

APPENDIX C

FINAL NOISE TECHNICAL REPORT

CHHILL

**Final Noise Technical Report
for the**

**NORTHWEST REGIONAL
POWER FACILITY**

Creston, Washington

Prepared for
**ENSR Consulting and Engineering
CSW Energy, Inc.
KVA Resources, Inc.**

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EXHIBIT
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Introduction

This technical report summarizes the results of the noise analysis conducted by CH2M HILL to determine the impacts that a natural gas powered generating facility would have on the noise environment in Creston, Washington, and surrounding areas. This study includes a review of applicable noise regulations, measurement of existing noise levels near the two proposed sites (including nearby residential areas), and projection of the potential noise level increase.

Noise Measurement Methodology

Noise level measurements and projections in this study are based on a methodology that simulates noise as perceived by the human ear. Because the human ear is more sensitive to midrange frequencies than to higher and lower frequencies, environmental noise is measured using the A-weighted sound level scale. The A-weighted scale uses units of decibels, denoted as dBA. Noise levels stated in dBA approximate the response of the human ear by filtering out the high and low frequencies in a manner similar to that occurring in the human ear.

A 10-dBA change in noise levels is judged by most people to be approximately a twofold change in loudness (e.g., an increase from 50 dBA to 60 dBA causes the perceived loudness to double). A 3-dBA increase is barely perceptible. Increases in average or cumulative noise levels of 5 dBA or more are clearly noticeable. Table 1 presents sound levels for some common noise sources. A technical summary of characteristics of noise and definitions of various noise levels descriptors are included in Appendix B titled "Background Noise Information." A complete listing of references used in this report is located in Appendix A.

Health Effects of Noise

Noise may have a variety of consequences for the physical health of human beings. Auditory effects of noise include hearing loss and interference with communication. Non-auditory effects include physiological reactions and interference with sleep.

Hearing loss may be either temporary or permanent. Temporary loss, attributable to fatigue of the inner ear, can occur after brief exposure to high noise levels, or after longer exposure to more moderate levels. Often this temporary decrease in hearing loss is accompanied by ringing or buzzing sensations in the ears. Continued exposure to levels sufficient to cause temporary hearing impairment can, over a period of time, result in damage to the inner ear that is permanent. Permanent hearing loss cannot be restored, either through medical treatment or hearing aids.

Hearing loss resulting from noise is referred to as a "noise-induced threshold shift." It usually first affects those frequencies necessary to hear and understand speech communication. Noise-induced permanent threshold shift is related to the intensity, duration, and frequency content of

Table 1
Sound Levels and Relative Loudness of Typical Noises in Indoor and Outdoor Environments

Activity	Sound Level (dBA)	Subjective Impression	Relative Loudness (human judgment of different sound levels)
Jet aircraft takeoff from carrier (50 ft)	140	Threshold of pain	64 times as loud
50 hp siren (100 ft)	130		32 times as loud
Jet takeoff (200 ft)	120	Uncomfortably loud	16 times as loud
Riveting machine	110		8 times as loud
Jet takeoff (2000 ft)	100	Very loud	4 times as loud
Heavy truck or motorcycle (25 ft)	90		2 times as loud
Pneumatic drill (50 ft), garbage disposal, or food blender	80	Moderately loud	Reference loudness
Vacuum cleaner (10 ft) or passenger car at 65 mph (25 ft)	70		1/2 as loud
Large store air conditioning unit (20 ft)	60		1/4 as loud
Light auto traffic (100 ft)	50	Quiet	1/8 as loud
Bedroom/living room or bird calls	40		1/16 as loud
Library, soft whisper (15 ft)	30	Very quiet	
Broadcasting studio	20		
	10	Just audible	
	0	Threshold of hearing	

Source: Noise and Vibration Control, Leo L. Beranek, 1988.

noise exposure. From extensive studies of industrial noise, it has been found that 8-hour exposure to continuous noise levels below approximately 80 dB does not cause significant permanent threshold shift.

Communication interference is one of the primary concerns in environmental noise problems. Communication interference includes speech interference and activities such as watching television. Normal conversational speech is in the range of 60 to 65 dBA and any noise in this range or louder may interfere with speech.

In addition to auditory effects, a number of other physiological responses to noise have been documented. These physiological responses are those measurable effects of noise on people which are realized as changes in the pulse rate, blood pressure, etc. and are usually termed "stress" reactions. While such effects can be induced and observed, the extent is not known to which these cause harm or are a sign of harm. Generally, physiological responses are a reaction to a loud short term noise such as a rifle shot or a very loud jet overflight.

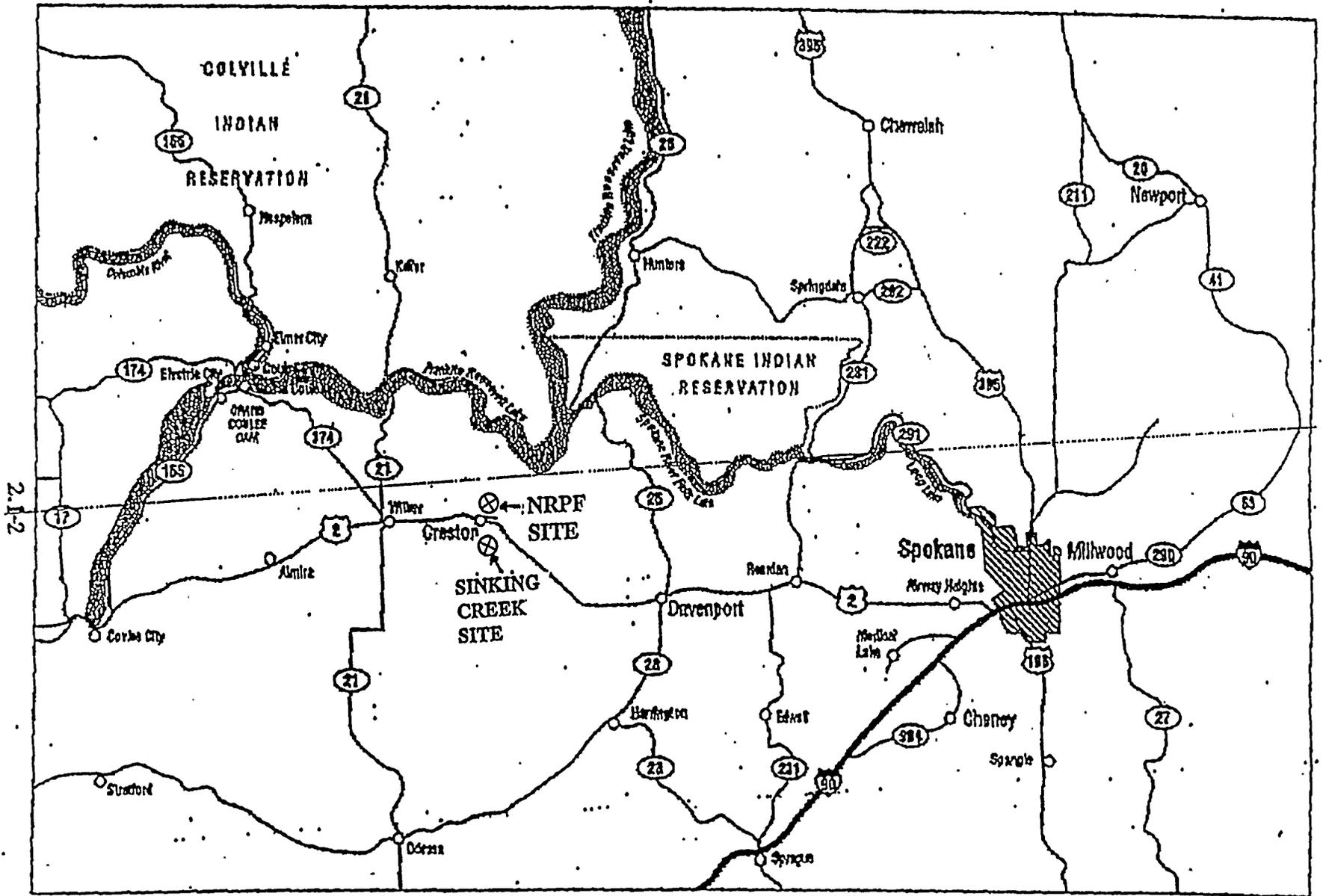
Stress reactions have not been observed at noise levels below that at which hearing loss can occur; the threshold of this stress effect seems to be 70-80 dBA. Therefore, if people are protected from noise exposures capable of causing hearing loss, it is believed they will also be protected from the experience of any noise-induced non-auditory disease.

It is evident that noise interferes with sleep. In addition to awakening a person, or preventing the person from falling asleep, noise can shift the stage of sleep from a deep, restful stage to a lighter one. In laboratory tests this is observed as a change in brain-wave pattern of a sleeping subject. The significance of these shifts in stage of sleep to a person's long term well-being has not been established.

A number of factors influence the degree to which noise may interfere with sleep. Impulsive or fluctuating noise is more disruptive than steady-state noise. Familiarity with the noise may reduce its ability to awaken, but there is no clear evidence that the quality of sleep is unaffected. Noise which has some information value is more likely to wake a person. In addition, the ability of noise to disrupt sleep is related to age. Elderly persons are much more easily awakened by noise than younger groups, and once awakened find it more difficult to return to sleep.

Proposed Generating Station Operations

The proposed plant will be a natural gas-fired combined-cycle generation facility located near Creston, Washington. Two alternative site locations are being considered: (1) the Northwest Regional Power Facility (NRPF) and (2) the Sinking Creek Site. (See Figure 1: Site Location Map). The project is designed as a standard block consisting of four General Electric Company (GE) MS7221FA combustion turbines, four heat recovery steam generators (HRSG), and two steam turbine generators.



