 21 and 25 at the Hillside Plant and Gravel Pit, Port Mellon, B.C. Measurements were made with specific regard to the equipment

proposed to be moved to the Sechelt location. The equipment measured included:

1. Primary (large) crusher and screens
2. Secondary (cone) crusher and screens
3. Front end loader
4. Barge loader

Additional fixed equipment measurements were made 86 08 20 at the Producers' Plant and Gravel Pit, Albert Head, B.C. The data obtained included measurements of:

1. Washing unit
2. Effects of an enclosure on a large primary crusher

The 24 hour data was recorded on three separate Larson Davis Type 700 sound monitoring instruments. The spot measurements and the equipment measurements were made using a Bruel & Kjaer 2206 type 1 sound level meter coupled with a Uher 4200 Report Stereo IC tape recorder. Recordings were analyzed in-house using Barron & Associates' computer assisted TOBADS one-third octave band analysis system.

The commmunity reponse was estimated using the method of Rosenblith and Stevens, as modified by Parrack. Unattenuated "worst-case" equipment sound levels were used in order to identify those pieces of equipment requiring acoustical treatment. The procedural worksheets are attached as Figures 2, 3, 4 and 5. This method has proved through experience to give an accurate reflection of the observable community reaction. A range of reactions is given for each situation, since many intervening variables occur in the estimation of community response. Similarly, no attempt should be made to estimate individual

response from these charts since the reaction of individuals can vary widely from the community average.

RESULTS

A. Measured Background Sound Levels

The result of our 24 hour measurements are given below in Table 1.

TABLE 1

	Location	Measured 24 Hour Sound Levels (dBA) L_{90} (Background)	L_{eq} (Average)
1.	Native Band Office	41	63
2.	Trail Bay Cottage Community	40	48
		(45)*[1]	(49)
3.	Porpoise Bay Native Subdivision	31*[2]	48

*[1] Numbers in brackets represent 12 hour daytime sound levels in dBA (07:00 to 19:00 hours).

*[2] Indicates noise floor of instrument; actual sound level may be less.

The L_{eq} is the energy averaged A-weighted level which has been shown to relate well to acoustic impact assessments. The L_{90} is the A-weighted sound level exceeded for 90% of the measurement period, corresponding to the background or natural ambient sound.

The above measurements show that background sound levels are very low. These levels were accumulated over the entire 24 hour period and thus reflect both day and night conditions. The nighttime levels are substantially less,

as may be seen from the time histories shown on Graphs 1 and 2 for the Band Office and Trail Bay respectively. The large difference between L_{90} and L_{eq} sound levels at the Native Band office results mainly from the increase in noise levels caused by traffic during the daytime. We believe these levels are very close (perhaps slightly higher) to those experienced at the hospital.

Day and nighttime octave band minimum background sound measurements were obtained at two additional locations: 1) Trail Avenue Hilltop (new development); and 2) Trail Bay Waterfront (foot of Trail Avenue). The results of these measurements are given in decibels below in Table 2 and represent the sound levels exceeded 90% of the time (L_{90}).

TABLE 2

Location	Octave Band Center Frequencies (Hertz) 63	125	250	500	1000	2000	4000	dBA
1. Trail Avenue Hilltop								
00:30 Hours	41	38	32	32	29	26	23	35
11:30 Hours	42	40	35	32	29	29	29	36
2. Trail Bay Waterfront								
01:00 Hours	45	44	40	40	43	42	40	48
11:00 Hours	55	47	41	40	38	34	30	43

There is very little difference between the day and night time measurements because of the general lack of traffic. Near the water the background sound levels are largely determined by the sound of waves on the shore which is a

function of both wind and tide. During our daytime measurement the sea was rippled and the tide low, thus giving minimum daytime levels. Further away from the shore the background sound decreases to near the lowest level one would expect to find in a suburban outdoor environment.

B. Measured and Estimated Equipment Sound Levels

The results of our individual equipment measurements and the estimated noise levels at the same three receiving locations used in Table 1 are given below in Table 3:

TABLE 3

Equipment	Measured and Estimated Maximum Sound Levels (dBA) at:			
	1. Source*	2. Native Office	3. Trail Bay Cottages	4. Porpoise Bay
1. Screens/cone crusher combo.	84	29	N/A	28
2. Primary crusher	101	38	N/A	37
3. Front end loader	92	33	N/A	32
4. Barge loader	77	N/A	49	N/A
5. Washer	91	29	N/A	29

*Source measurements were made at 25 ft., 10 ft., 15 ft., 40 ft. and 10 ft., respectively; N/A = not applicable.

The above measurements represent A-weighted peak levels (L_1 or the sound level exceeded 1% of the time and weighted to account for human hearing). Both atmospheric absorption and ground effect have been taken into account.

The sound from the barge loader was recorded while 1/4 in. Asphalt Crush was loaded onto a steel barge at the Hillside Plant. Four components of the overall barge loader sound were identified: 1. aggregate striking aggregate from a maximum height of approximately 40 ft.; 2. the conveyor belt drive; 3. the conveyor belt rollers; and 4. a surface mounted vibrator. Of these four components, the belt drive and the vibrator were clearly the main contributors to the overall sound field.

Estimates of octave band sound levels from the large primary crusher and the front end loader as received at the Trail Avenue Hilltop location, and from the barge loader as received at the Trail Bay Cottage Community, were also made. These calculations were all based on measured sound levels with no acoustical treatment. The resulting equipment sound levels are presented in Graphs No. 3, 4, 5 and 6 together with the background sound levels.

C. Estimated Community Reaction

Figures 2, 3 and 4 show the estimated peak sound levels from the primary crusher, the front end loader and the washer as well as the measured background noise levels at the Trail Avenue Hilltop location. These estimates use the existing unattenuated equipment sound levels and have assumed that the equipment will operate at night as well as during the day. The worst case applies to the untreated primary crusher, where the community response is estimated to range from "a few spontaneous complaints..." to "sporadic spontaneous individual complaints..." (refer to Figures for full quotes). Calculations for the washer have taken into account the sound reduction provided by a barrier as our information shows the line-of-sight will be blocked by the Waste, Block and Pipe, and Mason Sand piles.

The estimated community reaction to untreated barge loading activities is shown on Figure 4. Here, daytime background sound levels have been used (recorded at 11:00 hours at the foot of Trail Avenue waterfront) as we understand barge loading operations will only occur between 07:00 and 19:00 hours. Because our background levels were made during minimum sound conditions (ie. low tide and calm sea) the subsequent calculations represent worst case conditions. The resulting estimated community response ranges from "a few spontaneous complaints..." to "widespread individual complaints...".

D. Sound Reduction Recommended

Assuming a sound is bothersome, the level to which it must be reduced to achieve acceptability depends upon both the signal level and the existing background noise level at the receiver. Generally, the signal should be reduced to at least the same level as the existing background noise. To achieve inaudibility the signal should be reduced to about 3 decibels below the background noise if both signal and noise are of similar spectra. In some cases where the signal is very different than the noise (ie. a narrow band pure tone) or where the signal carries information (ie. speech, or a rhythmical beat) it should be reduced more than 5 decibels below the background. A comparison of the predicted equipment sound levels with the measured background sound levels (Tables 1 to 3 and Graph No.'s 3 to 6) indicate the following:

1. The primary crusher levels are estimated at 6 dBA above background nighttime levels of the Porpoise Bay Native Subdivision and 7 dBA above the same at the Trail Avenue Hilltop Subdivision. As a result, we predict that a reduc-

tion of the peak sound levels from the Primary crusher by at least 7 to 10 dBA will make its sound generally acceptable at these locations at night.

The relevant area at the Native Subdivision includes the majority of the housed area as far west as the Sechelt Inlet Road, no further south than the B.C. Hydro Substation and roughly the same distance north past the "Plant Access Road" (presently uninhabited). The area of principal concern for the Hilltop Subdivision involves those locations on the east slope of the hill with a clear line-of-sight to the proposed pit operations.

2. The barge loader peak sound levels are estimated at 5 dBA above background daytime levels at the Trail Bay Cottage Community. We predict that a minimum 5 to 8 dBA reduction of barge loader sound will make it generally acceptable at the Cottage Community. The relevant area encompasses the waterfront houses which are less than approximately 2000 ft. from the barge loader. Those houses east of the Sunshine Coast Highway are in an area where sound from the barge loader is mashed by the existing ambient sound.

In summary, our measurements and calculations have shown that the primary crusher will require sound treatment to reduce its audibility in the Trail Avenue Hilltop development and the Porpoise Bay Native Subdivison. In addition, the barge loader will require acoustic treatment to reduce its audibility at the Trail Bay Cottage Community. It is our opinion that operational controls (i.e. scheduling night work to those areas not having a clear line-of-sight to the community) will be sufficient to reduce the audibility of mobile equipment sound to an acceptable level. Sim-

ilarly, as long as the line-of-sight from the washer to the Hilltop Subdivision is blocked (ie. by the sand piles), we do not foresee the need for any acoustical treatment to the washer.

MITIGATIVE PROCEDURES

The appended estimates of community reaction assume that no special measures are taken to reduce or block the sound emanating from the various items of fixed and mobile equipment. Several methods are available for mitigating the noise from specific sources. Although detailed design of acoustical treatment is beyond the scope of this study, the following basic noise mitigation procedures are suggested as a basis for further discussion.

A. Primary Crusher - We understand the primary crusher will be relocated several times during Sechelt Aggregate's tenure. With this in mind we recommend an allowance be made for an enclosure around the primary crusher. An ideal enclosure would have no openings, which of course, is not possible in this case. We suggest that the enclosure be 5 sided, fit tight to the ground, that all openings be kept to a minimal size (perhaps covered with heavy curtain type barriers); and that at least 50% of the inside of the enclosure be lined with an absorptive material such as semi-rigid Fiberglas duct liner. The measured noise reduction given by an enclosure with some openings and without lining is shown in graph No. 7.

In addition to the enclosure, we suggest that wherever possible, the crusher be positioned behind an aggregate pile or natural berm which blocks the line-of-sight between the crusher and the Trail Avenue Hilltop subdivision. It must

be noted that the benefits of a berm alone can be reduced or eliminated by unfavourable climatic conditions.

B. Barge Loader - As previously noted, the main contributors to barge loader sound were the belt drive and the vibrator. We recommend the belt drive be enclosed in a structure lined with absorptive material such as 3/4 in. plywood lined with semi-rigid Fiberglas duct liner. Openings in the enclosure must be kept as small as possible. If the surface mounted vibrator is not essential we suggest it be removed or relocated closer to the plant. If this is not possible it should be enclosed in a similar manner to the belt drive. The conveyor belt rollers are unlikely to cause any acoustic problems assuming a maintenance program consistently deals with noisy bearings etc.

During our field measurements of the barge loader we were only able to obtain samples of 1/4 in. asphalt crush being loaded. Our earlier report (Barron & Strachan, September, 1971) noted that 1 1/4 in. crushed rock has significantly more high frequency sound energy than the smaller aggregates and subsequently we recommended the following operational sound controls:

1) Mason's sand should be loaded first in order to minimize the sound from aggregate landing directly on the barge and to minimize sound at the early operating hours (i.e. 7:00 hours).

2) If the initial aggregate (i.e. Mason's sand) is piled high on the portions of the barge nearest the Cottage Community (i.e. the north and east perimeter of the barge) it could become an effective barrier for all subsequent aggregate.

3) Care should be taken such that the aggregate falls on aggregate as much as possible and not against the sides of the barges.

The above earlier recommendations remain valid and should be carried out in addition to the belt drive and vibrator treatment described. If the above operational controls are properly and consistently adhered to we are of the opinion that they should be sufficient to adequately control the barge loader sound emission.

C. Mobile Equipment - Organize a work schedule where pit areas which are out of the line-of-sight of the Trail Avenue Hilltop area and the community in general, would be worked by the mobile equipment at night with all remaining areas worked during the day. All mobile equipment (ie. Cats, Dozers, and Front End Loaders) should be equipped with effective exhaust system mufflers. The acoustic effect of working out of the line-of-sight is clearly illustrated on Graph No. 8.

D. Maintenance - It will be essential that an effective maintenance program be enforced, especially regarding the barge loader, to prevent unnecessary increased sound levels due to wear and tear or faulty equipment (i.e. dry bearings, etc.).

E. General Plant Layout - In general all the fixed crushers, screens and washers are best located where shown, ie. behind stockpiles if possible.

DISCUSSION

The effect of local weather conditions on sound propagation can be significant. Our calculations have assumed a calm day of 15° C and relative humidity equal to 70%. Studies of sound propagation in the atmosphere have shown that wind and temperature gradients can cause large variations in the sound received at a distant site. Temperature inversions cause sound rays to bend downwards, sometimes nullifying the shielding effect of sound barriers and thus increasing the sound levels at the receiver. The presence of wind also causes the sound rays to bend. On the upwind side of the source the sound is refracted upwards and a sound shadow is created, while downwind the sound is bent towards the ground, increasing the level.

During the winter, most people tend to keep windows closed and to be indoors more often. However, temperature inversions or a southeast breeze during the summer could increase the downwind noise levels by 10 decibels or more. Fortunately, the prevailing wind direction during the summer months is westerly. For these reasons enclosures are recommended as opposed to berms. In general and whenever possible, equipment should be located out of the line-of-sight of all potential receivers.

CONCLUSIONS

This study has shown that attention will have to be paid to sound emissions from the primary crusher and the barge loading facility to ensure their operations do not contribute to the Sechelt Community acoustic environment. Reaction to sound emissions from mobile equipment and the washer are expected to be minimal. Sound levels from the aggregate plant are not expected to be significant at the hospital. Control of plant

layout and/or modification to individual machines can reduce the sound exposure and thus minimise the audibility of plant sounds in the community.

We trust the information contained in this report will be useful.

Respectfully submitted,

86 08 28

BARRON & ASSOCIATES

Kenneth E. Barron, P. Eng.
President

Stephen J. Insley, B.A. Hons.

