BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of Application No. 99-1 SUMAS ENERGY 2, INC. SUMAS ENERGY 2 GENERATION FACILITY	))))))))	EXHIBIT ____________ (IP-T)

WHATCOM COUNTY'S PREFILED TESTIMONY
WITNESS # __________ : IOANA PARK

Q: Please introduce yourself.

A: My name is Ioana Park.

Q: Please summarize your professional qualifications?

A: I hold a Bachelor of Science in Physics from Case Western Reserve University as well as a Master of Arts in Musical Acoustics from the University of Washington. I am a licensed Professional Engineer in Acoustical Engineering in Oregon (to my knowledge, the only state that licenses acoustical engineers). I have been an Acoustical Consultant with Bruck Richards Chaudiere (formerly Towne, Richards and Chaudiere) for 11 years, specializing in environmental noise studies. I have attached a copy of my resume hereto as Exhibit IP-1 for the Council's reference.

Q: What are the subjects of your testimony?

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A: I will provide a review and evaluation of the noise analysis conducted for the Draft Environmental Impact Statement (DEIS) in this matter. I will review the relevance of the sound level measurement information collected by Petur Sim of Whatcom County in relationship to the previously collected data. I will also review and provide insight for the Council in regard to the potential impacts of low frequency sound emissions from the proposed energy plant.

Q: What materials have you reviewed in preparation for this testimony?

A: Chapter 3.3-*Noise* of project DEIS;
Section 4.1.1-*Noise Analysis* (DEIS Tech Appendix) prepared by McCulley, Frick and Gilman (MFG);
Results of Environmental Noise Modeling (ENM) used in Noise Analysis, provided by MFG;
Results of noise monitoring conducted by Mr. Petur Sim of Whatcom County in the vicinity of the sites.

Q: What is your general evaluation of the DEIS Noise Analysis?

A: The DEIS noise analysis (Section 4.1.1) is thorough and consistent with professional standards. Measurement and analysis methodologies and mitigation approaches are appropriate for the purpose of the study.

In combination with supplementary information contained in Chapter 3.3 of the DEIS, (specifically, the analysis of cumulative impacts contained in Section 3.3.6 of the DEIS and not contained in Section 4.1.1), the analysis addresses all the main acoustical concerns related to the project, with one exception. The exception is the consideration of low-frequency noise, which is not regulated by Washington State, but has the potential of being an environmental noise impact and causing community complaints in a power-generation project.

Q: What information did you gain from the noise measurements by Petur Sim?

A: Mr. Sim conducted measurements at the Jager Residence, north of the proposed site, at the same location as SLM 2 in the noise analysis. Generally, the results are consistent with those shown in the project noise analysis, within the range of fluctuation normally associated with environmental sound levels in an inhabited environment. During some hours, the sound levels measured by Mr. Sim were a few dBA higher than those reported in Appendix B-1 of the project noise analysis, possibly due to the opening of the IKO roofing plant since the date of the noise analysis. Therefore, the measurements by Mr. Sim support the noise monitoring data presented in the project noise analysis and show them to be an accurate, or possibly a slightly conservative, representation of the existing conditions at the residence.

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In addition, Mr. Sim conducted noise monitoring at two locations ("Jager Pasture", and "Jager Farmhouse") zoned Agricultural and located south of the proposed project, across Halverstick Road from noise analysis location "S". Because of the increased distance between the proposed project site and the two Jager locations, these locations are expected to experience lower sound levels from the project than the analysis receiver "S", and therefore the measurements at the two locations can not be used as a baseline for comparison against the predictions at location "S".

We were able to learn two things from the measurements at the Agricultural locations: First, the sound levels were considerably higher than at the locations SLM 1 - 4 used in the analysis, which confirms that the choice of monitoring locations in the analysis was appropriate for identifying noise-sensitive receivers with low background sound levels. Second, it was Mr. Sim's observation that the IKO roofing plant was a major contributor to the existing sound levels at both locations. This is confirmed by the fact that, during the reported hours of operation of the crusher at the IKO roofing plant, sound levels at both locations were significantly higher.

Q: Do the predicted sound levels shown in Table 4.1-6 appear reasonable, based on your professional experience?

A: We were able to look at some of the ENM output provided by MFG and the results seem to show correct application of the model. The model itself is state-of-the-art and has been validated in other studies. We also evaluated qualitatively the relative differences between the results for the various receiver locations and they appear consistent with the relative distances and exposures. The fact that sound levels at R4 are higher than at the residences to the north, despite the increased distance, is probably attributable to noisier sources located near the east boundary of the site or oriented towards the east. This can not be verified, but is consistent with the results of predictions at property-line locations.

Q: Were the criteria for evaluating the predicted sound levels appropriate for identifying noise impacts?