2.1-2

FIGURE 1
 SITE LOCATION MAP
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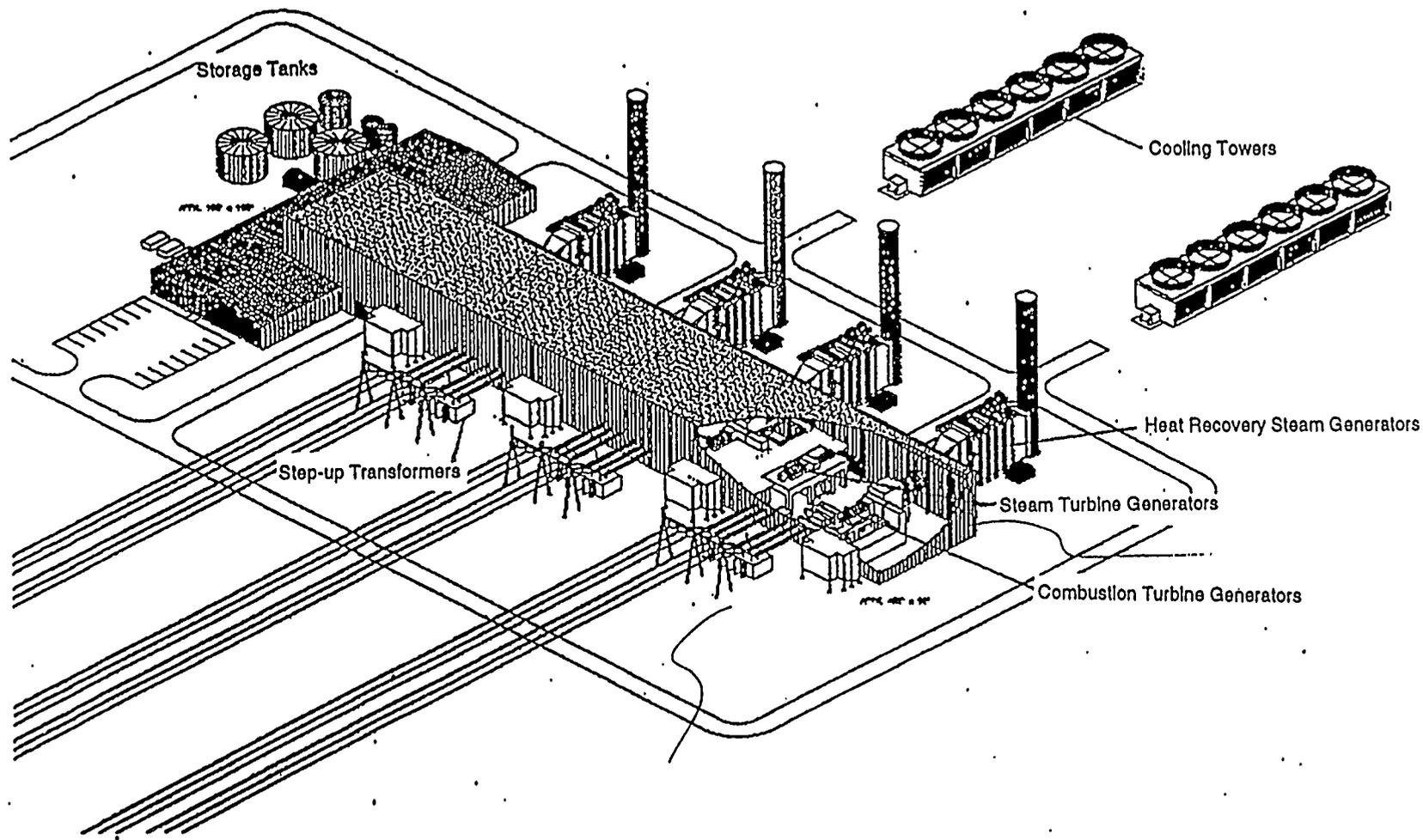


FIGURE 2
THREE DIMENSIONAL SITE LAYOUT

A general arrangement drawing for the conceptual 838 MW plant is shown in Figure 2. The major facilities and structures that will be provided include a main equipment building, a switching station, two aircooled condenser units, and several fenced evaporation ponds. Of primary concern with regard to noise is the main equipment building, which will include the Turbine-Generator/Control Building and the two aircooled condenser units. The Turbine-Generator/Control Building will be a multi-story structure that will house the turbine-generators and auxiliary equipment, control room, control equipment room, electrical switchgear, battery and uninterruptible power supply (UPS) equipment. The upper floor will include the major equipment operating level and the main control room. The lower floor will house auxiliary mechanical systems and electrical equipment, including switchgear, secondary unit substations, motor control centers, battery and battery chargers, inverter, and panels.

Applicable Regulations

Noise level criteria that would apply to this project are described in this subsection.

Construction and Operation Noise Regulations

Washington Administrative Code

Noise sources and their impacts in Lincoln County and the City of Creston are governed by Chapter 173-60 of the Washington Administrative Code (WAC), which sets maximum permissible environmental noise levels that cannot be exceeded in any 1-hour period. The maximum noise levels are different for the various classifications of receiving property (e.g., residential) and the noise source (e.g., industrial). The classification system is called the Environmental Designation for Noise Abatement (EDNA) and is generally based on a property's use. The maximum noise source in each EDNA in relation to a receiving property of each EDNA is shown in Table 2. Noise limits apply at the property line.

<i>Table 2</i>			
<i>Noise Limitations</i>			
EDNA of Noise Source	EDNA of Receiving Property		
	Class A	Class B	Class C
Class A (residential)	55 dBA	57 dBA	60 dBA
Class B (commercial)	57 dBA	60 dBA	65 dBA
Class C (industrial)	60 dBA	65 dBA	70 dBA
Source: WAC 173-60			

Between 10 p.m. and 7 a.m., the noise limitations in Table 2 are reduced by 10 dBA for the receiving properties that are Class A EDNA. The WAC noise regulations allow the maximum permissible sound levels to be exceeded during any sound that is of short duration. The noise levels indicated in Table 2, including the nighttime restrictions, may be exceeded for any receiving property during any 1-hour period by 15 dBA for a total of 1.5 minutes, by 10 dBA for a total of 5 minutes, and by 5 dBA for a total of 15 minutes.

The noise limitations shown in Table 2, along with the exceedance limitations, can be interpreted in terms of statistical noise descriptors. The noise levels that are exceeded 1.5, 5, and 15 minutes in an hour are designated as $L_{2.5}$, $L_{8.3}$, and L_{25} statistical levels, respectively. The L_x refers to the percentage of time the noise level is exceeded. For example, if noise levels are 60 dBA or higher for 15 minutes (25 percent of 1 hour), the noise conditions would be characterized as having an L_{25} equal to 60 dBA. Table 3 summarizes the exceedance limitations in terms of statistical noise descriptors for a Class C EDNA (industrial) with impacts on a Class A EDNA (residential). These limits are of particular interest for evaluating the noise impacts of the NRPF (Class C) on nearby residential receptors (Class A).

<i>Table 3</i>			
<i>Exceedance Limitations</i>			
<i>Class C EDNA with Impacts on a Class A EDNA</i>			
EDNA of Noise Source	Class A EDNA of Receiving Property		
	L_{25}	$L_{8.3}$	$L_{2.5}$
Class C (industrial)	65 dBA	70 dBA	75 dBA
Source: WAC 173-60			

On site construction generated noise is exempt from 7 a.m. to 10 p.m. for Class A EDNA and at all times for Class B and C EDNA. If project construction occurs at night, noise levels measured from nearby residential receivers must meet the WAC nighttime noise regulations set forth in the preceding paragraphs.

Environmental Protection Agency

The U.S. Environmental Protection Agency (EPA) describes its recommendations for noise levels in *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety* (March 1974). On the basis of available evidence, the EPA has concluded that a 24-hour Energy Equivalent Sound Level (L_{eq}) of 70 dBA is the maximum exposure consistent with long-term protection against significant hearing loss at a frequency of 4,000 Hz. Since this frequency is within the most sensitive range of the ear, protection at 4,000 Hz insures that the entire frequency spectrum of human hearing would be protected from significant hearing loss. For normal conversation in a residential area, an outdoor L_{eq} of 55 dBA has been identified with an indoor L_{eq} of 45 dBA.

Because of the number of variables involved, it has been difficult to establish a quantitative relationship between noise exposure and sleep interference. This seems to be largely dependent on the type of noise. A constant noise source with no substantially higher instantaneous peak noise levels is much more conducive to sleep than a lower noise level with occasional piercing noise. In light of present knowledge, however, researchers recommend that noise levels inside dwellings not exceed 30-47 dBA for satisfactory sleeping conditions.

By EPA standards, changes of less than 5 dBA to a noise level are generally not considered to be noticeable. A standard reduction of 15 dBA is applied to outdoor sound levels to arrive at the interior sound level. This is due to attenuation of noise by the typical structure.

Traffic Noise Regulations

Motor vehicles are required to comply with the EPA and WAC limitations for individual vehicles. Traffic noise generated within the project site boundaries would be required to comply with the WAC noise regulations. However, motor vehicle noise on public roadways is exempt from the maximum noise level regulations.

Existing Noise Conditions

Existing noise levels were recorded at nine sites, designated M1 through M9 on Figure 3, near the two alternative project locations. The sites were monitored using a Bruel and Kjaer 2231 Type 1 Sound Level Meter and 4230 Bruel and Kjaer Calibrator. As shown in Figure 1, the preferred site (NRPF) is located north of Creston, while the other (Sinking Creek Site) is located south of Creston. Photographs of each monitoring location are shown in Appendix C and descriptions of the monitoring locations are listed below. Measurement procedures complied with the American National Standards Institute (ANSI) S1.13-1971.