APPENDICES

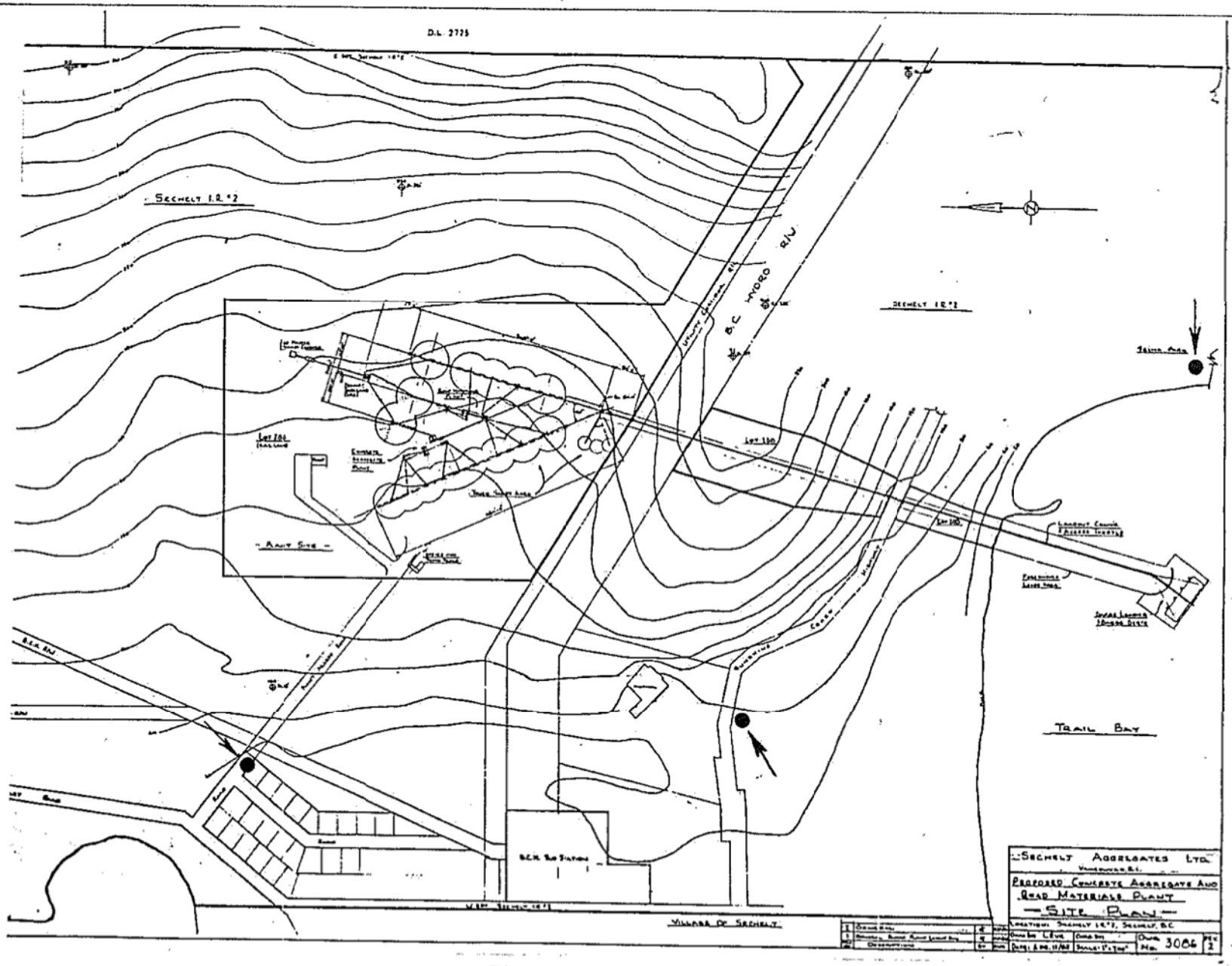

Figure No. 1

The proposed Sechelt Aggregates Plant with the three 24 hour measurements locations marked with arrows.

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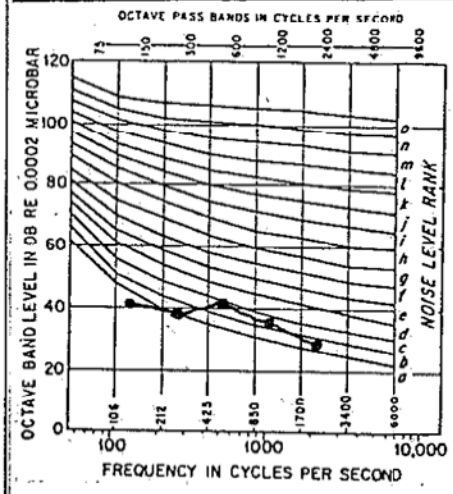
Figure No. 2

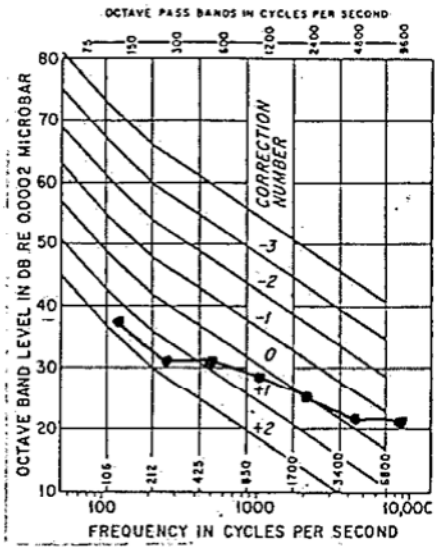
DETERMINATION OF COMMUNITY REACTION TO NOISE
(Method of Rosenblith and Stevens, modified by Parrack)

Project: 1132.861
Date: 86 07 23
Site: Sechelt

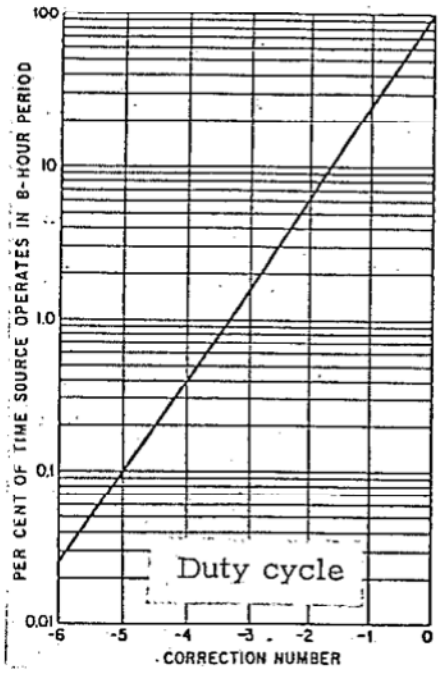
Remarks: Large Crusher at Trail Avenue Hilltop
Before Attenuation



Plot of measured
Sound Pressure Level.
Basic rank is C



Plot of background noise.
Correction Number is 0

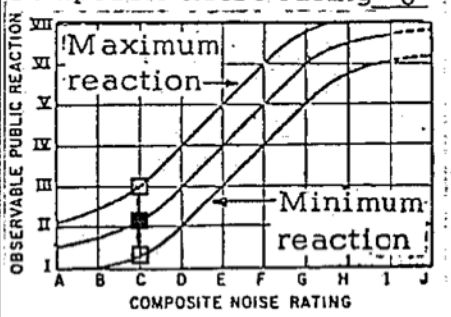


Factors influencing Rank

Correction number is 0

1. Background noise (from above)		+2 to -3		0
2. Temporal & seasonal factors:	a)	Daytime only	-1)	0
		Night-time	0)	
	b)	Duty cycle (from above)		0
	c)	Winter only	-1)	0
		Summer	0)	
3. Character of the noise:	a)	Full Spectrum	0)	0
		Pure tone	+1)	
	b)	Constant re time	0)	+1
		Impulsive	+1)	
4. Previous exposure:		None	0)	-1
		Some	-1)	
		Total correction to noise rank is		0

Composite noise rating C



Predicted reaction
of community is
Scale No. II

Scale Number	Description of the Activity or Action That Constitutes Each Level of Observable Public Response
I	No observable spontaneous complaints to operators or to other community members, and no community discussion.
II	A few spontaneous complaints can be observed. Usually these complaints are made to other residents and are detected only by carefully planned observation.
III	Sporadic spontaneous individual complaints to noise-source operators or to officials. Limited or irregular in number, time, and area of origin.
IV	Widespread individual complaints, regularly received from all noise-exposed areas.
V	Just observable initiation of group organization to lodge complaints with officials or operators. Some individual threats of the use of public-health, police, or legal enforcement agencies.
VI	Organized group action readily observable. Tendency toward integration of actions by community groups. Police power sometimes used to halt noisy operation.
VII	Group and community action completely integrated and supported community wide. Employs all police authority, legal action, or other public power to oppose noise-source operation.

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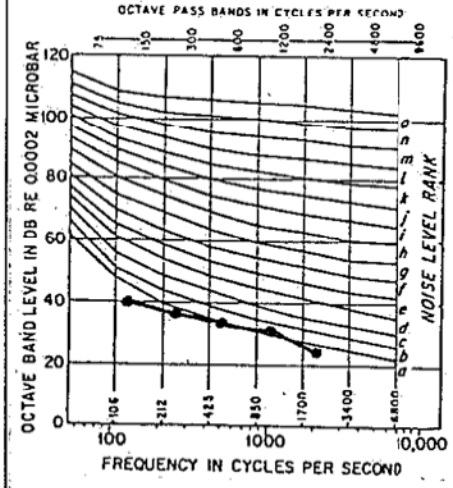
Figure No. 3

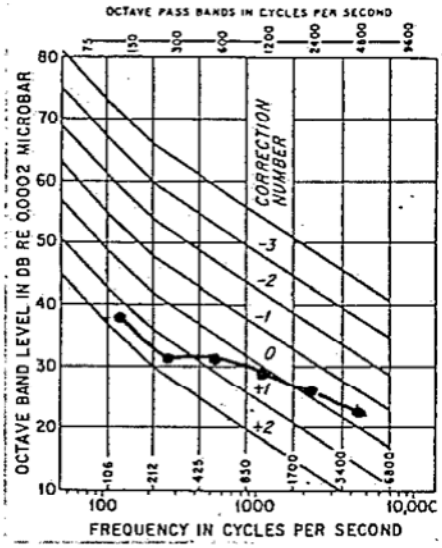
DETERMINATION OF COMMUNITY REACTION TO NOISE
(Method of Rosenblith and Stevens, modified by Parrack)

Project: 1132.861
Date: 86 07 23
Site: Sechelt

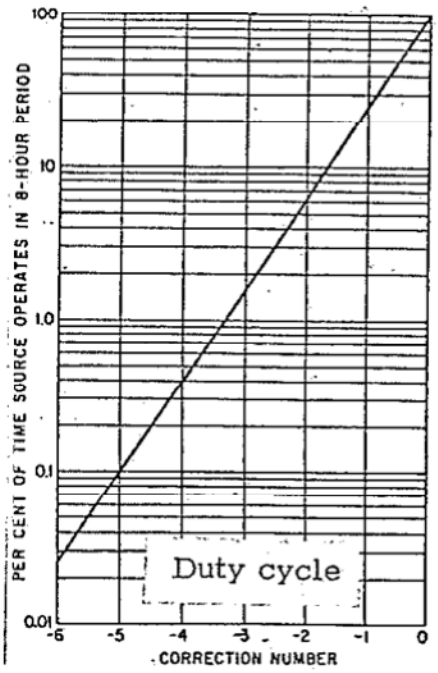
Remarks: Front End Loader at Trail Avenue Hilltop
Before Attenuation



Plot of measured
Sound Pressure Level.
Basic rank is B



Plot of background noise.
Correction Number is 0

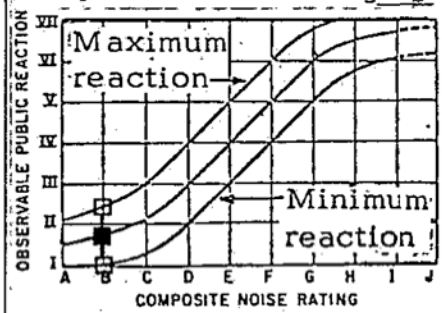


Factors influencing Rank

Correction number is 0

1. Background noise (from above)	+2 to -3		0
2. Temporal & seasonal factors: a)	Daytime only	-1)	0
	Night-time	0)	
b)	Duty cycle (from above)		0
c)	Winter only	-1)	0
	Summer	0)	
3. Character of the noise: a)	Full Spectrum	0)	0
	Pure tone	+1)	
b)	Constant re time	0)	+1
	Impulsive	+1)	
4. Previous exposure:	None	0)	-1
	Some	-1)	
	Total correction to noise rank is		0

Composite noise rating B



Predicted reaction
of community is
Scale No. II

Scale Number	*Description of the Activity or Action That Constitutes Each Level of Observable Public Response*
I	No observable spontaneous complaints to operators or to other community members, and no community discussion.
II	A few spontaneous complaints can be observed. Usually these complaints are made to other residents and are detected only by carefully planned observation.
III	Sporadic spontaneous individual complaints to noise-source operators or to officials. Limited or irregular in number, time, and area of origin.
IV	Widespread individual complaints, regularly received from all noise-exposed areas.
V	Just observable initiation of group organization to lodge complaints with officials or operators. Some individual threats of the use of public-health, police, or legal enforcement agencies.
VI	Organized group action readily observable. Tendency toward integration of actions by community groups. Police power sometimes used to halt noisy operation.
VII	Group and community action completely integrated and supported community wide. Employs all police authority, legal action, or other public power to oppose noise-source operation.

