What is the Grays Harbor Energy Center and the proposed expansion?

Grays Harbor Energy (GHE) currently owns and operates a 650 megawatt natural gas-fired power plant known as the Grays Harbor Energy Center. It is located on 22 acres in the Satsop Development Park, near Elma, Washington. The existing facility has two combustion turbine generators, one steam turbine generator, and a cooling tower. The existing facility is sometimes called Units 1 and 2.

GHE proposes to add two more combustion turbine generators, one more steam turbine and another cooling tower. The expansion is sometimes called Units 3 and 4.

How is noise measured?

Noise is measured using a sound level meter. All sound level meters have small microphones and special electronics to measure how the human ear perceives noise. These meters measure the A-weighted decibel level, which is abbreviated as dBA.

A-weighted levels are widely used to describe how we perceive noise. Examples of noise levels for common activities or places are:

- 20 dBA = a slight rustling of leaves
- 30 dBA = a soft whisper
- 40 dBA = a library
- 50 dBA = a quiet residential area (daytime)
- 60 dBA = a typical conversation at 3 feet
- 70 dBA = a vacuum cleaner at 3 feet
- 80 dBA = a busy city street at 50 feet

How are changes in noise measured?

Community noise levels constantly change. At any given time, the noise level is usually a combination of natural sounds from wildlife, birds, insects and tree rustle, noise from local and distant traffic, and noise from industrial, commercial and residential activities.

When noise levels are monitored over a period of time, the results are reported in different ways. The equivalent energy level or $L_{EQ}$ (said "L E Q") is commonly used to average the varying noise levels into a single value. The highest noise level recorded is the $L_{max}$ and the lowest level recorded is the $L_{min}$.

Other measures refer to the level that is exceeded a percentage of the time. For example, the $L_{10}$ is the level that is exceeded 10% of the time, and the $L_{90}$ is the level that is exceeded 90% of the time. At a particular location, the $L_{10}$ may reflect the relatively loud noise of cars, plane flyovers, or even birds. On the other hand, the $L_{90}$ reflects the fairly constant low-level noise.
observed at a location, like the sound of traffic from a distant highway.

**How are changes in noise levels perceived?**

Generally, changes in noise level of less than 3 dBA are barely perceptible to most people. In contrast, a 10 dBA increase in noise level is normally perceived as a doubling in loudness.

**How do multiple sources of noise affect measured levels?**

Because of the way our hearing works, everyday math cannot be used to simply add the noise level from one source to the noise level from another source to figure out the total amount of noise.

For example, 40 dBA from one noise source plus 40 dBA from another noise source does not equal 80 dBA when both sources are measured together. Instead, doubling the amount of noise results in only a 3 dBA increase in the total noise level. So, 40 dBA + 40 dBA = 43 dBA.

**What is the law concerning noise?**

The Washington Department of Ecology has regulations that set maximum noise levels for industrial facilities. These regulations are found in chapter 173-60 of the Washington Administrative Code.

The Washington Energy Facility Site Evaluation Council (EFSEC) has adopted these regulations for new energy facilities.

An industrial source of noise, such as the Grays Harbor Energy Center, may generally not produce more than 70 dBA at other industrial properties, more than 60 dBA at residential properties during the day, or more than 50 dBA at residential properties during the night.

An industrial facility is allowed to exceed these limits for short periods of time. It may exceed the limits by 5 dBA for 15 minutes per hour, by 10 dBA for 5 minutes per hour, or by 15 dBA for 1.5 minutes per hour.

The regulations also exempt sounds created by safety devices, if noise suppression would defeat the purpose of the device or is not economically feasible.

**What were sound levels before the Grays Harbor Energy Center began operating?**

A noise survey was done in the project area in 2001, before the Grays Harbor Energy Center was built. Daytime noise levels ($L_{eq}$) ranged from 25 to 66 dBA, and nighttime noise levels ranged from 23 dBA to 52 dBA.

Additional measurements taken in 2009 when the Grays Harbor Energy Center was largely inoperative showed that background noise levels had not changed significantly since 2001.

In general, background noise levels within the community are quite low, but cars, airplanes, construction, and other residential activities can raise those levels.