- Site M1 is at the east end of Foster Street near a residential home, approximately 5,280 feet (1 mile) from the proposed NRPF facility north of the City of Creston.
- Site M2 is a residential home at 250 NE on Foster Street, approximately 5,591 feet (1.06 miles) from the proposed NRPF facility north of the City of Creston.
- Site M3 is at the north end of E Street near a residential home, approximately 4,969 feet (0.94 miles) from the proposed NRPF site north of the City of Creston.
- Site M4 is near the northeast corner of the Creston Community Church at the corner of Creston Avenue and Foster Street, approximately 6,005 feet (1.14 miles) from the proposed NRPF site north of the City of Creston. This location is partially shielded by two homes on E Street, but a direct line-of-sight exists between the proposed NRPF and the Creston Community Church between the two homes.
- Site M5 is located on E Street between two residential homes, 540 NE and 410 NE, approximately 5,487 feet (1.04 miles) from the proposed NRPF facility north of the City of Creston.

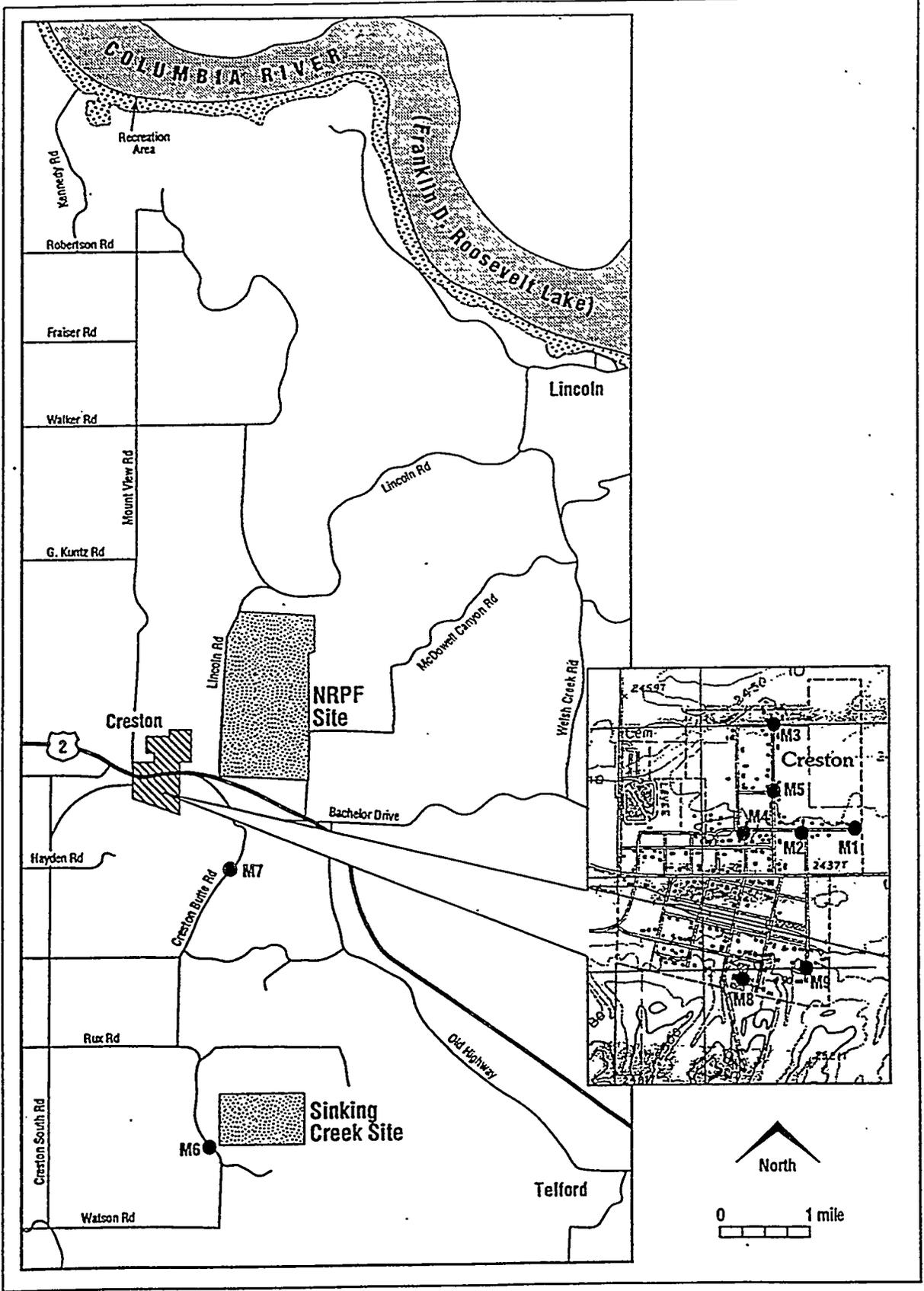


FIGURE 3
Noise Monitoring Locations

- Site M6 is located near the south side of the proposed Sinking Creek facility south of the City of Creston approximately 3,624 (0.7 miles) feet from the proposed Sinking Creek facility.
- Site M7 is located near a residential home (the Rosman residence), which is near Green Lake and outside the City of Creston, approximately 12,113 feet (2.3 miles) from the proposed Sinking Creek facility south of the City of Creston.
- Site M8 is located near the southwest corner of Creston School on a gravel parking area with a line-of-sight blocked by rolling hills but in the direction of the proposed Sinking Creek facility south of the City of Creston, approximately 17,794 feet (3.37 miles) from the Sinking Creek facility.
- Site M9 is located near several residential homes at the corner of S. First Street and F Street, approximately 17,477 feet (3.31 miles) from the proposed Sinking Creek facility south of the City of Creston.

Noise levels were recorded at Sites M1 through M9 between 7 a.m. and 10 p.m., as well as between 10 p.m. and 7 a.m. The current noise environment in the City of Creston and surrounding areas includes vehicular traffic on Highway 2, local traffic, domestic dogs, and birds. The majority of the noise is generated by Highway 2 which divides the town in half. A railroad line also travels through the town, but no trains passbys were observed during the measurement periods. Table 4 gives the results of the noise level monitoring. L_{90} is used for determining background noise levels at the site.

All existing ambient noise levels were below the maximum noise limits set forth in Chapter 173-60 of the WAC.

Impacts

The projected noise levels are based on the proposed building design, the site layout, and a preliminary list of equipment expected to be incorporated into the facility. The most significant steady noise sources are the four proposed General Electric (GE) model 7FA combustion turbines, the two steam turbine-generator units, and the two aircooled condensers units. Substantial noise levels may also be generated during two, infrequent plant processes: (1) combustion turbine startup, and (2) steam turbine trip (the venting of large amounts of steam).

Steady Noise Sources

The facility would operate 24-hours per day, 7 days per week. Noise source characteristics for the combustion turbines were collected from the GE America's Commercial Support Team in Schenectady, New York. Appended to this report is the letter from GE proposal manager, David W. Johnson, which outlines the data used in this analysis (Appendix D). Information on other noise

Table 4
Noise Monitoring Results (dBA)
August 16-17, 1994

Site	Start Time	End Time	L _{eq}	L ₉₀	L ₇₅	L ₅₀	L ₂₅	WAC EDNA Limits	Dominant Noise Source(s) During Measurement Period ¹
M1	10:08 a.m.	10:23 a.m.	43	35	44	47	50	60	Traffic on Highway 2, local activity (e.g., birds, children, dogs, etc.)
	3:12 a.m.	3:22 a.m.	33	29	35	36	38	50	Almost no traffic on Highway 2
M2 ²	10:40 a.m.	10:55 a.m.	43	38	44	47	49	60	Traffic on Highway 2, local activity (e.g., birds, children, dogs, etc.)
M3	11:31 a.m.	11:46 a.m.	46	37	43	50	55	60	Traffic on Highway 2, rainbow sprinkler, local activity (e.g., birds, children, dogs, etc.)
	4:08 a.m.	4:13 a.m.	35	29	35	39	42	50	Almost no traffic on Highway 2, rainbow sprinkler
M4	12:05 p.m.	12:20 p.m.	44	37	45	47	49	60	Traffic on Highway 2, rotating sprinkler, local activity (e.g., birds, children, dogs, etc.)
	4:23 a.m.	4:28 a.m.	37	31	39	41	43	50	No traffic on Highway 2, rotating sprinkler
M5	12:43 p.m.	12:58 p.m.	45	37	44	47	51	60	Traffic on Highway 2, leaves rustling, local activity (e.g., birds, children, dogs, etc.)
	4:36 a.m.	4:41 a.m.	31	28	32	34	37	50	Almost no traffic on Highway 2
Sinking Creek Facility Receiver Locations									
M6 ²	3:42 p.m.	3:57 p.m.	41		41	46	49	60	Background country noise
M7	4:40 p.m.	4:50 p.m.	44	33	45	49	51	60	Background country noise
	11:25 p.m.	11:35 p.m.	25	22	25	27	29	50	Crickets
M8	5:05 p.m.	5:10 p.m.	44	33	43	47	51	60	Traffic on Highway 2, wind in the fields
	11:50 p.m.	12:00 a.m.	33	27	34	36	38	50	One car on a residential street at low speeds
M9	5:52 p.m.	6:02 p.m.	42	36	43	46	48	60	Traffic on Highway 2, leaves rustling, local activity (e.g., birds, children, dogs, etc.)
	12:12 a.m.	12:22 a.m.	37	32	38	40	42	50	Leaves rustling

¹ Noise sources are listed in descending order of dominance.

² No nighttime measurements available for this Monitoring Location.

sources was obtained from standard acoustical engineering references and technical literature.

Noise levels were predicted for the receiver locations by the methods listed below:

1. Predicting the noise level due to each piece of equipment at the interior of the building wall. This included the effect of any noise mitigation techniques used inside the building, such as adding noise absorptive material to the walls and ceiling.
2. Determining the noise transmission loss through the building walls.
3. Estimating the reduction of level as the noise traveled from the exterior of the wall to the receivers.
4. Calculating the noise levels at the inlet and exhaust locations; included were the effects of silencing and other mitigation. The noise level at the receivers was then determined through estimation of the reduction level as the noise traveled to the receiver.