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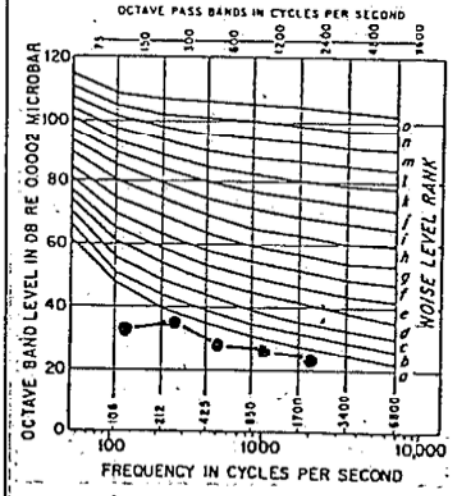
Figure No.4

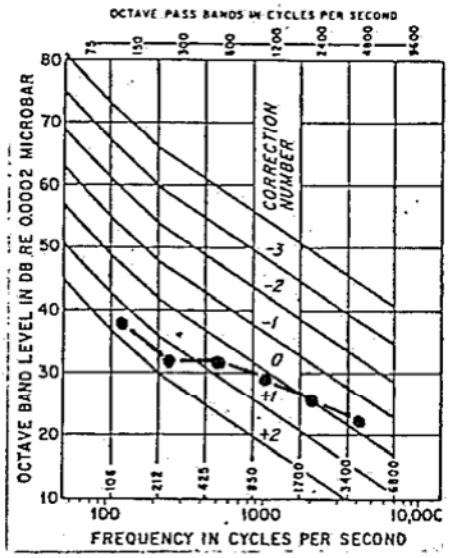
DETERMINATION OF COMMUNITY REACTION TO NOISE
(Method of Rosenblith and Stevens, modified by Parrack)

Project: 1132.861
Date: 86 08 25
Site: Sechelt

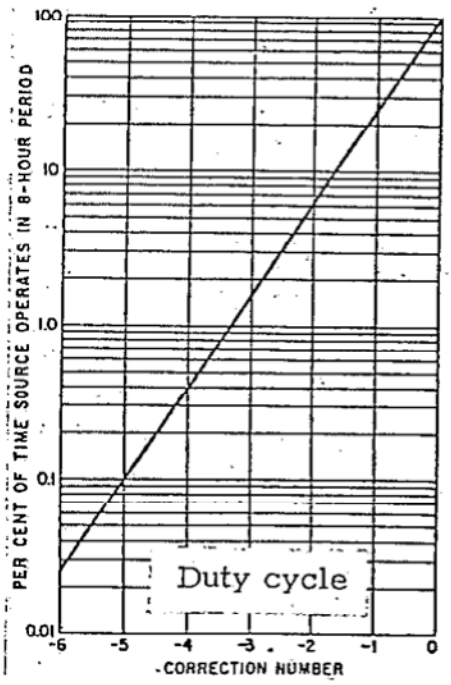
Remarks: Washer @ Trail Avenue Hilltop
Before Attenuation



Plot of measured
Sound Pressure Level.
Basic rank is a



Plot of background noise.
Correction Number is 0

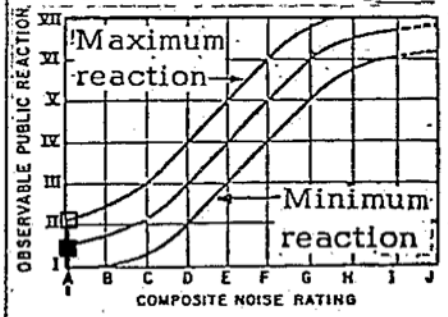


Factors influencing Rank

Correction number is 0

1. Background noise (from above)	+2 to -3		0
2. Temporal & seasonal factors:	a) Daytime only	-1)	0
	Night-time	0)	
	b) Duty cycle (from above)		0
	c) Winter only	-1)	0
	Summer	0)	
3. Character of the noise:	a) Full Spectrum	0)	0
	Pure tone	+1)	
	b) Constant re time	0)	0
	Impulsive	+1)	
4. Previous exposure:	None	0)	-1
	Some	-1)	
	Total correction to noise rank is		-1

Composite noise rating a



Predicted reaction
of community is
Scale No. I

Scale Number	Description of the Activity or Action That Constitutes Each Level of Observable Public Response
I	No observable spontaneous complaints to operators or to other community members, and no community discussion.
II	A few spontaneous complaints can be observed. Usually these complaints are made to other residents and are detected only by carefully planned observation.
III	Sporadic spontaneous individual complaints to noise-source operators or to officials. Limited or irregular in number, time, and area of origin.
IV	Widespread individual complaints, regularly received from all noise-exposed areas.
V	Just observable initiation of group organization to lodge complaints with officials or operators. Some individual threats of the use of public-health, police, or legal enforcement agencies.
VI	Organized group action readily observable. Tendency toward integration of actions by community groups. Police power sometimes used to halt noisy operation.
VII	Group and community action completely integrated and supported community wide. Employs all police authority, legal action, or other public power to oppose noise-source operation.

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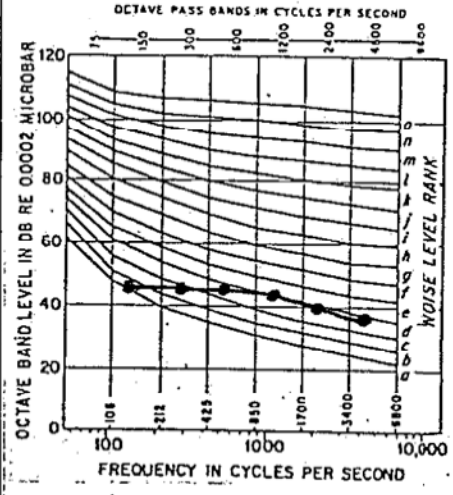
Figure No. 5

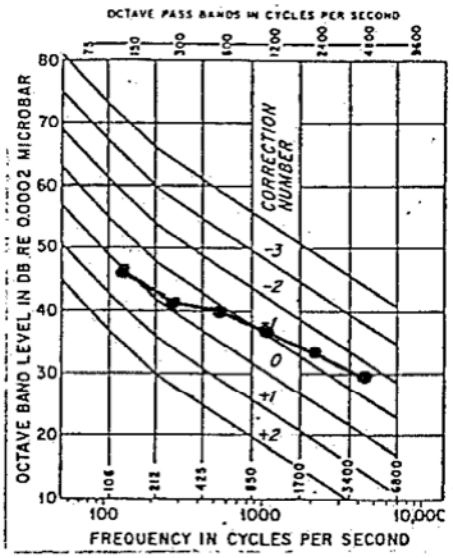
DETERMINATION OF COMMUNITY REACTION TO NOISE
(Method of Rosenblith and Stevens, modified by Parrack)

Project: 1132.861
Date: 86 07 25
Site: Sechelt

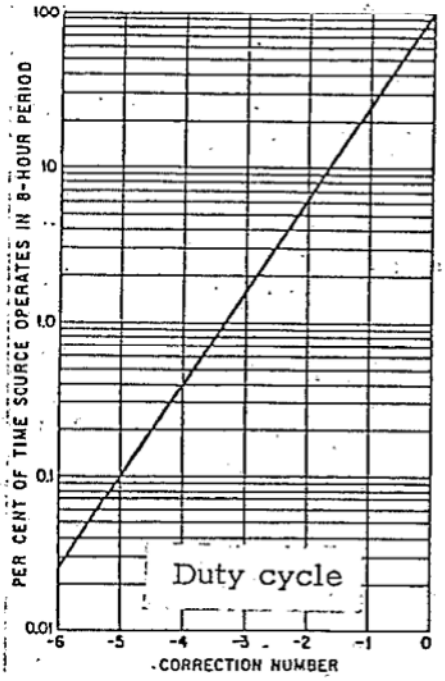
Remarks: Barge Loader at Trail Bay Cottage Community
Before Attenuation



Plot of measured
Sound Pressure Level.
Basic rank is E



Plot of background noise.
Correction Number is -1



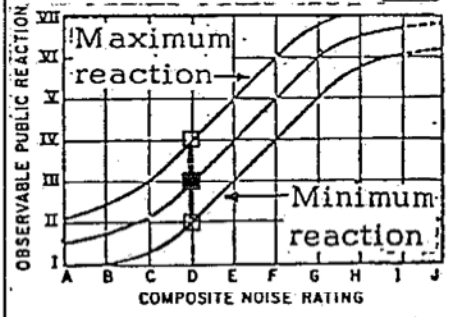
Factors influencing Rank

Correction number is 0

1. Background noise (from above)		+2 to -3		-1
2. Temporal & seasonal factors:	a)	Daytime only	-1)	-1
		Night-time	0)	
	b)	Duty cycle (from above)		0
	c)	Winter only	-1)	0
		Summer	0)	
3. Character of the noise:	a)	Full Spectrum	0)	+1
		Pure tone	+1)	
	b)	Constant re time	0)	0
		Impulsive	+1)	
4. Previous exposure:		None	0)	0
		Some	-1)	

