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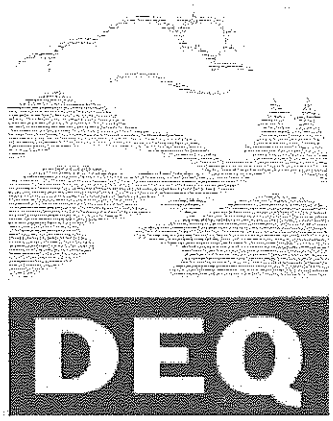
9/29/1975

OREGON
ENVIRONMENTAL QUALITY
COMMISSION MEETING
MATERIALS



State of Oregon
Department of Environmental Quality

AGENDA

ENVIRONMENTAL QUALITY COMMISSION

Portland General Electric's Bethel Turbine Generating Plant

Salem City Council Chambers
555 Liberty Street S.E., Salem

September 29, 1975

4:30 p.m. EQC to view Bethel Plant; PGE to start up engines

5:30 p.m. Meeting with Richards, Somers, Kramer, Underwood and Stuart Foster and client -- Hindquarter, 197 Commercial N.E., Salem

6:30 p.m. Dinner at Black Angus - (Hallock, Phinney and Crothers), 220 Commercial S.E., Salem (Social gathering only)

7:30 p.m. Hearing on PGE Bethel

State of Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

To: Joe Richards, Ron Somers, Ray Underwood Date: September 24, 1975

From: Director

Subject: Attached

The above will be meeting at the Hindquarter at 5:30 p.m. with Stuart Foster and client. There are no rooms available at the Hindquarter for a meeting, but you will be seated in a corner of the resturant away from others. You should ask for this seating arrangment when you enter the restaurant.

Jackie Hallock, Grace Phinney and Dr. Crothers will be meeting at the Black Angus for dinner at 6:30 p.m.

Neither the Hindquarter nor the Black Angus takes reservations for dinner.

MINUTES OF SPECIAL MEETING

of the

OREGON ENVIRONMENTAL QUALITY COMMISSION

September 29, 1975

Pursuant to required notice and publication, the Environmental Quality Commission convened a special meeting on Monday, September 29, 1975 in the Salem City Council Chambers at 555 Liberty Street S. in Salem, Oregon.

Present were Commission Chairman, Mr. Joe B. Richards and Commissioners Morris K. Crothers, Grace S. Phinney and Ronald M. Somers. The Department of Environmental Quality was represented by its Director, Mr. Loren (Bud) Kramer and several additional staff members.

The purpose of the meeting being to receive public testimony for Commission policy review of the Department's proposed air contaminant discharge permit for the Portland General Electric (PGE) turbine generating plant at Bethel, Mr. John Hector of the Department's Noise Pollution Control Division presented a staff report with regard to the proposed permit.

Conclusions of the report were as follows:

1. The installed noise suppression equipment did not achieve the predicted amount of noise reduction in the 31.5 Hertz octave band; therefore, the Department's daytime noise standard is projected to be marginally met and the nighttime (10 p.m. to 7 a.m.) standard would be exceeded by 3dB during operation of both twin-pacs at base power load.

2. Noise generated by equipment associated with the substation and turbine auxiliary equipment do not exceed Department rules.

3. Subjective evaluation of community noise with one turbine twin-pac operating indicates that the noise has been reduced to near inaudibility; however, the addition of the second twin-pac operation will slightly increase perceived noise levels.

4. Subjective evaluation did not substantiate complaints that the substation and turbine supporting equipment constitutes a community problem.

5. Opposition to the PGE turbine facility continues from many citizens in the Bethel community due to the apparent high sensitivity of these people to relatively low-amplitude nearly inaudible low-frequency noise.

6. The Department will evaluate the ability of both twin-pacs to comply with the day/night noise standards and will, if necessary, impose appropriate operating limitations to insure compliance.

7. The Department must act on the proposed renewal air contaminant discharge permit for the Bethel facility since the MWVAPA did not issue this permit prior to disbanding of the Authority on August 1, 1975.

8. The proposed MWVAPA ACD permit condition requiring cessation of operation of the Bethel facility when the PGE Trojan nuclear plant becomes operational cannot be justified since PGE has demonstrated compliance with ACD permit conditions and Department ambient air quality standards.

9. The proposed MWVAPA ACD permit conditions requiring a 500 hour per year operating limitation cannot be justified at this time; however, an operating hour limitation does appear necessary to insure compliance with air quality standards and significant deterioration limits.

10. Limiting Bethel operations to emergency conditions, which are demonstrated to be emergencies to the satisfaction of the Department, will insure minimal operation of the facility and allow time for development of a justifiable operating hour limitation.

11. Oxides of nitrogen emission controls, when deemed practicable by the Department, should be installed on the Bethel facility if operation exceeds 200 hours per year.

12. The Department should review the Bethel operation on a yearly basis to determine the adequacy of the Department's noise standards relative to the Bethel noise problem, the need for NO_x control, justification of an operating hour limitation, and compliance with ACD permit limitation provisions so that necessary and prompt adjustments can be made in the ACD permit as may be warranted.

Commissioner Phinney was informed by Mr. John Kowalczyk of the Department's Air Quality Program that PGE, in its application for a permit, had indicated the facility at Bethel might be used in emergencies for up to 1000 hours per year.

Commissioner Somers asked what could be done to eliminate the low rumble noise indicated in a staff evaluation report of February 11, 1975. Mr. Hector reported that these noises were in the 31.5 Hertz Band and that muffling measures employed by PGE which were expected to reduce the rumbles by about 9 decibels (dB) had realized a reduction of about 5 dB.

It was Mr. Hector's opinion that additional measures for muffling were available. It was reported that, on September 23, the Department had taken measurements with both twin packs operating at base load (totaling about 110 or 111 megawatts) and, at the 31.5 Band, a noise level of 76.3 dB was present. This compared favorably with the Department's previous estimate of 77.7 ± 1 which was extrapolated from levels present with one twin pack operating at base load. Commissioner Somers was told that two identical sources emitting a pure tone in phase would result in 6dB more noise than one alone. Mr. Hector added, however, that the twin packs operating together increased noise less than 3dB over the level for one and were not in synchronization. The September 23 measurements, it was reported, were taken at a distance of 400 feet in a northeasterly direction from the turbines.

Mr. Warren Hastings, an attorney for Portland General Electric, expressed appreciation for the opportunity to have the Commission inspect the turbines in operation as had been done earlier in the afternoon. He stated Portland General Electric as prepared to accept the proposed permit with the exception of minor details. These included lack of provision for operation for one-half hour every two weeks for maintenance purposes and provisions for reporting quarterly on practicable NO_x control developments for turbines. In Mr. Hasting's view, the rate of development in the field of turbine NO_x emission reduction was not rapid enough to warrant quarterly reporting. He conceded annual or intermittent reporting schedules might be appropriate.

Mr. Hastings declined to estimate for Commissioner Phinney the number of annual emergency operating hours to be expected on the grounds that such operation was contingent upon the critical water conditions which affect the availability of alternate hydroelectric power. In turn, Mr. Hastings contended, critical water conditions are correlative to unpredictable acts of God.

Mr. Hastings stressed the speculative nature of energy demand forecasts in explanation of the earlier estimates that a two or three hundred megawatt surplus above peak demand would be available at the present time in the Northwest.

Mr. Hastings indicated to Commissioner Somers that PGE's efforts in providing mufflers and shotcreting to the turbines had been aimed at meeting the Commission's noise standards, not eliminating the noise entirely. These efforts he reported, had resulted in the 5 dB reduction previously mentioned. It was contended that the machines now meet the daytime standards and, with one twin pack running, meet or exceed night time standards.

Commissioner Somers contended that the Commission's standards are not adequate in that they permit a source of noise violent enough to cause ripples in a glass of water standing in a distant house. He cited a staff report of actions taken on September 23 to substantiate this occurrence, and asked if future measures might eliminate this problem.

Noting that the original installation conformed to the best technology of its time, Mr. Hastings expressed his hope that further noise reduction measures might become available.

Mr. Hastings received Chairman Richards' concurrence in his plan to call upon PGE air and noise experts present, should testimony by others indicate a need for elaboration of PGE's position.

State Representative Drew Davis (Dist. #20) reported his visit to the Bethel generating plant and homes nearby. While conceding there was an apparent problem with infrasound in the homes, he stressed the needs for electric power in a technological society. He noted the scarcity of acceptable areas for the construction of dams to provide hydroelectric power and the existence of a petition being circulated with an eye to the cessation of nuclear generation plant construction. Representative Davis reported that the present age was one of transfer to electrical power, in automobiles, and other areas.

It was his contention that residents near the plant should try to get used to the noise and tolerate it much in the same fashion as residents near I-205 learn to tolerate the freeway noise levels.

Representative Davis recommended that the proposed permit be granted to PGE.

Mr. Marshall D. Jones, a resident of Caplin (on MacClay Road) said he had heard reports that the noise emitted by the turbines is worse at a distance of two miles than at a shorter distance. Reporting his residence during the existence of the plant to have been at a two-mile distance, Mr. Jones disavowed any botheration to him from the noise.

Mr. Jones expressed his belief in free enterprise, freedom, America, and progress; his abhorrence for subsidies, tax write-offs, income tax, monopoly, and government socialism; and his apprehension that the power in his all electric home would be shut off.

Mr. Jones implied that Mrs. Frady (a resident in the neighborhood of the turbines) would not so appreciate her husband's assiduous efforts to terminate operations if they were directed at his own place of employ rather than the PGE installations.

Mr. Jones was in favor of granting the proposed permit.

(Mrs.) Mary Petzel a farmer, Women's Chairman of the Oregon Farm Bureau Federation Board of Directors, and Secretary to the Marion County Farm Bureau, addressed the Commission in favor of the proposed permit. She concurred in the staff's conclusions that the plant would meet all noise standards in the daytime and, with one twin pack running, could meet all standards at night. She opined that rapid convection of hot exhaust gases would readily disperse them and render them innocuous.

Mrs. Petzel called to the Commission's attention various electrical needs of farming operations throughout the Willamette valley, stressing that some of these needs, such as electrical brooding and refrigeration devices, were critical and could brook no power interruption.

Mrs. Petzel called the Commission's attention to the magnitude of various farming and food processing activities in the Willamette valley and stressed their national importance in the food industry.

Chairman Richards informed those in attendance that three of the Commissioners had conducted a site inspection tour of the Bethel facility and experienced its operation at base powerload both on the site and in a position northeast of the plant, about four hundred yards from the plant and in line with the Frady residence.

Mr. Charles Frady of Salem suggested that Mrs. Petzel's 500-acre farm would be a good location for the PGE facility and corrected Mr. Marshall's statement, contending that he is not employed by General Motors and has never been affiliated with that Corporation.

Mr. Frady alluded to his past public utterances with regard to the PGE Bethel facility and reaffirmed them. He declared PGE's attempt to muffle the turbines a failure, regardless of Departmental evaluations. He asserted that the thunder and vibration in his home continued as vexatiously as ever when the turbines run. He cautioned that he and his family could not and would not tolerate the noise further.

Commissioner Somers discussed with Mr. Frady the possibility that the people most disturbed by the sound of the installation might have some form of redress forthcoming due to litigation currently pending. Commissioner Somers noted that the thrust of his previous suggestion that PGE not operate in violation of ambient standards without obtaining noise easements from the affected property owners might be served by some form of damage award flowing from current litigation. He was informed by Mr. Frady that injunctive relief was now being sought and that damages might become an issue also.

Commissioner Somers inquired if the failure of a recent legislative bill which would have given the Commission regulatory power over the emission of certain low frequency noise could be taken as conclusively eliminating any express or implicit Commission jurisdiction over such emissions. It was suggested that Counsel might be consulted on this subject.

Commissioner Crothers obtained Mr. Hector's concurrence in the understanding that the defeated legislation dealt with inaudible noises (below 20 Hz) and did not remove Commission authority over noise which is audible. He added that it was his understanding from Mr. Hector's testimony that the offending noise from PGE was in the 31.5 Hz octave band, an audible range within Commission jurisdiction.

(Mrs.) Marlene Frady addressed the Commission with her concerns about the Department's conduct and that of PGE.

She felt it inappropriate to discuss the terms of the proposed permit at a time when litigation was pending which, in her hope, would resolve her grievances with regard to the facility in a fashion more adequate than has been forthcoming from the Department or the Legislature.

She concurred in Mr. Frady's contention that the efforts by PGE to muffle the sound has failed. She stated that low frequency rumble, infrasonic sound, and vibrations impact her home due to the PGE facility.

Further, it was noted that air turbulence, not yet measured by the Department to Mrs. Frady's knowledge, creates acoustic energy which may aggravate the problem.

Mrs. Frady argued that subjective evaluations by DEQ staff members in her home had insulted her intelligence and integrity and informed that their repetition would not be allowed. She reported that professional testing by third parties was being and would continue to be done in her home when the turbines run. She suggested that testing with equipment identical to that used by Towne and Associates in a previous test should

be conducted in the homes now that muffling efforts have been completed. She urged also that testing be done by the Department at bands other than 31.5.

Arguing that low frequency noises carry for great distances, Mrs. Frady noted that such noises are generated by cooling fans.

She alluded to public testimony by herself and her husband to the effect that previously unnoticed low frequency noises now disturb her and her family and that there are noise sources of a low frequency rumbling nature on or near the Bethel site that she hears almost constantly.

Mrs. Frady expressed her dissatisfaction with the Department's continual mention of standards as justification for its actions. Her contention was that a standard that does not address itself to serious problems of people is inadequate. She added that the noise is detrimental to her sleep and that of her husband and, therefore, deserving of remedial attention.

She invited the Commission to peruse her testimony before the Mid-Willamette Valley Air Pollution Authority and the Legislature if more information was needed.

Mrs. Frady declined to use the word "sensitized" to describe her consciousness of low frequency sounds. She told Commissioner Richards that she had become aware of an almost continual sound which distracts her from reading on all but a few days each year and that she had become perceptive of previously unperceived sounds such as those caused by distant railroad trains (on 12th Street).

A loss of peacefulness, she reported, had commenced simultaneously with the construction of the Bethel Plant in the neighborhood she had characterized as previously very quiet and peaceful.

Mr. Richard McDougal, a lifelong resident of North Salem and an intended candidate for City Council, spoke in favor of the permit, inviting the forty people near the Bethel site to move out of that neighborhood rather than endanger the interests of the eighty thousand in need of the Bethel facility. He termed the PGE plant a necessary evil which is there to serve the economy of Salem in emergencies. The dinner table in New York City was said to be dependent on the economy of Salem.

Mr. John Platt of the Northwest Environmental Defense Center drew upon his experiences with PGE's Harborton Generation plant and conversations with Dr. George Tsongas in addressing the Commission. He questioned the integrity of ignoring the noise standard and its previous violations in proposing a permit. The estimate (staff report) that the standard would be marginally met (± 1 dB) was not, in his view, sufficient justification for issuance of a permit. He felt this to be particularly true in view of the psychological and physical damage suffered by many of the neighbors. Mr. Platt decried the elimination of total yearly usage limitation and the provision for cessation upon the advent of power from the Trojan generating plant. These conditions were, in his recollection, the object of long strife on the part of those adversely affected by the plant.

He questioned the propriety of the permit in view of the land use questions regarding the plant.

He questioned PGE's integrity, charging that in Portland the company had applied for a conditional use permit under the pretense of seeking substation facilities with full intent to construct the Harborton Generating facility. He charged that PGE continued construction even though it was demonstrated that they were in violation of the zoning ordinance. He charged further that Turbo Power and Marine could have supplied NO_x emissions control equipment with the Harborton Turbines originally if they had been ordered. He suggested that the Department might have insufficient means to monitor PGE and determine if, given the complex network of service contracts and exchange agreements between utilities in the Northwest, emergencies really exist during operation periods. It was Mr. Platt's conjecture that the new Department of Energy might better accomplish this task.

Mr. Platt urged that, in lieu of refusing the permit outright, the Department should condition its granting upon PGE's cessation of operation at Bethel when Trojan power is available, limitation of operation to daytime hours for a maximum of 300 hours per year, and confinement of operations to emergency situations as determined by the state agency most competent to evaluate such situations.

In view of his understanding that the price of fuel for the Bethel plant resulted in power costs at least twice the amount chargeable to the customer, Commissioner Crothers inquired as to what incentive PGE would have to operate the facility other than in emergency periods. Mr. Platt found this incentive in the Public Utility Commission requirement that equipment be used and usable and in the fixed return on investment attainable by utilities sheltered from competition. In his view, the higher the investment, the higher the return to stock holders would be. He termed this an incentive to inefficiency.

(Mrs.) Jan Egger of the Oregon Environmental Council vehemently opposed the permit as unprotective of the residents near the plant. Recalling that one inhabited home some 800 feet from the plant was owned by PGE, Mrs. Egger took exception to the apparent failure to obtain the exception for source-owned noise sensitive property available under OAR Chapter 340, section 35-035(6)(d). She felt the Department's proposed permit did not adequately take account of the special provisions of OAR Chapter 340, section 35-035(1)(f)(A) imposing limits of 68 dBA and 65 dBA for day and night operation respectively (in the 31.5 Hertz octave band for sources in operation over six minutes per hour).

It was contended by Mrs. Egger the permit should be redrafted to require the noise emissions limits to be governed by the Statistical Noise Level Limitations not to be equaled or exceeded for more that 10% of any hour (L_{10} limits). She suggested that the permit require PGE to monitor noise and log the results in a fashion as intense as the air pollution monitoring requirements, to include intensity, frequency, time percentages, and diurnal readings.

She reminded the Commission that, in July of 1974, power levels and total operation hours were conditions of the permit at a time when the hope for sound muffling improvements were running high.

She criticized staff's subjective evaluations which ran counter to the complaints of neighbors such as the Fradys, the Bakkes and the Kupers and suggested that staff confine itself to objective evaluations based on technical measuring.

She requested that the Oregon Environmental Council's Noise Committee be given the data on infrasound leading to the staff's conclusion that the facility causes no significant peaks in the 2-20 Hertz range. She said,Mr. James Lee, the Committee's acoustical physicist could review the data.

She urged that the Permit be withdrawn for further study, including octave band analysis within nearby homes and measurement of infrasound.

She lamented the absence in the proposed permit of the Mid-Willamette Valley Air Pollution Control Authority's "cessation" condition, providing for shutdown of Bethel when Trojan power is available. Mrs. Egger found this particularly unfortunate in the light of the array of unfulfilled promises to the residents, promises including portable equipment to be moved if adverse to the environment, quiet operation, clean air, and legislative attention to the problem of infrasound. This last hope, she contended, was blocked during the last legislative session in a frustrating manner not appropriate for discussion in the present forum.

She urged that the long range "study" being conducted by PGE had produced symptoms in its subjects similar to those produced by EPA tests with short duration, high amplitude sound.

It was contended that the limits in the present rule with regard to lower frequency noises were selected arbitrarily in the absence of sufficient data for sound conclusions as to what levels would be protective. In view of the Bethel situation, Mrs. Egger found the limits obviously inadequate and urged their amendment so as to provide a rule which would address itself to the subjective complaints of the people regarding their health, the health of their animals, and their property.

In response to Chairman Richards, Mrs. Egger stated her dissatisfaction with hinging the question of Commission jurisdiction on an informal Attorney General's opinion of October 31, 1974 employing the Webster Dictionary definition of noise and advising that inaudible frequencies (including infrasound) are not noise and without Commission jurisdiction. It was Mrs. Egger's opinion that any frequency deleterious to individuals should be considered within Commission jurisdiction. She urged that the opinion be formalized so that it could be reviewed.

It was the understanding of Commissioners Somers and Richards that the informal opinion had led to the bill dealing with infrasound which failed in the 1975 legislative session.

Mr. Roy B. Hurlbut argued that the Bethel facility is needed neither for peaking nor for the conditions of Trojan outage, critical water shortage, or severe weather-caused demand periods (as cited in a letter to the Director from Mr. Estes Snedecor). Mr. Hurlbut recalled that in 1973 the system peak for Portland General Electric was 2,492 megawatts with an assured capacity of 2,824 megawatts, leaving a 332 megawatt surplus. In 1974, he said the surplus was 582 megawatts, a 25% surplus. Mr. Hurlbut noted that the Federal Power Commission recommends a 10 to 15 percent surplus, well below the 1974 and 1973 surpluses enjoyed by PGE. In addition, he argued, PGE would soon add 650 megawatts to its system. Based on the previous peak, this would give a 35% surplus of assured capacity, an amount arguing, in Mr. Hurlbut's view, the superfluity of the 110 megawatt Bethel installation.

Mr. Hurlbut contended that the cost of operating the plant, 41 mils per kilowatt-hour, was an extremely high cost which could be manipulated to advantage in rate hearings.

Mr. Steve Anderson, Salem Attorney, contended that both subjective and technical evaluations demonstrate that infrasound has a deleterious effect on humans and other forms of life. He lamented the absence of Mr. James Lee who was said to be familiar with many studies on the effects of infrasound. He argued that foresight as to the problems that have occurred would have prevented the plant from ever coming into existence. Knowledge to which PGE had access, he charged, was not revealed to the public. He charged experts knew beforehand that the mufflers installed at PGE would be of negligible benefit, other than as a tactic for delay.

Mr. Anderson urged that a study of the need for power should be undertaken if PGE's rationale for granting the permit was a simple argumentum ad mendicum with regard to power need.

Mr. Anderson pointed out that, while some of the neighbors to the plant had been his clients with regard to related matters, his remarks were made not in their behalf, but of his own volition. He told Commissioner Somers that he had dropped out of pending litigation, deferring to a law firm in Portland.

Dr. Crothers was told that Mr. Anderson had no position with regard to the question of Commission jurisdiction over infrasound other than his hope that some regulatory authority exists somewhere. Mr. Anderson conjectured that the derailed legislative measure dealing with infrasound would not have failed but for the political power of PGE and the verbatim adoption of PGE views in a report from the President of the Senate.

Mr. Anderson told Commissioner Somers there was a possibility the courts might curb abuse of infrasound in the absence of regulatory authority in the executive branch. Commissioner Somers offered analogically the judicial reaction to the lack of a fluoride standard upon the commencement of the Martin-Marietta aluminum plant.

It was Mr. Anderson's view that courts have historically been called upon to correct abuses not corrected by recalcitrant legislatures with vested interests.

In answer to Commissioner Somers' inquiry, Mr. Anderson said he had not, during his representation of affected neighbors, suggested that PGE purchase noise easements from owners of affected property because PGE had never conceded any measure of damage whatsoever. He urged the Commission to make a finding regarding damaging effects of infrasound.

It was MOVED by Commissioner Crothers that the amended Director's recommendation (that the Department proceed to publish the proposed permit to allow 30 days for public comment and possible subsequent changes in the permit as may be warranted by public comment) be adopted.

This motion failed for lack of a second.

Commissioner Phinney, referring to the phrase "all other company generating resources" in PGE's letter clarifying "emergency" with regard to the permit operation limitation, questioned whether this meant company owned generating resources or had a broader meaning, such as resources available through exchange agreements. Mr. Hastings stated that it was PGE's intent to employ all other available resources, including those that PGE could purchase.

Mr. Kramer, in response to a question by Commissioner Richards, explained that the permit application is before the Department which can issue the permit without returning to the Commission for further advice.

It was MOVED by Commissioner Somers, seconded by Commissioner Phinney, and decided by favoring votes of Commissioners Somers, Crothers, Phinney, and Richards that the record be left open 15 days for written public comment to be evaluated upon the Commission's resumption of the matter in its October 24 regular meeting.

Commissioner Richards cautioned that it was not the intent of the Commission to conduct another public hearing on the matter on October 24, the oral hearing having been closed with the completion of testimony already received.

There being no further business, the meeting was adjourned.