Appended to this report are eleven computer spreadsheets that give the results of the calculations (Appendix E). Table 5 summarizes the results of the calculations. The existing noise levels listed in Table 5 are the day and night measurements recorded at each receiver. These two levels are indicative of the noise level range that could be expected at each location. The noise levels listed in the Total Projected Noise Level column reflect the sum of the existing and plant noise levels. Projected noise levels from the NPRF facility range from 10 to 13 dBA- L_{eq} below the WAC noise level limits and from 5 to 8 dBA- L_{eq} below EPA limits. For indoor levels 15 dBA is subtracted from the outdoor level (see Table 6). These levels are within the EPA recommendation of 30-47 dBA for nighttime sleeping conditions and the noise source is not disruptive due to its constant nature. Therefore, no adverse noise impact is expected from the operation of the proposed NRPF. Projected noise levels from the Sinking Creek facility range from 9 to 25 dBA- L_{eq} below the WAC noise level limits and from 4 to 20 dBA- L_{eq} below EPA limits. Sinking Creek facility levels are below the EPA recommendation of 30-47 dBA for nighttime sleeping conditions and the noise source is not disruptive due to its constant nature. Therefore, no adverse noise impact is expected from the operation of the Sinking Creek facility.

The facility generated noise level at the nearest NRPF site boundary, approximately 185 feet from the main equipment building, is estimated to be 70 dBA. Therefore, the 70 dBA WAC limit at the site boundary would be met. Facility noise levels at the property boundary of the Sinking Creek site is 67 dBA which also meets the 70 dBA WAC limit.

Other potential noise sources from the proposed power facility include in-well pumps at the well field site and an enclosed pump station along the Redwine Canyon Water Pipeline Corridor route (a pump station would not be required for the Cross-Country Water Pipeline Corridor). The in-well pumps will be underground and, therefore, no transmission of noise to sensitive areas is expected. The pump station noise will be mitigated by an enclosing structure. In sum, neither are expected to noticeably contribute to the surrounding noise level.

Monitoring Location	Exis			WAC EDNA Noise Limits ²			
	L _{eq}	L ₂₅		L _{eq}	L ₂₅	L _{8.3}	L _{2.5}
1	33-43	35-44		60	65	70	75
2 ³	43	44		60	65	70	75
3	35-46	35-43		60	65	70	75
4	37-44	36-45		60	65	70	75
5	31-45	32-44		60	65	70	75
6 ³	41	41		60	65	70	75
7	25-44	25-45		60	65	70	75
8	33-44	34-43		60	65	70	75
9	37-42	38-43		60	65	70	75

¹ Constant noise source contributes equally to the

² A 10 dBA reduction is applied to residential noi

³ No nighttime measurement available for Monitor

<i>Table 6</i> <i>Projected Nighttime Noise Levels</i> <i>(dBA-L_{eq})</i>			
Monitoring Location	Total Projected Nighttime Outdoor Noise Level	Total Project Nighttime Indoor Noise Level¹	EPA Recommended Noise Level for Sleeping
NRPF Facility Receiver Locations			
1	47	32	30 - 47
2 ²	--	--	30 - 47
3	48	33	30 - 47
4	47	32	30 - 47
5	47	32	30 - 47
Sinking Creek Facility Receiver Locations			
6 ²	--	--	30 - 47
7	35	20	30 - 47
8	35	20	30 - 47
9	38	23	30 - 47
¹ EPA attributes a decrease of 15 dBA to outdoor noise levels due to attenuation from the house structure. ² No nighttime noise measurement was available at this Monitoring Location.			

Infrequent Noise Sources

The combustion turbine start-up would likely occur several times during the initial startup of plant operations and then become very infrequent as the plant attains normal operating conditions. The combustion turbine startup process occurs over a 20-minute to 30-minute period, and the sound pressure levels (SPLs) near the combustion turbines are in the 100+ dBA range. Table 7 gives the estimated noise levels generated by the startup of the combustion turbines.

The steam turbine trip venting is expected to occur a maximum of two to three times per year and would last 20 to 30 minutes. Maximum SPLs are estimated to reach 100 dBA near the steam vent. Table 7 shows the estimated SPLs at each receiver created during the activation of the steam turbine trip venting.

The worst-case scenario for the infrequent noise sources would be when the steam turbine trip venting and combustion turbine startup occur simultaneously. Table 7 lists the combined sources that reflect this scenario. Under this scenario, maximum noise levels are expected to reach 41 dBA at Receiver No. 6. Because these infrequent noise sources are likely to occur only a few times per year and because the maximum noise levels are 19 dBA less than the WAC maximum noise level limit (L_{max} of 60 dBA) no adverse impact is expected from the identified infrequent noise sources associated with the NRPF.

*Table 7
Estimated Noise Levels Generated by the Most Significant
Infrequent Noise Sources (dBA)*

Receiver No.	SPL for Start-up of Combustion Turbine ¹	SPL for Steam Turbine Trip ²	SPL for Combined Events ³
NRPF Facility Receiver Locations			
1	35	35	38
2	34	34	37
3	35	35	38
4	33	33	36
5	34	34	37
Sinking Creek Facility Receiver Locations			
6	38	38	41
7	28	28	31
8	25	25	28
9	25	25	28

¹ Assumes 100 dBA at 3 feet during start-up period.
² Assumes 100 dBA at 3 feet for 20-30 minutes, 2-3 times per year for venting of steam.
³ In the event that start-up of combustion turbine and steam turbine trip occur at the same time.

Mitigation

Nighttime outdoor L_{eq} levels are estimated to range from 47 - 48 dBA at the nearest residential locations with the operation of the proposed NPRF power facility. According to the EPA, these levels are reduced by 15 dBA to obtain the indoor noise levels which would range from 32 - 33 dBA. With this reduction, the indoor noise level would be well within the EPA recommendation for levels consistent with sleep, 30 - 47 dBA. The noise source from the proposed power facility would also be a constant noise source which is less disruptive than a fluctuating noise source. Because the levels would be well below the EPA's recommended range and the WAC limits would also be met, no mitigation is recommended at this time. Similarly, the projected noise levels from the Sinking Creek facility satisfy both EPA and WAC requirements and, thus, no mitigation is recommended at this time.

To eliminate the potential for any increase in noise levels at nearby receivers, additional noise attenuation equipment could be added to the combustion turbine inlet and exhaust points. To satisfy the near field Occupational Safety and Health Act noise limits (i.e., worker noise level exposure inside the Turbine-Generator/Control Building), the General Electric (GE) MS7221FA 85 dBA near field package is recommended.

APPENDIX E

NOISE LEVEL PROJECTIONS

Receiver No. 1

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 1
 Noise Level Calculations 4780 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _a	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

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 Noise Level Calculations 4780 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine Package Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine Package Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	4780	4780	4780	4780	4780	4780	4780	4780	4780	
Distance from Turbine Generator Building to Receiver (meters)	1457	1457	1457	1457	1457	1457	1457	1457	1457	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.7	4.1	7.3	14.6	40.8	40.8	
Package SPL of four GE 7FAs at Receiver	22	31	24	17	5	2	-4	-41	-40	
A-weighted Package SPL of four GE 7FAs at Receiver	-17	5	8	8	2	2	-3	-40	-41	13

A4) Calculation of Combustion Turbine Inlet Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Distance from turbine inlets to Receiver (feet)	4780	4780	4780	4780	4780	4780	4780	4780	4780	
Distance from turbine inlets to Receiver (meters)	1457	1457	1457	1457	1457	1457	1457	1457	1457	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.7	4.1	7.3	14.6	40.8	40.8	
Inlet SPL of four GE 7FAs at Receiver	35	34	27	28	23	14	5	-23	-28	
A-weighted Inlet SPL of four GE 7FAs at Receiver	-4	8	11	19	20	14	6	-22	-29	24

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68
Distance from Exhaust to Receiver (feet)	4780	4780	4780	4780	4780	4780	4780	4780	4780	
Distance from Exhaust to Receiver (meters)	1457	1457	1457	1457	1457	1457	1457	1457	1457	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.7	4.1	7.3	14.6	40.8	40.8	
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	60	60	53	46	34	31	11	-36	-46	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	17	23	14	11	-13	-17	-32	-72	-69	25

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 Noise Level Calculations 4780 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]										
Composite SPL of Four GE 7FAs at Receiver	60	60	53	46	35	31	12	-23	-28	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	17	23	16	20	20	14	7	-22	-29	27
(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)										
[source: Edison Electric Institute 1978 rev. 1984]										
Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113
B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building										
Assuming Reverberant Field in Building										
Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87
Directivity Factor, Q _a	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) {50 ft high (2-story), 75 ft wide, and 400 ft long}	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88
B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building										
Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93
B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver										
Distance from Turbine Generator Building to Receiver (feet)	4780	4780	4780	4780	4780	4780	4780	4780	4780	
Distance from Turbine Generator Building to Receiver (meters)	1457	1457	1457	1457	1457	1457	1457	1457	1457	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.7	4.1	7.3	14.6	40.8	40.8	
Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven exciters]										
SPL of two steam turbine-generator units at Receiver	27	33	30	20	7	-1	-16	-58	-53	
A-weighted SPL of two steam turbine-generator units at Receiver	-13	6	14	12	4	-1	-15	-57	-54	17

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 Noise Level Calculations 4780 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	4780	4780	4780	4780	4780	4780	4780	4780	4780	
Distance from ACCs to Receiver (meters)	1457	1457	1457	1457	1457	1457	1457	1457	1457	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.7	4.1	7.3	14.6	40.8	40.8	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	53	53	55	51	45	39	32	-4	-11	
A-weighted SPL of two ACCs at Receiver	14	27	39	43	42	39	34	-3	-12	47
Noise Level Estimate for Northwest Regional Power Facility at Receiver										
	19	29	39	43	42	39	34	-3	-12	47

Receiver No. 2

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Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 2
 Noise Level Calculations 5091 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA Source: General Electric 9/21/94

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _a	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

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 Noise Level Calculations 5091 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine *Package* Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine *Package* Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	5091	5091	5091	5091	5091	5091	5091	5091	5091	
Distance from Turbine Generator Building to Receiver (meters)	1552	1552	1552	1552	1552	1552	1552	1552	1552	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.9	4.3	7.8	15.5	43.5	43.5	
Package SPL of four GE 7FAs at Receiver	21	30	24	16	5	1	-6	-44	-43	
A-weighted Package SPL of four GE 7FAs at Receiver	-18	4	8	7	1	1	-4	-43	-45	12