Total correction to noise rank is -1

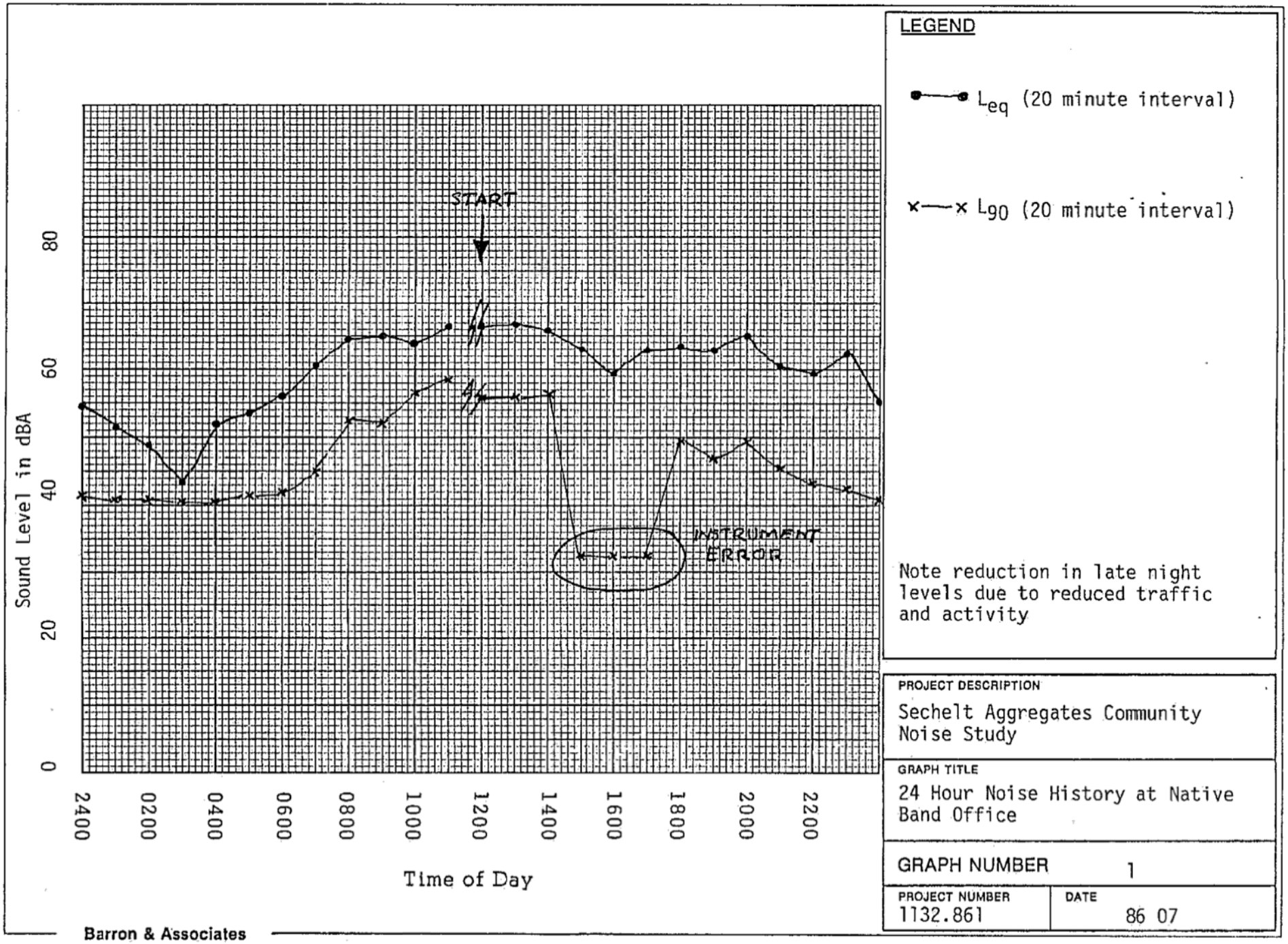
Composite noise rating D

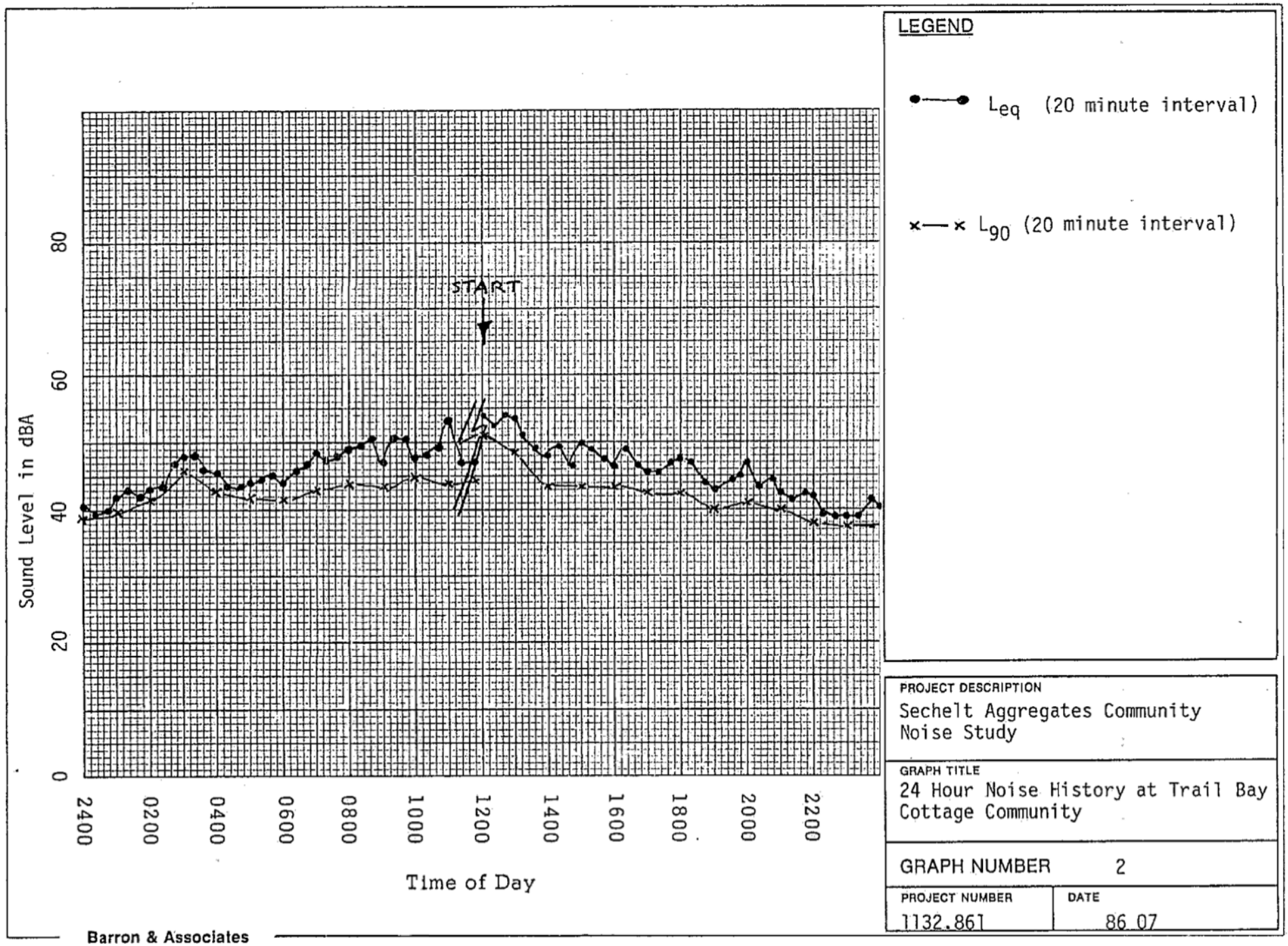


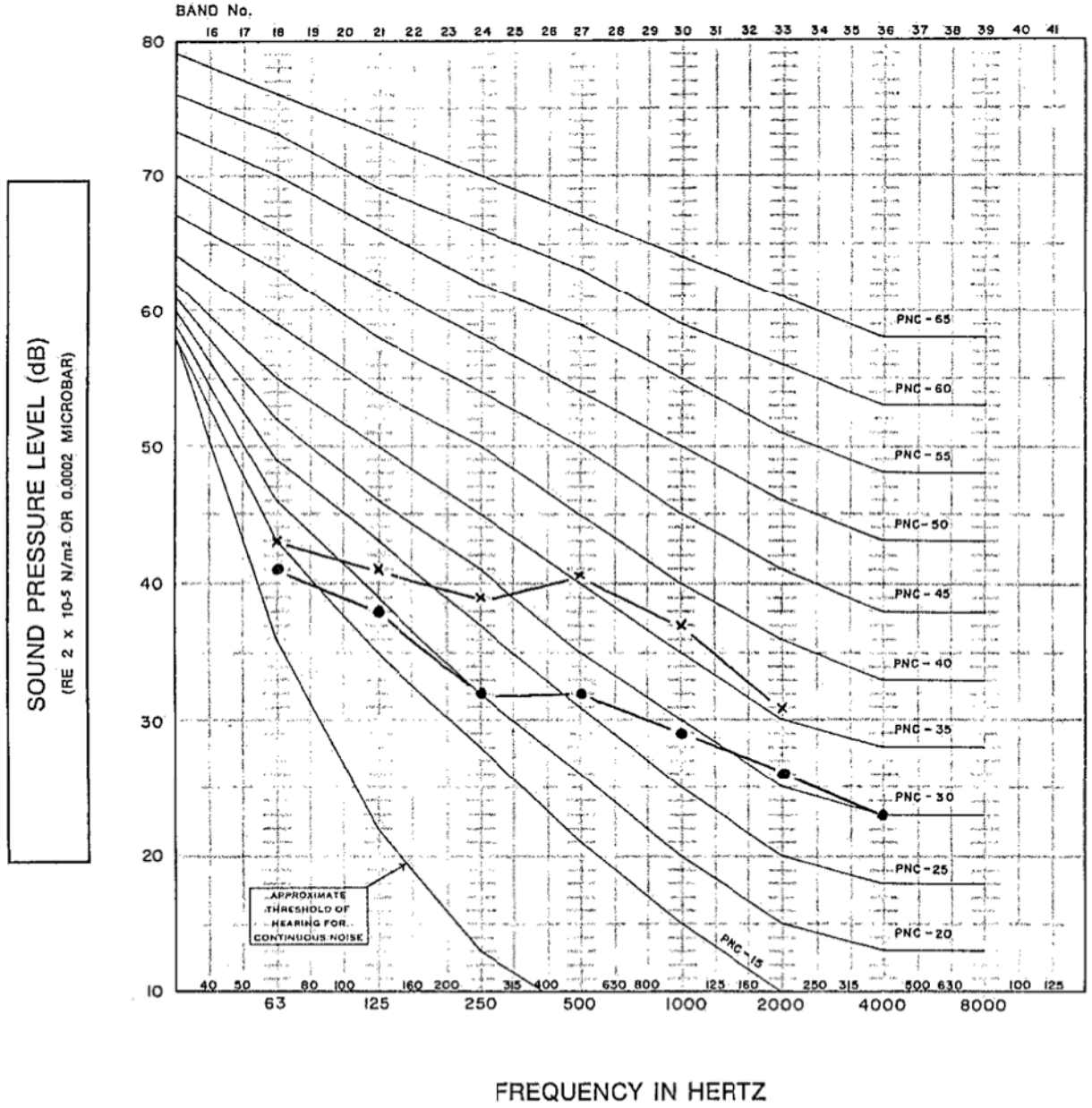
Predicted reaction
of community is
Scale No. III

Scale Number	Description of the Activity or Action That Constitutes Each Level of Observable Public Response
I	No observable spontaneous complaints to operators or to other community members, and no community discussion.
II	A few spontaneous complaints can be observed. Usually these complaints are made to other residents and are detected only by carefully planned observation.
III	Sporadic spontaneous individual complaints to noise-source operators or to officials. Limited or irregular in number, time, and area of origin.
IV	Widespread individual complaints, regularly received from all noise-exposed areas.
V	Just observable initiation of group organization to lodge complaints with officials or operators. Some individual threats of the use of public-health, police, or legal enforcement agencies.
VI	Organized group action readily observable. Tendency toward integration of actions by community groups. Police power sometimes used to halt noisy operation.
VII	Group and community action completely integrated and supported community wide. Employs all police authority, legal action, or other public power to oppose noise-source operation.

Barron & Associates


LEGEND
L_{eq} (20 minute interval)
L_{90} (20 minute interval)
START
INSTRUMENT ERROR
Note reduction in late night levels due to reduced traffic and activity
Sound Level in dBA
0
20
40
60
80
2400
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
Time of Day
PROJECT DESCRIPTION
Sechelt Aggregates Community Noise Study
GRAPH TITLE
24 Hour Noise History at Native Band Office
GRAPH NUMBER 1
PROJECT NUMBER 1132.861
DATE 86 07
Barron & Associates


LEGEND
L_{eq} (20 minute interval)
L_{90} (20 minute interval)
START
Sound Level in dBA
0
20
40
60
80
2400
0200
0400
0600
0800
1000
1200
1400
1600
1800
2000
2200
Time of Day
PROJECT DESCRIPTION
Sechelt Aggregates Community Noise Study
GRAPH TITLE
24 Hour Noise History at Trail Bay Cottage Community
GRAPH NUMBER 2
PROJECT NUMBER 1132.861
DATE 86 07
Barron & Associates



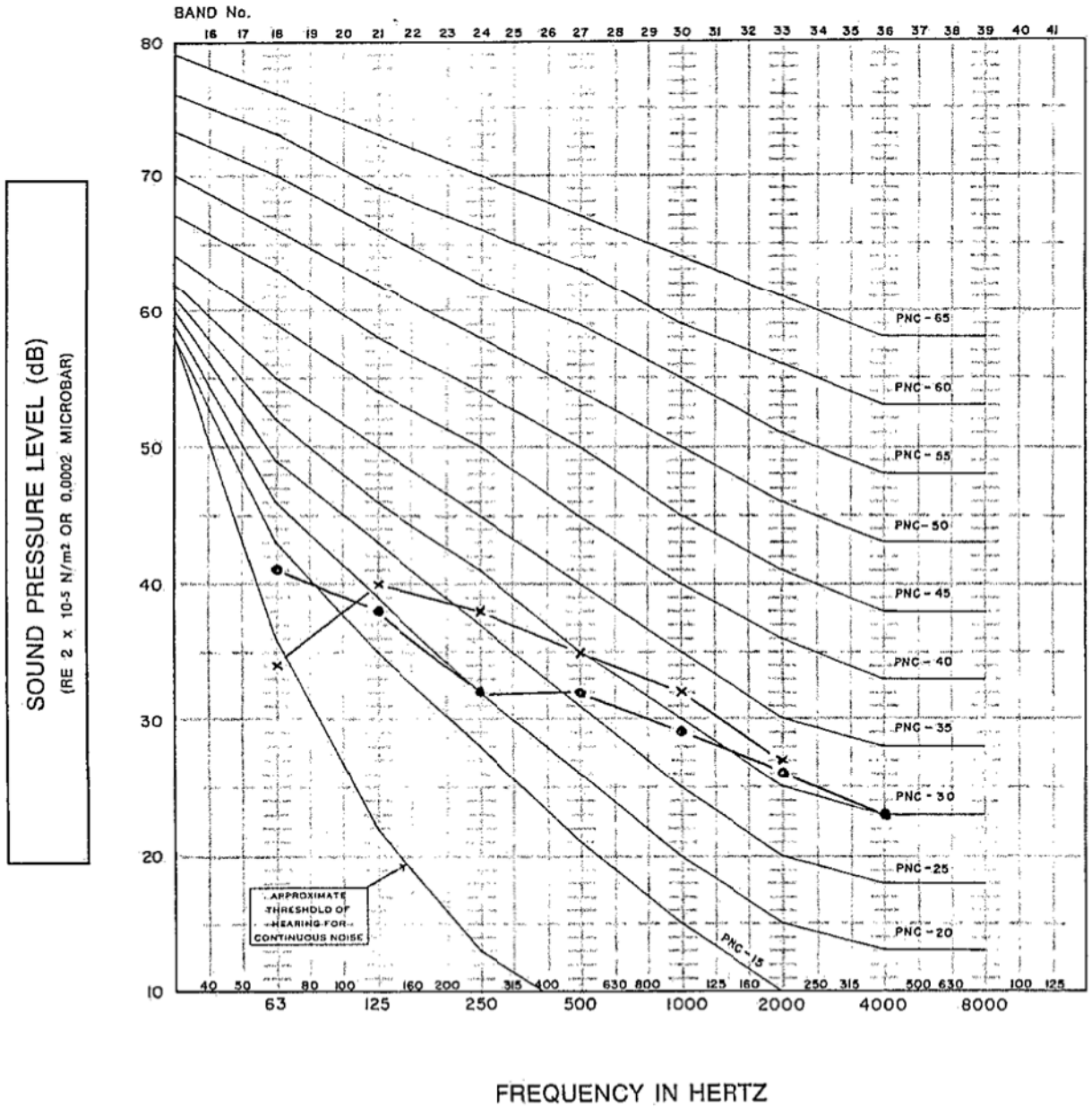
LEGEND

× ——— × Estimated Noise Level of Large Crusher at Trail Avenue Hilltop Location

• ——— • Trail Avenue Hilltop Nighttime Background Noise Level (L_{90} Measured at 00:30 Hrs)

PROJECT DESCRIPTION	Sechelt Aggregates Community Noise
GRAPH TITLE	Large Crusher Noise at Trail Avenue Hilltop
GRAPH NUMBER	3
PROJECT NUMBER	1132.861
DATE	86 07