ENVIRONMENTAL QUALITY COMMISSION

1234 S.W. MORRISON STREET • PORTLAND, ORE. 97205 • Telephone (503) 229-5696

MEMORANDUM

TO: Environmental Quality Commission

From: Director

SUBJECT: EQC Public Meeting - September 29, 1975

Staff Report - PGE Bethel Turbine Facility
Air Quality and Noise Control

BACKGROUND- GENERAL

The Portland General Electric (PGE) Bethel Turbine Facility is located two miles east of Interstate-5 Highway north of State Street at 53rd Street. The land is zoned Industrial Park; however, the property immediately south of State Street and north of the plant is zoned Residential-Agricultural. There are approximately seven homes within 1200 feet of the turbines and 40 homes within 2400 feet. The nearest home is approximately 800 feet; however, this property was purchased by PGE.

The facility is comprised of four Pratt & Whitney FT4C-1 combustion gas turbines driving two air-cooled electric generators, two 100,000 barrel fuel storage tanks and associated equipment. The turbines operate on either natural gas or fuel oil at a baseload generating capacity of approximately 110 megawatts total power or 55 megawatts per twin-pac unit (two turbines driving one generator). With both twin-pacs operating at base power load, approximately 10,000 gallons of fuel oil is consumed per hour (or equivalent natural gas).

PGE began discussions with the Department in early 1971 regarding the noise aspects of the facility. Air quality aspects were under the jurisdiction of Mid-Willamette Valley Air Pollution Authority (MWVAPA).

Background - Noise

In April 1973 the Department tentatively specified maximum sound pressure levels at a reference distance of 400 feet from the turbines in two low frequency octave bands, as these turbines customarily produce their highest noise levels in the lower portion of the frequency spectrum.

In July, 1973, the facility began operations. It was subsequently determined that the turbine noise peaked in the 31.5 Hertz octave band, the lower of the two frequency bands defined in the initial guideline. At that time the turbine noise exceeded the 31.5 Hertz band guideline of 75 dB by 5 dB at the reference location during base load operation of both twin-pacs.

In early 1974 the Department proposed noise control standards that had been revised from a previous proposal. These proposed rules were substantially those that were adopted by the Commission in September, 1974. These rules allowed a maximum noise level at the reference location in the 31.5 Hertz octave band of 77.5 dB during the daytime hours (7 a.m. to 10 p.m.) and 74.5 during the nighttime hours (10 p.m. to 7 a.m.). These levels correspond to a level of 68 dB during the daytime and 65 dB during the nighttime at the nearest privately owned residence.

Citizen complaints regarding the PGE facility began shortly after the start-up of the turbines in July, 1973. Within that year, 408 written complaints were logged and 124 telephone complaints were taken from the area residents. Of these complaints 275 related to noise and vibration. Since then the turbine operations have been drastically curtailed; however, complaints are still logged during actual and alleged operation of the facility.

During a public hearing on June 17, 1974, held in Salem, regarding the noise and air quality of the facility, approximately 20 citizens testified. Some lived close to the Bethel plant and claimed no problem; however, most objected vigorously to the location and operation of the turbines near their homes. Their claimed problems ranged from simple annoyance to physiological damage to themselves and their animals and structural damage to their homes.

At the July, 1974, meeting the Commission approved requirements to be met by PGE at the Bethel turbine facility as follows:

1) Installation of the proposed noise suppression equipment be approved to be installed in accordance with the following time table:

   a) By no later than July 15, 1974, commence construction.

   b) By no later than October 1, 1974, complete all construction.

   c) By no later than October 15, 1974, demonstrate compliance with the Department's industrial day/night noise standard.

2) Until the noise suppression equipment is installed, operation of the facility shall be limited to daylight hours (7 a.m. - 8:30 p.m.) and to one generating twin-pac at a power level not to exceed 55 megawatts.

3) After noise suppression equipment is installed, PGE shall operate the Bethel facility so as to continuously comply with the Department's day and night noise standards.

4) The Department shall in cooperation with PGE, evaluate the effectiveness and adequacy of the installed noise suppression equipment and resultant noise level impact on the Bethel community, and report the results of its evaluation to the Commission no later than December 31, 1974.

5) No later than December 31, 1974, the plant emit, as a condition precedent to the plant operating, a noise level no greater than 45 dBA at any affected residence within 3,000 feet of the plant unless they have obtained an easement for the emission of noise from the affected property.

Due to unavoidable problems with their supplier, PGE was not able to meet the required time schedule; however, the Department extended this schedule such that facility would comply within a reasonable length of time. It should also be noted that additional noise suppression equipment was required and testing of one twin-pac was not conducted until mid-June, 1975. The second twin-pac unit has been fitted with the additional noise suppression equipment within the last few weeks.

Background - Air Quality

Air Quality aspects of the PGE Bethel facility were under the jurisdiction of the Mid-Willamette Valley Air Pollution Authority (MWVAPA) until August 1, 1975, when the MWVAPA was disbanded. Since August 1, 1975, the Department has been responsible for air quality aspects of the Bethel facility.

The MWVAPA began public hearings on a proposed air contaminant discharge permit (ACDP) for the Bethel facility on April 17, 1973. On June 19, 1973 the MWVAPA Board of Directors authorized issuance of the initial ACD permit.

Authorization to renew the ACD permit, with some modification, was given by the MWVAPA Board on July 16, 1974. This action came after a June 17, 1974 joint EQC/MWVAPA hearing on noise and air quality aspects of the Bethel facility.

The MWVAPA held a hearing to again consider renewing the Bethel ACD Permit on June 10, 1975. The MWVAPA Board authorized issuance of the renewal permit, which contained some further modifications, on July 15, 1975. PGE formally objected to two additions in the proposed renewal permit. Specifically, PGE objected to a 500 hour per year operation limitation and a directive to cease operation when the PGE Trojan Nuclear plant became operational. The renewal ACD Permit was not issued by MWVAPA before disbandment of the Authority and it is now the responsibility of the Department to complete action on the pending renewal permit.

DISCUSSION - Noise

Results of tests conducted June 12, 1975, at the Bethel facility on one twin-pac unit with noise suppression equipment added indicate that the turbine noise of both twin-pacs operating at baseload will exceed the night noise standard in the existing configuration. The data taken by the Department resulted in a level of 74.7 ± 1 dB in the 31.5 Hertz octave band at the reference measurement location with one twin-pac operating. Theoretically, the addition of a second, identical, twin-pac would increase the level 3 dB which would thus result in a level of 77.7 ± 1 dB. This level is compared to the standard of 77.5 dB for daytime operations and 74.5 dB at night. Therefore, the data indicate that this configuration of noise suppression equipment will not allow operations of both twin-pac units during the nighttime period of 10:00 p.m. to 7:00 a.m.; however, the daytime standard appears to be marginally met. Operation of a single twin-pac unit would meet the daytime standard and marginally meet the nighttime noise standards.

Condition number 5 limiting turbine noise in the "A"-weighting scale to 45 dBA is being met. Data indicates that the "A" scale noise levels with both twin-pacs operating at baseload will be less than 40 dBA at the nearest private residence; however, other ambient noise sources may increase the level to slightly above 40 dBA.

The Department has received many noise complaints on the Bethel facility during periods of time that the turbines were not operating. The turbines are located on a previously installed substation site. Various sources of noise are associated with the substation, primarily transformer hum and cooling fans noise. Additional equipment associated with the turbine installation are transformers, oil transfer pumps and a compressor and motor to provide air pressure to assist in start-up of the turbines. Noise level measurements have been taken of each of these pieces of equipment at a reference distance of 50 feet. Noise levels from pre-existing equipment associated with the substation would cause a noise level of approximately 70 dBA to the existing noise levels if all supporting equipment and substation equipment were operating simultaneously.

The Department has conducted noise surveys in the Bethel community on several occasions to monitor the noise levels and conduct subjective evaluations of the auxiliary equipment noise from the plant without the turbines operating. On all measurements the noise levels were below the range of the sound level meter. Thus, this non-turbine noise was never found greater than 40 dBA. At times an audible electrical hum was verified; however, this was not above the 40 dBA level. No other definitive noises originating from the PGE facility were noted during these tests. It should be noted that these surveys included times of the evening when the ambient noise levels were normally very quiet; therefore, the human ear was able to detect very low level noise.

The operating times of the auxiliary equipment are infrequent. The turbine transformer and fuel forwarding pump are only operating when the turbines are running. Equipment that may operate without the turbine is the oil transfer pump and the turbine compressor. The transfer pump is operated approximately 4 days per year to circulate the oil in the storage tanks. The turbine compressor operates every 3 to 4 days during the summer months and every 2 days during times of higher possibility of turbine operations. The compressor operates for a period of approximately one hour while it charges an air start-up bottle. Projected noise from the turbine compressor at the nearest residence is calculated at approximately 30 dBA.

Although the noises from these non-turbine items may be audible in the community during low ambient noise periods, the levels are significantly below levels that the Commission set as protective of the public health and welfare. Under existing Department standards a continuous noise of 50 dBA during the night period would be considered acceptable for these types of noise sources; however, the Department has never measured a level greater than 40 dBA during operation of the sub-station and turbine-supporting equipment.

During two separate periods of time (February 11 & 13, and June 12, 1975) staff from the Department's Salem-North Coast Region Office conducted subjective evaluations of the noise conditions within residences located north and northeast of the PGE Bethel turbine plant. Those evaluations were in conjunction with noise measurements being conducted of the turbine plant by staff from the Department's Noise Control Division. Plant operating conditions were similar with one twin-pac operating (54mw, 56mw, 52mw). Wind directions were as follows: February 11th - 30-35 miles per hour from the south; February 13th - 10 miles per hour from the south; June 6th - 0.5 miles per hour from north-northeast. The February evaluations followed installation of the initial noise suppression system. The June evaluation followed installation of the final noise suppression system with shotcreting treatment of the turbine housing.

The results of the February evaluations revealed that the plant noise was more detectable in those residences closer to the plant, and generally consisted of a low rumble and an occasionally detectable low whine. For the closer residences, the noise could generally be detected without strain. However, in some parts of these homes, as well as the more distant residences, perfect quiet was required of everyone to detect the plant noise. In two residences vibrations were noted (window pane rattling and surface vibrations in a glass of water), with some ear pressure seemingly being experienced in one of those residences.

Citizens living in the Bethel community have continued to complain about the PGE turbine noise since power generation use of the turbines has ceased. Complaints have been logged each time the turbines have been operated for testing and exercise purposes. It should also be noted that the Department has notified the Bethel community prior to any operation

The evaluation conducted on June 12 found the noise levels in the same residences to be "subjectively" reduced from those detected during the February evaluations. Perfect quiet was required of everyone in order to detect plant noise. The noise which could be detected was best described as similar to that generated by equipment operating in the distance. In each residence, the detected plant noise was obscured by other adjacent noise sources (e.g., an operating refrigerator, trees rustling in the wind, a lawn sprinkler, a decorative waterfall with a pump, etc.).

During the time period from March to June, 1975, residents in the area north and northeast of the PGE Bethel turbine plant complained of auxiliary noises emanating from the plant when it was not in operation. The noise, being experienced primarily at night, was described as being "similar to a blower, with a whine and odd type of vibration". It was further described as a "rhythmic, pulsating noise of low frequency."

In an effort to define the source of the complaints, staff from the Department's Salem-North Coast Region Office conducted routine surveillance checks in the affected residential area, with special nightly investigations being conducted during the week of May 20-24, 1975. These nightly inspections were conducted between 8:30 p.m. and 1:05 a.m., with prevailing wind conditions generally being from the south-southwest at 1-10 miles per hour. The only noise found to be emanating from the PGE plant was the characteristic "hum" of the electrical transformers. The only other noises detected were those of typical noctural origins (dogs and other animals, wind, aircraft, and vehicular traffic). All prevailing noise levels were measured by noise meters to be less than 40 dBA.

It should be noted that during one evening investigation, a faint noise similar to an electrical fan could be detected. Further investigation found the source to be the air conditioners/humidifiers serving a mushroom plant located along 50th Street. Noise levels were measured to be 48 dBA at the mushroom plant property line [well within the Department's noise standards as specified by Oregon Administrative Rules, Chapter 340, Section 35-035(1)(a)].

It should also be noted that several persons have suspected that the turbine plant was generating high levels of infrasonic noise. Infrasound is defined as sound existing below 20 Hertz and is therefore, inaudible to the majority of humans. The Department conducted an analysis of data collected from the facility on June 12, 1975, to examine the energy content below 20 Hertz. No significant amplitude peaks were noted between the range of 2 to 20 Hertz. Actual data from the plant and analytical calculations indicate that the noise should peak at a frequency of approximately 30 Hertz. Therefore, the Department has not been able to demonstrate that this facility generates infrasonic noise.

DISCUSSION - Air Quality

PGE has notified the Department in writing that they object to conditions 5.1 (500 hour per year operating limitation) and condition 5.2 (cessation of operation) in the proposed MWVAPA renewal ACD Permit, and that if the permit is issued by the Department, they will request an appeal hearing on the grounds that these new conditions are arbitrary and unsupported. The Department has reviewed the history and justifications given by MWVAPA for these two proposed requirements with the following findings.

Cessation of Operation:

MWVAPA's proposed condition 5.2 requiring cessation of operation of the Bethel facility after the Trojan Nuclear Plant is operational was not part of the original MWVAPA permit issued on 7/6/73, nor was it alluded to in any public hearings or staff reports preceding issuance of the initial permit.

At the permit renewal public hearing held on 6/17/74 the MWVAPA Director's report recommended the cessation of operation permit condition with the only basis being it would "lead to an improved situation in the Bethel community." Noise complaints were primarily addressed as the community Problem. The only air quality aspect addressed was reference to a number of odor complaints.

The cessation of operation condition was not incorporated into the renewal permit at this time, but adopted as a policy by the MWVAPA Board. It was authorized to be incorporated in the presently proposed renewal permit at the July 15, 1975 MWVAPA Board meeting.

Operation of the Bethel facility has been very minimal during the first two years of its existence. A review of air quality data from the Salem area during this time indicates the air quality standards pertaining to particulate, NO_2 and SO_2 are being met with some margin to spare and presently foreseeable future growth would not appear to threaten violation of these standards. In light of these facts and that the PGE Bethel facility has complied with all ACD Permit conditions, there appears to be no justification from an air quality basis for requiring total cessation of operation of the Bethel facility.

Operating Hour Limitation:

The proposed 500 hour per year maximum operation condition was not part of the initial MWVAPA permit issued on 7/6/73. When the initial permit was issued, the MWVAPA Board stated its intent to limit future operations at the Bethel to strictly peaking. At the 6/17/74 permit renewal public hearing, the MWVAPA's Directors' report stated that it had been concluded that defining peaking is impractical. A 500 hour limit was proposed as a new permit condition presumably based on

PGE's projected operation in their original permit application. This condition was incorporated in the renewal permit authorized by the MWVAPA Board on July 16, 1974. PGE did not appeal this condition at that time. The 500 hour per year limitation was proposed and authorized for continuance in the permit at the July 15, 1975 MWVAPA Board meeting despite a projection of 1000 hours per year operation in the current PGE ACD permit renewal application.

Based on the potential for emitting a large quantity of air contaminant emission, it appears that an operating hour limitation for the Bethel facility is needed to 1) insure ambient air standards are not exceeded, and 2) prevent Federal significant air quality deterioration increments from being totally used up, thereby limiting growth potential of the area.

Lacking appropriate modelling information at this time, it is considered advisable to delete the 500 hour limit in the presently proposed renewal permit until a justifiable limit can be defined.

PGE has indicated in a letter to the Department dated September 8, 1975 (attachment A), that they intend to operate Bethel only in emergencies. PGE has defined emergencies as conditions when all other available company generating resources are in full operation and failure to operate the Bethel turbine would result in denial of service to customers entitled to firm service.

Limiting operation to emergency conditions in the Bethel ACD Permit could insure minimal use of the facility and allow sufficient time to develop a justifiable operating hour limitation.

Oxides of Nitrogen Emission Control:

The PGE Bethel turbines consume a large quantity of fuel and even with the cleanest fuels are a very large source of oxide and nitrogen emissions. This air contaminant is a precursor for photochemical oxidants, a contributor to the gas-to-particulate formation which causes haze, and is itself a toxic gas.

MWVAPA required NO_X retrofit control to be provided by May, 1975, in the original ACD permit issued for Bethel. This condition was recommended for deletion at the 6/17/74 permit renewal hearing by MWVAPA in light of the new proposed cessation of operation permit condition. The NO_X retrofit requirement was deleted from the 1974 renewal permit apparently since the MWVAPA Board adopted the cessation condition as a policy.

NO_X control will soon become operational at the PGE Beaver turbine installation. Practicality of applying the Beaver-type NO_X control at Bethel is highly questionable in light of the differences of turbine projected operation and availability of an adequate water supply.

Major efforts have been under way nationally for several years to develop suitable NO_x control for the Bethel-type turbine. When this equipment is available, it should be required at Bethel to follow the original intent of MWVAPA, and meet the Department's requirements for highest best practicable treatment and control. Requiring a major expenditure for NO_x control, however, would only be deemed practicable by the Department if plant operations exceeded approximately 200 to 300 hours per year.

Proposed Modified Permit

In consideration of the above information a proposed renewal permit (attachment 1) has been drafted for consideration and issuance. The presently proposed permit has been modified from the proposed MWVAPA renewal permit (attachment B) as follows:

1. Written in the Department's ACD permit format.
2. Deletes the cessation of operation conditions (MWVAPA 5.2).
3. Adds limitations of operation to emergency conditions (condition 10).
4. Adds requirement for NO_x control (condition 11).
5. Adds requirement to comply with the Department's day and night noise limits (condition 12).
6. Extends the permit expiration date from August 1, 1976 to August 1, 1980.

CONCLUSIONS

1. The installed noise suppression equipment did not achieve the predicted amount of noise reduction in the 31.5 Hertz octave band; therefore, the Department's daytime noise standard is projected to be marginally met and the nighttime (10 p.m. to 7 a.m.) standard would be exceeded by 3dB during operation of both twin-pacs at base power load.

2. Noise generated by equipment associated with the substation and turbine auxiliary equipment do not exceed Department rules.

3. Subjective evaluation of community noise with one turbine twin-pac operating indicates that the noise has been reduced to near inaudibility; however, the addition of the second twin-pac operation will slightly increase perceived noise levels.

4. Subjective evaluation did not substantiate complaints that the substation and turbine supporting equipment constitutes a community problem.

5. Opposition to the PGE turbine facility continues from many citizens in the Bethel community due to the apparent high sensitivity of these people to relatively low-amplitude nearly inaudible low-frequency noise.

6. The Department will evaluate the ability of both twin-pacs to comply with the day/night noise standards and will, if necessary, impose appropriate operating limitations to insure compliance.

7. The Department must act on the proposed renewal air contaminant discharge permit for the Bethel facility since the MWVAPA did not issue this permit prior to disbanding of the Authority on August 1, 1975.

8. The proposed MWVAPA ACD permit condition requiring cessation of operation of the Bethel facility when the PGE Trojan nuclear plant becomes operational cannot be justified since PGE has demonstrated compliance with ACD permit conditions and Department ambient air quality standards.

9. The proposed MWVAPA ACD permit conditions requiring a 500 hour per year operating limitation cannot be justified at this time however, an operating hour limitation does appear necessary to insure compliance with air quality standards and significant deterioration limits.

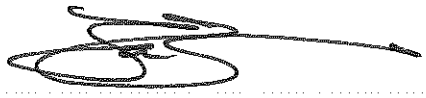
10. Limiting Bethel operations to emergency conditions, which are demonstrated to be emergencies to the satisfaction of the Department, will insure minimal operation of the facility and allow time for development of a justifiable operating hour limitation.

11. Oxides of nitrogen emission controls, when deemed practicable by the Department, should be installed on the Bethel facility if operation exceeds 200 hours per year.

12. The Department should review the Bethel operation on a yearly basis to determine the adequacy of the Department's noise standards relative to the Bethel noise problem, the need for NO_x control, justification of an operating hour limitation, and compliance with ACD permit limitation provisions so that necessary and prompt adjustments can be made in the ACD permit as may be warranted.

DIRECTOR'S RECOMMENDATION

It is the Director's recommendation that the Department proceed to issue the attached air contaminant discharge renewal permit (attachment 1) for the PGE Bethel turbine facility, which would include allowing the required 30 day time period for public comment and possible subsequent changes in the permit as may be warranted by public comment.



LOREN KRAMER
Director

9/22/75
Attachments: 1, A and B

PROPOSED 9/29/75

AIR CONTAMINANT DISCHARGE PERMIT

Department of Environmental Quality
1234 S.W. Morrison Street
Portland, Oregon 97205
Telephone: (503) 229-5696
Issued in accordance with the provisions of
ORS 468.310

ISSUED TO:
PORTLAND GENERAL ELECTRIC COMPANY
Power Resources
621 S. W. Alder
Portland, OR 97205

PLANT SITE:
Bethel Plant
5765 State Street
Salem, OR

ISSUED BY DEPARTMENT OF
ENVIRONMENTAL QUALITY

LOREN KRAMER
Director

Date

REFERENCE INFORMATION

Application No. 034

Date Received July 2, 1975

Other Air Contaminant Sources at this Site:

Source	SIC	Permit No.
(1)		
(2)		

SOURCE(S) PERMITTED TO DISCHARGE AIR CONTAMINANTS:

Name of Air Contaminant Source	Standard Industry Code as Listed
ELECTRIC POWER GENERATION	4911

Permitted Activities

Until such time as this permit expires or is modified or revoked, Portland General Electric Company is herewith permitted in conformance with the requirements, limitations and conditions of this permit to discharge treated exhaust gases containing air contaminants from its four (4) Pratt and Whitney (FT4C-1 combustion turbines) fuel burning devices located at Bethel substation, 5765 State Street, Salem, Oregon, including emissions from those processes and activities directly related or associated thereto.

Compliance with the specific requirements, limitations and conditions contained herein shall not relieve the permittee from complying with all rules and standards of the Department and the laws administered by the Department.

Performance Standards and Emission Limits

1. The permittee shall at all times maintain and operate all air contaminant generating processes and all contaminant control equipment at full efficiency and effectiveness such that the emission of air contaminants are kept at the lowest practicable levels.

2. Emission of air contaminants shall not exceed any of the following when operating at base load except where otherwise specified:

   A. Particulate matter restrictions:

      (1) Fifteen (15) pounds per hour of particulate for any single turbine when distillate fuel is burned.

      (2) Seven (7) pounds per hour of particulate for any single turbine when natural gas is burned.

   B. Nitrogen oxides restrictions:

      (1) 320 pounds per hour of nitrogen oxides (NO_x) for any single turbine when distillate fuel is burned.

      (2) 110 pounds per hour of nitrogen oxides (NO_x) for any single turbine when natural gas is burned.

   C. Carbon monoxide restrictions:

      (1) 17.5 pounds per hour of carbon monoxide (CO) for any single turbine burning distillate fuel.

      (2) 210 pounds per hour of carbon monoxide (CO) for any single turbine burning natural gas.

      (3) 45 pounds per hour of carbon monoxide (CO) for any single turbine at half load burning distillate fuel.

      (4) 180 pounds per hour of carbon monoxide (CO) for any single turbine at half load burning natural gas.

   D. Visible smoke emissions from each stack shall be minimized such that Von Brand Reflectance Number 95 or better is achieved at all times and shall not exceed 10 percent opacity except for the presence of uncombined water.

Special Conditions

3. The permittee shall store the petroleum distillate having a vapor pressure of 1.5 psia or greater under actual storage conditions in pressure tanks or resevoirs or shall store in containers equipped with a floating roof or vapor recovery system or other vapor emission control device. Further, the tank loading facilities shall be equipped with submersible filling devices or other vapor emission control systems. Specifically, volatile hydrocarbon emissions from the 200,000 barrel fuel storage tanks shall not exceed 75 pounds per day under normal storage conditions.