A4) Calculation of Combustion Turbine *Inlet* Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50

Distance from turbine inlets to Receiver (feet)	5091	5091	5091	5091	5091	5091	5091	5091	5091	
Distance from turbine inlets to Receiver (meters)	1552	1552	1552	1552	1552	1552	1552	1552	1552	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.9	4.3	7.8	15.5	43.5	43.5	

Inlet SPL of four GE 7FAs at Receiver	35	34	26	27	23	13	3	-27	-32	
A-weighted Inlet SPL of four GE 7FAs at Receiver	-4	8	10	18	19	13	5	-26	-33	23

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68

Distance from Exhaust to Receiver (feet)	5091	5091	5091	5091	5091	5091	5091	5091	5091	
Distance from Exhaust to Receiver (meters)	1552	1552	1552	1552	1552	1552	1552	1552	1552	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.9	4.3	7.8	15.5	43.5	43.5	

Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	60	60	52	45	34	30	9	-40	-50	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	17	23	13	10	-14	-18	-33	-76	-73	24

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Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 2
 Noise Level Calculations 5091 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	60	60	52	45	34	30	10	-26	-31	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	17	23	16	19	19	13	5	-25	-32	27

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

[source: Edison Electric Institute 1978 rev. 1984]

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

**B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building**

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87

Directivity Factor, Q_e

Directivity Factor, Q _e	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	5091	5091	5091	5091	5091	5091	5091	5091	5091	
Distance from Turbine Generator Building to Receiver (meters)	1552	1552	1552	1552	1552	1552	1552	1552	1552	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.9	4.3	7.8	15.5	43.5	43.5	

Composite Noise Levels from two steam-generator units at Receiver [Includes turbines, generators, and shaft-driven exciters]

SPL of two steam turbine-generator units at Receiver	26	32	30	20	6	-2	-18	-61	-56	
A-weighted SPL of two steam turbine-generator units at Receiver	-13	6	13	11	3	-2	-17	-60	-57	16

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 2
 Noise Level Calculations 5091 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	5091	5091	5091	5091	5091	5091	5091	5091	5091	
Distance from ACCs to Receiver (meters)	1552	1552	1552	1552	1552	1552	1552	1552	1552	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.9	4.3	7.8	15.5	43.5	43.5	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	52	52	55	51	44	38	31	-7	-14	
A-weighted SPL of two ACCs at Receiver	13	26	39	42	41	38	32	-6	-16	46
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Noise Level Estimate for Northwest Regional Power Facility at Receiver	18	28	39	42	41	38	32	-6	-15	46

Receiver No. 3

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 3
 Noise Level Calculations 4469 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA (source: General Electric 9/21/94)

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	

Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64

Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	

Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building

Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	

Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94

Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	

Directivity Factor, Q_n	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 3
 Noise Level Calculations 4469 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine Package Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74

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A3) Calculation of Combustion Turbine Package Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	4469	4469	4469	4469	4469	4469	4469	4469	4469
Distance from Turbine Generator Building to Receiver (meters)	1363	1363	1363	1363	1363	1363	1363	1363	1363
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.5	1.6	3.8	6.8	13.6	38.2	38.2
Package SPL of four GE 7FAs at Receiver	23	32	25	17	6	3	-3	-38	-37
A-weighted Package SPL of four GE 7FAs at Receiver	-17	5	9	9	3	3	-1	-37	-38

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A4) Calculation of Combustion Turbine Inlet Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33
Distance from turbine inlets to Receiver (feet)	4469	4469	4469	4469	4469	4469	4469	4469	4469
Distance from turbine inlets to Receiver (meters)	1363	1363	1363	1363	1363	1363	1363	1363	1363
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.5	1.6	3.8	6.8	13.6	38.2	38.2
Inlet SPL of four GE 7FAs at Receiver	36	35	28	28	24	15	6	-20	-25
A-weighted Inlet SPL of four GE 7FAs at Receiver	-3	9	11	20	21	15	8	-19	-26

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A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15
Distance from Exhaust to Receiver (feet)	4469	4469	4469	4469	4469	4469	4469	4469	4469
Distance from Exhaust to Receiver (meters)	1363	1363	1363	1363	1363	1363	1363	1363	1363
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.5	1.6	3.8	6.8	13.6	38.2	38.2
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0
Exhaust SPL of four GE 7FAs at Receiver	61	61	54	46	35	32	12	-33	-43
A-weighted Exhaust SPL of four GE 7FAs at Receiver	18	24	14	12	-12	-16	-30	-69	-66

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NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 3
 Noise Level Calculations 4469 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver (Package + Inlet + Exhaust)

Composite SPL of Four GE 7FAs at Receiver	61	61	54	46	36	32	14	-20	-25	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	18	24	17	21	21	16	8	-19	-26	28

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven excitors)

Source: Edison Electric Institute 1978 rev. 1984

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	.5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building

Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87

Directivity Factor, Q_s

Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	

Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	4469	4469	4469	4469	4469	4469	4469	4469	4469	
Distance from Turbine Generator Building to Receiver (meters)	1363	1363	1363	1363	1363	1363	1363	1363	1363	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.5	1.6	3.8	6.8	13.6	38.2	38.2	

Composite Noise Levels from two steam-generator units at Receiver (includes turbines, generators, and shaft-driven excitors)

SPL of two steam turbine-generator units at Receiver	27	33	31	21	8	0	-15	-54	-49	
A-weighted SPL of two steam turbine-generator units at Receiver	-12	7	15	13	5	0	-14	-53	-50	18

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 3
 Noise Level Calculations 4469 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	4469	4469	4469	4469	4469	4469	4469	4469	4469	
Distance from ACCs to Receiver (meters)	1363	1363	1363	1363	1363	1363	1363	1363	1363	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.5	1.6	3.8	6.8	13.6	38.2	38.2	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	54	54	56	52	46	40	34	-1	-8	
A-weighted SPL of two ACCs at Receiver	14	27	40	43	43	40	35	0	-9	48
Noise Level Estimate for Northwest Regional Power Facility at Receiver	19	29	40	43	43	40	35	0	-9	48

Receiver No. 4

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 4
 Noise Level Calculations 5505 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _e	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

NRRP SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 4
 Noise Level Calculations 5505 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine Package Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine Package Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	5505	5505	5505	5505	5505	5505	5505	5505	5505	
Distance from Turbine Generator Building to Receiver (meters)	1678	1678	1678	1678	1678	1678	1678	1678	1678	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.7	2.0	4.7	8.4	16.8	47.0	47.0	
Package SPL of four GE 7FAs at Receiver	21	30	23	15	4	0	-7	-49	-48	
A-weighted Package SPL of four GE 7FAs at Receiver	-19	4	7	7	0	0	-6	-48	-49	12

A4) Calculation of Combustion Turbine Inlet Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Distance from turbine inlets to Receiver (feet)	5505	5505	5505	5505	5505	5505	5505	5505	5505	
Distance from turbine inlets to Receiver (meters)	1678	1678	1678	1678	1678	1678	1678	1678	1678	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.7	2.0	4.7	8.4	16.8	47.0	47.0	
Inlet SPL of four GE 7FAs at Receiver	34	33	26	26	22	12	1	-31	-36	
A-weighted Inlet SPL of four GE 7FAs at Receiver	-5	7	9	18	18	12	3	-30	-37	22

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68
Distance from Exhaust to Receiver (feet)	5505	5505	5505	5505	5505	5505	5505	5505	5505	
Distance from Exhaust to Receiver (meters)	1678	1678	1678	1678	1678	1678	1678	1678	1678	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.7	2.0	4.7	8.4	16.8	47.0	47.0	
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	59	59	52	44	33	29	7	-44	-54	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	16	22	12	10	-15	-19	-35	-80	-77	24

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 4
 Noise Level Calculations 5505 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	59	59	52	44	33	29	9	-30	-35	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	16	22	15	19	18	12	3	-30	-37	26

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven excitors)

Source: Edison Electric Institute 1978 rev. 1984

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building

Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87
Directivity Factor, Q _a	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building In (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	5505	5505	5505	5505	5505	5505	5505	5505	5505	
Distance from Turbine Generator Building to Receiver (meters)	1678	1678	1678	1678	1678	1678	1678	1678	1678	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.7	2.0	4.7	8.4	16.8	47.0	47.0	

Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven excitors]

SPL of two steam turbine-generator units at Receiver	25	31	29	19	5	-3	-20	-65	-60	
A-weighted SPL of two steam turbine-generator units at Receiver	-14	5	13	10	2	-3	-19	-64	-61	15

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 4
 Noise Level Calculations 5505 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	5505	5505	5505	5505	5505	5505	5505	5505	5505	
Distance from ACCs to Receiver (meters)	1678	1678	1678	1678	1678	1678	1678	1678	1678	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.7	2.0	4.7	8.4	16.8	47.0	47.0	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	52	52	54	50	43	36	29	-12	-19	
A-weighted SPL of two ACCs at Receiver	12	26	38	41	40	36	30	-11	-20	45
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Noise Level Estimate for Northwest Regional Power Facility at Receiver	18	27	38	41	40	36	30	-11	-20	46

Receiver No. 5

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 5
 Noise Level Calculations 4987 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

**A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building**

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _e	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 5
 Noise Level Calculations 4987 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine ~~Package~~ Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)
 Package SPL of GE 7FA at outside of building wall from 4 turbines
 A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines

13	13	13	16	23	24	29	36	25
67	76	70	64	55	55	56	45	46
28	50	54	55	52	55	57	46	45

Surface area of south building wall directed towards residences
 Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines

793	793	793	793	793	793	793	793	793
96	105	99	93	84	84	85	74	75

A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines

57	79	83	84	81	84	86	75	74
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A3) Calculation of Combustion Turbine ~~Package~~ Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)
 Distance from Turbine Generator Building to Receiver (meters)
 Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)
 Atmospheric Attn. (68deg F & 50% Humidity) (dB)