Barron & Associates



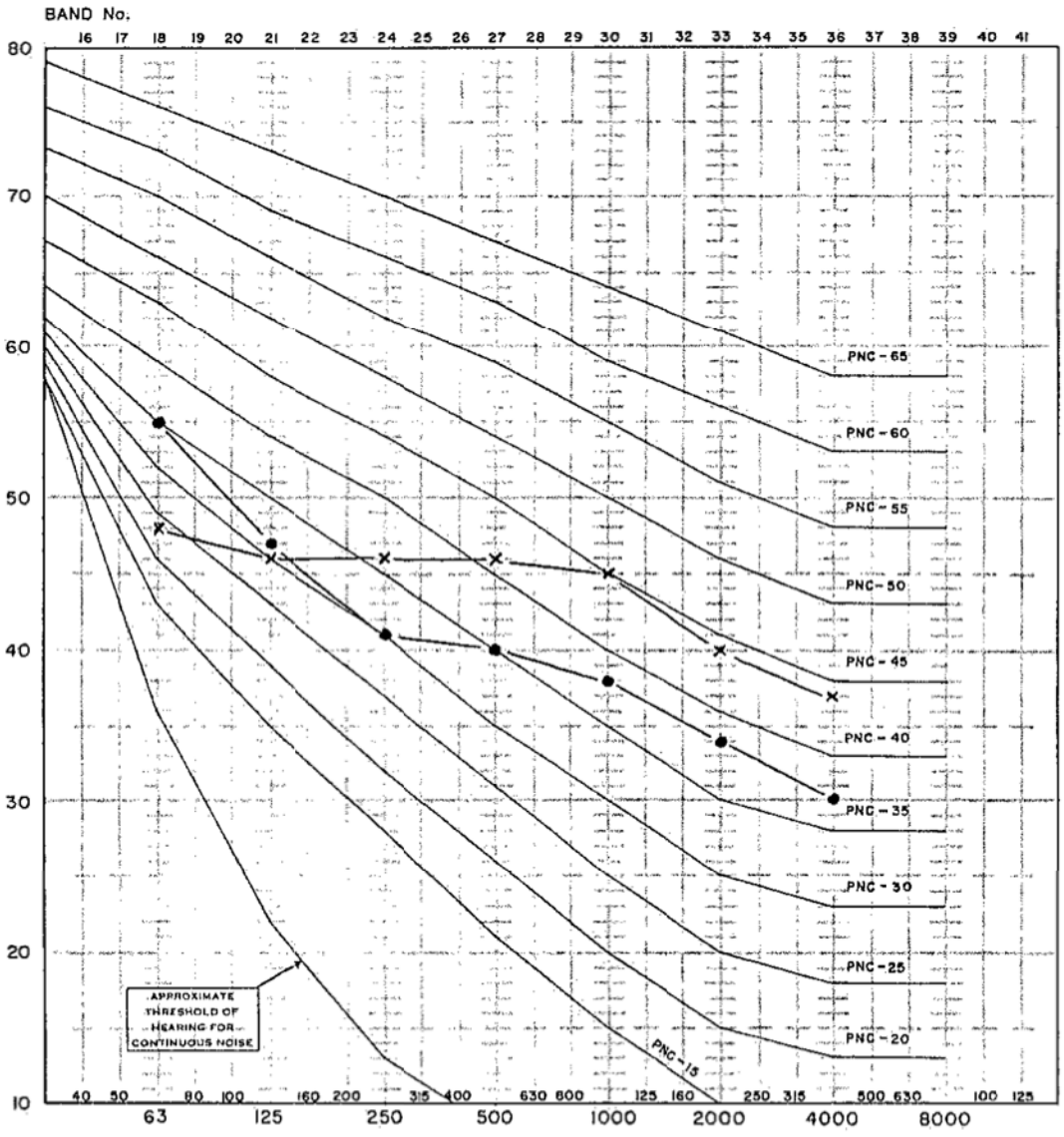
LEGEND

×———× Estimated Noise Level of Front End Loader at Trail Avenue Hilltop Location

●———● Trail Avenue Hilltop Nighttime Background Noise Level (L_{90} Measured at 00:30 Hrs)

PROJECT DESCRIPTION	Sechelt Aggregates Community Noise
GRAPH TITLE	Front End Loader Noise at Trail Avenue Hilltop
GRAPH NUMBER	4
PROJECT NUMBER	1132.861
DATE	86 07

Barron & Associates



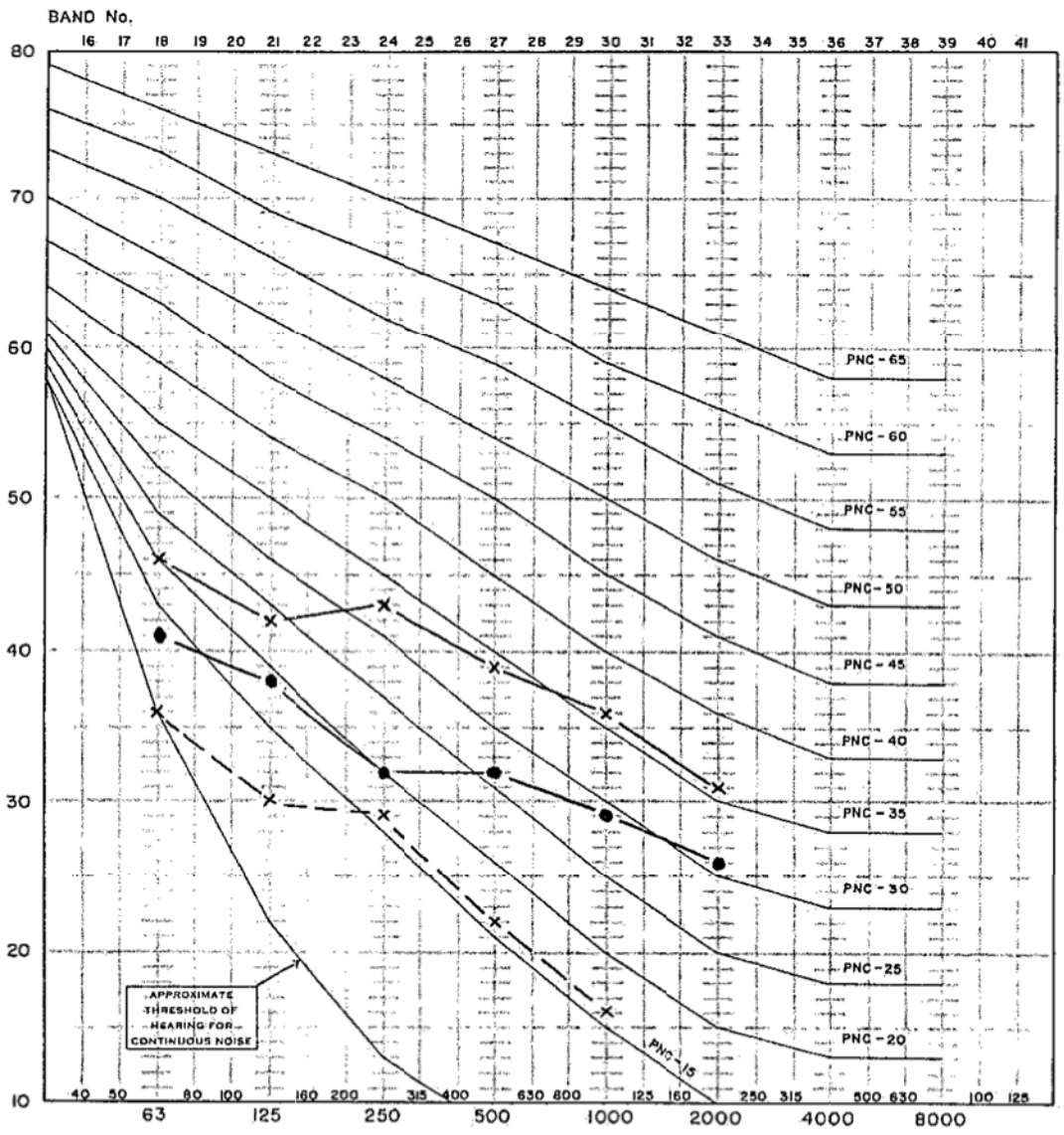
LEGEND

×——× Estimated Noise Level of Barge Loader at East Trail Bay Cottage Community

●——● Trail Bay Daytime Background Noise Level (L_{90} Measured at the Foot of Trail Avenue Waterfront at 11:00 hrs.)

PROJECT DESCRIPTION	Sechelt Aggregates Community Noise Study
GRAPH TITLE	Barge Loader Noise at Trail Bay Cottage Community
GRAPH NUMBER	5
PROJECT NUMBER	1132.861
DATE	86 07

Barron & Associates



SOUND PRESSURE LEVEL (dB)
(RE 2 x 10-5 N/m2 OR 0.0002 MICROBAR)

FREQUENCY IN HERTZ

LEGEND

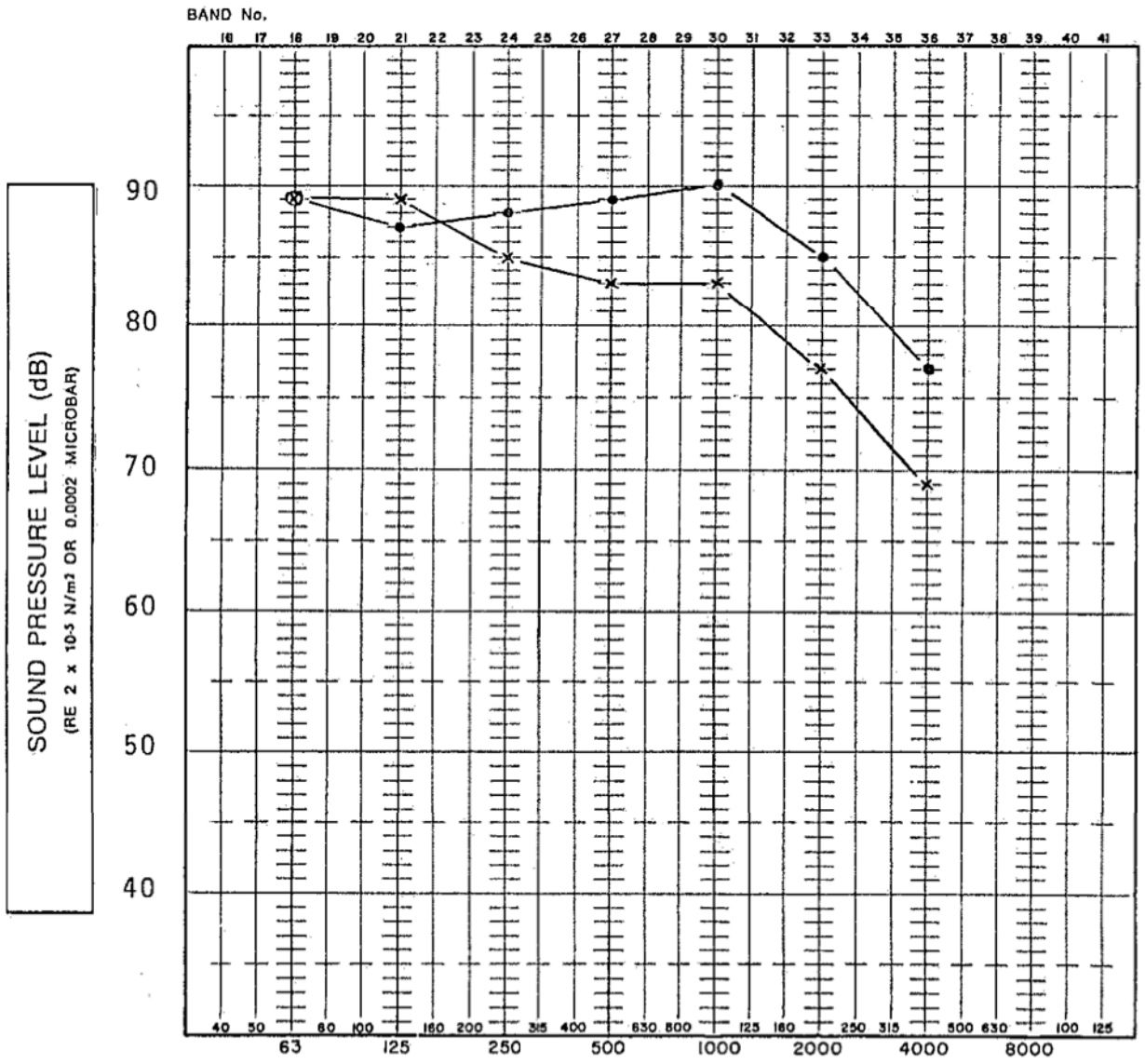
×———× Estimated Peak noise level of washer at Trail Avenue Hilltop location with a clear line-of-sight.

×— — —× Same as above with line-of-sight blocked by sand piles.

●———● Night time Background noise level at Trail Avenue Hilltop (L90 measured at 00:30 Hrs).

PROJECT DESCRIPTION: Sechelt Aggregates Acoustical Study	
GRAPH TITLE: Washer at Trail Avenue Hilltop	
GRAPH NUMBER 6	
PROJECT NUMBER 1132.861	DATE 86 08

Barron & Associates



LEGEND

●———● Producers' Pit Primary Crusher peak levels (L_1) at 25 ft. measured in line with large enclosure opening on North side.

×———× Same as above (L_1 @ 25 ft.) measured at southeast side giving the barrier effectiveness.