4. Turbines shall always be started on natural gas.

5. The permittee shall burn the lowest sulfur and ash content distillate oil available, but in no case shall a lower grade than ASTM No. 2 distillate be burned.

6. The sulfur content of the fuel burned shall not exceed 0.3 percent by weight at any time.

7. Fuel delivery by truck shall be kept to a minimum and only between the hours of 9 a.m. and 2 p.m. and 5 p.m. and 9 p.m., providing for specific instances with good cause shown, the Department may authorize other hours.

8. Operation of any combustion turbine at other than power output of 15 to 30 megawatts (30 degrees F ambient basis) shall not exceed more than five percent of the operating time.

9. Prior to modification or renewal of this permit, a public hearing shall be held to assess the operation of the plant.

10. The permittee shall limit operation of the combustion turbines to emergency conditions when all other available generating resources are in full operation and failure to operate the facility will result in denial of service to customers entitled to firm service. The permittee shall advise the Department as early as possible of each such emergency and shall demonstrate the nature and extent thereof to the satisfaction of the Department.

11. The permittee shall provide NO_X control to meet limits prescribed by the Department when the Department determines NO_X control is practicable. NO_X control will not be required if the operation of the facility is less than 200 hours per year. The permittee shall submit quarterly progress reports to the Department on the developments in practicable NO_X control for turbines.

12. The permittee shall comply with applicable Department daytime and nightime noise rules.

Compliance Schedule

None required.

Monitoring and Reporting

13. The permittee shall regularly monitor and inspect the operation of the plant to insure that it operated in continual compliance with the conditions of this permit. In the event that any monitoring equipment becomes inoperative for any reason, the permittee shall immediately notify the Department of said occurrence. Specifically the permittee shall:

A. Calibrate, maintain and operate in a manner approved by the Department, an emission monitoring instrument for continually monitoring and recording emissions of oxides of nitrogen.

B. Calibrate, maintain and operate in a manner approved by the Department an emission monitoring instrument for continually monitoring and recording emissions of carbon monoxide.

C. Obtain and record representative sulfur analysis and ash analysis by methods approved by the Department of fuel oils as burned for every delivery lot or whenever the source of supply is changed. In addition, the permittee shall maintain facilities for obtaining representative samples from the fuel handling system at the plant site as approved by the Department and provide with the Department analysis of periodic samples upon request.

D. Maintain and submit to the Department a log of operating incorporating, but not limited to, the following parameters:

(1) Time of operation.

(2) Quantities and types of fuel used relative to time of operation.

(3) Electrical output relative to time of operation.

(4) Stack emissions relative to time of operation.

(a) oxides of nitrogen (NO_X) in ppm and pounds per hour

(b) carbon monoxide (CO) in ppm and pounds per hour

(c) percent oxygen (O_2)

(5) Ambient conditions relative to time of operation.

(a) oxides of nitrogen (NO_X) in ppm and micrograms per cubic meter

(b) sulfur dioxide (SO_2) in ppm and micrograms per cubic meter

(c) particulate concentration in ppm and micrograms per cubic meter

(6) Wind direction and velocity relative to time of operation.

(7) Ambient temperature, pressure and humidity.

(8) This log is to be submitted on or before the 25th of the month following the month logged and will indicate the instantaneous, hour by hour conditions existent at the plant site and ambient monitoring station. Any malfunctions occurring and the duration shall be noted in the log. Stack and ambient data will be submitted whether or not the turbines are operating.

14. Portland General Electric Company shall conduct a particulate, sulfur dioxide and oxides of nitrogen monitoring program in the vicinity of the Bethel site to determine ground level concentrations. The monitoring program shall be conducted in a manner approved by the Department. Appropriate meteorological paramters shall be determined. This data is to be incorporated in the log specified in condition 13-D.

15. In the event that the permittee is temporarily unable to comply with any of the provisions of this permit, the permittee shall notify the Department by telephone as soon as is reasonably possible, but not more than one hour, of the upset and of the steps taken to correct the problem. Operation shall not continue without approval nor shall upset operation continue during Air Pollution Alerts, Warnings, or Emergencies or at any time when the emissions present imminent and substantial danger to health.

Emergency Emission Reduction Plan

16. The permittee will implement an emission reduction plan during air pollution episodes when so notified by this Department.

17. As a minimum, the permittee will implement the following emission reduction plan during air pollution episodes when so notified by the Department.

A. ALERT: Prepare to shut down all turbines.

B. WARNING: Shut down all combustion turbines.

C. EMERGENCY: Continue WARNING measures.

18. In addition, the permittee shall cease operation of the combustion turbines upon notification from the Department that air quality at any downwind continuous monitoring site in Marion County has reached the following:

A. 95 percent of the adopted particulate standard taken as 142 micrograms per cubic meter of air, 24 hour average. Operation shall remain curtailed until particulate air quality is below 135 micrograms per cubic meter of air, 24 hour average.

B. 95 percent of the adopted sulfur dioxide standard taken as 247 micrograms per cubic meter of air, 24 hour average and 123 micrograms per meter of air, 3 hour average. Operation shall remain curtailed until sulfur dioxide air quality is below 234 micrograms per cubic meter of air, 24 hour average, and 1170 micrograms per cubic meter of air, 3 hour average.

C. 95 percent of the adopted photochemical oxidant standard taken as 152 micrograms per cubic meter of air, 1 hour average. Operation shall remain curtailed until photochemical oxidant air quality is expected to be less than 120 micrograms per cubic meter of air, 1 hour average during the next 24 hours.

General Conditions

G1. A copy of this permit or at least a copy of the title page and complete extraction of the operating and monitoring requirements and discharge limitations shall be posted at the facility and the contents thereof made known to operating personnel.

G2. This issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

G3. The permittee is prohibited from conducting any open burning at the plant site or facility.

G4. The permittee is prohibited from causing or allowing discharges of air contaminants from source(s) not covered by this permit so as to cause the plant site emissions to exceed the standards fixed by this permit or rules of the Department of Environmental Quality.

G5. The permittee shall at all times conduct dust suppression measures to meet the requirements set forth in "Fugitive Emissions" and "Nuisance Conditions" in OAR, Chapter 340, Section 21-050.

G6. (NOTICE CONDITION) The permittee shall dispose of all solid wastes or residues in manners and at locations approved by the Department of Environmental Quality.

G7. The permittee shall allow Department of Environmental Quality representatives access to the plant site and record storage areas at all reasonable times for the purposes of making inspections, surveys, collecting samples, obtaining data, reviewing and copying air contaminant emission discharge records and otherwise conducting all necessary functions rela ted to this permit.

G8. The permittee, without prior notice to and written approval from the Department of Environmental Quality, is prohibited from altering, modifying or expanding the subject production facilities so as to affect emissions to the atmosphere.

G9. The permittee shall be required to make application for a new permit if a substantial modification, alteration, addition or enlargement is proposed which would have a significant impact on air contaminant emission increases or reductions at the plant site.

G10. This permit is subject to revocation for cause, as provided by law, including:

a. Misrepresentation of any material fact or lack of full disclosure in the application including any exhibits thereto, or in any other additional information requested or supplied in conjunction therewith;

b. Violation of any of the requirements, limitations or conditions contained herein; or

c. Any material change in quantity or character of air contaminants emitted to the atmosphere.

G11. The permittee shall notify the Department by telephone or in person within one (1) hour of any scheduled maintenance, malfunction of pollution control equipment, upset or any other conditions that cause or may tend to cause a significant increase in emissions or violation of any conditions of this permit. Such notice shall include:

a. The nature and quantity of increased emissions that have occurred or are likely to occur,

b. The expected length of time that any pollution control equipment will be out of service or reduced in effectiveness,

c. The corrective action that is proposed to be taken, and

d. The precautions that are proposed to be taken to prevent a future recurrence of a similar condition.

G12. Application for a modification or renewal of this permit must be submitted not less than 60 days prior to permit expiration date. A filing fee and Application Investigation and Permit Issuing or Denying Fee must be submitted with the application.

G13. The permittee shall submit the Annual Compliance Determination Fee to the Department of Environmental Quality according to the following schedule:

Amount Due	Date Due
$225.00	July 1, 1976
$225.00	July 1, 1977
$225.00	July 1, 1978
$225.00	July 1, 1979
(See G12)	June 1, 1980

SEP 15 1975

Attachment "A"

State of Oregon
DEPARTMENT OF ENVIRONMENTAL QUALITY
RECEIVED
SEP 11 1975
OFFICE OF THE DIRECTOR

PORTLAND GENERAL ELECTRIC COMPANY
621 S.W. ALDER ST.
PORTLAND, OREGON 97205

ESTES SNEDECOR, JR.
VICE PRESIDENT

September 8, 1975

Mr. Loren Kramer, Director
Department of Environmental Quality
1234 S. W. Morrison Street
Portland, Oregon 97204

Dear Mr. Kramer:

Pursuant to discussions between our staffs we are hereby clarifying our intention to operate the Bethel Gas Turbine Plant only in emergencies.

In this context "emergency" is only the circumstance in which all other available Company generating resources are in full operation and failure to operate the Bethel and Harborton combustion turbines would result in denial of service to customers entitled to firm service.

Under this proposal the plants will operate principally to serve unexpected load demands such as might be occasioned by outage of the Trojan Nuclear Plant, critical water conditions or an unusually severe cold spell causing demands to exceed existing normal power resources. Such occasions would normally be in fall and winter because at other times of the year less-costly alternative power sources are usually available. Because of the cost of gas turbine power, it is Company policy to plan ahead for installation of more economical resources to meet load growth. Examples are the Carty coal-fired plant, Beaver combined-cycle addition, Colstrip fossil and Pebble Springs nuclear, all in stages of development.

Sincerely,

Vice President

Attachment "B"

DRAFT

Permit Number 242318

Expiration Date 8-1-76

MID-WILLAMETTE VALLEY AIR POLLUTION AUTHORITY
2585 State St., Salem, Oregon 97301
Phone (503) 581-1715

Air Contaminant Discharge Permit

(Issued in accordance with provisions of MWVAPA Rules, Title 22)

Issued to: Portland General Electric Co.
621 S.W. Alder Street
Portland, Oregon

Application No. 34

Issuance Date August, 1973

Last Renewal August, 1975

Plant site: Bethel Substation, 5500 Blk. of State St., North Side of Street, Salem, Oregon

Source(s) covered by this permit:

Source	SIC No.
Electric Power Generation	4911

Approved:

M.D. Roach, Director

MID-WILLAMETTE VALLEY AIR POLLUTION AUTHORITY
2585 State Street, Salem, Oregon 97301
Phone (503) 581-1715

Permit Number 242318

Air Contaminant Discharge Permit

Source(s): Electric Power Generation SIC No. 4911

1. Permitted Activities

1.1 Until such time as this permit expires or is modified or revoked, Portland General Electric Company is herewith permitted to discharge emissions in a controlled manner from four Pratt & Whitney FT4C-1 combustion gas turbines driving two air-cooled electric generators, two 100,000 barrel fuel storage tanks with vapor controls, and associated fuel handling equipment located at the Bethel substation, 5765 State Street, Salem, Oregon. These air contaminant discharges, based upon a maximum power output of 127 megawatts peak load, are permitted in accordance with the requirements, limitations, and conditions of this permit.

1.2 Specific listing of requirements, limitations, and conditions contained herein does not relieve the permittee from compliance with all rules of the Mid-Willamette Valley Air Pollution Authority, nor waives the right of the Authority to require compliance therewith.

2. Performance Standards and Emission Limits

2.1 Notwithstanding the general and specific emission standard and regulations of the Authority, the highest and best practicable treatment and control of air contaminant emissions shall in every case be provided by the permittee so as to maintain overall air quality at the highest possible levels, and to maintain contaminant concentrations, visibility reduction, odors, soiling and other deleterious factors at the lowest possible levels. In the case of new sources of air contaminants, particularly those located in areas with existing high air quality, the degree of treatment and control provided shall be such that degradation of existing air quality is minimized to the greatest extent possible (OAR 20-001). Specifically, total emissions from the four combustion turbines shall not exceed the following limits at any time:

2.1.1 Particulate matter restrictions:

2.1.1.1 Fifteen (15) pounds per hour of particulate for any single turbine when distillate fuel is burned.

2.1.1.2 Seven (7) pounds per hour of particulate for any single turbine when natural gas is burned.

2.1.2 Nitrogen oxides restrictions:

2.1.2.1 320 pounds per hour of nitrogen oxides (NOx) for any single turbine when distillate fuel is burned.

2.1.2.2 110 pounds per hour of nitrogen oxides (NOx) for any single turbine when natural gas is burned.

2.1.3 Carbon monoxide restrictions:

2.1.3.1 17.5 pounds per hour of carbon monoxide (CO) for any single turbine burning distillate fuel.

2.1.3.2 210 pounds per hour of carbon monoxide (CO) for any single turbine burning natural gas.

2.1.3.3 45 pounds per hour of carbon monoxide (CO) for any single turbine at half load burning distillate fuel.

2.1.3.4 180 pounds per hour of carbon monoxide (CO) for any single turbine at half load burning natural gas.

The above limitations shall be applicable to base load operation except where otherwise specified.

2.1.4 In addition, visible smoke emissions from each stack shall be minimized such that a Von Brand Reflectance Number of 95 or better is achieved at all times and shall not exceed 10 percent opacity except for the presence of uncombined water.

2.2 The permittee shall store the petroleum distillate having a vapor pressure of 1.5 psia or greater under actual storage conditions in pressure tanks or reservoirs or shall store in containers equipped with a floating roof or vapor recovery system or other vapor emission control

device. Further, the tank loading facilities shall be equipped with submersible filling devices or other vapor emission control systems (MWR 33-165). Specifically, volatile hydrocarbon emissions from the 200,000 barrel fuel storage tanks shall not exceed 75 pounds per day under normal storage conditions.

2.3 The permittee shall not allow unnecessary amounts of particulate matter to become airborne from buildings, roads, driveways, open areas, or materials handling processes (MWR 32-040). Reasonable precautions to prevent particulate matter from becoming airborne are specified in Section 5 of this permit.

2.4 The permittee is prohibited from causing or allowing discharges of air contaminants from sources not covered by this permit so as to cause the plant site to exceed the standards fixed by this permit or rules of the Authority.

3. Compliance Schedule

Not applicable.

4. Monitoring and Reporting

4.1 The permittee shall regularly monitor and inspect the operation of the plant to insure that it operates in continual compliance with the conditions of this permit and the Rules and Regulations of the Authority. In the event that any monitoring equipment becomes inoperative for any reason, the permittee shall immediately notify the Authority of said occurrence. Specifically the permittee shall:

4.1.1 Calibrate, maintain and operate in a manner approved by the Authority, an emission monitoring instrument for continually monitoring and recording emissions of oxides of nitrogen.

4.1.2 Calibrate, maintain and operate in a manner approved by the Authority an emission monitoring instrument for continually monitoring and recording emissions of carbon monoxide.

Air Contaminant Discharge Permit

Source(s): Electric Power Generation SIC No. 4911

4.1.3 Obtain and record representative sulfur analysis and ash analysis by methods approved by the Authority of fuel oils as burned for every delivery lot or whenever the source of supply is changed. In addition, the permittee shall maintain facilities for obtaining representative samples from the fuel handling system at the plant site as approved by the Authority and provide the Authority analysis of periodic samples upon request.

4.1.4 Maintain and submit to the Authority a log of operation incorporating, but not limited to, the following parameters:

4.1.4.1 Time of operation.

4.1.4.2 Quantities and types of fuel used relative to time of operation.

4.1.4.3 Electrical output relative to time of operation.

4.1.4.4 Stack emissions relative to time of operation.

(a) oxides of nitrogen (NOx) in ppm and pounds per hour
(b) carbon monoxide (CO) in ppm and pounds per hour
(c) percent oxygen (O_2)

4.1.4.5 Ambient conditions relative to time of operation.

(a) oxides of nitrogen (NOx) in ppm and micrograms per cubic meter
(b) sulfur dioxide (SO_2) in ppm and micrograms per cubic meter
(c) particulate concentration in ppm and micrograms per cubic meter

4.1.4.6 Wind direction and velocity relative to time of operation.

4.1.4.7 Ambient temperature, pressure and humidity.

4.1.5 This log is to be submitted on or before the 25th of the month following the month logged and will indicate the instantaneous, hour by hour conditions existent at the plant site and ambient monitoring station. Any malfunctions occurring and the duration shall be noted in the log. Stack and ambient data will be submitted whether or not the turbines are operating.

4.2 Portland General Electric Company shall conduct a particulate, sulfur dioxide and oxides of nitrogen monitoring program in the vicinity of the Bethel site to determine ground level concentrations. The monitoring program shall be conducted in a manner approved by the Authority. Appropriate meteorological parameters shall be determined. This data is to be incorporated in the log specified in subsection 4.1.4.

4.3 In the event that the permittee is temporarily unable to comply with any of the provisions of this permit, the permittee shall notify the Authority by telephone as soon as is reasonably possible, but not more than one hour, of the upset and of the steps taken to correct the problem. Operation shall not continue without approval nor shall upset operation continue during Air Pollution Alerts, Warnings, or Emergencies or at any time when the emissions present imminent and substantial danger to health (MWR 21-045).

5. Conditions of Operation

5.1 The permittee shall not operate the Bethel plant for more than 500 facility hours. From startup to shutdown no matter how many engines are operated nor what the load factor, the plant is not to operate more than 500 hours. The 500 hour limit may be modified by the Board of Directors of the Authority at a special or regular meeting, providing a demonstrated need is substantiated by the permittee that extended curtailment would adversely affect the public health and welfare of the five-county area of jurisdiction and that previous 500 hour use occurred only when power was not available as determined by the Northwest Power Pool.

5.2 In accordance with the policy established by the Board of Directors of the Authority the permittee shall not operate

the Bethel facility after the Trojan plant first produces power for commercial consumption.

5.3 The permittee shall at all times maintain and operate the air contaminant generating processes and all contaminant control equipment at full efficiency and effectiveness, such that the emission of air contaminants is kept at the lowest practicable level.

5.4 Turbines shall always be started on natural gas.

5.5 The permittee shall burn the lowest sulfur and ash content distillate oil available, but in no case shall a lower grade than ASTM No. 2 distillate be burned.

5.6 The sulfur content of the fuel burned shall not exceed 0.3 percent by weight at any time.

5.7 The vehicular traffic areas of the plant site, or access road, are to be oiled, or paved as often as required to prevent dust emissions.

5.8 Fuel delivery by truck shall be kept to a minimum and only between the hours of 9 a.m. and 2 p.m. and 5 p.m. and 9 p.m., providing for specific instances with good cause shown, the Authority may authorize other hours.

5.9 Operation of any combustion turbine at other than power output of 15 to 30 megawatts (30 degrees F ambient basis) shall not exceed more than five percent of the operating time.

6. Emergency Emission Reduction Plan

6.1 The permittee will implement an emission reduction plan during air pollution episodes when so notified by this Authority.

6.2 As a minimum, the permittee will implement the following emission reduction plan during air pollution episodes when so notified by the Authority:

6.2.1 ALERT: Prepare to shut down all turbines.

6.2.2 WARNING: Shut down all combustion turbines.

6.2.3 EMERGENCY: Continue WARNING measures.

6.3 In addition, the permittee shall cease operation of the combustion turbines upon notification from the Authority that air quality at any downwind continuous monitoring site in Marion County has reached the following:

6.3.1 95 percent of the adopted particulate standard taken as 142 micrograms per cubic meter of air, 24 hour average. Operation shall remain curtailed until particulate air quality is below 135 micrograms per cubic meter of air, 24 hour average.

6.3.2 95 percent of the adopted sulfur dioxide standard taken as 247 micrograms per cubic meter of air, 24 hour average and 1235 micrograms per cubic meter of air, 3 hour average. Operation shall remain curtailed until sulfur dioxide air quality is below 234 micrograms per cubic meter of air, 24 hour average, and 1170 micrograms per cubic meter of air, 3 hour average.

6.3.3 95 percent of the adopted photochemical oxidant standard taken as 152 micrograms per cubic meter of air, 1 hour average. Operation shall remain curtailed until photochemical oxidant air quality is expected to be less than 120 micrograms per cubic meter of air, 1 hour average, during the next 24 hours.

7. General Requirements for All Sources

7.1 The permittee is prohibited from conducting any open burning at the plantsite (MWR 33-005).

7.2 Disposal of waste residue in a landfill or other solid waste disposal area shall be done in a manner and at locations approved by the Department of Environmental Quality.

7.3 The permittee shall obtain approval in writing from the Authority for any change in the plant facility, production capabilities, or for any new emission sources prior to installation or modification of the equipment classified as an emission source or emission control equipment (MWR 21-010).

7.4 This permit is subject to suspension or revocation prior to its expiration date for any of the reasons listed

Air Contaminant Discharge Permit

Source(s): Electric Power Generation SIC No. 4911

below (MWR 22-005):

7.4.1 Within sixty days after the sale or exchange of the permitted air contaminant source(s).

7.4.2 Upon change in the nature of activities, operations, air contaminant discharges from those of record on the last permit application.

7.4.3 Upon issuance of a new or modified permit to the same air contaminant source.

7.4.4 Upon written request of the permittee.

7.4.5 Misrepresentation of any material, fact, or lack of full disclosure in the application or other additional information requested therewith.

7.4.6 Violation of any of the requirements, limitations, or conditions contained herein.

7.5 Non-compliance with the terms of this permit may subject the permittee to imposition of a civil penalty or misdemeanor.

7.6 If the Authority finds that there is a serious danger to the public health or safety, or irreparable damage to a resource will occur, it may suspend or revoke a permit effective immediately (MWR 22-025).

7.7 The permittee shall allow Authority representatives access to the plantsite and record storage areas at all reasonable times for the purpose of making inspection, surveys, collecting samples, obtaining data, and otherwise conducting all necessary functions related to this permit.

7.8 Prior to modification or renewal of this permit, a public hearing shall be held by the Board of Directors to assess the operation of the plant.

PGE BETHEL TURBINE NOISE DATA

Measured 400 Feet N.E.*

Date	Power, MW	Octave Band Levels, dB		Comments
		31.5 Hz	63 Hz	
9/12/73	102	80	70	Original configuration.
10/19/74	52	76	66	Muffler failed. Data extrapolated for 2nd twin-pac.
2/13/75	56	79.2 ± 1	71.4 ± 1	Data extrapolated for 2nd twin-pac with muffler.
6/13/75	52	77.7 ± 1	63.5 ± 1	Data extrapolated for 2nd twin-pac with muffler and turbine housing shotcreting.

* Subtract 9.5 dB to determine levels at noise sensitive property, 1200 feet from the turbines.

Attachment C

TYPICAL "A" WEIGHTED NOISE LEVELS

NEAR PGE-BETHEL FACILITY

Date	Location	Power Level (MW)	Noise Level (dBA)
9/5/73	Frady yard	0	41
9/5/73	Frady yard	55	42
9/5/73	Backe yard	0	42
9/5/73	Backe yard	55	44
9/12/73	Frady yard	100	36
9/12/73	Frady yard	100	37
9/12/73	Backe yard	100	38
2/6/74	Backe rental	100	43
2/6/74	End of 53rd St.	100	37
2/6/74	Backe fence	100	42

NON-TURBINE NOISE LEVELS

PRE-EXISTING SUBSTATION EQUIPMENT

Equipment	Noise Level (dBA) @ 50 feet	Location
Transformer	60-61	East
Transformer	70	West
Circuit Breaker	50-52	East
Transformer	66-68	South

AUXILIARY EQUIPMENT FOR TURBINES

Equipment	Noise Level (dBA) @ 50 feet	Location
Turbine Transformer	63	West
Oil Transfer Pumps and Fuel Forwarding Pump	64-66	East
Turbine Compressors	56	North

Reference: Department Memo dated 6/6/74

Note: These levels would be reduced by at least 27 dBA at a distance of 1200 feet from the equipment.