4987	4987	4987	4987	4987	4987	4987	4987	4987
1520	1520	1520	1520	1520	1520	1520	1520	1520
0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80
0.0	0.0	0.6	1.8	4.3	7.6	15.2	42.6	42.6

Package SPL of four GE 7FAs at Receiver
 A-weighted Package SPL of four GE 7FAs at Receiver

22	31	24	16	5	2	-5	-43	-42
-18	4	8	8	2	2	-4	-42	-44

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A4) Calculation of Combustion Turbine ~~Inlet~~ Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)
 Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)
 Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines
 Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines

51	50	43	45	43	37	35	33	28
12	24	27	36	40	37	36	34	27
57	56	49	51	49	43	41	39	34
18	30	33	42	46	43	42	40	33

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Distance from turbine inlets to Receiver (feet)
 Distance from turbine inlets to Receiver (meters)
 Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)
 Atmospheric Attn. (68deg F & 50% Humidity) (dB)

4987	4987	4987	4987	4987	4987	4987	4987	4987
1520	1520	1520	1520	1520	1520	1520	1520	1520
0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80
0.0	0.0	0.6	1.8	4.3	7.6	15.2	42.6	42.6

Inlet SPL of four GE 7FAs at Receiver
 A-weighted Inlet SPL of four GE 7FAs at Receiver

35	34	27	27	23	14	4	-25	-30
-4	8	10	19	20	14	5	-24	-32

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A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)
 Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)
 Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines
 Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines

76	76	69	63	54	54	41	20	10
37	50	53	54	51	54	42	21	9
82	82	75	69	60	60	47	26	16
43	56	59	60	57	60	48	27	15

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Distance from Exhaust to Receiver (feet)
 Distance from Exhaust to Receiver (meters)
 Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)
 Atmospheric Attn. (68deg F & 50% Humidity) (dB)

4987	4987	4987	4987	4987	4987	4987	4987	4987
1520	1520	1520	1520	1520	1520	1520	1520	1520
0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80
0.0	0.0	0.6	1.8	4.3	7.6	15.2	42.6	42.6

Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm

-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0
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Exhaust SPL of four GE 7FAs at Receiver
 A-weighted Exhaust SPL of four GE 7FAs at Receiver

60	60	53	45	34	31	10	-38	-48
17	23	13	11	-13	-17	-33	-74	-72

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NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 5
 Noise Level Calculations 4987 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	60	60	53	45	34	31	11	-25	-30	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	17	23	16	20	20	14	6	-24	-31	27

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

[source: Edison Electric Institute 1978 rev. 1984]

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

**B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building**

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87

Directivity Factor, Q_s	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	4987	4987	4987	4987	4987	4987	4987	4987	4987	
Distance from Turbine Generator Building to Receiver (meters)	1520	1520	1520	1520	1520	1520	1520	1520	1520	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.8	4.3	7.6	15.2	42.6	42.6	

Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven exciters]

SPL of two steam turbine-generator units at Receiver	26	32	30	20	7	-2	-17	-60	-55	
A-weighted SPL of two steam turbine-generator units at Receiver	-13	6	14	11	3	-2	-16	-59	-56	16

NRPF SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 5
 Noise Level Calculations 4987 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	4987	4987	4987	4987	4987	4987	4987	4987	4987	
Distance from ACCs to Receiver (meters)	1520	1520	1520	1520	1520	1520	1520	1520	1520	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.6	1.8	4.3	7.6	15.2	42.6	42.6	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	53	53	55	51	44	38	31	-6	-13	
A-weighted SPL of two ACCs at Receiver	13	26	39	42	41	38	33	-5	-15	47
Noise Level Estimate for Northwest Regional Power Facility at Receiver	18	28	39	42	41	38	33	-5	-14	47

Receiver No. 6

SINKING CREEK SITE

Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 6
 Noise Level Calculations 3624 Feet From Turbine Generator Building

+24
-34

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exchlers)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70
A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building										
Assuming Reverberant Field in Building	11.0	1.0								
Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _n	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 6
 Noise Level Calculations 3624 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	63	63	55	49	38	35	18	-11	-16	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	20	26	19	23	24	19	13	-10	-17	30

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

[source: Edison Electric Institute 1978 rev. 1984]

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87
Directivity Factor, Q_e	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	3624	3624	3624	3624	3624	3624	3624	3624	3624	
Distance from Turbine Generator Building to Receiver (meters)	1105	1105	1105	1105	1105	1105	1105	1105	1105	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.4	1.3	3.1	5.5	11.0	30.9	30.9	

Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven exciters]

SPL of two steam turbine-generator units at Receiver	29	35	33	23	10	3	-10	-45	-40	
A-weighted SPL of two steam turbine-generator units at Receiver	-10	9	17	15	7	3	-9	-44	-41	20

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 6
 Noise Level Calculations 3624 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	3624	3624	3624	3624	3624	3624	3624	3624	3624	
Distance from ACCs to Receiver (meters)	1105	1105	1105	1105	1105	1105	1105	1105	1105	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.4	1.3	3.1	5.5	11.0	30.9	30.9	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	55	55	58	54	48	43	38	8	1	
A-weighted SPL of two ACCs at Receiver	16	29	42	46	45	43	40	9	0	51
Noise Level Estimate for Northwest Regional Power Facility at Receiver	21	31	42	46	45	43	40	9	0	51

Receiver No. 7

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 7
 Noise Level Calculations 12113 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA (source: General Electric 9/21/94)

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field In Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _o	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 7
 Noise Level Calculations 12113 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine *Package* Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine *Package* Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	12113	12113	12113	12113	12113	12113	12113	12113	12113	
Distance from Turbine Generator Building to Receiver (meters)	3693	3693	3693	3693	3693	3693	3693	3693	3693	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	1.5	4.4	10.3	18.5	36.9	103.4	103.4	
Package SPL of four GE 7FAs at Receiver	14	23	15	6	-9	-17	-34	-112	-111	
A-weighted Package SPL of four GE 7FAs at Receiver	-26	-3	-1	-3	-12	-17	-33	-111	-112	3

A4) Calculation of Combustion Turbine *Inlet* Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50

Distance from turbine inlets to Receiver (feet)	12113	12113	12113	12113	12113	12113	12113	12113	12113	
Distance from turbine inlets to Receiver (meters)	3693	3693	3693	3693	3693	3693	3693	3693	3693	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	1.5	4.4	10.3	18.5	36.9	103.4	103.4	
Inlet SPL of four GE 7FAs at Receiver	27	26	18	17	9	-5	-26	-94	-99	
A-weighted Inlet SPL of four GE 7FAs at Receiver	-12	0	2	8	6	-5	-24	-93	-100	11

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68

Distance from Exhaust to Receiver (feet)	12113	12113	12113	12113	12113	12113	12113	12113	12113	
Distance from Exhaust to Receiver (meters)	3693	3693	3693	3693	3693	3693	3693	3693	3693	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	1.5	4.4	10.3	18.5	36.9	103.4	103.4	
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	52	52	44	35	20	12	-20	-107	-117	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	9	15	5	0	-27	-36	-62	-143	-140	17

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 7
 Noise Level Calculations 12113 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	52	52	44	35	20	12	-18	-94	-99	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	9	15	7	9	6	-5	-24	-93	-100	18

(B) Two Steam Turbine-Generator Units (Incl. turbines, generators, and shaft driven exciters)

[source: Edison Electric Institute 1978 rev. 1984]

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building

Assuming Reverberant Field In Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87
Directivity Factor, Q_s	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)

SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	12113	12113	12113	12113	12113	12113	12113	12113	12113	
Distance from Turbine Generator Building to Receiver (meters)	3693	3693	3693	3693	3693	3693	3693	3693	3693	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	1.5	4.4	10.3	18.5	36.9	103.4	103.4	

Composite Noise Levels from two steam-generator units at Receiver [Includes turbines, generators, and shaft-driven exciters]

SPL of two steam turbine-generator units at Receiver	19	25	21	10	-7	-20	-47	-128	-123	
A-weighted SPL of two steam turbine-generator units at Receiver	-21	-2	5	1	-10	-20	-46	-127	-124	7

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 7
 Noise Level Calculations 12113 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	12113	12113	12113	12113	12113	12113	12113	12113	12113	
Distance from ACCs to Receiver (meters)	3693	3693	3693	3693	3693	3693	3693	3693	3693	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	1.5	4.4	10.3	18.5	36.9	103.4	103.4	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	45	45	46	41	31	19	2	-75	-82	
A-weighted SPL of two ACCs at Receiver	6	19	30	32	27	19	3	-74	-83	35
Noise Level Estimate for Northwest Regional Power Facility at Receiver	11	20	30	32	27	20	3	-74	-83	35

Receiver No. 8

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 8
 Noise Level Calculations 17794 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building

Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _e	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 8
 Noise Level Calculations 17794 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine *Package* Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine *Package* Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	17794	17794	17794	17794	17794	17794	17794	17794	17794	
Distance from Turbine Generator Building to Receiver (meters)	5425	5425	5425	5425	5425	5425	5425	5425	5425	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.2	6.5	15.2	27.1	54.3	151.9	151.9	
Package SPL of four GE 7FAs at Receiver	11	20	11	1	-17	-29	-55	-164	-163	
A-weighted Package SPL of four GE 7FAs at Receiver	-29	-7	-5	-8	-20	-29	-54	-163	-164	-1

A4) Calculation of Combustion Turbine *Inlet* Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50

Distance from turbine inlets to Receiver (feet)	17794	17794	17794	17794	17794	17794	17794	17794	17794	
Distance from turbine inlets to Receiver (meters)	5425	5425	5425	5425	5425	5425	5425	5425	5425	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.2	6.5	15.2	27.1	54.3	151.9	151.9	
Inlet SPL of four GE 7FAs at Receiver	24	23	14	12	1	-17	-46	-146	-151	
A-weighted Inlet SPL of four GE 7FAs at Receiver	-15	-3	-2	3	-2	-17	-45	-145	-152	6