PROJECT DESCRIPTION
Sechelt Aggregates Acoustical Study

GRAPH TITLE
Reduction from Crusher Enclosure at Producers' Pit

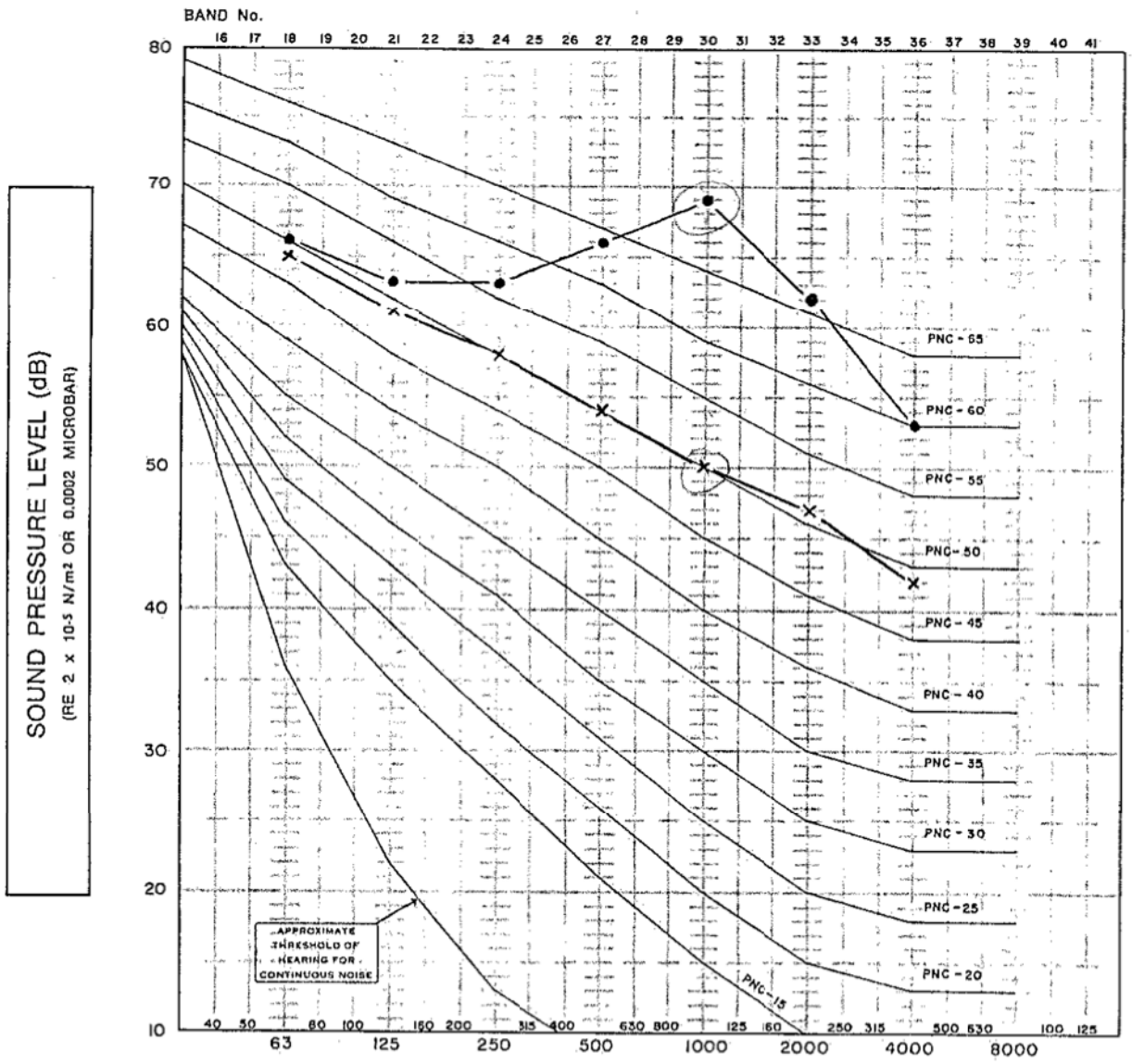
GRAPH NUMBER 7

PROJECT NUMBER 1132.861

DATE 86 08

Barron & Associates consulting acoustical engineers

lowered 20 dB " out of line of sight "



LEGEND

●———● Peak levels (L_1) from Producers' Gravel Pit measured at approx. 2/3 mi. in the line-of-sight of equipment.

×———× Same as above (L_1 @ 2/3 mi.) out of the line-of-sight of equipment.

Note: Both measurements were made on Metchosin Road. The first was made from the south side of the road overlooking the pit while the second was made from the north side of the road with the pit out of view.

PROJECT DESCRIPTION: Sechelt Aggregates Acoustical Study	
GRAPH TITLE: Noise reduction gained through blocking the line-of-sight	
GRAPH NUMBER 8	
PROJECT NUMBER 1132.861	DATE 86 08

Barron & Associates

File
0700037
G-7-45

Community Noise and Vibration Study, March 1998
Sechelt, B.C.

Prepared for:

Construction Aggregates Ltd.
Sechelt, B.C.

File:0470-98A

98 05 05

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cc: A. Parker

Table of Contents

Community Noise and Vibration Study, March 1998

Sechelt, B.C.

BKL Consultants Ltd. has carried out field noise and vibration measurements in the community near the Construction Aggregates Ltd. (CAL) facility in Sechelt, B.C. The purpose of these measurements was to make a comparison with recognised standards and to assess the noise and vibration impact of the CAL operation in the community.

1. SITE DESCRIPTION

The CAL site is a developed gravel and sand pit operation. The site, shown on Figure 1, is located on a hillside overlooking the community of Sechelt. The CAL facility is essentially a 24 hour operation. This includes a wide range of noise and vibration sources associated with the excavation, hauling, cleaning, crushing, and piling of gravel and sand. There are also ancillary activities directly related to the operation, such as road truck traffic and barge operation.

We understand that noise and vibration complaints have been received from residents in the community. Noise complaints have been received from the s.22 (see Figure 1). s.22 is located on a hillside directly across from the CAL facility at approximately the same elevation and 1.5 to 2 miles away. We also understand that vibration complaints have been received from the s.22 approximately 1 mile away. The s.22 is below the CAL site, near the Sunshine Coast Highway and Trail Bay. We have evaluated the impact of the CAL facility based on noise and vibration measurements in the community and a comparison of these results with standard recognised criteria. We have addressed these two issues separately below.

2. NOISE

2.1 Noise Assessment

To establish the noise level exposure in the community, two noise measurements were made commencing at 8:00 pm on 98 03 03 and running for 21 consecutive hours. We also made short term

noise measurements and observations at the sites to confirm the results of the community noise monitors and to comment on our perceptions of the noise level. The weather during the measurement period was clear, with little to no wind.

The s.22 monitor was located on top of a shed at an elevation of approximately 10 feet. The approximate measurement location is marked in Figure 1, and the measurement results are shown in Figures 2a and 2b.

The other community noise monitor was placed on top of the tower of the Fire Hall in Sechelt. The approximate measurement location is marked in Figure 1, and the measurement results are shown in Figures 3a and 3b.

The noise levels were monitored with two Larson Davis (LD) 700 community noise monitors. The measuring devices recorded the 21 hour equivalent noise level (Leq), the level variation on an hourly basis (shown on the interval reports, Figures 2a and 3a) and the 20 second equivalent noise level histories (shown on the graphical reports, Figures 2b and 3b). Figures 2a and 3a also refer to the exceedance levels L_1, L_{10}, L_{50}, and L_{90} which represents the A-weighted noise level (slow response time) which is exceeded for 1%, 10%, 50%, and 90% of the time. The L_1 is generally referred to as the "maximum" noise level, while the L_{90} is the "background" or ambient noise level.

Noise levels in this study are described in terms of "dBA, Leq" or "A-weighted equivalent" sound levels. An "A-weighted" sound level (dBA) is an overall acoustical measurement covering the complete frequency content of the sound, with a specific weighting of the various frequencies which approximates the human ear's response to sounds of different frequencies.

Fluctuating noise levels are commonly described in terms of equivalent sound level (Leq). This is the level of a steady sound which would have the same energy as the actual fluctuating sound over the given time period.

The weather can play a significant role in the propagation of noise. Under some atmospheric conditions, it is possible for the noise level of a steady source to fluctuate by 10 to 15 dBA.

2.2 Noise Criteria

Our evaluation of the s.22 and Fire Hall sites has been based on the District of Sechelt "Noise Bylaw, No. 220," 1994 (Appendix A). The Noise Bylaw is comprised of definitions and regulations regarding the emission of noise within Sechelt.

The Noise Bylaw defines Construction as the:

> "erection, repair, alteration, enlargement, addition, demolition or removal of a building or other structure, or the excavation or filling-in of land in any manner."

The Bylaw defines Noise as:

> "any sound that is loud, harsh or undesirable and which unreasonably disturbs the quiet, peace, rest, enjoyment, comfort or convenience, of the neighbourhood in which the sound is received, or of a person in the vicinity."

Section 3 outlines general regulations of the Noise Bylaw which includes the statement that:

> "No person, being the owner or occupier of property shall at any time permit that property to be used so that sound emanating from it constitutes a Noise."

In addition to Section 3, Section 4 provides specific regulations. Section 4(1)(c) Machine Noise states:

> "No person shall cause or permit the operation of a vehicle, vessel, engine, or equipment, including generators, power tools, power equipment, lawn mowers, jet skis, or other machines in such a manner that creates a Noise."

Section 4(1)(d) Construction Noise notes:

> "No person shall, on a Monday to Saturday inclusive before 0700 hours or after 2100 hours, or on a Holiday before 0900 hours or after 1700 hours, engage in or permit Construction in such a manner as to create a Noise."

Section 4(1)(f) Quiet Hours states:

> "No person shall cause or permit a Noise of any kind, which by its nature is unreasonably interrupting or would tend to interrupt the sleep of a person in the neighbourhood or vicinity, on a Monday to Saturday before 0700 hours or after 2300 hours, or on a Holiday before 0900 hours or after 2300 hours; except on the night of December 31st and until 0100 hours on the morning of January 1st."

Further, it should be noted that typical urban and suburban community noise bylaws include both a qualitative (i.e., subjective) and a quantitative (i.e., specified measurable noise levels) section. The latter generally states daytime and nighttime noise levels at the receptor location which should not be exceeded. In most cases, this is 55 dBA daytime and 45 dBA nighttime for residential areas. These levels are based upon the L_{20} noise level, that is, the noise level that is exceeded for 20% of the time.

2.3 Noise Discussion

We visited the s.22 during the nighttime hours while the CAL facility was operating. We made our observations at this time so that the effect of other extraneous background noise sources would be minimised. Our observations at the site during the nighttime hours indicate that although the noise from the CAL facility was at times audible, it was easily masked by noise from road traffic in Sechelt and the highway. At no time did we find the noise levels "unreasonably disturbing" the peace and quiet of the neighbourhood.

During the daytime hours, the time history chart of the monitor at the s.22 (Figure No. 2b) indicates that were a series of high noise levels for very short periods of time from approximately 07:00 to 17:00 on 98 03 04. We did not visit the site during these hours, and so we cannot personally report on what may have caused these high noise levels. We have reviewed the time logs of the equipment operating at CAL (Appendix B), as well as the noise levels measured at the Fire Hall. Some of the high noise levels occurred during time periods when no significant equipment was operating at the CAL facility. Further, some of the measured noise levels were higher at the s.22 location than at the Fire Hall, which would indicate that the source of noise

was closer to the s.22 than to the Fire Hall. We are not familiar enough with the local noise sources to comment on what may have caused these high noise levels, but conclude that they are unlikely to be at the CAL facility.

From a quantitative community Noise Bylaw standpoint, a review of the time interval data indicates that there was no hour in which the L_{20} noise level exceeded 45 dBA, the typical quantitative community noise bylaw nighttime limit.

2.4 Noise Conclusions

Based upon these noise measurements and our observations in the community, we conclude that the noise emissions from the CAL facility did not contravene the intent of the Sechelt Noise Bylaw at the s.22 However, it is possible that under some atmospheric conditions that the noise emissions from the CAL facility could be clearly audible in the community. This would require further testing to confirm.

3. VIBRATION

3.1 Vibration Assessment

Vibration measurements were made at various times during the day of 98 03 04 inside the s.22 s.22 During the day, the pit was undergoing a variety of operational conditions ranging from shutdown to normal operation. The operational times of the equipment were logged for a comparison with our measurements.

The vibration measurements were made in the kitchen, which s.22 identified as one of the worst locations for vibration inside the house. A Wilcoxon 417 accelerometer was attached to the kitchen linoleum floor. The accelerometer was connected to a Bruel and Kjaer 2143 spectrum analyser to record both the level and frequency spectrum information. Figure 4 shows the background vibration levels as well as measurements made during the day at times when s.22 s.22 indicated she had a "perceptible vibration". The levels measured are slow averaged

acceleration decibels, frequency weighted in accordance with the U.S. National Research Council, National Academy of Sciences, Committee on Hearing, Bioacoustics and Biomechanics (CHABA) recommendations.[1]

The background vibration levels were measured early in the day (from approximately 10:00 to 11:30) with various appliances in the s.22 turned off and on. s.22 reported that she was not perceiving a vibration during these background measurements. During the remainder of the measurements (approximately 11:30 to 17:00), s.22 reported perceiving a vibration.

During the entire vibration measurement period, the undersigned did not perceive any annoying vibration. There was a very brief period during the day (less than 5 minutes) when a low frequency sound was perceived by this observer. However, as there was no significant change in the vibration levels measured on the kitchen floor, it was concluded that this sound was an airborne transmission-the result of a distant low frequency noise source such as barge traffic, airplane noise, or an idling diesel locomotive. This sound was not loud enough to be judged annoying to this observer.

A comparison of the time periods in which s.22 noted a "perceptible vibration" and the equipment logs at the CAL facility shows no clear correlation with any particular equipment. In fact, there were time periods in which s.22 indicated that she perceived a vibration and there were no major pieces of equipment operating at the CAL facility.

3.2 Vibration Criteria

There are various daytime and nighttime thresholds of human perception to vibration. As with noise, the most critical vibration criteria of interest is the 0.0036 m/sec^2 (71 dB) "threshold of perception". According to the CHABA criteria (page VI-16), "the overall vibration that will not cause an adverse impact for any condition and time period" corresponds to rms acceleration values below 0.0036 m/s^2.

---

[1] Guidelines for Preparing Environmental Impact Statements on Noise - Report of Working Group 69 on Evaluation of Environmental Impact of Noise - Committee on Hearing, Bioacoustics, and Biomechanics, Assembly of Behavioral and Social Sciences, National Research Council, National Academy of Sciences, Washington, DC, 1977.

For comparison sake, we have also identified the 0.005 m/sec^2 (74 dB) Nighttime RMS criterion (a level which indicates a 1% expectation of complaints due to nighttime activities) and the 0.072 m/sec^2 (97 dB) Daytime RMS threshold (a level which indicates a 20% expectation of complaints due to activities during the daytime hours).

3.3 Vibration Discussion

A comparison of the vibration levels indicates that, on average, the vibration levels during the time in which s.22 reported a "perceptible vibration" are slightly higher than during the background measurements. However, there are also a couple of measurements that are lower in level than the background measurements. Also, it must be noted that even the highest vibrational levels are more than 30 dB below the CHABA threshold of perception. For comparison sake, a vibrational level of 41 dB contains 1,000 times less vibrational energy than the CHABA nighttime criteria of 71 dB.