Attachment D

Turbine Configuration: Initial Mufflers

TABLE I

PGE BETHEL PLANT
SUBJECTIVE NOISE EVALUATION

Staff:
Russell Fetrow
Stephen Downs

DATE: 2/11/75 GENERATOR LEVEL: 54 MW WIND: 30-35mph toward the north

RESIDENCE	TIME	EVALUATION	COMMENTS
GORDON BAKKE			
a. kitchen	11:10 am	very low rumble	can see vibration
b. living room	"	very very low rumble	waves on glass of water strain to hear it
c. front door (inside)	"	low rumble	more pronounced at window
d. bathroom	"	low rumble	window facing plant
e. bedroom	11:40 am	low rumble	window facing plant
LOCKHART	--did not	bother due to illness in family---	
JENNY LARSON		(Indicated that she was not bothered with it today)	
a. living room	11:50 am	Could not hear plant. Could only hear fireplace and freezer.	This part of house protected by barn.
b. upstairs bedroom	11:55 am	Can't hear turbine over wind noise	
KUPER		Mr. Kuper indicated that the noise was not as bad as the day before.	
a. living room	12 noon	very very low rumble	
b. bathroom	"	low rumble mixed with wind noise	window cracked open slightly at bottom
c. outside between house and barn	"	low rumble and whine	can be heard very clearly
d. horse barn tack room	12:15 pm	could not hear it	

Attachment E

TABLE I Continued.....

Staff:
Russell Fetrow
Stephen Downs

PGE BETHEL PLANT
SUBJECTIVE NOISE EVALUATION

DATE: 2/11/75 GENERATOR LEVEL: 54 MW WIND: 30-35 mph toward the north

RESIDENCE	TIME	EVALUATION	COMMENTS
CHRISTENSON ---	not at home	-------	
RINGLER		Felt that it was worse the day before. Vibrations have not changed.	
a. living room	12:15 pm	very very low rumble	had to strain to hear rumble
b. study	"	very low rumble	study room window vibrating
c. family room	"	very low rumble	family room patio door faces turbines
outside family room d. patio door	12:30 pm	low rumble and low whine	
FRADY ----would	not allow DEQ representatives in house---		

Attachment E

TABLE I Continued.....

Staff:
Russell Fetrow
Stephen Downs

PGE BETHEL PLANT
SUBJECTIVE NOISE EVALUATION

DATE: 2/13/75 GENERATOR LEVEL: 56 MW WIND: 10 mph toward the north

RESIDENCE	TIME	EVALUATION	COMMENTS
GORDON BAKKE			
a. kitchen	11:20 am	very low rumble	can see vibration on glass. had to have dog removed to hear plant.
b. living room	"	very very low rumble	strain to hear it
c. front door (inside)	"	low rumble	same as 2/11/75 survey
d. bathroom	"	very low rumble	lower than day before
e. bedroom	11:30 am	low rumble	low rumble more pronounced in hallway between main house and bedroom abt. 3 ft. wide
LOCKHART ------did not bother due	to illness in family------		
JENNY LARSON ---not at home-----			
KUPER			radios had to be shut off to hear any noise
a. living room	11:35 am	could not hear it	
b. bathroom	"	very very low rumble	had to strain to hear noise
c. outside between house and barn	"	very low rumble and slight whine	not as noticeable as 2/11/75 survey
d. horse barn tack room	11:45 am	could not hear it	
CHRISTENSON ---not at home----			

Attachment E

TABLE I

PGE BETHEL PLANT
SUBJECTIVE NOISE EVALUATION

Staff;
Russell Fetrow
Stephen Downs

DATE: 2/13/75 GENERATOR LEVEL: 56 MW WIND: 10 mph toward the north

RESIDENCE	TIME	EVALUATION	COMMENTS
RINGLER			
a. living room	11:50 am	very low rumble	pulsating feeling observed
b. study	"	very very low rumble	study room window vibrating
c. family room	"	very very low rumble	had to strain to hear it
d. outside family room patio door	12 noon	low rumble and low whine	same as 2/11/75 survey
FRADY ------would not allow DEQ representatives in house-----			

Attachment E

Turbine Configuration: Final Mufflers with Turbine Housing Shotcreting

TABLE I

Staff:
Stephen Downs
Larry Jack

PGE BETHEL PLANT
SUBJECTIVE NOISE EVALUATION

DATE: 6/12/75 GENERATOR LEVEL: 52 MW WIND & WEATHER: Sunny & Warm (80-85 F) Wind from N-NE 0-5 MPH

LOCATION	TIME	EVALUATION AND COMMENTS
S. End of Hampden Lane	1:35 p.m.	Low Rumble detectable, with sound of escaping exhaust (wind type noise). No whine. Meter < 40 dba. PGE representative Scott Turner at same location. His meter recorded 37-38 dba. Mr. Turner indicated that if this test produced acceptable results, shot creting would probably not be performed on West-Twin pack, since operation of both twin-packs results in an increase of only 3 dba over level of single twin-pack.
Backe Residence	1:50 p.m.	
a. Front Porch (outside)		Very low rumble. Detection hampered by noise generated by lawn sprinkler and wind
b. Kitchen		Slight ripples detectable on glass of water placed on west counter top. Noise of distant equipment possibly faintly detectable. Overpowered by noise of refrigerator when operating.
c. Master Bedroom		Slightly detectable low rumbling of equipment operating in distance. Slight sensation of ear pressure.
d. Bathroom		Slight sensation of ear pressure.
Lockhardt Residence	2:05 p.m.	As we were leaving the Backe property, Mr. & Mrs. Lockhardt stopped on their way out. Mr. Lockhardt stated something to the effect that "he couldn't pinpoint it to the PGE plant, but he was experiencing a shortness of breath for the past half hour. They have had it, and were just then leaving for San Diego." No subjective analysis was performed at their residence.
Larsen Residence	2:10 p.m.	Mrs. Larsen was not at home. Only small children present. For purposes of liability, an evaluation was not conducted.

Attachment F

TABLE I

Staff:
Stephen Downs
Larry Jack

PGE BETHEL PLANT
SUBJECTIVE NOISE EVALUATION

LOCATION	TIME	EVALUATION AND COMMENTS
Kuper Residence (outside, on patio between house and barn)	2:15 p.m.	Very slight rumbling noise possibly (maybe) detectable. Obscured by wind noises. Readily overpowered by decorative waterfall and small pump. No noises detectable in tack room.
Ringler Residence	2:30 p.m.	
a. Living Room		Noise of distant equipment operating. Note: a farm tractor was operating in the neighborhood when we entered the house.
b. Family Room		Low rumbling was detectable when the sliding glass door facing plant was open. Noise similar to that of distant airplane, but was definitely PGE plant. Noise was obscured by wind noise in nearby trees.
SE Entrance to PGE Plant (off State Street)	2:45 p.m.	Slightly detectable rumbling, accompanied by sound of exhaust gases. Noise level < 40 dba on meter. Noise obscured by traffic noises on State Street.
SW Entrance to PGE Plant (main plant entrance-off State Street)	2:53 p.m.	Low rumbling detectable, accompanied by rushing air exhaust sound. Transformer "buzz" also detectable. Squeaky whine sound evident, similar to that associated with sawmill conveyor. Observers were immediately downwind of the plant. Noise levels recorded 44-46 dba on meter.

Attachment F

Testimony received subsequent to the September 29, 1975 meeting includes the following:

1. September 30 letter from Mr. Arch Beckmann.

2. October 2 materials from Mr. Charles H. Frady including previous testimony before legislature and Mid-Willamette Valley Air Pollution Authority and a study by Goodfriend and Kessler on low frequency noise.

3. October 7 written testimony of Mrs. Jan Egger (OEC) subject to October 13 corrections.

4. October 7 letter from Mr. Van A. Gibson.

5. October 8 letter from Mrs. Genevieve H. Larson.

6. October 8 letter from Mr. Estes Snedecor (PGE).

7. October 13 testimony of Mr. and Mrs. Henry Germond.

8. October 17 letter from Mr. A.J. Porter. (PGE)

9. October 20 memo re: additional concerns of Mrs. Jan Egger.

10. October 20 letter from James Cartwright (OEC).

ENVIRONMENTAL QUALITY COMMISSION

1234 S.W. MORRISON STREET • PORTLAND, ORE. 97205 • Telephone (503) 229-5696

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MEMORANDUM

TO: Environmental Quality Commission

FROM: Director

SUBJECT: Agenda Item No. F, October 24, 1975, EQC Meeting

PGE - Bethel Turbine Facility - Response to Testimony Received At September 29, 1975 Meeting

BACKGROUND

The Commission held a public meeting on September 29, 1975 in Salem to obtain testimony on the issues of air quality and noise control regarding Portland General Electric's Bethel Turbine Generating Plant located near Salem.

At this meeting, the Commission voted to hold the record open for fifteen (15) days, directed the Department to respond to testimony submitted, and to schedule this matter for further consideration at the regular monthly Commission meeting on October 24, 1975.

DISCUSSION

Testimony received during the September 29, 1975 meeting (no testimony submitted afterward up to the date of preparation of this report -- October 10, 1975) has been reviewed by the Department and the following responses are offered:

Air Quality

1. In response to PGE

   a. Allow engine exercise

      PGE requested that engine exercise periods be allowed to insure proper operation and prevent engine damage. This exercise period is anticipated to be about one-half hour every two weeks. The Department believes this to be a reasonable request provided the actual test periods receive prior review and approval from the Department. Condition 13 has been added to the proposed Air Contaminant Discharge (ACD) Permit (Attachment 1) to accommodate this request.

   b. Less Frequent NOx Control Reports

      PGE requested that NOx control progress reports be required on a less frequent basis than quarterly. PGE suggested annual reports. The Department believes that both the Department and PGE must be kept fully up-to-date on developments in NOx control so that such control, when available, can be required and installed promptly. A semiannual report is the minimum time the Department recommends for such reporting. Condition 11 has been modified in the proposed ACD permit to require semiannual reports.

2. In response to Mr. John Platt (Northwest Environmental Definse Council)

   a. NOx control was available when the plant was built

      The Department does not believe practicable NOx control was available when the Bethel plant was built, nor is it available at the moment. The first series of durability tests on dry NOx control will be run later this year. Water injection NOx control has been used in the Bethel-type turbines over the past few years, but the effects on engine durability and the extremely high cost of water treatment systems make water injection not practicable for Bethel-type turbines in the opinion of the Department.

   b. Limit operating hours and phase out operation

      In the September 29, 1975 report to the EQC, the Department indicated that phase-out was not justified from an Air Quality standpoint. An operating hour limit was reported as justified but a specific hour limitation which could be substantiated would take several months to develop.

c. Require appropriate agency to make determination of emergency operating conditions

It would be the Department's explicit intent to consult with appropriate agencies such as Bonneville Power Administation (BPA) and the Public Utilities Commission (PUC) in cases of controversy as to whether emergency conditions actually exist which warrant operation of Bethel turbines.

Noise

1. In response to Commissioner Sommers

a. Compliance with 45 dBA requirement

In July 1974 the Commission required PGE to obtain noise easements from residents subjected to noise above 45 dBA. The September 29, 1975 Staff Report (page 4, paragraph 2) discussed this condition. In summary, the facility does not produce enough energy in the "A" weighted frequency spectrum to exceed 45 dBA. Attachment C of the referenced Staff Report presents data that shows noise levels were below 45 dBA during operation of the turbine at a distance of 1200 feet and greater.

b. 1975 legislative action on infrasound

The Commission and an informal opinion from the Department's Legal Counsel stated that the enabling legislation allowed control of audible sounds but not inaudible sound. A House Bill (HB 2029) introduced into the last session by the Joint Interim Committee on Environmental/Agricultural and Natural Resources added a definition of "noise." This definition expanded the frequency to 2 H_Z to 50,000 Hertz. The normal audible range is 20 H_Z to 20,000 Hertz. This definition would also include vibration as well as air-born low and high frequency noise.

This Bill passed the House and then went to the Senate Energy and Environment Committee. In general, industry was against the expansion of the frequency range provided in the Bill and attempts were proposed for a compromise definition. Testimony was made by the Department that the fiscal impact of expansion of the noise definition would amount to $750 for additional microphones for low and high frequency measurements. Fiscal impact was estimated by others to be between $12,000 and $60,000 for additional equipment; however, this estimate did not account for equipment already budgeted or presently owned by the Department. This Bill also had many provisions which would have benefited the Department's Noise Program, such as clear authority to provide exceptions, exemptions and variances. Local noise ordinances would also have Commission approval under the proposed Bill. This Bill died in the Committee.

2. In response to Mrs. Marlene Frady (resident)

a. Noise measurements should be made near residences

The Department Noise Rules were developed to protect noise sensitive property, both inside and outside. The nearest privately owned property is approximately 1200 feet from the turbines. A convenient measurement location of 400 feet from the turbines was used for several reasons:

(1) This distance is close enough to the turbines, so that other ambient noises do not interfere with the measurements.

(2) This distance is far enough back from the facility that all noise originating from the turbines is measured. If some noise is generated by turbulance above the exhaust stacks, it will be measured at this location.

(3) The mathematical projection of the allowable levels in the rules to a reference location is always conservative. Excess attenuation will reduce the level somewhat more than spherical dispersion; thus, we are confident that the standards are not exceeded at 1200 feet from the turbines. Verification of the applicability of the mathematical projections has been made at Harborton and Bethel by measurements near residences.

(4) It is usually not necessary to take measurements inside of homes for noise control rules. The noise may be more easily detected by the human ear within a home because of less background noise, however, the measuring instruments adequately detect the low frequency rumbling outside even when other background noises are present.

b. Infrasound problem

The measurements the Department has recently taken of both twin-pacs operating at base load do not show low frequency noise present below 22 Hertz. As in most mechanical devices, the initial frequency peak is preceded by a lower level rather than a greater level. Although the Department's instruments for low freqnency measurements are not as accurate as in the audible range, they do give an excellent indication of the energy content. A system that has a possible error of -1 dB at 2 H_Z, +1 dB at 4 H_Z, 1/2 dB at 10 H_Z and 0 dB at 20 H_Z was used to record at the lower frequencies. The following levels were found:

One-Third Octave Band Range (Hertz)	Level dB
2.2 - 2.8	56
2.8 - 3.6	57
3.6 - 4.5	62.3
4.5 - 5.6	65
5.6 - 7.1	67
7.1 - 8.9	68.1
8.9 - 11.1	70
11.1 - 14.9	71.9
14.2 - 17.8	71.2
17.8 - 22	71.8
22 - 28	76.2
28 - 36	71.3
36 - 45	66.1
45 - 56	62.6
56 - 71	56

Thus the measurements show the peak energy is in the one-third octave band from 22 H_Z to 28 Hertz (a portion of the 31.5 Hertz octave band). The level in the bands below 22 Hertz decrease as the frequency decreases. See one-third octave band plot (Attachment 2).

Documentation of infrasound problems according to Department research indicates a threshhold of problems at 85 dB. Based on measurements above there appears to be no documented basis for considering that infrasound problems exist in the Bethel community as levels are well below the threshhold cited in literature.

c. Auxiliary equipment noise

The cooling fans located on the transformers were measured and reported in the staff report as auxiliary equipment to the turbines and existing equipment of the substation. Although no octave band measurements were conducted, these types of fans do not cause a community noise problem at these large distances. Compliance with Department noise rules was noted. The subjective tests conducted by the Salem-North Coast Region did not identify the noise from the cooling fans. The only fan noise heard was at the near-by mushroom plant which was audible after going to their property line.

3. In response to Mr. John Platt (NWEDC)

a. Operating conditions which comply with Department noise rules

The September 29, 1975 Department report stated the Department estimated that the turbine facility would marginally comply with the daytime octave band noise rule but would exceed the nightime rule during baseload operation of both twin-pacs. The report also stated that a single twin-pac unit would marginally meet the nightime standards. This was based upon the extrapolation of data from one twin-pac and using the possible data tolerances of the instrumentation systems.

In a subsequent measurement, on September 23 with the plant producing 110 MW of power (baseload), the Department measured 76.3 ± 1 dB in the 31.5 Hertz octave band. The standard of 77.5 dB for daytime is thus met. One twin-pac would meet the nightime standard of 74.5 dB in the 31.5 Hertz octave band if it were operated slightly less than baseload (baseload test measure 74.7 ± 1 dB). The data in essence indicates that recently installed noise mufflers and shotcreting have reduced low frequency noise approximately 3 dB which corresponds to approximately a 50% reduction in perceivable noise.

4. In response to Ms. Jan Egger (OEC)

a. Noise measurement data for both twin-pacs

Noise data collected on September 23, 1975 with both twin-pac units operating are presented in this report in response to Mr. John Platt's question. Subjective tests are shown in Attachment 3.

b. Measurements in and near homes needed

A response to Mrs. Frady's similar question has been made earlier in this report.

c. Noise sensitive property at 800 feet should be limiting criteria

The nearest potential "noise sensitive property" (NSP) from the facility is approximately 800 feet from the turbines. This property was purchased by PGE several years ago. The noise rules apply to all NSP; however, there is a provision for a Department granted exception under Section 35-035 (6) (d) for NSP owned by the owner of the noise source. The Department has been projecting the measured noise to a distance of 1200 feet, which is the approximate distance to the Bache residence.

Although no official exception request has been filed for this property, PGE has now indicated they will file one to satisfy the strict interpretation of the Rule. The Department would expect to grant such exception. It should be noted that since the property is owned by PGE, zoning of the property is not relevant.

d. Worst noise condition is not addressed

The Department's octave band rule was not written in "statistical noise levels" as were the allowable levels in Tables G, H and I of the rules that use the total audible A weighted frequency measurements. The octave band rule applies to a source that "the Director has reasonable cause to believe that

the statistical noise levels" are not protective. If that source operated "for more than 6 minutes in any one hour" the allowable maximum octave band levels in Table J are used. The octave band table was not written using the statistical descriptor but a maximum allowable level as used in Tables A, B, C, D, E, and F.

Field measurements read from the sound level meter were taken by reading the central tendency of the meter vane. When data was recorded on a magnetic tape recorder, the data was averaged. It should also be noted that the recorded data indicate that the average, the median and the equivalent energy noise levels were all within 1 dB of each other.

In summary, the department's special octave band rule adequately addresses maximum noise generation and is more restrictive than the Department's statistical noise levels.

e. Noise emission limits, monitoring requirements and operating restrictions should be included in the ACD permit

The Department agrees that incorporating specific noise requirements in the ACD permit will at least insure no misunderstanding among the public and PGE regarding requirements of the Department regarding compliance with Department noise rules. Condition 12 has been modified in the proposed ACD permit to include actual noise limits that must be met, restriction of operation to one twin-pac at night, and annual noise measurements to demonstrate compliance.

f. The Department octave band noise rules appear to be insufficient to protect health and welfare

The industrial and commercial noise rules were developed with the advice of an ad-hoc committee made up of segments of industry people, environmentalists and noise consultants. It should be noted that the octave band table is more stringent than the statistical "A"-weighted tables and in comparison to the rules from other states, the Oregon octave band rule is more restrictive. The State of Illinois uses 75 dB during the day, 69 dB at night and New Jersey used 96 dB during the day and 89 dB at night. The Oregon standard is 68 dB during the day and 65 dB at night. It is well known that Illinois has the most comprehensive state-wide noise program in the Country.

The Department is committed to continually evaluating the adequacy of its noise rules and if justified to propose changes to them. It must be remembered that the objective of the Department noise rules is to protect the general community against interference with speech and sleep.

CONCLUSIONS

1. The recently installed mufflers and shotcreting have reduced turbine noise in the low frequency range approximately 3 dB which represents about a 50% reduction in perceivable noise.

2. Recent noise measurements indicate the Bethel facility can comply with Department daytime octave band noise standards (76.3 $\pm$ 1 dB measured versus 77.5 dB allowed in the 31.5 Hertz octave band) with both twin-pacs operating at baseload.

3. Recent noise measurements indicate the Bethel facility can comply with Department nightime octave band noise standards with one twin-pac operating at a level slightly below baseload (74.7 $\pm$ 1 dB measured at baseload versus 74.5 dB allowed in 31.5 Hertz octave band).

4. The Department's octave band noise limits which are deemed applicable to the Bethel turbines are more stringent than the Department's statistical noise limits and address worst case noise generation.

5. Noise measurements at the 400 foot reference distance from the turbines can be mathematically accurately projected to levels at residences without actual measurements at the residences.

6. Noise measured by the Department from the Bethel turbine peaks in the 31.5 Hertz octave band (at 76 dB) and dimishes at lower frequencies, therefore an infrasound problem should not be present as studies indicate the threshhold of infrasound problems is 85 dB.

7. The Bethel facility does not exceed 45 dBA in the "A"-weighted scale at any noise sensitive property.

8. Requiring cessation of operation or limiting operating hours cannot be justified in respect to Department noise and air quality regulations at this time, with the exception that operation must be limited to one twin-pac at a reduced load at nightime to insure compliance with Department noise rules.

9. Justifiable operating restrictions, applicable noise limits and periodic noise compliance monitoring requirements should be and now have been incorporated in the presently proposed ACD permit.

10. The Department would expect to consult with appropriate agencies such as BPA and PUC in controversial instances regarding a determination if emergency conditions exist requiring operation of the Bethel facility.

11. The Department will review the adequacy of the Department noise rules and Bethel ACD permit if issued, on a yearly basis or sooner if new data becomes available.

DIRECTOR'S RECOMMENDATION

It is the Director's recommendation that the Department proceed toward issuance of the attached proposed air contaminant discharge permit (Attachment A) for the Bethel facility by giving 30 day public notice, considering public comment subsequently received, making changes in the ACD permit as may be warranted and finally issuing an ACD permit.

LOREN KRAMER
Director

JFK:cs
10/10/75

Attachments (3)

Permit Number: 24-2318
Expiration Date: 8/1/80
Page 1 of 8

PROPOSED 10/10/75

AIR CONTAMINANT DISCHARGE PERMIT

Department of Environmental Quality
1234 S.W. Morrison Street
Portland, Oregon 97205
Telephone: (503) 229-5696
Issued in accordance wth the provisions of
ORS 468.310

ISSUED TO:

PORTLAND GENERAL ELECTRIC COMPANY
Power Resources
621 S. W. Alder
Portland, Oregon 97205

PLANT SITE:

Bethel Plant
5765 State Street
Salem, Oregon

ISSUED BY DEPARTMENT OF ENVIRONMENTAL QUALITY

Loren Kramer
Director

Date

REFERENCE INFORMATION

Application No. 034

Date Received July 2, 1975

Other Air Contaminant Sources at this Site:

	Source	SIC	Permit No.
(1)			
(2)			

SOURCE(S) PERMITTED TO DISCHARGE AIR CONTAMINANTS:

Name of Air Contaminant Source	**Standard Industry Code as Listed**
ELECTRIC POWER GENERATION	4911

Permitted Activities

Until such time as this permit expires or is modified or revoked, Portland General Electric Company is herewith permitted in conformance with the requirements, limitations and conditions of this permit to discharge treated exhaust gases containing air contaminants from its four (4) Pratt and Whitney (FT4C-1 combustion turbines) fuel burning devices located at Bethel substation, 5765 State Street, Salem, Oregon, including emissions from those processes and activities directly related or associated thereto.

Compliance with the specific requirements, limitations and conditions contained herein shall not relieve the permittee from complying with all rules and standards of the Department and the laws administered by the Department.

Performance Standards and Emission Limits

1. The permittee shall at all times maintain and operate all air contaminant generating processes and all contaminant control equipment at full efficiency and effectiveness such that the emission of air contaminants are kept at the lowest practicable levels.

2. Emission of air contaminants shall not exceed any of the following when operating at base load except where otherwise specified:

   A. Particulate matter restrictions:

      (1) 6.8 kilograms (15 pounds) per hour of particulate for any single turbine when distillate fuel is burned.