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68

Distance from Exhaust to Receiver (feet)	17794	17794	17794	17794	17794	17794	17794	17794	17794	
Distance from Exhaust to Receiver (meters)	5425	5425	5425	5425	5425	5425	5425	5425	5425	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.2	6.5	15.2	27.1	54.3	151.9	151.9	
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	49	49	40	30	12	0	-40	-159	-169	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	6	12	1	-5	-35	-48	-83	-195	-192	13

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 8
 Noise Level Calculations 17794 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]										
Composite SPL of Four GE 7FAs at Receiver	49	49	40	30	12	0	-39	-146	-151	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	6	12	3	4	-2	-17	-44	-145	-152	14
(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)										
[source: Edison Electric Institute 1978 rev. 1984]										
Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113
B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building										
Assuming Reverberant Field in Building										
Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87
Directivity Factor, Q _a	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88
B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building										
Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93
B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver										
Distance from Turbine Generator Building to Receiver (feet)	17794	17794	17794	17794	17794	17794	17794	17794	17794	
Distance from Turbine Generator Building to Receiver (meters)	5425	5425	5425	5425	5425	5425	5425	5425	5425	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.01	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.2	6.5	15.2	27.1	54.3	151.9	151.9	
Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven exciters]										
SPL of two steam turbine-generator units at Receiver	15	21	17	4	-15	-32	-67	-180	-175	
A-weighted SPL of two steam turbine-generator units at Receiver	-24	-5	1	-4	-19	-32	-66	-179	-176	3

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 8
 Noise Level Calculations 17794 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	17794	17794	17794	17794	17794	17794	17794	17794	17794	
Distance from ACCs to Receiver (meters)	5425	5425	5425	5425	5425	5425	5425	5425	5425	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.2	6.5	15.2	27.1	54.3	151.9	151.9	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	42	42	42	35	22	7	-19	-127	-134	
A-weighted SPL of two ACCs at Receiver	2	15	26	27	19	7	-17	-126	-135	30

Noise Level Estimate for Northwest Regional Power Facility at Receiver	7	17	26	27	19	8	-17	-126	-135	30
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Receiver No. 9

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 9
 Noise Level Calculations 17477 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

**A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field In Building**

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _s	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 9
 Noise Level Calculations 17477 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine Package Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine Package Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	17477	17477	17477	17477	17477	17477	17477	17477	17477	
Distance from Turbine Generator Building to Receiver (meters)	5328	5328	5328	5328	5328	5328	5328	5328	5328	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.1	6.4	14.9	26.6	53.3	149.2	149.2	
Package SPL of four GE 7FAs at Receiver	11	20	12	1	-17	-28	-54	-161	-160	
A-weighted Package SPL of four GE 7FAs at Receiver	-29	-6	-5	-8	-20	-28	-53	-160	-161	-1

A4) Calculation of Combustion Turbine Inlet Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50

Distance from turbine inlets to Receiver (feet)	17477	17477	17477	17477	17477	17477	17477	17477	17477	
Distance from turbine inlets to Receiver (meters)	5328	5328	5328	5328	5328	5328	5328	5328	5328	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.1	6.4	14.9	26.6	53.3	149.2	149.2	

Inlet SPL of four GE 7FAs at Receiver	24	23	14	12	1	-16	-45	-143	-148	
A-weighted Inlet SPL of four GE 7FAs at Receiver	-15	-3	-2	3	-2	-16	-44	-142	-149	6

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68

Distance from Exhaust to Receiver (feet)	17477	17477	17477	17477	17477	17477	17477	17477	17477	
Distance from Exhaust to Receiver (meters)	5328	5328	5328	5328	5328	5328	5328	5328	5328	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.1	6.4	14.9	26.6	53.3	149.2	149.2	

Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
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Exhaust SPL of four GE 7FAs at Receiver	49	49	40	30	12	1	-39	-156	-166	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	6	12	1	-5	-35	-47	-82	-192	-189	13

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 9
 Noise Level Calculations 17477 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	49	49	40	30	13	1	-38	-143	-148	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	6	12	3	4	-2	-16	-43	-142	-149	14

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)
[source: Edison Electric Institute 1978 rev. 1984]

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	

SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87

Directivity Factor, Q _e	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) (50 ft high (2-story), 75 ft wide, and 400 ft long)	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	

Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	17477	17477	17477	17477	17477	17477	17477	17477	17477	
Distance from Turbine Generator Building to Receiver (meters)	5328	5328	5328	5328	5328	5328	5328	5328	5328	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.1	6.4	14.9	26.6	53.3	149.2	149.2	

Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven exciters]

SPL of two steam turbine-generator units at Receiver	15	21	17	5	-15	-32	-66	-177	-172	
A-weighted SPL of two steam turbine-generator units at Receiver	-24	-5	1	-4	-18	-32	-65	-176	-173	3

SINKING CREEK SITE
Noise Level Estimate for Northwest Regional Power Facility at Receiver No. 9
 Noise Level Calculations 17477 Feet From Turbine Generator Building

C) Two Aircooled Condensers [source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	17477	17477	17477	17477	17477	17477	17477	17477	17477	
Distance from ACCs to Receiver (meters)	5328	5328	5328	5328	5328	5328	5328	5328	5328	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	2.1	6.4	14.9	26.6	53.3	149.2	149.2	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	42	42	43	35	23	8	-18	-124	-131	
A-weighted SPL of two ACCs at Receiver	2	16	27	27	20	8	-16	-123	-132	30

Noise Level Estimate for Northwest Regional Power Facility at Receiver	7	17	27	27	20	8	-16	-123	-132	30
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NRPF Property Boundary

NRPF SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 185 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA [source: General Electric 9/21/94]

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _a	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

NRPF SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 185 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine ~~Package~~ Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine ~~Package~~ Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	185	185	185	185	185	185	185	185	185	
Distance from Turbine Generator Building to Receiver (meters)	56	56	56	56	56	56	56	56	56	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.0	0.1	0.2	0.3	0.6	1.6	1.6	
Package SPL of four GE 7FAs at Receiver	50	59	53	47	38	37	38	26	27	
A-weighted Package SPL of four GE 7FAs at Receiver	11	33	37	38	34	37	39	27	26	45

A4) Calculation of Combustion Turbine ~~Inlet~~ Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Distance from turbine inlets to Receiver (feet)	185	185	185	185	185	185	185	185	185	
Distance from turbine inlets to Receiver (meters)	56	56	56	56	56	56	56	56	56	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.0	0.1	0.2	0.3	0.6	1.6	1.6	
Inlet SPL of four GE 7FAs at Receiver	64	63	56	58	56	49	47	44	39	
A-weighted Inlet SPL of four GE 7FAs at Receiver	24	37	40	49	52	49	48	45	38	57

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68
Distance from Exhaust to Receiver (feet)	185	185	185	185	185	185	185	185	185	
Distance from Exhaust to Receiver (meters)	56	56	56	56	56	56	56	56	56	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.0	0.1	0.2	0.3	0.6	1.6	1.6	
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	89	89	82	76	67	66	53	31	21	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	45	52	43	41	19	18	10	-5	-2	53

NRPF SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 185 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]										
Composite SPL of Four GE 7FAs at Receiver	89	89	82	76	67	67	54	44	39	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	45	52	45	50	52	50	49	45	38	58
(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)										
[source: Edison Electric Institute 1978 rev. 1984]										
Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113
B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building										
Assuming Reverberant Field in Building										
Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87
Directivity Factor, Q_s	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft High (2-story), 75 ft wide, and 400 ft. long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88
B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building										
Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)										
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93
B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver										
Distance from Turbine Generator Building to Receiver (feet)	185	185	185	185	185	185	185	185	185	
Distance from Turbine Generator Building to Receiver (meters)	56	56	56	56	56	56	56	56	56	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.0	0.1	0.2	0.3	0.6	1.6	1.6	
Composite Noise Levels from two steam-generator units at Receiver [includes turbines, generators, and shaft-driven exciters]										
SPL of two steam turbine-generator units at Receiver	55	61	59	50	39	34	26	10	15	
A-weighted SPL of two steam turbine-generator units at Receiver	16	35	43	42	36	34	27	11	14	46

NRPF SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 185 Feet From Turbine Generator Building

C) Two Aircooled Condensers Isource: Zurn Balacke-Durr, Inc. March 1, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy]

A-weighted noise level measured at 800 feet from one (1) Air cooled condenser unit
 A-weighted noise level from two (2) ACCs at 800 feet based on measurement

64
 67

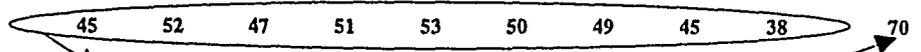
To estimate aircooled condenser noise levels at the nearby property line (540 feet), the manufacturer's noise level measurements taken at 800 feet were used. This method should provide more accurate estimates at distances close to the units.