A: The WAC noise limits were applied correctly. However, we take exception to the determination of cumulative noise impacts in Section 3.3.6. MFG's method of establishing baseline levels in the DEIS chapter was to average together daytime and nighttime hours, resulting in baseline sound levels of 52 to 55 dBA. Compared to these baseline sound levels, the sound level increases due to the project were found to be no more than 4 dBA (DEIS, P. 3.3-11). However, higher increases would occur during the nighttime hours, when baseline sound levels are lower. These higher increases are not revealed by the method of 24-hour averaging. Since the facility is expected to operate 24 hours a day, it would be appropriate to evaluate daytime and nighttime noise increases separately, due to significant and consistent differences in the background environment between daytime and nighttime. If we average nighttime hours only, the baseline sound levels are 46-47 dBA

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and predicted sound level increases are up to 8 dBA. This would be a clearly noticeable noise increase and a significant noise impact according to EPA guidelines.

Q: Can you make any statements regarding potential impacts related to the low-frequency components of the project sound emissions?

A: The calculated sound levels in the Applicant's Noise Analysis of January 10, 2000, Table 4.1-6, are A-weighted levels, which is the descriptor used in all applicable Washington State noise regulations. The A-weighted decibel is the descriptor of choice in most noise regulations because of its relevance to the sensitivity of human hearing.

The A-weighted level is an energy sum taking into account sound in all frequency bands. However, the contributions of various octave bands are given different weight in the dBA level, corresponding to the variation in sensitivity of the human ear between frequency bands. In particular, the low frequencies do contribute to the A-weighted level, but are given lesser weight in the result than the higher frequencies.

As shown in Table 4.1-5 of the Applicant's Noise Analysis, the sound level output of a number of noise sources, such as the Gas Turbine, Stack Exit, and HSRG sources, is highest in the low-frequency octave bands centered on 31.5 and 63 Hz. There are no Washington State regulations addressing each octave band separately. The following criteria may be used as guidelines for evaluating the impact of noise in the low-frequency bands centered on 31 Hz and 63 Hz.

1. Experience by British Gas in quieting gas turbines in response to complaints about low-frequency noise has led them to use a criterion of 60 dB in the 31-Hz octave band at the nearest residence. (J.R. Newman and K.I. McEwan, British Gas, "Low Frequency Gas Turbine Noise", *American Society of Mechanical Engineers*, 79-GT-196, January 15, 1979).

2. The Oregon Department of Environmental Quality (DEQ) Noise Control Regulations for Industry and Commerce established noise limits in octave bands for industrial or commercial noise sources and residential receivers. The Oregon DEQ nighttime allowable sound levels are 65 dB in the 31-Hz octave band and 62 dB in the 63-Hz octave band.

Table 1 below shows the predicted sound levels produced by the facility with mitigation at residential Receivers 1-4 in the 31-Hz and 63-Hz octave bands, based on results of the Environmental Noise Model (ENM) provided by McCulley, Frick & Gilman.

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TABLE 1
PREDICTED SOUND LEVELS FROM PROPOSED FACILITY
NEUTRAL ATMOSPHERE WITH MITIGATION
FROM PROJECT NOISE ANALYSIS BY MFG

Location	Sound Level (dB)	
	31-Hz Band	63-Hz Band
1	63	69*
2	70*	68*
3	60	64*
4	70*	68*
Oregon DEQ Criteria	65	62
British Gas Criteria	60	--

*Exceeds Oregon DEQ criteria

As shown in Table 1, the predicted sound levels in the 63-Hz band exceed the Oregon DEQ criteria at all residential receivers. Sound levels in the 31-Hz band exceed the Oregon DEQ criteria at 2 of 4 receivers, and are at or above the British Gas criteria at all receivers.

While the criteria have no regulatory authority in the case of this project, the comparison suggests that the low-frequency components of the predicted sound levels may cause complaints in the community unless further mitigated.

Q: Are the recommended noise mitigation measures appropriate, and are there additional noise mitigation measures available for the control of low-frequency noise?

A: The noise mitigation measures listed in Section 4.1.1.6 seem effective and comprehensive, and according to the Noise Analysis, the resulting sound levels meet Washington State noise regulations. However, the time allowed for this review did not permit a sufficiently detailed analysis to assess whether the noise mitigation measures were optimized for the control of low-frequency sound. We recognize the inherent difficulty in controlling low-frequency noise. This is due to the basic physics of sound propagation, which causes most passive, broadband noise control measures, such as natural or human-made noise barriers, enclosures, sound absorptive baffles, etc. to be more effective against high-frequency than low-frequency sound.

The approach in selecting noise mitigation measures that are effective in controlling low-frequency noise includes dedicating first priority in mitigation measures to sources with strong low-frequency components, and, if several materials with the same broadband noise reduction performance are available, selecting materials with better performance at low frequencies (for example, concrete instead of frame wall for a building or enclosure) is recommended.

END OF TESTIMONY

I declare under penalty of perjury that the above testimony is true and correct to the best of my knowledge.

Executed at ___________________, Washington, on this _______ day of June, 2000.

By: _______________________

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