      (2) 3.2 kilograms (7 pounds) per hour of particulate for any single turbine when natural gas is burned.

   B. Nitrogen oxides restrictions:

      (1) 145.1 kilograms (320 pounds) per hour of nitrogen oxides (NO_X) for any single turbine when distillate fuel is burned.

      (2) 49.9 kilograms (110 pounds) per hour of nitrogen oxides (NO_X) for any single turbine when natural gas is burned.

   C. Carbon monoxide restrictions:

      (1) 7.9 kilograms (17.5 pounds) per hour of carbon monoxide (CO) for any single turbine burning distillate fuel.

      (2) 95.3 kilograms (210 pounds) per hour of carbon monoxide (CO) for any single turbine burning natural gas.

      (3) 20.4 kilograms (45 pounds) per hour of carbon monoxide (CO) for any single turbine at half load burning distillate fuel.

      (4) 81.6 kilograms (180 pounds) per hour of carbon monoxide (CO) for any single turbine at half load burning natural gas.

   D. Visible smoke emissions from each stack shall be minimized such that Von Brand Reflectance Number 95 or better is achieved at all times and shall not exceed 10 percent opacity except for the presence of uncombined water.

Special Conditions

3. The permittee shall store the petroleum distillate having a vapor pressure of 12mm Hg (1.5 psia) or greater under actual storage conditions in pressure tanks or reservoirs or shall store in containers equipped with a floating roof or vapor recovery system or other vapor emission control device. Further, the tank loading facilities shall be equipped with submersible filling devices or other vapor emission control systems. Specifically, volatile hydrocarbon emissions from the 200,000 barrel fuel storage tanks shall not exceed 34 kilograms (75 pounds) per day under normal storage conditions.

4. Turbines shall always be started on natural gas.

5. The permittee shall burn the lowest sulfur and ash content distillate oil available, but in no case shall a lower grade than ASTM No. 2 distillate be burned.

6. The sulfur content of the fuel burned shall not exceed 0.3 percent by weight at any time.

7. Fuel delivery by truck shall be kept to a minimum and only between the hours of 9 a.m. and 2 p.m. and 5 p.m. and 9 p.m. For specific instances with good cause shown, the Department may authorize other hours.

8. Operation of any combustion turbine at other than power output of 15 to 30 megawatts (-1.1 degrees C ambient basis) shall not exceed more than five percent of the operating time.

9. Prior to modification or renewal of this permit, a public hearing shall be held to assess the operation of the plant.

10. The permittee shall limit operation of the combustion turbines to emergency conditions when all other available generating resources are in full operation and failure to operate the facility will result in denial of service to customers entitled to firm service. The permittee shall advise the Department as early as possible of each such emergency and shall demonstrate the nature and extent thereof to the satisfaction of the Department.

11. The permittee shall provide NO_X control to meet limits prescribed by the Department when the Department determines NO_X control is practicable. NO_X control will not be required if the operation of the facility is less than 200 hours per year. The permittee shall submit semi-annual progress reports to the Department on the developments in practicable NO_X control for turbines.

12. The permittee shall comply with the following requirements regarding noise:

    a. Sound pressure levels emitted from the turbines shall not exceed the limitations specified in Table I of this condition, when measured at any location 400 feet from the geometric center of the turbine engine installation. Sound pressure levels may be measured at a distance other than 400 feet and corrected, according to the inverse square law, to a reference distance of 400 feet.

Table I

Maximum Sound Pressure Levels at 400 Feet

Octave Band Center Frequency, Hz	7 a.m. - 10 p.m.	10 p.m. - 7 a.m.
31.5	77.5	74.5
63	74.5	71.5
125	70.5	65.5
250	64.5	59.5
500	61.5	55.5
1000	58.5	52.5
2000	55.5	49.5
4000	52.5	46.5
8000	49.5	43.5

b. The facility operation shall be limited to operation of both twin paks at base load during the hours of 7 a.m. to 10 p.m. and to one twin pak during the hours of 10 p.m. and 7 a.m. at a load which the Department acknowledges in writing complies with applicable noise limits in (a) above.

c. The permittee shall demonstrate compliance with the limits in (a) above annually and shall submit data to the Department in conformance to the applicable measurement procedures. The Department shall be notified prior to such compliance tests.

13. Periodic scheduled turbine engine exercise to insure proper operation of the facility and prevent equipment damage shall be allowed in accordance with an exercise schedule approved by the Department in writing.

Compliance Schedule

None required.

Monitoring and Reporting

14. The permittee shall regularly monitor and inspect the operation of the plant to insure that it is operated in continual compliance with the conditions of this permit. In the event that any monitoring equipment becomes inoperative for any reason, the permittee shall immediately notify the Department of said occurrence. Specifically the permittee shall:

A. Calibrate, maintain and operate in a manner approved by the Department, an emission monitoring instrument for continually monitoring and recording emissions of oxides of nitrogen.

B. Calibrate, maintain and operate in a manner approved by the Department an emission monitoring instrument for continually monitoring and recording emissions of carbon monoxide.

C. Obtain and record representative sulfur analysis and ash analysis by methods approved by the Department of fuel oils as burned for every delivery lot or whenever the source of supply is changed. In addition, the permittee shall maintain facilities for obtaining representative samples from the fuel handling system at the plant site as approved by the Department and provide with the Department analysis of periodic samples upon request.

D. Maintain and submit to the Department a log of operating incorporating, but not limited to, the following parameters:

(1) Time of operation.

(2) Quantities and types of fuel used relative to time of operation.

(3) Electrical output relative to time of operation.

(4) Stack emissions relative to time of operation.

(a) oxides of nitrogen (NO_X) in ppm and pounds per hour

(b) carbon monoxide (CO) in ppm and pounds per hour

(c) percent oxygen (O_2)

(5) Ambient conditions relative to time of operation.

(a) oxides of nitrogen (NO_X) in ppm and micrograms per cubic meter

(b) sulfur dioxide (SO_2) in ppm and micrograms per cubic meter

(c) particulate concentration in ppm and micrograms per cubic meter

(6) Wind direction and velocity relative to time of operation.

(7) Ambient temperature, pressure and humidity.

(8) This log is to be submitted on or before the 25th of the month following the month logged and will indicate the instantaneous, hour by hour conditions existent at the plant site and ambient monitoring station. Any malfunctions occurring and the duration shall be noted in the log. Stack and ambient data will be submitted whether or not the turbines are operating.

15. Portland General Electric Company shall conduct a particulate, sulfur dioxide and oxides of nitrogen monitoring program in the vicinity of the Bethel site to determine ground level concentrations. The monitoring program shall be conducted in a manner approved by the Department. Appropriate meteorological paramters shall be determined. These data are to be incorporated in the log specified in condition 13-D.

16. In the event that the permittee is temporarily unable to comply with any of the provisions of this permit, the permittee shall notify the Department by telephone as soon as is reasonably possible, but not more than one hour, of the upset and of the steps taken to correct the problem. Operation shall not continue without approval nor shall upset operation continue during Air Pollution Alerts, Warnings, or Emergencies or at any time when the emissions present imminent and substantial danger to health.

Emergency Emission Reduction Plan

17. The permittee will implement an emission reduction plan during air pollution episodes when so notified by this Department.

18. As a minimum, the permittee will implement the following emission reduction plan during air pollution episodes when so notified by the Department.

    A. ALERT: Prepare to shut down all turbines.

    B. WARNING: Shut down all combustion turbines.

    C. EMERGENCY: Continue WARNING measures.

19. In addition, the permittee shall cease operation of the combustion turbines upon notification from the Department that air quality at any downwind continuous monitoring site in Marion County has reached the following:

    A. 95 percent of the adopted particulate standard taken as 142 micrograms per cubic meter of air, 24 hour average. Operation shall remain curtailed until particulate air quality is below 135 micrograms per cubic meter of air, 24 hour average.

    B. 95 percent of the adopted sulfur dioxide standard taken as 247 micrograms per cubic meter of air, 24 hour average and 123 micrograms per meter of air, 3 hour average. Operation shall remain curtailed until sulfur dioxide air quality is below 234 micrograms per cubic meter of air, 24 hour average, and 1170 micrograms per cubic meter of air, 3 hour average.

    C. 95 percent of the adopted photochemical oxidant standard taken as 152 micrograms per cubic meter of air, 1 hour average. Operation shall remain curtailed until photochemical oxidant air quality is expected to be less than 120 micrograms per cubic meter of air, 1 hour average during the next 24 hours.

General Conditions

G1. A copy of this permit or at least a copy of the title page and complete extraction of the operating and monitoring requirements and discharge limitations shall be posted at the facility and the contents thereof made known to operating personnel.

G2. This issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

G3. The permittee is prohibited from conducting any open burning at the plant site or facility.

G4. The permittee is prohibited from causing or allowing discharges of air contaminants from source(s) not covered by this permit so as to cause the plant site emissions to exceed the standards fixed by this permit or rules of the Department of Environmental Quality.

G5. The permittee shall at all times conduct dust suppression measures to meet the requirements set forth in "Fugitive Emissions" and "Nuisance Conditions" in OAR, Chapter 340, Section 21-050.

G6. (NOTICE CONDITION) The permittee shall dispose of all solid wastes or residues in manners and at locations approved by the Department of Environmental Quality.

G7. The permittee shall allow Department of Environmental Quality representatives access to the plant site and record storage areas at all reasonable times for the purposes of making inspections, surveys, collecting samples, obtaining data, reviewing and copying air contaminant emission discharge records and otherwise conducting all necessary functions rela ted to this permit.

G8. The permittee, without prior notice to and written approval from the Department of Environmental Quality, is prohibited from altering, modifying or expanding the subject production facilities so as to affect emissions to the atmosphere.

G9. The permittee shall be required to make application for a new permit if a substantial modification, alteration, addition or enlargement is proposed which would have a significant impact on air contaminant emission increases or reductions at the plant site.

G10. This permit is subject to revocation for cause, as provided by law, including:

a. Misrepresentation of any material fact or lack of full disclosure in the application including any exhibits thereto, or in any other additional information requested or supplied in conjunction therewith;

b. Violation of any of the requirements, limitations or conditions contained herein; or

c. Any material change in quantity or character of air contaminants emitted to the atmosphere.

G11. The permittee shall notify the Department by telephone or in person within one (1) hour of any scheduled maintenance, malfunction of pollution control equipment, upset or any other conditions that cause or may tend to cause a significant increase in emissions or violation of any conditions of this permit. Such notice shall include:

a. The nature and quantity of increased emissions that have occurred or are likely to occur,

b. The expected length of time that any pollution control equipment will be out of service or reduced in effectiveness,

c. The corrective action that is proposed to be taken, and

d. The precautions that are proposed to be taken to prevent a future recurrence of a similar condition.

G12. Application for a modification or renewal of this permit must be submitted not less than 60 days prior to permit expiration date. A filing fee and Application Investigation and Permit Issuing or Denying Fee must be submitted with the application.

G13. The permittee shall submit the Annual Compliance Determination Fee to the Department of Environmental Quality according to the following schedule:

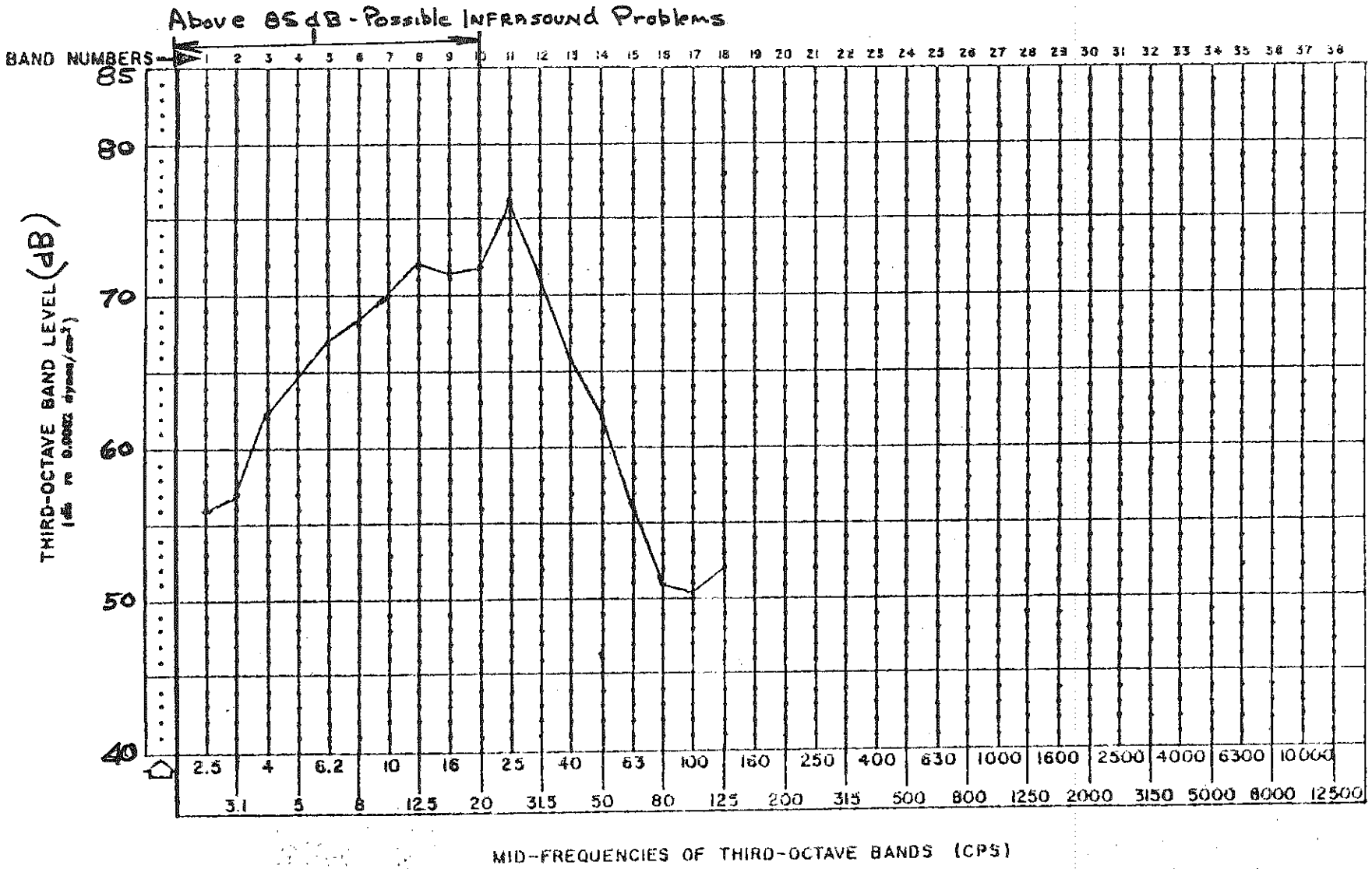
Amount Due	Date Due
$225.00	July 1, 1976
$225.00	July 1, 1977
$225.00	July 1, 1978
$225.00	July 1, 1979
(See G12)	June 1, 1980

Test 9-23-75

PGE BETHEL

NOISE FREQUENCY DISTRIBUTION

(110 MW) at 400 feet



Attachment 2

Attachment 3

State of Oregon

DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE MEMO

To: RHFetrow

cc: EJWeathersbee

cc: JMHector

Date: Sept. 24, 1975

From: SCDowns

Subject: NP-PGE Bethel Turbine Plant
Salem, Marion County
~~Salem-North Coast~~ Region

On Sept. 23, 1975, Larry Jack and I conducted a subjective evaluation of the noise conditions in and around three (3) residences located north and northeast of the PGE Bethel turbine plant located in Salem.

The turbine plant was testing the newly installed muffler system with gunite (shot-creting) treatment on both twin packs operating simultaneously. During the subjective evaluation, the Department's noise section from Portland was also taking noise meter readings. Representatives from PGE and from Turbo Power and Marine were also taking noise meter readings.

The results of the subjective evaluation are included in Table I, along with the results of observations at three outside locations in the Bethel area. Residence locations are shown on maps 1 and 2. Sketches of the houses are included in Table II.

TABLE I

PGE BETHEL PLANT

SUBJECTIVE NOISE EVALUATION

Staff: Stephen Downs
Larry Jack

Date: Sept. 23, 1975 Generator Level: 111 MW Wind & Weather: Sunny & warm (75°F) Wind from west, 0-6 mph.

LOCATION	TIME	EVALUATION AND COMMENTS
Backe residence:	11:25 a.m.	
a. Front porch (outside)		Low whine detectable, with distinct sound of rushing air. Ambient noises readily detectable, such as dogs barking, chain saw, aircraft, and noise similar to that from a router (wood shop).
b. Kitchen		Slight ripples detectable in glass of water placed on west counter top (similar to observations of 6/12/75). Very low whine detectable, similar to electrical hum. Steady noise similar to strong wind rustling through trees. Noise from chain saw and aircraft readily detectable, as well as that generated by clock on kitchen oven.
c. Bathroom		Pronounced rushing air noise. Mr. Downs detected a very low throbbing, which Mr. Jack did not experience. Chirping birds were readily apparent.
d. Master bedroom		Similar to the bathroom, but less pronounced. Very, very low throbbing detectable. Very low whine (whistling) barely detectable - similar to a vacuum cleaner operating in the neighborhood. Very slight ear pressure possibly experienced (real or imagined?). Noise from birds and chickens detectable.
e. Living room		No noise detectable, except that possibly associated with a wood shop router (very faint).
f. Front hallway (front door open)		Rushing air noise, low rumbling and very low whine detectable. Aircraft and distant traffic also readily detectable. Described by Mr. Backe as similar to distant thunder.

NOTE: All observations were made with house windows open. Mrs. Backe complained that they are still experiencing noises from the plant ("motor hum") at night; generally from midnight to 4:00 a.m.. They had not noticed these noises until after the mufflers were installed. She also complained about the "sloppy work" performed by DEQ and MWVAPA.

TABLE I

PGE BETHEL PLANT

SUBJECTIVE NOISE EVALUATION

Staff: Stephen Downs
Larry Jack

Date: Sept.,23, 1975 Generator Level: 111 MW Wind & Weather: Sunny & warm (75°F) Wind from west, 0-6 mph.

LOCATION	TIME	EVALUATION AND COMMENTS
Ringler residence: No one at home. Observations made outside, at the rear (west) of the house on the rock patio. Prior permission obtained from Mrs. Ringler.	11:55 a.m.	Very low rumbling, similar to that of a very distant freight train. Swish of rushing air and very low whine also detectable. Plant noises readily overshadowed by distant traffic noise. NOTE: Air emissions from plant were estimated to be 1/2 Ringelmann.
Larson residence: Living room	12:10 p.m.	PGE plant was not detectable. Only noise detectable was that from the freezer in the dining room, and a chain saw in the distance. Mr. Larson indicated that he observed the plant was operating, but wasn't being bothered by it at the time.
Along 50th St., adjacent to Castle & Cooke mushroom plant	12:15 p.m.	PGE plant not detectable. Only noises were from traffic and numerous fans serving the mushroom plant.
SE entrance to PGE plant (off State Street)	12:20 p.m.	Distinct sound of rushing air and very low rumbling (similar to very distant freight train) were detectable, and slightly more pronounced than at the Backe residence. Aircraft and State Street traffic were the dominant noise sources.
SW entrance to PGE plant (off State Street)	12:25 p.m.	Distinct sound of rushing air and very low rumbling detectable. Very low jet-type whine also detectable, as was the characteristic transformer hum. The chirping of grasshoppers and/or crickets could be detected above the plant noise.

TABLE I

PAGE

PGE BETHEL PLANT

SUBJECTIVE NOISE EVALUATION

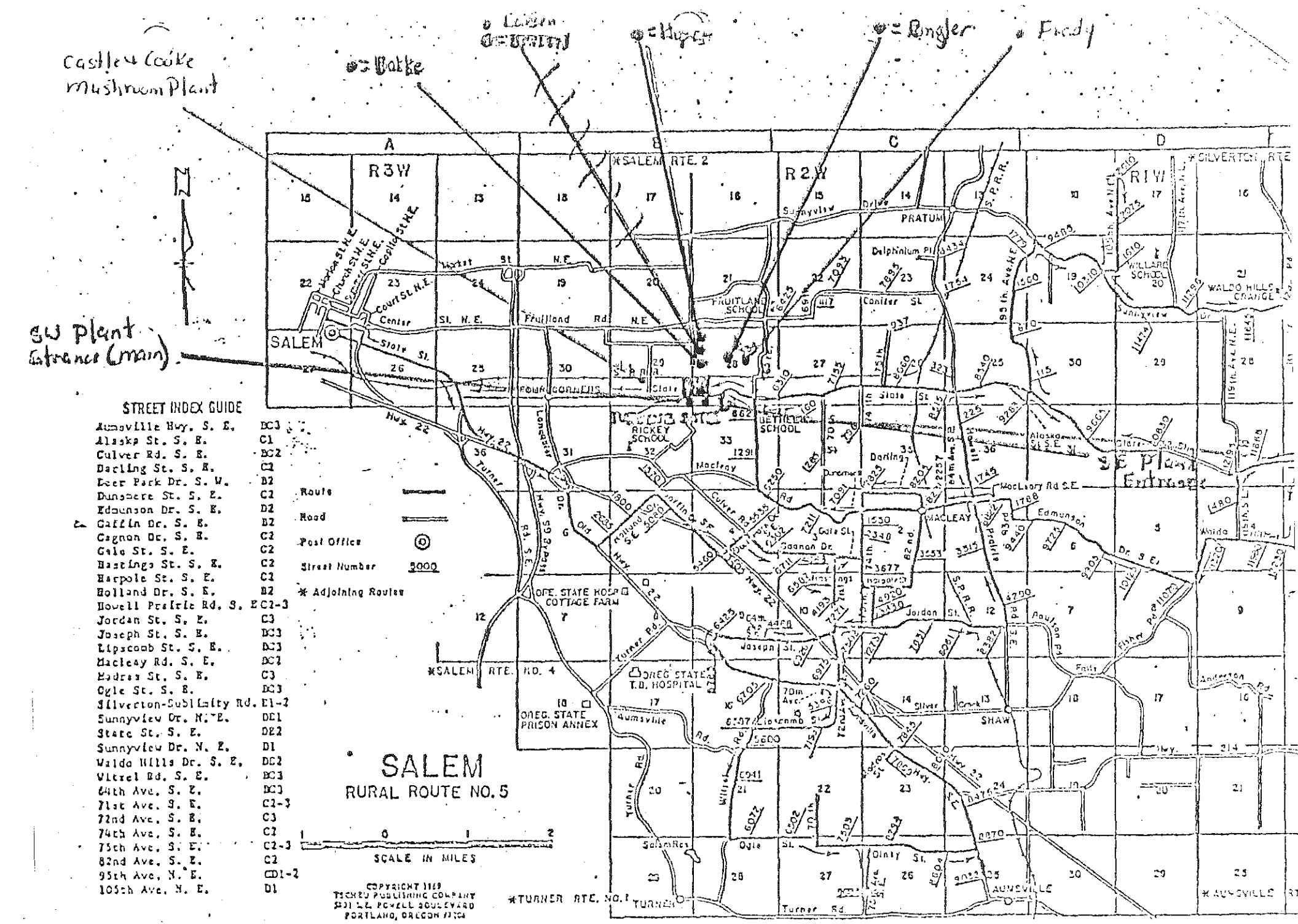
Staff: Stephen Downs
Larry Jack

Date: Sept. 23, 1975 Generator Level: 111 MW Wind & Weather: Sunny & warm (75°F) Wind from west, 0-6 mph.

LOCATION	TIME	EVALUATION AND COMMENTS
Kuper residence:		Would not allow DEQ representatives on premises.