3.4 Vibration Conclusions

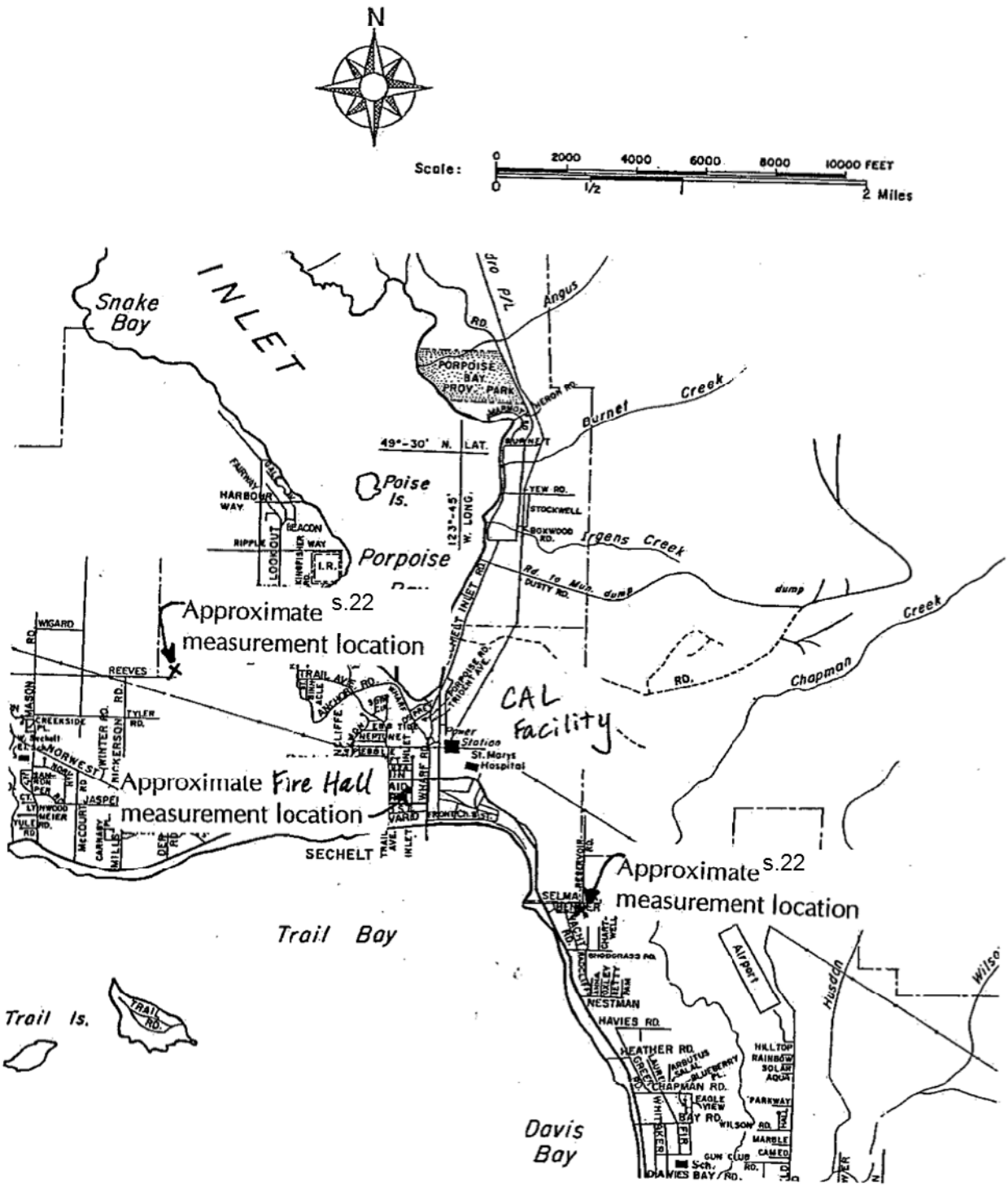
From a review of these data, it can be seen that the maximum measured vibration is significantly below the CHABA threshold of perception criterion level. We conclude, therefore, that based on the measurements made, activities at the CAL facility are not causing vibrational levels at the s.22 that are even close to exceeding recognised standards for threshold of perception (the most critical condition).

If you have any questions regarding this report, please call.

Sincerely,

BKL CONSULTANTS LTD.

Kenric D. Van Wyk, P.Eng.



Project: 0470-98A Figure 1 98 04

BKL Consultants Ltd.

21 Hour Noise Measurement at s.22 , Sechelt, B.C.

SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0147
DATA FROM: 0470-981
03/05/98 09:55:56

Time	0021:00:00
LVL	41.3
L01	58
L10	40.5
L50	37.5
L90	36.5

Run date	03/03
Stop date	03/04
Run time 1	20:00
Stop time 2	17:00
Detector	SLOW
Weight	A
Intv Ln's	ON
History	3801
Save Peaks	OFF
Period	20.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0147
DATA FROM: 0470-981 03/05/98 09:55:56

Date 3 MAR Period 01:00 h:m

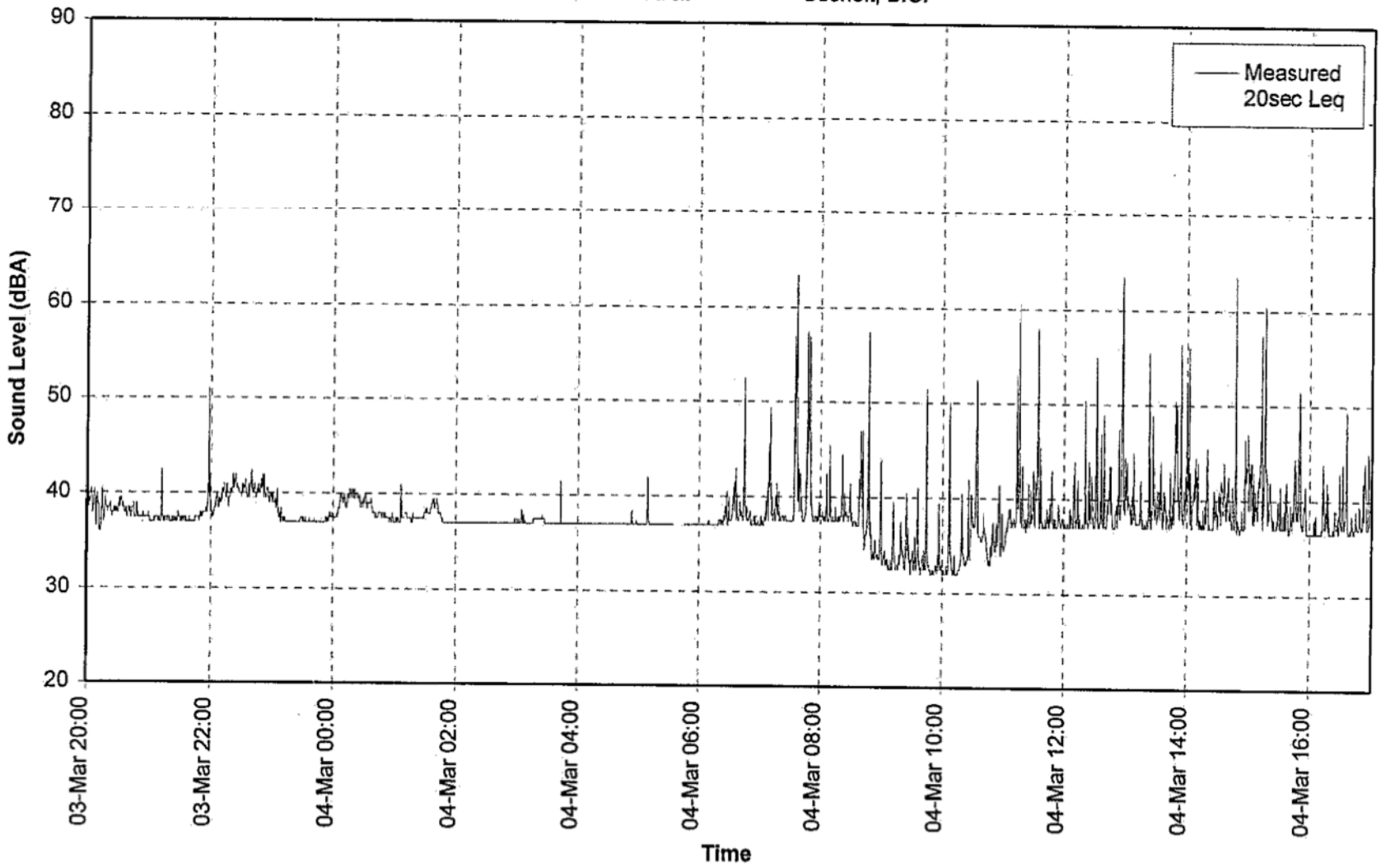
Time	LVL	L01	L10	L50	L90
20:00:01	38.5	41.0	39.5	38.0	37.5
21:00:01	38.0	44.5	38.0	37.5	37.0
22:00:01	40.0	42.5	41.5	40.0	39.0
23:00:01	37.5	40.5	38.0	37.0	37.0
0:00:01	38.5	41.0	40.0	38.5	37.5
1:00:01	38.0	40.0	39.0	37.5	37.0
2:00:01	37.0	37.5	37.0	37.0	37.0
3:00:01	37.0	39.0	37.5	37.0	37.0
4:00:01	37.0	37.5	37.0	37.0	37.0
5:00:01	37.0	39.5	37.0	37.0	37.0
6:00:01	38.5	48.0	39.0	37.5	37.0
7:00:01	47.0	59.5	44.5	38.0	37.5
8:00:01	41.5	51.5	41.5	37.5	34.0
9:00:01	36.0	48.0	36.0	33.0	32.5
10:00:01	38.5	52.0	39.0	34.5	32.0
11:00:01	43.5	58.5	41.5	37.5	37.0
12:00:01	45.5	58.5	43.5	37.5	37.0
13:00:01	42.5	54.0	43.5	38.5	37.0
14:00:01	44.0	54.5	43.0	38.0	37.0
15:00:01	44.5	58.0	44.5	38.0	37.0
16:00:01	39.0	47.0	41.0	37.0	36.5

Figure 2a

BKL Consultants Ltd.

24 Hour History Graph (20s Histories)

Noise Levels Measured at s.22 Sechelt, B.C.



File: 470-98A

Figure No. 2b

98 04 29

BKL Consultants Ltd.

21 Hour Noise Measurement at Fire Hall, Sechelt, B.C.

SUMMARY REPORT

LARSON-DAVIS LABORATORIES
MODEL 700 SN B0123
DATA FROM: 0470-982
03/05/98 10:28:49

Time	0021:00:00
LVL	56.2
L01	66
L10	59
L50	52.5
L90	40.5

Run date	03/03
Stop date	03/04
Run time 1	20:00
Stop time 2	17:00
Detector	SLOW
Weight	A
Intv Ln's	ON
History	3801
Save Peaks	OFF
Period	20.0

INTERVAL REPORT LARSON-DAVIS LABORATORIES MODEL 700 SN B0123
DATA FROM: 0470-982 03/05/98 10:28:49

Date 3 MAR Period 01:00 h:m

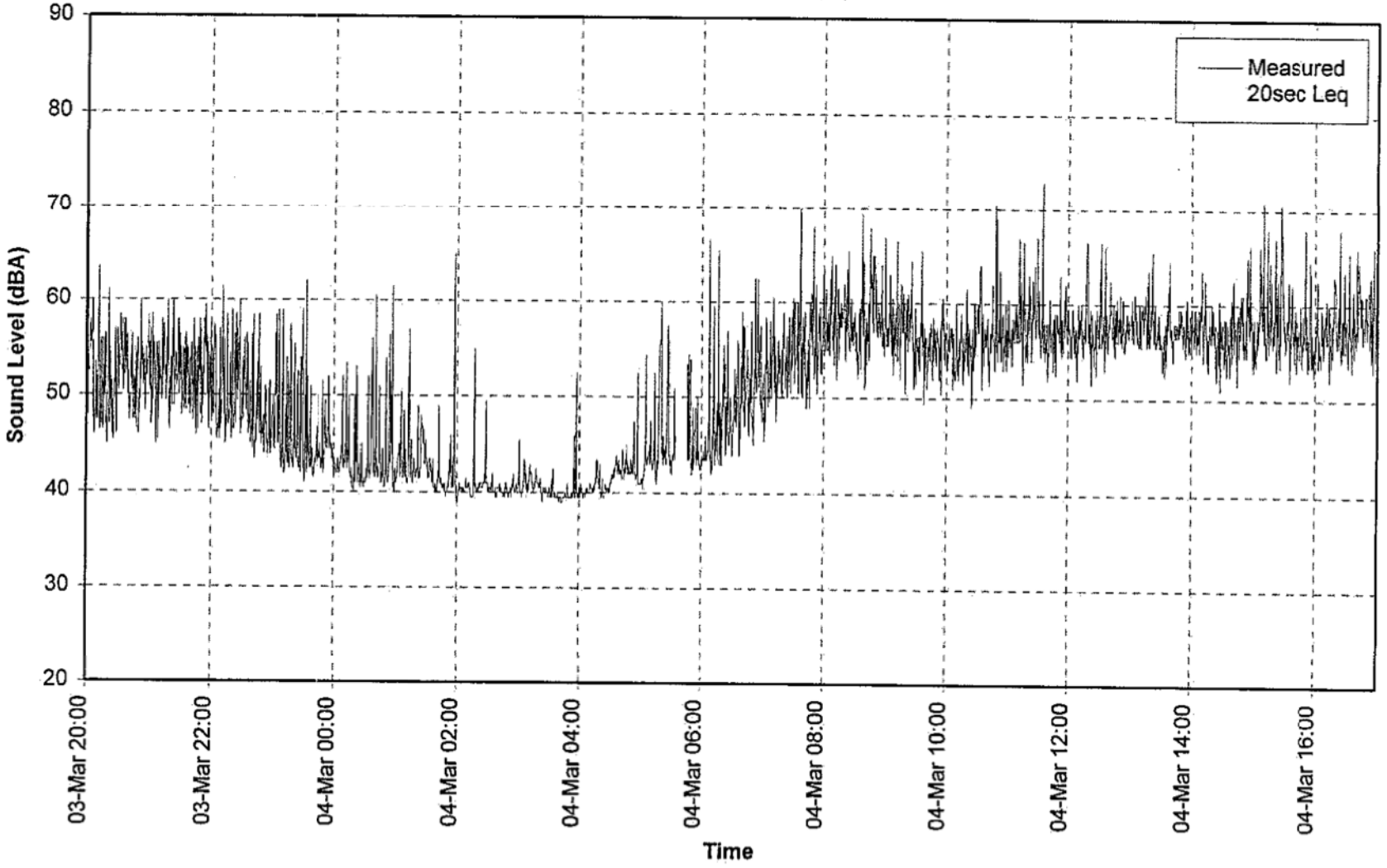
Time	LVL	L01	L10	L50	L90
20:00:01	54.0	63.0	57.5	51.5	46.5
21:00:01	53.5	62.0	57.0	51.0	47.5
22:00:01	52.0	62.0	56.0	48.0	45.0
23:00:01	49.5	61.0	52.0	44.0	42.0
0:00:01	47.0	59.5	48.0	42.0	40.5
1:00:01	47.0	58.0	46.0	42.0	40.5
2:00:01	41.5	50.0	41.0	40.5	39.5
3:00:01	41.0	47.5	42.0	40.0	39.5
4:00:01	42.0	47.0	43.5	41.0	40.0
5:00:01	48.5	59.5	51.5	43.5	42.0
6:00:01	53.0	64.0	55.0	47.0	43.0
7:00:01	57.0	68.0	59.5	53.5	49.5
8:00:01	59.5	69.0	63.0	57.5	53.5
9:00:01	57.5	66.0	60.0	56.0	52.0
10:00:01	57.5	66.5	59.0	55.5	51.5
11:00:01	59.0	68.5	61.0	57.0	53.5
12:00:01	58.5	68.5	60.5	57.0	54.0
13:00:01	58.0	64.0	60.0	57.0	54.5
14:00:01	58.0	65.5	60.5	56.5	53.0
15:00:01	60.0	71.0	62.0	56.5	53.5
16:00:01	59.0	68.5	61.5	57.0	53.5

Figure 3a

BKL Consultants Ltd.