Composite Noise Levels from two air cooled condensers at Receiver

A-weighted noise level from two (2) ACCs at property line located 540 feet from center of air cooled condensers (based on measurement)

70

Noise Level Estimate for Northwest Regional Power Facility at Receiver



These levels do not include aircooled condensers...but this final calculation does

Sinking Creek Property Boundary

SINKING CREEK SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 800 Feet From Turbine Generator Building

Total noise level estimates are based on the following individual noise sources

(A) Four General Electric Type 7FA Combustion Turbines

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

(C) Two Air Cooled Condensers (each with 24 fan drives)

Octave Band Frequency (Hz)	31.5	63	125	250	500	1000	2000	4000	8000	A-weighted
Sound Wavelength (feet)	35.81	17.90	9.02	4.51	2.26	1.13	0.56	0.28	0.14	
A-weighting (dB)	-39.4	-26.2	-16.1	-8.6	-3.2	0	1.2	1	-1.1	

A) Free Field Reference Data for GE 7FA (source: General Electric 9/21/94)

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Package SPL of GE 7FA @400 Feet (122 meters)	55	64	58	55	53	54	60	56	46	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	60
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	16	38	42	46	50	54	61	57	45	64
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Package SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	61	70	64	61	59	60	66	62	52	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	66
Package A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	22	44	48	52	56	60	67	63	51	70

A1) Calculation of Combustion Turbine Package Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
Package SPL of GE 7FA at inside building wall from 4 turbines (free field)	85.1	94.1	88.1	85.1	83.1	84.1	90.1	86.1	76.1	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (free field)	45.7	67.9	72.0	76.5	79.9	84.1	91.3	87.1	75.0	94
Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	110.6	119.6	113.6	110.6	108.6	109.6	115.6	111.6	101.6	
A-weighted Package Sound Power Level of GE 7FA at inside of building wall from 4 turbines	71.2	93.4	97.5	102.0	105.4	109.6	116.8	112.6	100.5	
Directivity Factor, Q _s	2	2	2	2	2	2	2	2	2	
Interior Surface Area of First floor of Building in (m ²) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	86.3	95.3	89.3	85.8	83.7	84.8	90.8	86.8	76.8	
A-weighted Package SPL of GE 7FA at inside of building wall from 4 turbines (reverberation field)	46.9	69.1	73.2	77.2	80.5	84.8	92.0	87.8	75.7	94

SINKING CREEK SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 800 Feet From Turbine Generator Building

A2) Calculation of Combustion Turbine *Package* Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
Package SPL of GE 7FA at outside of building wall from 4 turbines	67	76	70	64	55	55	56	45	46	
A-weighted Package SPL of GE 7FA at outside of building wall from 4 turbines	28	50	54	55	52	55	57	46	45	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Package Sound Power Level of GE 7FA at outside of south building wall from 4 turbines	96	105	99	93	84	84	85	74	75	
A-weighted Package Sound Power Level of GE 7FA at outside of building wall from 4 turbines	57	79	83	84	81	84	86	75	74	91

A3) Calculation of Combustion Turbine *Package* Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	800	800	800	800	800	800	800	800	800	
Distance from Turbine Generator Building to Receiver (meters)	244	244	244	244	244	244	244	244	244	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.1	0.3	0.7	1.2	2.4	6.8	6.8	
Package SPL of four GE 7FAs at Receiver	38	47	40	34	24	24	24	8	9	
A-weighted Package SPL of four GE 7FAs at Receiver	-2	20	24	25	21	24	25	9	8	31

A4) Calculation of Combustion Turbine *Inlet* Noise Levels

Inlet SPL of GE 7FA @400 Feet (122 meters)	51	50	43	45	43	37	35	33	28	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters)	12	24	27	36	40	37	36	34	27	44
Inlet SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	57	56	49	51	49	43	41	39	34	
Inlet A-weighted Noise of GE 7FA @400 Feet (122 meters) from 4 turbines	18	30	33	42	46	43	42	40	33	50
Distance from turbine Inlets to Receiver (feet)	800	800	800	800	800	800	800	800	800	
Distance from turbine Inlets to Receiver (meters)	244	244	244	244	244	244	244	244	244	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.1	0.3	0.7	1.2	2.4	6.8	6.8	
Inlet SPL of four GE 7FAs at Receiver	51	50	43	45	42	36	33	26	21	
A-weighted Inlet SPL of four GE 7FAs at Receiver	12	24	27	36	39	36	34	27	20	43

A5) Calculation of Combustion Turbine Exhaust Noise Levels

Exhaust SPL of GE 7FA @400 Feet (122 meters)	76	76	69	63	54	54	41	20	10	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters)	37	50	53	54	51	54	42	21	9	62
Exhaust SPL of GE 7FA @400 Feet (122 meters) from 4 turbines	82	82	75	69	60	60	47	26	16	
Exhaust A-weighted Noise Level of GE 7FA @400 Feet (122 meters) from 4 turbines	43	56	59	60	57	60	48	27	15	68
Distance from Exhaust to Receiver (feet)	800	800	800	800	800	800	800	800	800	
Distance from Exhaust to Receiver (meters)	244	244	244	244	244	244	244	244	244	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.1	0.3	0.7	1.2	2.4	6.8	6.8	
Silencer DIL, Based on IAC MODEL 3 PS, +2000 fpm	-4.0	-11.0	-23.0	-26.0	-44.0	-48.0	-44.0	-37.0	-22.0	
Exhaust SPL of four GE 7FAs at Receiver	76	76	69	63	53	53	39	13	3	
A-weighted Exhaust SPL of four GE 7FAs at Receiver	33	39	30	28	6	5	-4	-23	-20	40

SINKING CREEK SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 800 Feet From Turbine Generator Building

Composite Noise Levels from four GE 7FAs at Receiver [Package + Inlet + Exhaust]

Composite SPL of Four GE 7FAs at Receiver	76	76	69	63	54	53	40	26	22	
Composite A-weighted Noise Level of Four GE 7FAs at Receiver	33	39	32	37	39	36	34	27	20	45

(B) Two Steam Turbine-Generator Units (incl. turbines, generators, and shaft driven exciters)

[source: Edlson Electric Institute 1978 rev. 1984]

Gross electrical generating rating of each unit, MWe (assumed)	120	120	120	120	120	120	120	120	120	
Octave band level adjustments per Table 4.14 EEI	9	3	5	10	14	18	21	29	35	
Sound power level of the two units, (dB) (see Table 4.3 EEI)	115.3	121.3	119.3	114.3	110.3	106.3	103.3	95.3	89.3	
A-weighted sound power level of the two units, (dBA)	75.9	95.1	103.2	105.7	107.1	106.3	104.5	96.3	88.2	113

B1) Calculation of Steam Turbine-Generator Noise Levels Inside Turbine Generator Building
 Assuming Reverberant Field in Building

Distance from turbine center to wall, feet	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
Distance from turbine center to wall, meters	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	
SPL at inside building wall from 2 steam turbine-generator units (free field)	89.8	95.8	93.8	88.8	84.8	80.8	77.8	69.8	63.8	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (free field)	50.4	69.6	77.7	80.2	81.6	80.8	79.0	70.8	62.7	87

Directivity Factor, Q_v

Interior Surface Area of First floor of Building in (m^2) [50 ft high (2-story), 75 ft wide, and 400 ft long]	7785	7785	7785	7785	7785	7785	7785	7785	7785	
Absorption Factor for R-11 and R-19 mounted on 24-gauge sheet metal walls and ceiling, respectively (see AVNC)	0.61	0.61	0.61	1.10	1.20	1.11	1.08	1.09	1.09	
SPL at inside building wall from 2 steam turbine-generator units (reverberation field)	91.0	97.0	95.0	89.5	85.5	81.5	78.5	70.5	64.5	
A-weighted SPL at inside of building wall from 2 steam turbine-generator units (reverberation field)	51.6	70.8	78.9	80.9	82.3	81.5	79.7	71.5	63.4	88

B2) Calculation of Steam Turbine-Generator Noise Levels Outside Turbine Generator Building

Transmission Loss Data for building walls (sheet metal, 24 gauge - see AVNC Tab 7)	13	13	13	16	23	24	29	36	25	
SPL at outside of building wall from 2 steam turbine-generator units	72	78	76	68	56	52	44	29	34	
A-weighted SPL at outside of building wall from 2 steam turbine-generator units	33	52	60	59	53	52	45	30	32	
Surface area of south building wall directed towards residences	793	793	793	793	793	793	793	793	793	
Sound Power Level at outside of south building wall from 4 turbines	101	107	105	97	85	80	73	58	63	
A-weighted Package Sound Power Level at outside of building wall from 2 steam turbine-generator units	62	81	89	88	82	80	74	59	61	93

B3) Calculation of Steam Turbine-Generator Noise Levels at Receiver

Distance from Turbine Generator Building to Receiver (feet)	800	800	800	800	800	800	800	800	800	
Distance from Turbine Generator Building to Receiver (meters)	244	244	244	244	244	244	244	244	244	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.1	0.3	0.7	1.2	2.4	6.8	6.8	

Composite Noise Levels from two steam-generator units at Receiver [Includes turbines, generators, and shaft-driven exciters]

SPL of two steam turbine-generator units at Receiver	42	48	46	37	26	21	11	-8	-3	
A-weighted SPL of two steam turbine-generator units at Receiver	3	22	30	29	23	21	13	-7	-4	34

SINKING CREEK SITE: PROPERTY BOUNDARY
Noise Level Estimate for Northwest Regional Power Facility at the Property Boundary
 Noise Level Calculations 800 Feet From Turbine Generator Building

C) Two Aircooled Condensers (source: Zurn Balacke-Durr, Inc. August 31, 1995 fax transmittal to Ms. Teresa Trotman/C&SW Energy)

Sound power of one (1) air cooled condenser unit w/ 24 fan drives (ACC)	124.3	124.30	127.30	124.30	120.30	117.30	118.30	107.80	100.80	
Total sound power level for two (2) ACCs	127.3	127.3	130.3	127.3	123.3	120.3	121.3	110.8	103.8	
A-weighted sound power level from two (2) ACCs	87.9	101.1	114.2	118.7	120.1	120.3	122.5	111.8	102.7	127
Distance from ACCs to Receiver (feet)	800	800	800	800	800	800	800	800	800	
Distance from ACCs to Receiver (meters)	244	244	244	244	244	244	244	244	244	
Atmospheric Attenuation Coefficient (dB/100m or dB/328ft)	0.00	0.00	0.04	0.12	0.28	0.50	1.00	2.80	2.80	
Atmospheric Attn. (68deg F & 50% Humidity) (dB)	0.0	0.0	0.1	0.3	0.7	1.2	2.4	6.8	6.8	
Composite Noise Levels from two air cooled condensers at Receiver										
Total SPL of two ACCs at Receiver	69	69	71	68	64	60	60	45	38	
A-weighted SPL of two ACCs at Receiver	29	42	55	60	61	60	61	46	37	67
Noise Level Estimate for Northwest Regional Power Facility at Receiver	34	44	55	60	61	60	61	46	37	67