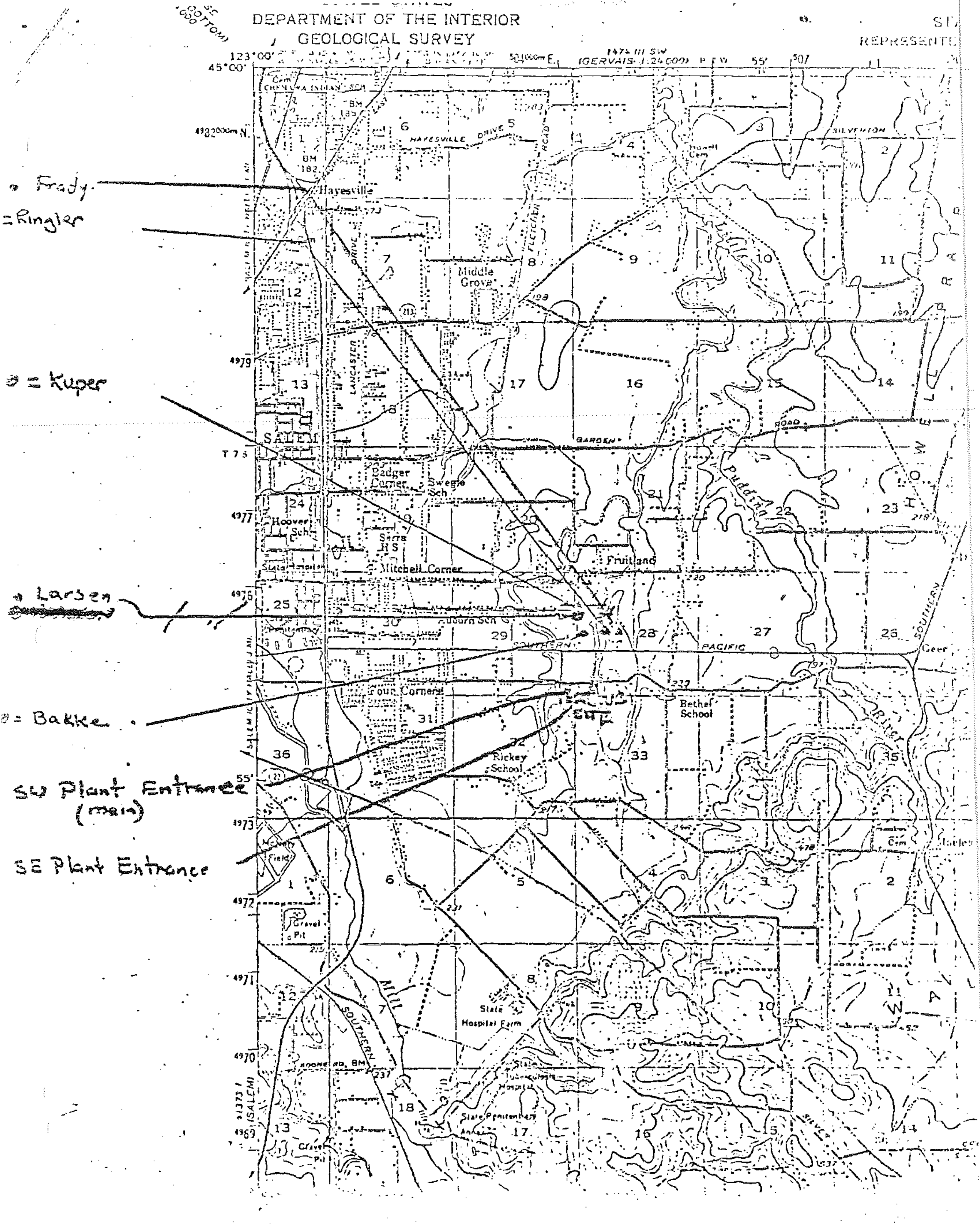
NOTE: At 11:35 a.m. (9/23/75), Marlene Frady telephoned the Salem-North Coast Region Office and requested that PGE be informed of the following message:

"You haven't solved anything with the mufflers. The noise is just as bad now as before in my home."



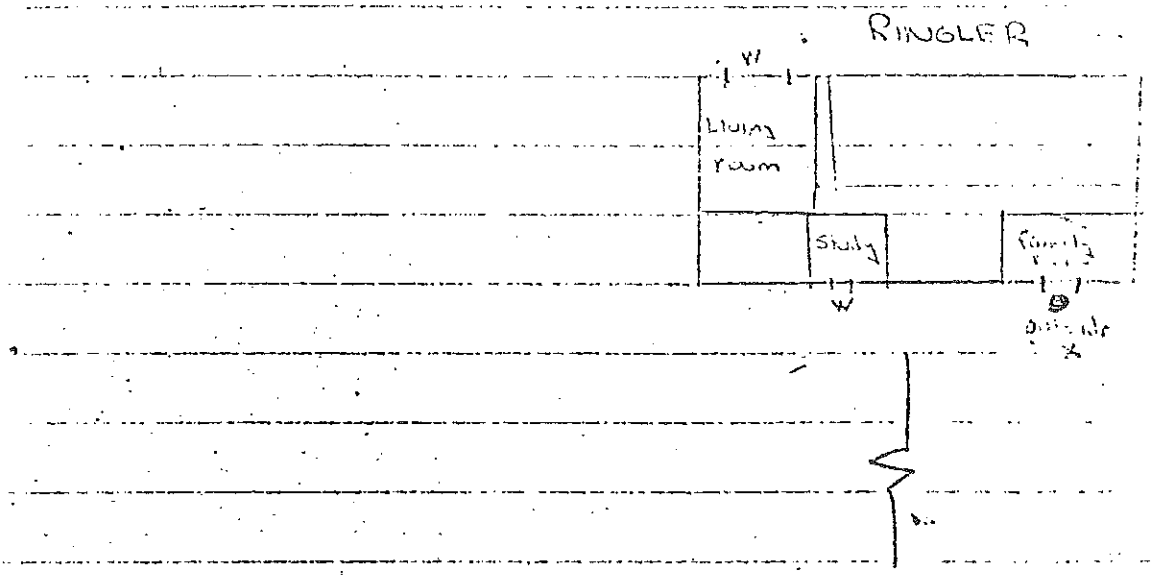
STREET INDEX GUIDE

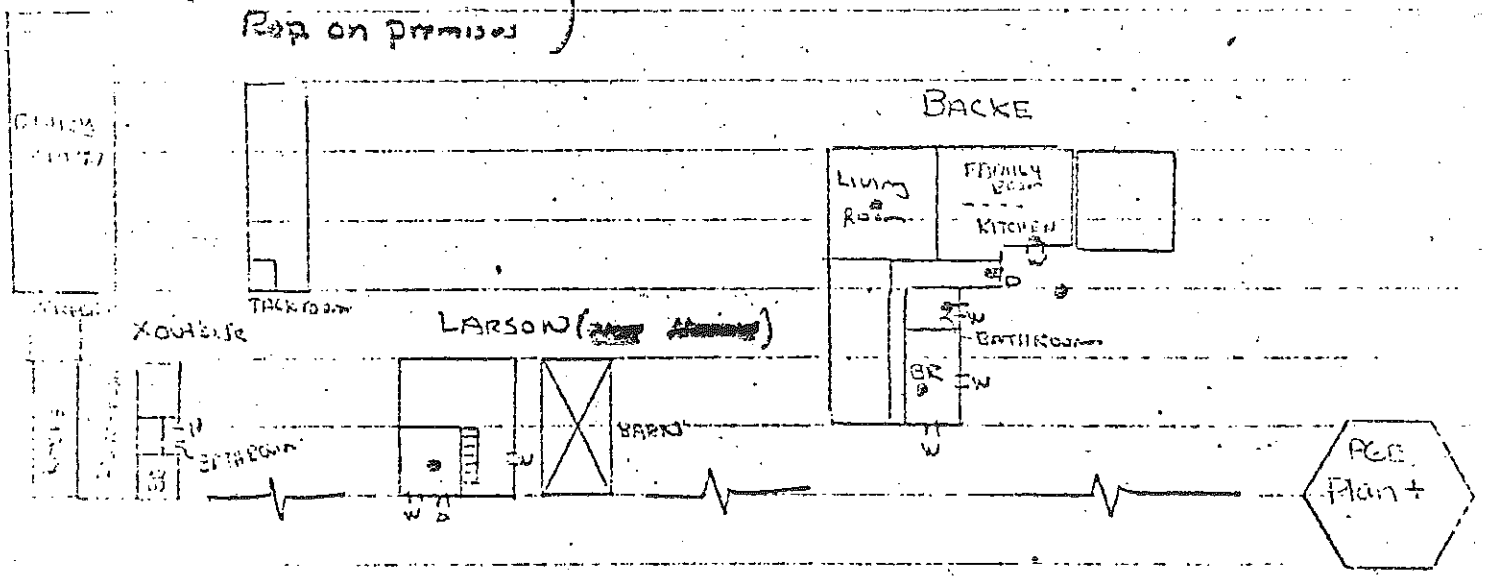
Aumsville Hwy. S. E.	BC3
Alaska St. S. E.	C1
Culver Rd. S. E.	BC2
Darling St. S. E.	C1
Deer Park Dr. S. W.	B2
Dunsmore St. S. E.	C2
Edmunson Dr. S. E.	D2
Gaffin Dr. S. E.	B2
Cagnon Dr. S. E.	C2
Gale St. S. E.	C2
Hastings St. S. E.	C2
Harpole St. S. E.	C1
Holland Dr. S. E.	B2
Howell Prairie Rd. S. E.	C2-3
Jordan St. S. E.	C3
Joseph St. S. E.	BC3
Lipscomb St. S. E.	BC3
Macleay Rd. S. E.	BC2
Madras St. S. E.	C3
Ogle St. S. E.	BC3
Silverton-Sublimity Rd.	E1-2
Sunnyview Dr. N. E.	DE1
State St. S. E.	DE2
Sunnyview Dr. N. E.	D1
Waldo Hills Dr. S. E.	DC2
Witzel Rd. S. E.	BC3
64th Ave. S. E.	BC3
71st Ave. S. E.	C2-3
72nd Ave. S. E.	C3
74th Ave. S. E.	C2
75th Ave. S. E.	C2-3
82nd Ave. S. E.	C2
95th Ave. N. E.	CD1-2
105th Ave. N. E.	D1


DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Frady
Ringler
Kuper
Larsen
Bakke
SW Plant Entrance (main)
SE Plant Entrance
Hayesville
HAYESVILLE DRIVE
Middle Grove
SALEM
Badger Corner
Swegle Sch
Hoover Sch
Serra HS
Mitchell Corner
Fruitland
Auburn Sch
Four Corners
Bethel School
Rickey School
Gravel Pit
State Hospital Farm
State Tuberculosis Hospital
State Penitentiary Annex
SOUTHERN PACIFIC
GARDEN ROAD
LANCASTER DRIVE
FLETCHER ROAD
SILVERTON
Geer
Mill
Pudding
Cem

House Sketches

NOT TO SCALE





TESTIMONY TO THE ENVIRONMENTAL QUALITY COMMISSION RELATING TO THE AIR CONTAMINANT DISCHARGE PERMIT NO. 24-2318, OPERATION OF PORTLAND GENERAL ELECTRIC'S BETHEL TURBINE PLANT.

October 13, 1975

Not enough discussion has been given in previous testimony to the option of removing the Bethel turbines from their present location. This is a practical alternative.

To a mechanical engineer who is trained in thermal power engineering, who has worked with prime mover machinery, and who has toured the Harborton plant, the fact is simply: This type of generating plant is easily moved.

Basically the criteria for portability of this type of machine is that no elaborate foundations are required, connections of services are minimal, and no significant structure is involved.

These units are most often factory-assembled, factory-tested, and shipped to the site by rail car or flat-bed trailer over the highway. Sometimes they are separated into modules for ease of shipment only to be joined by simple field connections at the site. They are known as "packaged" plants.

Site preparation is minimal involving grading, paving, and the pouring of spread-footings or support pads on which to rest the skid-mounted unit. Connections at the site require fuel lines, control wiring, and conductors to a nearby switch yard for introducing the power generated into the utility system.

By far the most elaborate structural portion of such a peaking station is fuel storage if oil is to be used. On barge-mounted units the barge itself serves as the fuel tank. This type of mounting was used quite conveniently for peaking purposes by Consolidated Edison Company for New York City. For natural gas-fueled stations no storage is normally provided.

The relative ease and speed of setting up such a station is what persuaded many utilities to buy and install such plants. This same relative ease of setting up the plant was also touted as being a real advantage if moving the plant to a different location became necessary.

You may well ask, why is the packaged type of power generating plant so easy to set-up and take down? The key to this feature is the aircraft-type gas turbine. Much of the same type gas turbine that powers our many jet airplanes is used in peaking plants of this type. Such turbines are quite light in relation to their power compared to stationary turbines such as the Beaver, Oregon machines. Besides their light weight which makes them easily portable, they are lower in cost because they are a mass-produced component for the aircraft industry.

These advantages have penalties, however. They have components which have very short lives depending on the power level at which they are operated. Thus, the gas turbine is well-suited to peaking

loads, that is, run a few hours at a time when the needs are particularly high.

The other important disadvantage is their low efficiency. The packaged gas turbine peaking plant's efficiency is low compared to the stationary gas turbine (Beaver) and quite low compared to a steam plant. This further tends to limit such units to peaking.

An interesting aspect of the gas turbine is that the same amount of fuel (gas or oil) would heat twice as many homes if burned in individual heating systems instead of using electric heat.

A further comment naturally follows from these considerations: The use of gas turbines for peaking began as a "fad" and was spurred by the brown-outs of past years. In a region where much of our energy is produced by hydro-electric plants, fossil-fueled peaking units seem to be rather wasteful. Hydro-electric plants are ideally suited to peak handling. To use gas turbines for base load is totally unsound.

One more concern is the cost of setting up a plant of this type. Compared to a stationary plant, this kind of unit is relatively cheap to set-up or take-down. Restoring the vacated site is especially simple because so little foundation and structure was required in the first place.

In general, the packaged gas turbine generating plant has been primarily a temporary expedient to quickly obtain peaking capacity and "black start" capability. The heavier stationary units and the lighter packaged units have helped utilities fill the gap while larger fossil and nuclear steam plants are being built.

The granting of a five year operating permit tends to lend permanence to this portable unit, the operation of which affects the health of the people and animals near it. Since there is a sufficient amount of water in the reservoirs of our river system to amply supply our electricity needs for this winter season, (according to BPA) and since PGE expects Trojan to start up in late Dec. or Jan., this would be an opportune time to move the turbines to a more remote location, which would relieve the residents near Bethel of an irritant and give PGE greater latitude in use of these gas turbines.

Henry S. Germond, P.E.

Henry S. Germond

Norma Jean Germond

Norma Jean Germond

OREGON ENVIRONMENTAL COUNCIL
2637 S.W. WATER AVENUE, PORTLAND, OREGON 97201 / PHONE: 503/222-1963

October 7, 1975

MEMBERS OF ENVIRONMENTAL QUALITY COMMISSION
Mr. Joe B. Richards, Chairman

Supplemental testimony in opposition to extension of PGE Bethel combustion turbine facility including history of House Bill 2029; testimony entered by East Salem Environmental Committee (Bethel area residents) by Mr. and Mrs. Charles H. Frady to 1975 Legislature and other correspondence relating.

History of House Bill 2029.

During the September 29, 1975 Bethel facility hearing, Commissioner Somers raised the question:"Do we conclude that the Legislature closed the door on infrasound when it failed to pass the bill?" -- i.e., House Bill 2029.

In submitting these comments, Oregon Environmental Council wishes to say that one can only conjecture on what the Senate body intention may have been. The House of Representatives approved the measure. We feel no conclusions that the Legislature"closed the door" can be supported by the record.

The record does support certain facts of politicization of the legislative process, demonstration of effectiveness of special interests in blocking legislation they oppose,and the good-faith response of the Bethel citizens to the Commission's suggestion they "take it to the Legislature".

September 10, 25, 30, 1975 --

Interim Committee on Environment, Agriculture and Natural Resources hearings on noise. Mr. Tom Donaca, AOI, introduced proposed bill, LC 707 to give statutory authority for variances and exemptions. Mr. Don Barney, City of Portland, added an amendment to clarify authority and permit contractual arrangements for local control of noise pollution. DEQ submitted amendments to allow civil penalties for noise violations. OEC added an amendment permitting DEQ to sssess ultrasound, infrasound and vibrations by definition (not to include allowable emission levels).

Chart prepared by OEC is attached to illustrate DEQ authority for noise.

For discussion of legal aspects of the proposed bill as drafted and approved by the House, see: Report of the Legislative Joint Interim Committee on Environmental, Agricultural and Natural Resources, December, 1974, Pp. 82 - 87.

Janet McLennan, counsel and executive secretary for the Interim Committee, who is now Administrator for Natural Resources, State of Oregon, reports this summary of the bill:

"

HB 2029

Allows the Environmental Quality Commission to grant specific variances in noise emission standards and authorizes the commission to delegate by rule the authority to grant such variances to the Department of Environmental Quality. Allows revocation or modification of variances after notice and public hearing.

Permits the Environmental Quality Commission to exempt classes of activities within categories of noise emission sources from rules establishing maximum noise levels.

Allows cities and counties to adopt additional noise emission standards no less stringent than state-wide standards and to enforce them if approved by the commission.

Provides for civil penalties to apply to the violation of noise emission standards or the terms and conditions of noise emission variances.

The Legislative Fiscal Office reports no fiscal impact.

Hearing Dates

E & E: 9-10-74, 9-25-74 Full Comm.: 9-30-74, 10-1-74

Appearing before the Committee with respect to the measure:

-LeRoy Hemmingway, Esq., Oregon Environmental Council
-Thomas C. Donaca, Esq., Associated Oregon Industries
-B. J. Seymour, Informational Officer, Department of Environmental Quality
-Don Barney, City of Portland
-Marc Kelley, Portland General Electric
-Gary Carlson, League of Oregon Cities

Related Hearings

E & E (LC 197): 10-15-73, 12-14-73
Full Comm.: 1-11-74, 1-18-74, 1-23-74, 1-24-74, 1-29-74

The final vote of the Committee was as follows:

-Voting aye: Rep. Byers, Fadeley, Kafoury, Markham, Whitehead, Whiting
Sen. Macpherson, Meeker, Thorne
-Voting no: Rep. Wolfer " Ibid., P. 82.

Section 2 of the measure, dealing with infrasound, is described in the Report as follows:

" During discussion by the Environmental Quality Commission on noise regulation for industry and commerce, the question was raised whether the Commission had the authority to regulate

noise that is generally considered outside the frequency range of human hearing. Section 2 of this measure would add to ORS chapter 467 a definition of noise specifically designed to allow the Commission to regulate infra sound (sound lower in pitch than can normally be heard by humans), which it is alleged may cause damage to structures and can be injurious to people and animals. The definition would also include ultra sound to the extent of 50,000 hertz (or cycles per second)."

Ibid., P. 83.

October 1, 1975 --

Joint Interim Committee passed HB 2029 with 9 Aye votes; 1 Nay vote. At the same session, HB 2030 was passed out of committee (introduced by Rep. Byers); which bill exempted all agricultural and forestry operations from the departmental noise regulations.

January 17, 1975 --

House Bill 2029, formerly Interim Committee Bill, LC 707, was referred by House Speaker Lang to the Environment Energy Committee, Rep. Nancie Fadeley, Chairman. Fiscal Office reported "no fiscal impact" (Ibid., P. 82.)

January 23, 1975 --

Letter distributed to Legislature by Bethel residents (One copy attached to Chairman Joe Richards' copy of this testimony).

February 10, 1975 --

Letter to Governor Straub by Bethel residents (One copy attached to Chairman Joe Richards' copy of this testimony).

February 27, 1975 --

Testimony presented to House Env./Energy Committee hearing on HB 2029 by Bethel residents (One copy attached to Chairman Joe Richards' copy of this testimony).

March 25, 1975 --

Final hearing in House Committee. (One copy of transcript which includes Dr. M. Crothers' testimony therein is attached to Chairman Joe Richards' copy of this testimony).

March 27, 1975 --

HB 2029 voted out of House Env./Energy Committee with a "Do Pass" vote of 5 Aye; 2 Nay. Bill sustained one minor amendment on local authority vs. state, with no fiscal impact accruing to that change.

April 1, 1975 --

Rep. Ted Kulongski appointed to carry HB 2029 to House floor. OEC requested by Rep. Fadeley to prepare background information for floor speech.

April 4, 1975 --

Bill released by Rep. Fadeley in committee as she noted publically that request had been made to her by House leadership to concurrently release HB 2030, the noise exemption bill.

April 8, 1975 --

House floor vote on HB 2029. Prior motion to re-refer bill back to committee failed. Question of infrasound and noise regulation thoroughly debated on House floor. Bill passed, 32 - 26. Sent to Senate.

SENATE PHASE --

It may be said that orderly progress on the bill ceased at this point.

April 9, 1975 --

Senate President placed double referral on HB 2029:
(1) Env./Energy Committee, Sen. Ted Hallock, Chairman
(2) Full Ways and Means Committee, Sen. Jack D. Ripper and Rep. Harvey Akeson, co-chairmen.

Bethel residents attempted, without success, to obtain fiscal information on the bill.

April 21, 1975 --

Testimony in Senate Env./Energy Committee hearing by Bethel residents (One copy attached to Chairman Richards' copy of this testimony).

The Department testified (Mr. John Hector, Noise Control) that a February 11, 1975 memo, Hector to Mr. Cannon, had meant to convey a "negative fiscal impact" based on cities or counties adopting and enforcing noise ordinances. Mr. Hector said the Dept. either had or was budgeted to acquire all equipment necessary to measuring infrasound except for one microphone estimated at $750. Testimony by an acoustician verified this estimate.

Several additional hearings and work sessions were held. A 5-Aye Vote with a "Do Pass" was recorded on the bill. Amendments were voted upon, but not engrossed into the bill. Several of these seriously affected the bill in provisions other than the infrasound section.

One gave an exemption to agriculture noise (sought by Oregon Farm Bureau). Another, requested by Associated General Contractors, placed state preemption for noise in the bill. AOI had sought this in all previous hearings dating back to the Interim Committee. However, such a provision was opposed by the Association of Oregon Counties, League of Cities and the City of Portland which has a noise ordinance in draft.

A third amendment affected vehicles registered in jurisdictions other than the one in which a noise violation is made. The Association of Automotive Safety and Equipment Mfrs. (muffler manufacturers and wholesalers) sought this change which OEC and the Department opposed, since it posed enforcement problems.

Strategies to reverse the more offensive of these amendments were in place, but proponents felt great jeopardy lay in sending the bill to Ways and Means. It will be recalled by the Commission that the DEQ operating budget, sub-surface sewage authority, auto emissions labs and other areas of high concern to the Department met their unfriendliest handling in the Ways and Means Committee.

Senator Hallock requested the re-referral be lifted in the light of negligible impact. Senator Boe did not grant the request. Bethel citizens, after several visits to the Senate President's office, received, on May 12, 1975 an odd document entitled, "Fiscal Impact of HB 2029" (no date; no author). It contained various arguments opposing the measurement of infrasound and quotations of Dr. Crothers before the House committee. Therein was reference to a memo "from Legislative Fiscal on HB 2029 which (shows)...Significant costs ($12,000 - $60,000) would occur to acquire metering equipment capable of measuring inaudible sound frequencies. This memo was not available to the Senate Environment and Energy Committee". (emphasis ours)

Attempts to obtain this Fiscal Office memo were not met with success by Senator Hallock's aides nor by OEC. Then Senator Hallock received written testimony (not presented in public hearing) in a document, "NOISE? - A Statement on HB 2029 by Doug Heider, PGE" (undated). It contained the identical language, costs, underlining, paragraphing, etc. as the memo received from Senator Boe's office by the Bethel residents. Obviously, one derived from the other.