24 Hour History Graph (20s Histories)

Noise Levels Measured at Fire Hall, Sechelt, B.C.



File: 470-98A

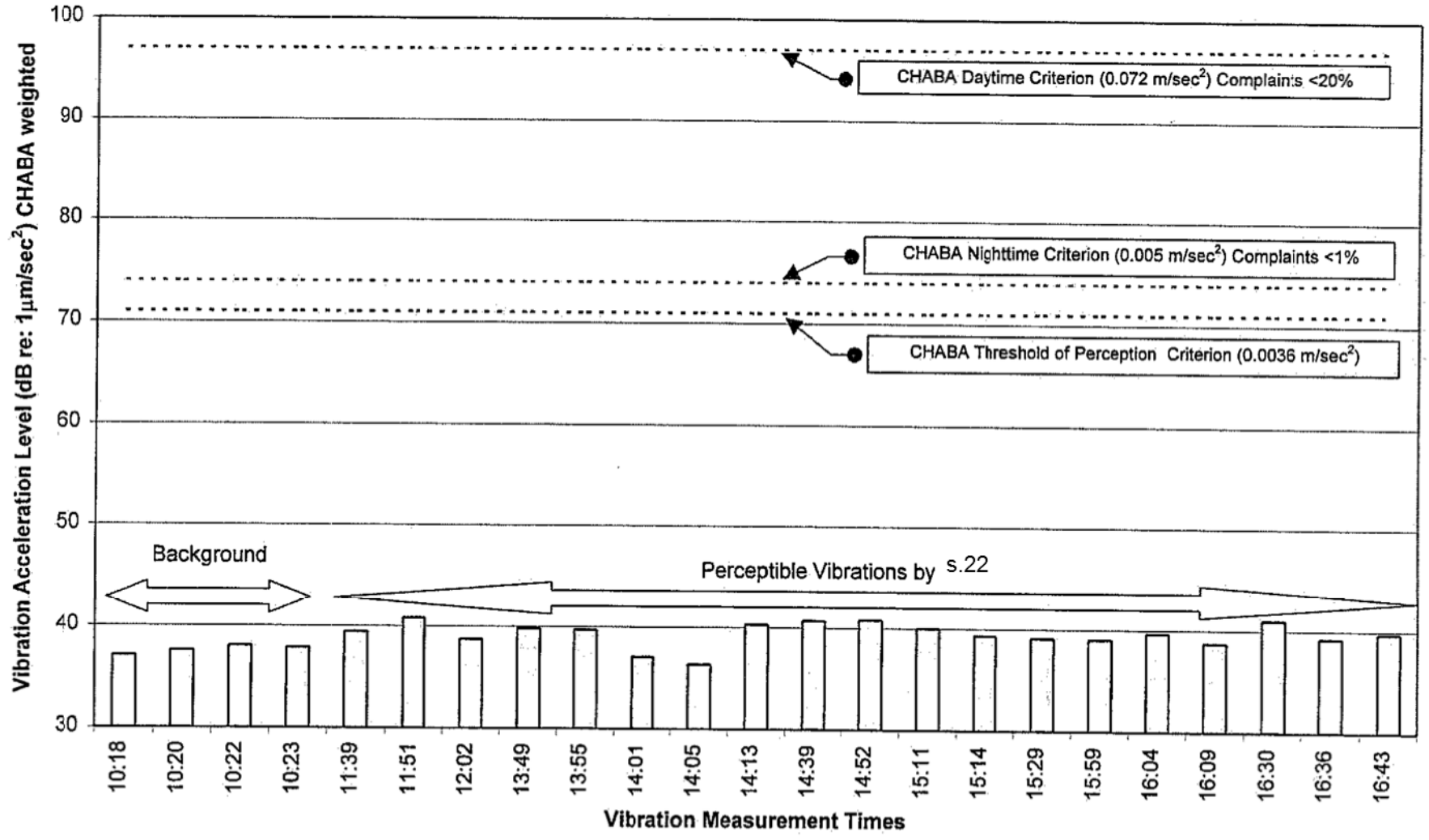
Figure No. 3b

98 04 29

BKL Consultants Ltd.

Vibration Measurements . s.22 **, Sechelt, B.C.**

Kitchen Measurement Location on 98 03 04



Project: 0470-98A

Figure 4

98 04

BKL Consultants Ltd.

Appendix A - District of Sechelt "Noise Bylaw, No. 220," 1994

DISTRICT OF SECHELT

NOISE BYLAW NO. 220, 1994

A Bylaw to regulate noise within the District of Sechelt

WHEREAS the Municipal Act provides inter alia that Council may by bylaw regulate or prohibit noise and other disturbances;

NOW THEREFORE the Council of the District of Sechelt in open meeting assembled enacts as follows:

1. **CITATION**

This bylaw may be cited for all purposes as the District of Sechelt "Noise Bylaw, No. 220," 1994.

2. **DEFINITIONS**

In this bylaw:

"Construction" means erection, repair, alteration, enlargement, addition, demolition or removal of a building or other structure, or the excavation or filling-in of land in any manner.

"Council" means the Municipal Council of the District of Sechelt.

"District" means the District of Sechelt or the area within its boundaries, as the context may require.

"Holiday" includes Sunday, Canada Day, Victoria Day, B.C. Day, Labour Day, Thanksgiving, Remembrance Day, Christmas Day, December 26th, New Year's Day, Good Friday, Easter Monday, and any other holiday fixed by Parliament or the Legislature.

"Noise" means any sound that is loud, harsh or undesirable and which unreasonably disturbs the quiet, peace, rest, enjoyment, comfort or convenience, of the neighbourhood in which the sound is received, or of a person in the vicinity.

"**Property**" means real property and includes land, other than a highway, together with all improvements which have been so affixed to the land as to make them, in fact and in law, a part thereof.

3. **GENERAL REGULATIONS**

(1) **Causing Noise**

No person shall at any time cause, or permit to be caused, a Noise in or on a public or private place.

(2) **Owner Permitting Noise**

No person, being the owner or occupier of Property shall at any time permit that Property to be used so that sound emanating from it constitutes a Noise.

4. **SPECIFIC REGULATIONS**

(1) Without limiting the generality of Section 3 of this Bylaw, the following specific restrictions apply:

(a) Sound equipment noise

No person shall cause or permit the playing of a musical instrument or operation of a radio, stereo, television, public address system, or other apparatus for the production or amplification of sound, either on private premises or Property or in any public place, in such a manner as to create a Noise.

(b) Animal Cries

No person shall cause or permit the keeping or harbouring of an animal, (including fowl and bird) which by its barking, howling, shrieking, calling or other cries creates a Noise.

b) Machine Noise

No person shall cause or permit the operation of a vehicle, vessel, engine, or equipment, including generators, power tools, power equipment, lawnmowers, jet skis, or other machines in such a manner that creates a Noise.

l) Construction Noise

No person shall, on a Monday to Saturday inclusive before 0700 hours or after 2100 hours, or on a Holiday before 0900 hours or after 1700 hours, engage in or permit Construction in such a manner as to create a Noise.

(e) Holiday Construction - Business Noise

No person shall, as a business, engage in or permit Construction on Property so as to create a Noise on a Holiday.

(f) Quiet Hours

No person shall cause or permit a Noise of any kind, which by its nature is unreasonably interrupting or would tend to interrupt the sleep of a person in the neighbourhood or vicinity, on a Monday to Saturday before 0700 hours or after 2300 hours, or on a Holiday before 0900 hours or after 2300 hours; except on the night of December 31st and until 0100 hours on the morning of January 1st.

5. EMERGENCIES

(1) Notwithstanding any provision in this Bylaw, a person may perform work of an emergency nature in a manner that creates Noise where the work and resulting Noise are urgently necessary for the preservation and protection of life, health, or Property or highways, but the onus shall be on the person performing the work to show cause that the work was of an urgent emergency nature.

6. **ENFORCEMENT**

(1) This bylaw may be enforced by an officer of the local detachment of the RCMP, or a Bylaw Enforcement Officer of the District.

(2) The Bylaw Enforcement Officer and officers of the RCMP are hereby authorized to enter, at all reasonable times, upon any land in order to ascertain whether the regulations of this Bylaw are being observed, and for the purposes of Noise and disturbances, it is deemed reasonable to enter at any time where there is or has just been an apparent breach of a term of this Bylaw.

(3) No person shall interfere with or obstruct the entry of a Bylaw Enforcement Officer or an officer of the RCMP in the conduct of administration or enforcement of this Bylaw.

7. **SEVERABILITY**

(1) Should any section, subsection, clause, paragraph, sentence or word of this Bylaw by declared invalid by a court of competent jurisdiction, no other part of this Bylaw shall be deemed to be invalid and the balance of the Bylaw shall remain in force as a whole except for the part declared invalid.

8. **OFFENCE AND PENALTY**

(1) Every person who offends against or violates a provision of this Bylaw or who suffers or permits an act or thing to be done in contravention of or in violation of a provision of this Bylaw or who neglects to do or refrains from doing anything required to be done by a provision of this Bylaw, shall be deemed to be guilty of an offence against this Bylaw and, upon conviction thereof, shall be liable to a fine not exceeding Two Thousand Dollars ($2,000.00) or six (6) months imprisonment, or both.

(2) Each day a violation of a provision of this Bylaw exists or is permitted to exist, shall constitute a separate offence.

9. **REPEAL**

(1) District of Sechelt "Noise Control Bylaw" No. 46, 1988 is hereby repealed.

(2) Village of Sechelt "Noise Control Bylaw" No. 259, 1984 is hereby repealed.

READ A FIRST TIME THIS 19th DAY OF OCTOBER, 1994

READ A SECOND TIME THIS 19TH DAY OF OCTOBER, 1994

READ A THIRD TIME THIS 19th DAY OF OCTOBER, 1994

RECONSIDERED AND FINALLY ADOPTED THIS 2nd DAY OF NOVEMBER, 1994

Deputy Mayor

Municipal Clerk

I hereby certify this to be a true and accurate copy of Noise Bylaw No. 220, 1994.

Municipal Clerk

Appendix B - CAL Equipment Logs

MARCH 4/98 - DAVE

955 - CANYON PIT - O.B. - 3 TRUCKS T 32 C 33 C 34 - 0725 - 1000 Lunch 1015
TO LOWER POND O.B. DUMP 1015 - 1445
949 - 0900 955 PUSHING O.B. AT DUMP, - 1015 - 1110, 1230 - 1400
957 - 0700 - 0900 - GRADE PIT ROAD, 1110 - 1200, 1400 - 1930.

990 - PUSHING TO BARGE - 0715 - 0900, 3/4 + 1/2 CRUSH.
- 0900 - 1005. MOVING SCREENING
- 1005 - 1040, 1/2 + 3/4 CRUSH
- 1040 - 1110 - DP TO 1066 SR, 1100 - 1330 LOAD TRUCK SAND (2 WHEELS)
981 - TRUCK SALES + PUSH TO S - 0700 → 1330 - 215 - 1004 - LOAD TRUCKS TO DYKES
- 1630

690 - BREAKING ROCK 516 # 1 - 0800 - 0900
DITTO - 0920 - 1035.
LOADING ROCK - 1100 - 1415

BARGE LOG - EXCO 61 - START 0715 - FINISH - 0945 (20 S, TOKO, SOCS)
EXCO 3 - 4 1005 - 4. 1105
NO LOG ATT. E
J.A. - COMPACTOR - THICKENER - 0945 - 1445

PIT DOWN - 0700 - 1530 MAINT
(JAW CRUSHER) STARTED 3:30

PRIMARY DOWN 0630 - 1430 MAINT -
14:30 started
2nd CRUSH RT RUN 0720 - 1415
SAND RT. DOWN - 0700 - 0750 - PILES UP
0950 - 1020 RUN, 1020 - 1135 PILE UP
1135 - 1534 RUN
STONE RT. DOWN - ROADAGE - 0700 - 1330 - RUN 1330 - 1530

BA BARGE - RUN TAP - 0830 - 0930,