A "laundering" came on May 27, 1975 when the Legislative Fiscal Office issued a Revised Fiscal Impact of House Bill 2029 that brought the cost down to $750, and lengthily explained where the $12,000 - $60,000 came from (a memo from Robin M. Towne & Assoc. to PGE) lack of verification from the Department on this cost, and actual cost now shown.

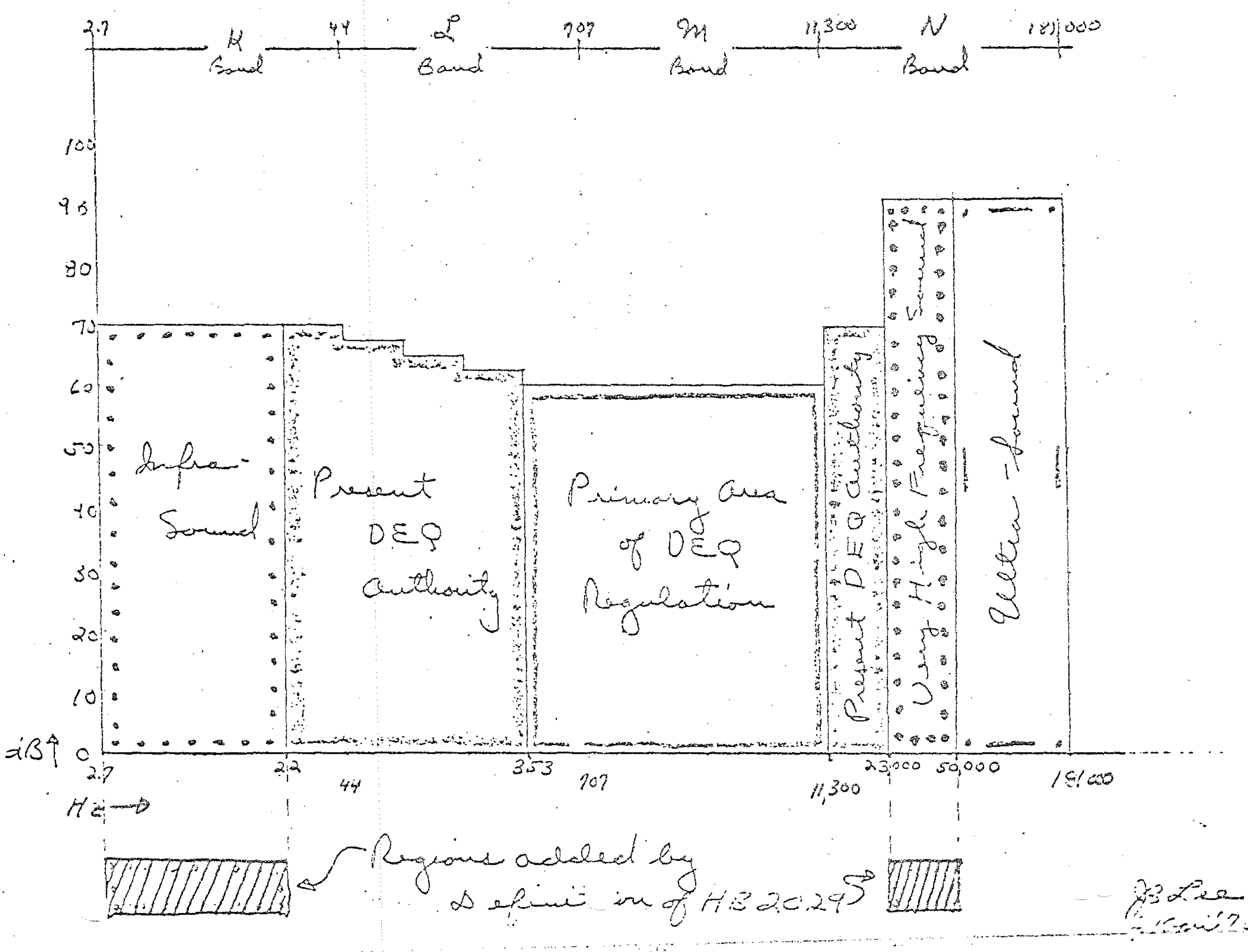
By this time, the Env./Energy Committee was out of bills; the lobbyists now focused on HB 2029 included AGC, AOI, ASEM, Oregon Farm Bureau, League of Cities, Oregon Counties, City of Portland, OEC, the utilities and the Bethel citizens. A final request by Senator Hallock to lift the prior re-referral met with no success. Senators Carson and Burbidge's request to President Boe that the re-referral be rescinded received the reply that "...it is not possible to reopen the Environment and Energy Committee....I would encourage you both to give thought to reintroduction of such legislation during the next session".

Thus are the conclusions we make as stated in our opening remarks; chiefly, that the Oregon legislature did not -- as a body, or by majority vote -- close the door on infrasound. That the issue of infrasound was politicized and not taken on its merits is shown. That the provision for assessing infrasound was not the only debated issue in this bill and that the Bethel residents tried hard to overcome these and all other odds is demonstrated.

OREGON ENVIRONMENTAL COUNCIL

Noise Committee
Jan Egger, Chairman

Attachments


2.7
K Band
44
L Band
707
M Band
11,300
N Band
181,000
100
90
80
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60
50
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30
20
10
dB 0
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22
44
353
707
11,300
23,000
50,000
181,000
Hz
Infra-Sound
Present DEQ Authority
Primary Area of DEQ Regulation
Present DEQ Authority
Very High Frequency Sound
Ultra-Sound
Regions added by Definition of HB 2029
JB Lee

LEE JOHNSON
ATTORNEY GENERAL

JAMES W. DURHAM
DEPUTY ATTORNEY GENERAL

DEPARTMENT OF JUSTICE
PORTLAND DIVISION
599 STATE OFFICE BUILDING
PORTLAND, OREGON 97201
TELEPHONE: (503) 229-5725

October 31, 1974

Mr. Kessler R. Cannon, Director
Department of Environmental Quality
Terminal Sales Building
1234 S.W. Morrison Street
Portland, Oregon 97205

Re: Infra Sound

Dear Kess:

You have asked for my comment regarding the view of the Oregon Environmental Council, set forth in Mr. Larry William's October 18, 1974 letter to you, that "infra sound is simply an extension of audible noise and indeed does fall within the jurisdiction of your Department."

ORS chapter 467 gives the Environmental Quality Commission jurisdiction over "noise emissions." Webster's Dictionary defines "noise" as "any loud, discordant, or disagreeable sound or sounds." It defines "sound" as "that which is or can be heard."

The United States Environmental Protection Agency recognizes a definition of "noise" as "unwanted sound." 1 Noise: EPA Legal Compilation, page 59.

"Infra" is defined by Webster's Dictionary as "below" or "underneath." "Infra sound" would, therefore, appear to be below or underneath sound and not a part of sound.

Words in a statute are to be interpreted in their ordinary and usual sense, as they are popularly used. Portland v. Meyer, 32 Or 368 (1898).

In my opinion, it would be extraordinary and unusual (and perhaps even unsound) to interpret "noise emissions" as including something which could not be heard.

If it seems desirable for the Department to have jurisdiction over "infra sound," ORS chapter 467 should be amended to so provide. In this connection, I call your attention to a legislative bill (L.C. 707) being proposed by the Joint Interim Committee on Environmental, Agricultural and Natural Resources, which would provide the following new definition of noise in ORS chapter 467:

> "As used in this chapter, 'noise' means an oscillation in pressure, stress, particle displacement, or particle velocity in an elastic medium and possessing amplitude, duration and frequency between 2 and 50,000 hertz."

Please let me know if we can be of further assistance in this matter.

Sincerely,

Ray Underwood

RAYMOND P. UNDERWOOD
Chief Counsel
Portland Office

cj

KESS CANNON
Director

November 4, 1974

Larry:

The attached from Ray Underwood will be of interest to you. Let's discuss this at your convenience.

K

Kess.

OREGON ENVIRONMENTAL COUNCIL

2637 S.W. WATER AVENUE, PORTLAND, OREGON 97201 / PHONE: 503/222-1963

October 20, 1975

Joe B. Richards
Chairman, Enviromental Quality Commission
777 High Street
P.O. Box 10747
Eugene, Oregon

Grace Phinney
1107 N.W. 36th
Corvallis, Oregon 97330

Jackie Hallock
2445 N.W. Irving
Portland, Oregon 97210

Ronald M. Somers
106 E. 4th Street
The Dalles, Oregon 97052

Morris Crothers, M.D.
865 Medical Center Drive
Salem, Oregon 97304

Dear Commissioners:

In October, 1974, Mr. Kessler Cannon, then Director of the Department of Enviromental Quality, asked for advice from Mr. Raymond Underwood of the Department of Justice on whether the DEQ had statutory authority over infrasound (inaudible sound below approx. 16 Hz). Mr. Underwood, in a letter dated October 31, 1974, advised the DEQ that when ORS chapter 467 gave the EQC authority over "noise emissions" it did not intend to include infrasound.

We must disagree with that conclusion--infrasound is a noise emission, the EQC does have authority over it, and for the DEQ to regulate it would further the policies behind the statute and comply with the intent of the legislature.

Several concerned citizens from the Bethel area have testified before the Commission about their experience with infrasound and the harm this long-term exposure has done to their lives. Evidence from scientific studies detailing the effects of exposure to major sources of infrasound has been submitted to the Commission. Law Review articles have been written about this problem (see 70 Columbia Law Review 652). When the Legislature passed ORS chapter 467, its express policy was "...to provide protection of the health, safety and welfare of Oregon citizens from the hazards and deterioration of the quality of life imposed by excessive noise emissions." ORS 467.010.

The heart of the matter is to determine what the Legislature meant by "excessive noise emissions." Did they intend to include only those sounds within the audibility limits of the human ear, or did they intend to protect the public from all those sounds which are shown to detrimentally affect human health?

In his letter of October 31, 1975, Mr. Underwood defined noise as "unwanted sound" and "any loud, discordant or disagreeable sound or sounds." We agree, but then we must go one step further--what is "sound"? Technical literature in the field of acoustics generally defines sound as a mechanical disturbance in an elastic medium, i.e. in terms of frequency and Hz, regardless of the audibility range of the ear. see Chamber's Dictionary of Science and Technology (1972): McGraw-Hill Encyclopedia of Science and Technology (1971).

Mr. Underwood asserts that sound, as defined in Webster's Dictionary, means "... that which is or can be heard." Here we must disagree. Webster's defines sound as:

(a) the sensation perceived by the sense of hearing (the pattern of nerve impulses arriving in the brain is associated with and subjectively experience as sound)

(b) an auditory impression

(c) mechanical radiant energy that is transmitted by longitudinal pressure waves in the air or in other material medium and is the objective cause of the sense of hearing. Webster's Third New International Dictionary (1966), at page 2176.

Infrasound, although not subjectively heard, does cause vibrations in the ear. It is not heard as pitch because the brain screens out this pervasive noise.

Mr. Underwood also attempts to define "infrasound" in his letter. He breaks the word into two parts, and then defines "infra" as meaning "below" or "underneath"; therefore infrasound must be something below or underneath sound and thus not a part of sound. Unfortunately, this process of definition completely distorts the real meaning of the term. Infrasonics is defined, in Webster's, as "... having a frequency lower than about 16 cycles per second, and therefore below the audibility range of the human ear and producing only a fluttering sensation with no sense of pitch."

Of course, it is not very useful to argue legislative intent out of a Webster's dictionary, and when anyone begins to make definitions of definitions, the possible interpretations are endless. What is important is that "noise emissions" can easily be construed to include infrasound, and that construction of the statute best furthers the policies outlined in ORS 467.010. To exclude infrasound from the statute would be to needlessly limit the authority of the EQC in an area which clearly needs regulation. In construing a statute, that sense of the words is to be adopted which best harmonizes with the context and promotes the policies and objectives of the legislation. State ex rel. Nilsen v. Oregon State Motor Assn., 248 Or 133 (1967).

In 1975 legislation was introduced to clarify this matter. HB 2029 passed the floor of the House, but then died in a Senate committee. Mrs. Jan Egger has provided the Commission with a detailed legislative history of this bill, and based on that history we feel that it is impossible to draw any valid implications of legislative intent, one way or the other, from its failure to pass.

In conclusion, we feel that infrasound is a noise emission, and that the EQC has the legal authority to deal with it. However, if the Commission still feels uncertain about this issue, we would ask that the EQC request a formal, impartial Attorney General's Opinion. It should be noted that Mr. Underwood's letter is not binding on the EQC and it has no standing as an opinion of the Department of Justice. If the Commission does request such an opinion, we would appreciate it if this letter and Mr. Underwood's letter were forwarded to them for their consideration.

These questions concerning the EQC's authority to regulate infrasound also relate to another matter before the Commission, specifically the PGE Bethel permit. We ask that the permit be delayed until the formal opinion is given so that conditions protecting the Bethel residents can be included in the permit. Alternatively, if the permit is granted, it should be for a shorter time in order for the EQC to study infrasound and promulgate rules and standards for the protection of Oregon citizens from the serious harm exposure to these noise emissions can inflict on their lives.

Sincerely,

James R. Cartwright
OEC Noise Committee

cc: Loren Kramer
Ray Underwood

Infrasonic Measurements*)

by

Per V. Brüel and Hans P. Olesen

ABSTRACT

Large infrasonic sound pressures are reported to be found in several environments such as in automobiles, in "tube trains", in high buildings etc. These noise signals produce unpleasant effects on man such as loss of balance and certain psychological effects when the sound pressure levels exceed the hearing threshold which is 100 — 140 dB re 20 μPa in the 1 — 20 Hz range.

This paper describes the infrasonic environment measured in high buildings in windy weather, in automobiles, and near the test site for large aero-engines.

Further it reports on measurements to check the response of man to infrasonic sound pressures, by vibrating the flexible walls of a small office using a vibration exciter and, thereby, producing high infrasound levels in the room.

SOMMAIRE

D'importantes pressions infrasonores se rencontrent dans différents environnements tels qu'automobiles, métro, grands bâtiments, etc. Ces bruits ont des effets nuisibles sur l'homme, par exemple une perte d'équilibre et certains effets psychologiques lorsque les niveaux de pression acoustique dépassent le seuil d'audition qui est de 100 à 140 dB par rapport à 20 μPa dans la gamme 1 — 20 Hz.

Cet article décrit l'enrivonnement infrasonore mesuré dans de grands bâtiments par temps venteux, en automobile et près du site d'essai de gros moteurs d'avions.

Il décrit en outre des mesures effectuées pour vérifier la réponse humaine aux infrasons en faisant vibrer les cloisons flexibles d'un petit bureau à l'aide d'un excitateur de vibrations et en produisant ainsi de hauts niveaux infrasonores dans la salle.

ZUSAMMENFASSUNG

Infraschall ist gelegentlich unangenehm spürbar
in Hochhäusern bei böigem Wetter,
während der Autofahrt bei unverschlossenen Fenstern,
in der Nähe von Triebwerk-Prüfständen,
im U-Bahntunnel,
an Deck von Motorschiffen.

Im Frequenzbereich 1 Hz bis 20 Hz liegt die Wahrnehmbarkeitsschwelle etwa zwischen 140 dB und 100 dB re 20 μPa. Höhere Pegel können das Wohlbefinden und den Gleichgewichtssinn stören. Zwecks subjektiver Versuche wurde eine leichte Trennwand mit einem Vibrator erregt, wodurch hohe Infraschallpegel im Raum erzeugt werden konnten.

*) This paper was initially prepared for presentation at the Inter-Noise '73 Conference, Copenhagen, August 22 — 24th 1973

See pages 22 - 23

Lately, there has been an increasing interest in sound of very low frequencies. Several articles describe the low frequency sound which exists in the ocean and is found all over the world. Infrasound is also found in the atmosphere with variable strength. One source of this sound is thunderstorms. These may take place far away from the places where the infrasound is noticed, and this is because the damping of the low frequency sound is very small compared to the attenuation in the air of normal audible sound.

However, the most interesting cases seem to be those where man is subjected to infrasound in man-made environments. The sound may be produced either by working machines or, for example, by the interaction of wind with a structure. This is seen both in the case of an automobile interior when running at moderate to high speeds and in high buildings in windy weather. In London complaints have been reported about rattling doors and windows caused by infrasound from buses (9) and recent studies in the U.S.A. have indicated that vibrating bridges, excited by traffic, emit infrasonic waves which may be a threat to human beings and buildings (10).

Other interesting phenomena can be observed near operating aerospace engines, e.g., a large manufacturer of aeroengines has a problem concerning an indisposition among his office personnel, which was believed to have some connection with the low frequency sound from engines running in test beds.

Instrumentation

The infrasonic signals were measured by means of the combination of a Microphone Carrier System and the special Condenser Microphone Type 4146 with a nearly closed leakage tube which allows measurements down to 0,1 Hz. Also a Precision Sound Level Meter can be used, but then measurements can be carried down only to 2 Hz. In both cases the signals are recorded on a portable FM tape recorder for analysis in the laboratory (see Fig.1). Before each set of measurements a pure tone calibration signal was recorded on the magnetic tape.

Generation of infrasound

To make a crude check of the response of man to infrasound, the flexible walls of a small office room were used as membranes, excited by a vibration exciter, (Figs.12 and 13), to produce sound pressure levels of 95 to 115 dB in the frequency range from 2 — 16 Hz. The sound signal waveform was somewhat distorted (the second harmonic was measured to be between 14 and 25 dB lower than the fundamental, depending on the fundamental frequency), but it was possible to obtain crude threshold curves for detection of the infrasound and for the appearance of ill-feeling.

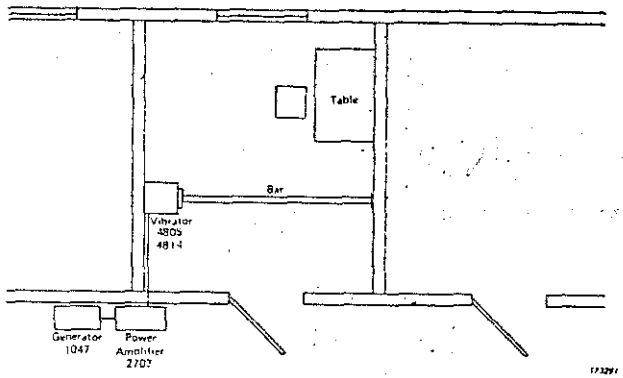

Fig.12. A vibration exciter used to excite the walls of a small office for infrasound generation

The detection threshold levels found were lower than those given in the literature. To provoke the sense of ill-feeling, both higher sound levels and longer exposure times were required except at 12 Hz, where instantaneous and violent ill-feeling was experienced by several persons at relatively low sound levels (85 — 110 dB).

Although there are many psychological effects in these experiments which reduce the reliability of the results, the effect still appeared even for some of the persons involved who strongly believed that the whole thing was nonsense.

Fig.14 shows the response registered by a sceptical person who exposed himself to a high sound level at one frequency each evening, while reading, in order to find the exposure time needed before a slight dizzyness appeared.

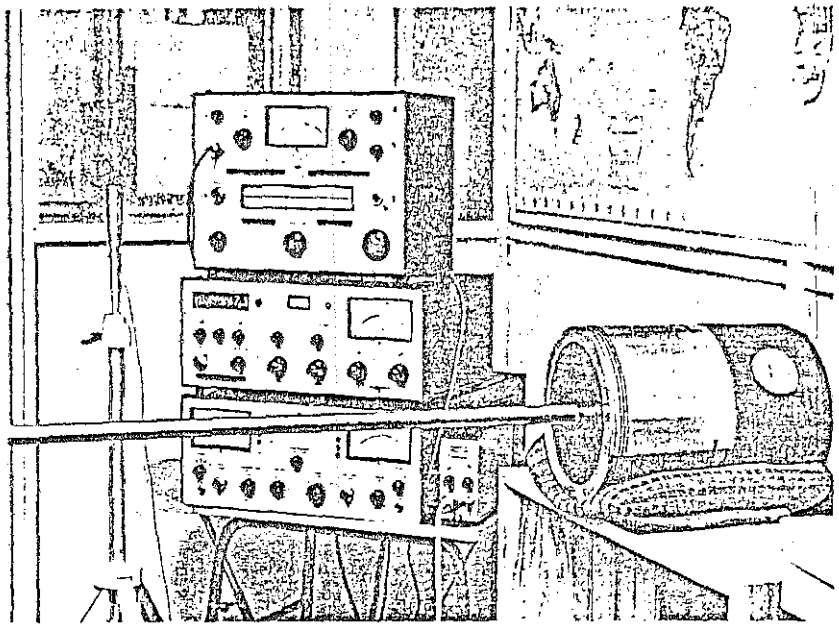

Fig.13. A photograph of the test arrangement in Fig.12

A similar incidence occurred at the aeroengine manufacturer's plant, where the head of the office did not believe in the complaints of his office staff. When the installed himself in the office where complaints had been most severe, in order to demonstrate that the whole thing was nonsense, he felt sea-sick himself after relatively short time.

Discussion

The measurements have confirmed that significant infrasound levels do exist, especially in man-made environments. There is also a strong indication that even low sound levels, at low frequencies may cause unpleasant effects on human beings. The effect on human beings especially, is difficult to measure as an exposure time is always involved (see Figs.14 and 15), except at very high levels. Furthermore, as the test material is so limited and as all test parameters are not known, no attempt has been made here to point to specific threshold levels. However, the experiments showed, very clearly, that there was a tendency that even convinced sceptics were influenced to feel sea-sick at moder-

ate infrasound exposure. As such levels are found both in automobiles, in high buildings and in other environments where people must work or live, there seems to be a great need for further investigation into the topic.

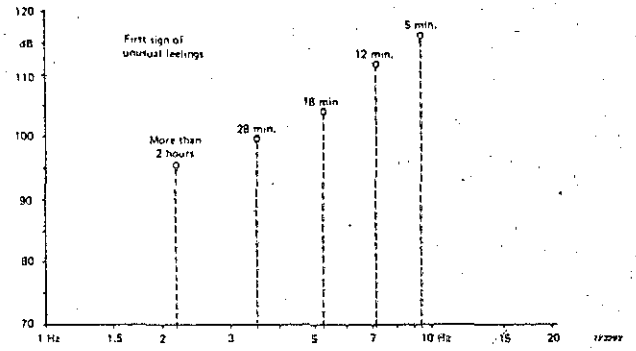

Fig. 14. The sensory response of one person to infrasound excitation

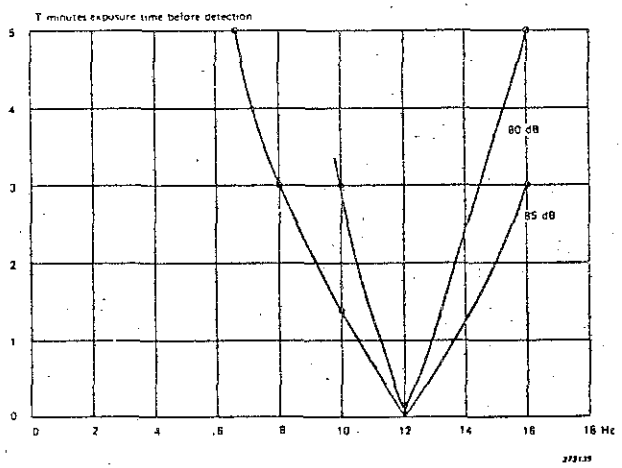

Fig. 15. The threshold/exposure time relationship around the most sensitive frequency

References

Proceedings of the British Acoustical Society, Vol. 1 No.3, Summer 1972.

Meeting on "Infrasound and Low Frequency Vibrations" at Salford University on 26th November 1971:

1. Instrumentation for Infrasound, H. G. LEVENTHALL and R. A. HOOD, Chelsea College, London.

2. Low Frequency Threshold Effect, N. S. YEOWARY, University of Salford.

3. Infrasonic Effects on the Human Organs of Equilibrium, MARGARET G. EVANS, University of Salford.

4. Natural Sources of Low Frequency Sound, R. W. B. STEPHENS, Chelsea College.

5. Low Frequency Noise in Road Vehicles, W. TEMPEST, University of Salford.

6. Some Subjective Effects of Infrasound, R. A. HOOD, H. G. LEVENTHALL and K. KYRIAKIDES, Chelsea College.

7. Low Frequency Noise and Vibration in Tankers, A. B. LEWIS and S. L. GIBBONS.

8. Annoyance Effects due to Low Frequency Sound, M. E. BRYAN, University of Salford.

Noise & Vibration Bulletin, NVB, March 1973

9. The Infrasonic Bus, abstracted from London Evening News, 16th February 1973, SIR RICHARD WAY and ROLAND MAYLE.

10. Bridge Waves, abstracted from Philadelphia Inquirer, 27th January 1973, WILLIAM DONN and NAMBATH K. BALACHANDRAN.

September 29, 1975

TO: Members of the Environmental Quality Commission

FROM: Mrs. Marlene M. Prouty, 390 Fir Knoll Lane N.E., Salem, Oregon 97301

SUBJECT: PGE Bethel Turbines, Salem, Oregon

Dear Members:

It seems to us it would be inappropriate to discuss terms of a permit for PGE. We trust our judicial system, where cases are won or lost on facts and truth, and where all men are equal, will accomplish for us what governmental agencies have not been able to do. I can assure you the people in East Salem would not be involved in a lawsuit against PGE unless we had just cause to do so and the facts to back up that decision.

However, there are some points we want to clarify to the EQC Members and some questions need to be raised about the sound testing performed this year by the Department of Environmental Quality and Turbo-Power & Marine Systems.

First and foremost is that the recently installed mufflers with shot-coating have not corrected or alleviated the problem of low frequency rumble, infra-sonic sound and vibrations in our homes. We have not seen any data to indicate that DEQ or PGE has attempted to measure the air turbulence, which produces great acoustic energy. This has been a major problem and still remains to be a serious problem.

I would like to clarify our position on why we will not allow DEQ to come into our home to make a subjective evaluation. After the DEQ report presented by Al Kirk in June of 1974 we determined we would not allow any more subjective evaluations by DEQ. It is an insult to our intelligence and integrity!

Since then we have had sound testing done by professional sound consultants who have the equipment, knowledge and the expertise to report the facts in an unbiased manner. We will continue to have sound consultants do testing in our home whenever the Bethel turbines operate.

I also raise a question about the sound testing being done at 400'. In previous tests made by Teane & Associates, testing was also done in the home. It seems to us in order to have an accurate evaluation, the sound testing should be done with the same type of equipment in the homes since the windows have been installed. A number of our people have been on the plant site, right next to the turbines when they were operating and did not experience the rumbling and vibrations that we experience in our home. In conjunction with this most data we have seen from the BPA only includes the 63 and 31.5 Hertz octave band. Any sound consultant will tell you the lower the sound the higher the decibels. For instance - testing in the 63 Hertz octave band produces sound measured in the decibel range of the 60's, in this instance. In the 31.5 Hertz octave band - the 70's. In the octave band below that - the 80's and below that the 90's, etc. We do not believe BPA is giving an accurate picture at 400'.

You may or may not be aware that cooling fans emit low frequency noise. I believe you are aware that wave lengths of low frequency noise are quite long and are carried great distances. It is a matter of public record that the low frequency noise from the trains on 12th street bother us in our home. I was never aware of the trains before BPA operated the turbines. It is a matter of public record that several neighbors have been over near the Bethel turbines when noises were bothering us so we could not sleep and did locate a source of noise around the turbines that sounds like motors running constantly. Apparently they weren't running when BPA did their testing. It is a matter

of public record that noises bother us a great deal now. Noises we were never aware of before the turbine plant operated, especially in the lower frequencies. I experience severe pain in my ears when the turbines operate. My children and husband do also. We also experience pain in our ears associated with other low frequency noises. Our 10 year old daughter complains a great deal about her ears hurting when noise is present, especially when we are riding in the car. I can count on my hands days when it has been quiet enough for me to read a book in my own home. By quiet I mean from the constant low frequency rumbling or motors that seems to be ever present in our area now.

We are quite upset with all the standards being shown down our throats by the DEC. If a standard won't protect people from a serious problem the standard isn't any good.

I have not been able to sleep well since the turbines began operating. I have to sleep with ear plugs many nights and sometimes take tranquilizers also. It is a matter of public record that my husband has to take tranquilizers often because of the low frequency noise that keeps him from sleeping. Anything that disturbs a persons' sleep has to be considered detrimental. If we have become sensitive to noise it is through no choice of ours this has occurred.

If the EPC members are interested more information is a matter of public record in the form of our testimonies before the legislature this past session and filed with the DEC.

NATIONAL
ENQUIRER
LARGEST CIRCULATION OF ANY PAPER IN AMERICA
SEPTEMBER 2, 1973

Study by Research Team Reveals . . .

Strange Sound Drivers Can't Hear Causes Rise In Traffic Accidents When a Storm Approaches

Something you cannot see, hear or feel causes traffic accidents to increase when storms are approaching or passing, says the head of a university research team.

"We call this force 'infrasound,' and I doubt that one driver in a thousand knows about it," said Dr. John Hutchinson, professor of civil engineering at the University of Kentucky.

"Yet, the evidence we gathered from hundreds of drivers involved in traffic accidents shows that infrasound, which comes from thunder up to 200 miles away, can cause drivers to itch, have headaches, become crabby, restless and dizzy, and even feel slightly drunk.

"Under these conditions a driver's reflexes are impaired to the point that his reactions are slowed 30 to 40 percent. Drivers must learn that they are going to be affected like this whenever a storm approaches."

Dr. Hutchinson headed a 16-man team that studied traffic accidents in the Lexington, Ky., area for the National Highway Traffic Safety Administration.

"We found that at times police could hardly keep up with the accidents when a thunderstorm was building up, whether it rained or not. We started asking the drivers how they felt under these conditions, and we found we could scientifically correlate the infrasound from thunderstorms with driving disabilities."

RESEARCH CHIEF: Dr. John Hutchinson points to chart on which flags indicate where accidents occurred during an approaching storm.

Dr. Hutchinson explained what his team's tests revealed about the causes and effects of infrasound.

"The human ear can hear sounds only at frequencies between 20 and 1,600 cycles per second," he said. "Infrasound is below 20 cycles. It is there — but you can't hear it.

"Infrasound comes from the collision of hot and cold air. When lightning strikes and produces thunder, you get sound from one cycle per second upward. At 20 cycles you hear thunder. Below 20 is infrasound.

"We have measured infrasound traveling undiminished as much as 200 miles ahead of an actual storm. So, although you cannot hear thunder 200 miles away, the infrasound can be affecting you without your knowing about it. It makes drivers uncomfortable and slows their reflexes."

Infrasound affects people differently, Dr. Hutchinson said.

"About a third of American drivers push themselves and their machines to the limits. When infrasound hits such a person, he finds he is trying to drive to the limit with his reflexes impaired by 30 to 40 percent.

"At the other end of the scale is the driver who never pushes himself or his machine. He tends to stick to the rules. When infrasound hits him, he gets irritable, slows down — and blocks traffic."

Both types of drivers can be dangerous to themselves and to others, Dr. Hutchinson said. "All drivers should be more self-critical of their driving when a storm approaches."

— MALCOLM BALFOUR

OREGON ENVIRONMENTAL COUNCIL

2637 S.W. WATER AVENUE, PORTLAND, OREGON 97201 / PHONE: 503/222-1963

TESTIMONY BEFORE ENVIRONMENTAL QUALITY COMMISSION
RELATING TO PORTLAND GENERAL ELECTRIC COMPANY
BETHEL FACILITY PERMIT - SEPTEMBER 29, 1975

Members of the Commission, Hearings Officer and Director:

The subject proposed Air Contaminant Discharge Permit No. 24-2318 involving operation of the Bethel Plant of Portland General Electric Company to 8/1/80 is regretably unprotective to the health and welfare of the near residents of the facility.

1. The measured levels are for one twin-pak unit with data extrapolated to include both twin-pak units. It is believed more current readings to include both twin-paks are available, but the staff report does not include this information.

The special nature of the low-frequency sound emitted by this plant makes it necessary, we feel, to do actual measurements by octave bands, in and at 25' from the residences. All measured data is at 400' from the plant. Only subjective findings are within the structures.

2. The homes (2) at 800' from the plant which were purchased by the company are within the province of the Department to protect. Residents meet all criteria which the Department has established for determining Noise Sensitive Property.

Under OAR, CH 35-035 (6) Exceptions, the owner of a noise source may write a request for such exception which the Department may then authorize if any conditions under (6) - (a) - (d) are met. The subject residences at 800' from the plant are not on land zoned industrial or commercial.

We would ask:

a. Was this request made by the company, and when?

b. If so, was the request granted, and when?

c. If answers to both above questions are negative, why are measurements being extrapolated to 1200' as (quoting from staff report, P.2): "...at the nearest privately owned residence."?

3. All the levels discussed on P. 2, staff report, appear to be dealing in maximums-not-to-be-exceeded; yet the Rules of the Department can be interpreted to mean the levels allowed in Table J (Octave Band Sound Pressure Levels) are L_{10} statistical levels to be allowed for no more than 6 minutes out of any hour (SEE RULES, P. 34 L, OAR CH 35-035 (1), (f), (A).

   Also see Definitions, (33) "Statistical Noise Level", P. 34 i.

   The staff report admits, on P. 4 that "...the daytime standard appears to be marginally met" (for operation of both twin paks) and "Operation of a single twin-pak unit would... marginally meet the nighttime noise standards".

   An unfavorable combination of wind variation, application of the tolerances (+ or - 1 dB) and power generating level (there being more noise as power levels increase) would easily tip the balance, resulting in violation of the L_{10} levels stated. No discussion of " worst condition" is made.

4. The permit itself relates to air emissions. Although noise has no Departmental permit system, per se, and derives its authority from the Air Quality Section, it would seem that the ACD Permit would address more fully the noise conditions permitted with operation of the Bethel plant. This would seem to include, at a minimum that:
   a. Noise emission limits should apply at the L_{10} level, with more cognizance of variability and tolerances.
   b. The emissions should be monitored by the company using appropriate calibrated instruments.
   c. Monitoring logs should be maintained and submitted periodically, as with air factors.
   d. Parameters such as frequency (in hertz), intensity (in decibels) and duration (per cent of time per hour not to exceed Table J limits) as well as diurnal limits are all appropriate to be specified.

      Ambient requirements allowable (background conditions) during measurements should be shown.

5. The permit contains only one statement (P. 3, # 12) that governs noise emissions, and there are no details in it. Are we to take the company at good faith that full compliance for noise is assured without requiring interim measurememts or reports?

Although 275 complaints on noise and vibration were received during the long-term operation of the plant; and although the complaints on noise continue, the permit addresses air almost exclusively. A detailed staff report does not change the fact that the permit itself is notably lacking in specificity.

The Commission was quite specific in stipulating conditions when it last ruled on this matter in July, 1974. At that time power levels and hours of permitted operation were given. Also at that time the hopes for the sound-proofing were high, based

upon company reassurances of significant future attenuation of the noise. Current measurements shown in Attachment C indicate only 2.3 decibels reduction with the sound-proofing. Again, this is with extrapolated, rather than actual data to determine effects 25' from the residences.

There are no measurements to take account of sympathetic vibrations to the structures resulting in interior noise, although subjective comments by staff note "windows rattling", etc.

In the subjective comments we note the impact on Mr. Bakke and others. The Kuper residence outdoor effects are attributed to being the cause for the low reproductive rate in his livestock. No subjective noting of cracks in walls and ceilings is made.

In general, we do not put too much store in the subjective comments of staff as a means of gathering data. Whereas complaints can only be couched in subjective terms, data is best provided by technical means.

We note an attempt to measure the infrasonic emissions, and ask that the data analysis showing "no significant amplitude peaks..." (P. 6 of staff report) in the range below pitch perception be made available to us, as it is not included in the report. We wish to have this data reviewed by our Committee's Mr. James B. Lee, acoustic physicist. It was Mr. Lee who first made findings by calculations of projected infrasound from the Bethel plant, in 1973. It should be mentioned that Mr. Lee, who cannot be here tonight, but who has testified many times in the past, is presently teaching architural acoustics at California Polytechnic Institute. It will be recalled that he cautioned against the company's expensive and essentially worthless sound-proofing. The company ignored his public testimony that the larger mufflers and shotcreting would be ineffective.

We find this permit without adequate procedural safeguards; and with the marginal meeting of the regulations (irrespective of interpretation of whether L_{10} is applicable)and possibilities of exceeding tolerances when wind and power generating levels are taken into account, we recommend:

PERMIT BE WITHDRAWN FOR ADDITIONAL STUDY AND NOISE RULE APPLICATION WHERE APPROPRIATE.

This recommendation includes taking actual measurements within the affected residences, noting the A-scale ambients in the homes of this quiet semi-rural community. In addition to octave-band readings done in the homes, staff should measure vibration since it is an adverse effect caused by the sound waves. Likewise, since staff seems now to possess the technical capability to test for infrasound, (see P. 6, report) it too should be assessed within the homes.

The single condition of the prior MWVAPA ACD permits that gave hope to the residents up until now was the cessation provision. This required that Bethel not be operated after Trojan began operating.

The August, 1973 MWVAPA permit attached to the report clearly states this in Section 5.2. If, in fact, the only basis for this condition was "to lead to an improved situation in the Bethel community" (P. 7, staff report), we can find nothing wrong with this reasoning. Little else to date has effected an improvment in the quality of their lives which the advent of this plant's noise emissions so deleteriously affected. They were promised many things. In Portland General Electric Company brochures: "quiet" and "clean"; in the 1973 Legislature hearings on siting of these plants by NTEC: "portability in the event of environmental problems"; before the EQC: limited hours of operation; soundproofing; quantitative noise limits; before the MWVAPA: limited hours, other sanctions and eventual cessation of operation.

Their latest hope to be dashed was that the 1975 Legislature would address their problem by allowing noise to be defined to include frequencies outside the pitch-perception range. How this attempt by citizens was blocked by powerful utility intervention remains a chapter not timely to relate here.

We cannot see how this Commission can give this plant clearance when the long-term effects of exposure to low frequency sound and infrasound are largely unknown. EPA data is mostly with short exposure, high amplitude (loud) emissions -- yet the effects are similar to those experienced by the residents at lower amplitudes over a long period. I have given you a reprint of technical findings on infrasound showing sources (jet engines) like Bethel's.

The levels selected for Table J are largely arbitrary. They evolved during and after a 90-day Ad Hoc Committee composed mainly of industrialists (see list attached). The fact that they "tie in" with those of Illinois or New York does not reduce the arbitrariness. The empirical evidence would seem to be that the levels are insufficient to protect health and welfare over long exposures and that adverse side effects of high sensitivity to all other noise with low-frequency components is a consequence of long exposure.

Thank you.

Attch.

Respectfully submitted,

Jeanette Egger

Jeanette Egger, Chairman
Noise Committee

OREGON ENVIRONMENTAL COUNCIL

ATTACHMENT C

NOISE REGULATION STUDY
COMMITTEE MEMBERS

Albert Duble
Towne and Associates
Mohawk Building
Portland, OR 97204

Edward Daly
Daly Engineering
4070 S.W. 109th Avenue
Beaverton, OR 97005

Jan Egger
Oregon Environmental Council
290 S.W. Iron Mt. Blvd.
Lake Oswego, OR 97034

Roy Hemmingway
Oregon Environmental Council
2111 N.E. 8th
Portland, OR

Nancy Marshall
Oregon Environmental Council
2030 S.W. Main
Portland, OR

Thomas Donaca
Associated Oregon Industries
2187 S.W. Main Street
Portland, OR 97205 227-5639

Ben Heald
Sanderson Safety Supply Co.
800 S.E. Hawthorne Blvd.
Portland, OR 97214

Connie Wold
Boise Cascade Corporation
P.O. Box 200
Boise, Idaho 83701

Paul Lizundia
Pacific Northwest Newspaper Assoc.
806 S.W. Broadway
Portland, OR 97205 228-9831

David Klick
Northwest Ford Processors Assoc.
2828 S.W. Corbett St.
Portland, OR 97201 226-2848

Frank Butchart
Consulting Engineer
1730 S.W. Skyline Blvd.
Portland, OR 97221 297-3741

Ron Kathren
Portland General Electric Co.
621 S.W. Alder Street
Portland, OR 97205 228-7181

Doug MacGowan
ESCO Corporation
2141 N.W. 25th Street
Portland, OR 97210 228-2141

Bill McConnel
Clyde Equipment Co.
1631 N.W. Thurman
Portland, OR 97209 227-5561

Don Crawford
Weyerhaeuser Company
Lab. B
Longview, Washington 98632
1-206-425-2150

Dick Tuttle
Georgia-Pacific Corp.
900 S.W. 5th Avenue
Portland, OR 97204

Delbert Johnson
Burlington Northern
American Bank Building
Portland, OR 97204

STATEMENT TO THE

ENVIRONMENTAL QUALITY COMMISSION

ON THE PGE BETHEL TURBINE PLANT

ON BEHALF OF THE

OREGON FARM BUREAU FEDERATION

Salem, Oregon September 29, 1975

I am Mary Petzel, Women's Chairman and a member of the Oregon Farm Bureau Federation Board of Directors. My address is 7198 River Road N., Salem 97303. I am also secretary for the Marion County Farm Bureau. My husband, Frank, our son, Tom, and I operate a 500 acre family farm producing vegetables, prunes and berries. The Oregon Farm Bureau Federation appreciates the opportunity to present this statement to your Commission.

As farmers, we are vitally interested in having an adequate supply of electrical energy available. Although farmers are dependent on fossil fuels for our primary source of production energy, an adequate supply of electricity is absolutely essential for the production, processing and distribution of foods.

We have been advised by the Salem office of the Department of Environmental Quality that the Bethel plant meets Oregon Air Quality Standards. As the hot exhaust gases rise rapidly and are dissipated by normal high level air movements, contamination of the air should not be a problem.

Sound tests made in June, 1975, at the Bethel facility seem to indicate dBA noise levels are within the noise regulatory limits. Except for the 31.5 Hz octave band frequency level, all other frequency levels were below day and night standards.

The 315 Hz nighttime (10 p.m. to 7 a.m.) standard level can be achieved by operating one turbine instead of two. These hours are generally during a low demand period.

Some agricultural enterprises that depend on continual electrical services are dairying, livestock and poultry production. Seasonal and periodic needs

include irrigation; farm processing and filling storages; farm shops, etc. The farm homes have all of the needs of urban residences, and in addition, need power to pump water for the farm home, livestock and other farm facilities.

Power for operating feed and crop conveyors is a common need for dairies, livestock and poultry operations as well as for production, farm processing and storage of many crops. Milking machines, refrigerated bulk storage tanks and manure disposal equipment is common for all dairies. The latest available Census of Agriculture information reports over 200 dairy farms in Marion and Polk. Many of these are in the PGE service area.

Electricity is used for brooding chickens and turkeys, baby pigs and lambs. Any interruption of service during these critical periods can be disastrous.

Farmers use their shops for emergency repairs and for annual maintenance for tractors, trucks and all types of farm equipment. The farmers must have dependable power for their electric welders and a large variety of motor-driven shop equipment. These are essential tools for agricultural food production.

Equipment for farm processing and storage of many crops is electrically operated. A major crop is grass seed, which is not food for people, but forage seeds which are predominate in Oregon production and are "plants in a package" which are essential for meat and dairy products in the future.

The same principle applies more directly to hay and feed grains and other food crop seeds grown in the mid-Willamette Valley. There are a number of on-farm food drying and packaging facilities in the Salem area also.

In addition to these and other crop production not mentioned, food processing and storage plants are important to the economy of the mid-Willamette Valley. Salem is now the center of the largest food processing area in the world. There are over 20 plants operated by national companies, independent firms, cooperatives and individual farmers within 20 miles of the Bethel generating facility. Salem, Woodburn

and Stayton have large cold storage facilities for storage of frozen foods which are produced seasonally and held for distribution during the entire year. In addition, many of the support services, manufacture of cans, cartons, other containers and labels; maintenance of facilities; and other related services are located in Salem.

Almost everything related to food production, processing, storage and distribution depend on an adequate continuous supply of electrical energy. As over 90% of Oregon produced and processed fruits and vegetables are shipped out of the state, adequate electrical service to the food industry has an impact on the public interest nationally as well as for the Salem area.

We mentioned earlier the importance of adequate electrical service tc the farm home. In addition to lighting, cooking, water heating and some space heating, many appliances and installations are motor driven. Many are thermostatic operated (refrigerators, freezers, furnaces, air conditioning, etc.). Others operate on timed cycles (washers, dryers, etc.). These depend on maintenance of proper voltage. "Brown-outs", periods of continual low voltage or extended interruption of service could result in the loss of refrigerated or frozen food, additional service or replacement costs for motors or appliances, and many other inconveniences to the farm household.

Farmers also depend on radio and television for entertainment, news reports and weather reports. As agricultural production is always at the mercy of the weather, updated weather reports are an important tool in food production.

We hope our urban neighbors, who we are sure take electrical service for granted, realize the value of the Bethel plant for generating electricity for peak loads and emergency periods. In addition to the many conveniences and standard of living provided for everyone, adequate and continuous electrical service is essential to the production, processing and distribution of food products that the general public takes for granted.

We certainly urge the Environmental Quality Commission finds that the Bethel gas turbine electrical generating facility meets EQC air quality and noise control standards. We believe the operation of this facility is in the public interest--locally, for all Oregonians and nationally. We again wish to express our appreciation for the opportunity to present this statement.

CITY OF SALEM, OREGON
City Hall / 555 Liberty St. S.E.
Zip Code 97301

SALEM CITY HALL

RESERVATION REQUEST
588-6254

Name of Organization_____

Nature of Meeting (please explain fully):

_____

_____

Special Arrangements or Equipment Needed:_____

_____

Person in Charge:_____
Address: _____

_____

Office or Title in Organization: _____

Room Requested:_____

Meeting Time: _____ AM / PM

Until: _____ AM / PM

Meeting Date:_____

Expected Attendance_____

Refreshments Yes ____ No ___

Number of chairs needed_____

Fee Paid_____

Home Phone:_____

Work Phone:_____

RULES FOR CITY HALL ROOMS

1. If the group holding a room reservation does not meet and does not notify the City Manager's Office in advance, the group shall forfeit for one month the privilege of a meeting room reservation.
2. The City Hall meeting rooms are not designed for the serving of hot meals. If light refreshments are to be served in a room, the City should be notified at the time of the reservation. No alcoholic beverages will be allowed.
3. It is expected that the meeting rooms and the refreshment area will be left in neat condition, all food containers should be removed from the meeting room.
4. All movable furniture must be returned to the original position. The desks and chairs of the Councilmen shall not be moved without the approval of the City Manager. Furniture arrangements should be specified at the time of reservation.
5. If the slide projector in the Council Chambers is to be used, the key must be obtained in advance from the City Manager's Office. The key must be returned immediately after use to the responsible staff person who has checked the projector for damages.
6. If the meeting is during the evening, or if it is a small group meeting lasting less than two hours during business hours, park north of the Civic Center on Levels I and II. For longer daytime meetings with small groups, park at the south end of the Library parking lot. Very large groups holding a daytime meeting must make other arrangements such as shuttle busses, Bush Park, etc.
7. The City Manager may determine exceptions to these rules.

PLEASE READ GENERAL POLICY ON ATTACHED SHEET

I have truthfully represented the above group's name, nature, and activities, and I have read, understood, and agree to comply with all of the rules and regulations set forth above and on the Policy Sheet. I further affirm that I am of legal age and that I will be personally responsible for the above group's conduct and for the repair of damage to equipment or facilities, and for the replacement of stolen equipment.

Signature: _____ Date: _____