**How much noise does the existing Grays Harbor Energy Center produce?**

During summer 2009, Michael Theriault Acoustics (MTA) and GHE staff measured noise levels near three neighboring homes located about 2,500 feet from the facility. Measurements were taken when the facility
was operating at either full load or near-full load. Measurements were also taken at a "control" location much closer to the power plant than the residences. By measuring the noise level at the control location, it was possible to determine if levels at the residences were due to the facility or to some other source of noise.

Measured noise levels ($L_{EQ}$) at the homes due to all sources generally ranged between 30 dBA and 50 dBA. Occasionally, measured levels were above 50 dBA, and on a few occasions above 60 dBA.

MTA looked closer at each of the instances that noise levels went above 50 dBA at night or above 60 dBA during the day (which are the State's noise limits). In order to understand these higher levels, MTA compared them to measurements taken at the control location, looked at frequency or pitch information, listened to audio recordings, and reviewed facility operation data.

MTA concluded that all of these higher noise levels were caused by sources other than the Grays Harbor Energy Center, with the exception of one emergency steam release at the plant. The emergency steam release caused noise levels to exceed 60 dBA on one day during early morning hours for about 30 minutes.

MTA concluded that the Grays Harbor Energy Center usually resulted in noise levels in the low 30s (dBA) at residences, and well below the most stringent regulatory limit of 50 dBA.

Michael Theriault from MTA will present these results in more detail during EFSEC's meeting in July and will be able to answer questions about them.

**How much noise will the expansion make?**

MTA used a widely-accepted computer model to predict the sound levels that would result from the expanded facility.

The computer model used conservative assumptions about how noise travels from the facility to surrounding areas. For example, it assumed a wind constantly blows from the plant toward the residences, which tends to increase estimated noise levels. The model also assumed temperature and humidity conditions that tend to increase estimated noise levels. Because of these and other assumptions, computer modeling usually over-estimates the actual noise levels produced by a facility.

With all four units operating, the model predicted noise levels ranging from 45 dBA to 49 dBA at nearby residential properties. This is about 2 to 4 decibels higher than what the model predicts for the existing facility. The model also predicted noise levels ranging from 54 dBA to 79 dBA at adjacent industrial properties.

Michael Theriault will present these results in more detail during the July meeting and he will be able to answer questions about them.
**Will the expansion seem twice as loud as the existing facility?**

No. Units 3 and 4 are being designed to produce no more noise than the existing Units 1 and 2. This does not mean that the expanded facility will be twice as loud as the existing facility. Due to the nature of human hearing, doubling a noise source results in only a 3 dBA increase in noise levels, which is considered a just perceptible difference.

**What will GHE do to mitigate noise from the expansion?**

GHE has proposed to take several steps to mitigate the noise from the proposed expansion:

- The project will be required to comply with the state noise regulations, unless a waiver has been obtained from the receiving property owner. An acoustical specialist will perform a noise monitoring study after construction of the expansion to confirm compliance.

- The design of Units 3 and 4 will include mufflers in air intake ductwork of the combustion turbines and ventilation systems as well as in the exhaust of the waste heat boilers. High-performance acoustical enclosures will house each of the combustion turbines and the existing noise wall will be maintained.

- An acoustical specialist will take noise level measurements during performance testing of Units 3 and 4, and will use those results to determine whether additional measures are necessary to comply with Washington State regulations.

- An acoustical specialist will conduct a field study of Units 1 and 2 to identify additional and reasonable, cost-effective mitigation measures that could be implemented with the construction of Units 3 and 4 to further reduce project noise.

**Who will GHE have to answer questions during the EFSEC meetings?**

Mike Theriault and Mike Hankard will make a presentation on behalf of GHE at the meetings EFSEC has scheduled in July 2010. They will be available to answer questions.

Mike Theriault is President and Principal Consultant for Micheal Theriault Acoustics, Inc. and has more than 23 years of experience in acoustics. He specializes in combustion turbine noise control for the electric power industry. He has worked on more than 100 power projects, and has provided expert testimony on power plant noise issues throughout the country.

Mike Hankard is President and Principal Consultant for Hankard Environmental, Inc. and has more than 20 years of experience in acoustics. He specializes in the measurement and analysis of noise levels from industrial and transportation facilities.
Where can you find additional information?

More information about noise can be found in the following documents:

Application for Amendment 5 to the Site Certification Agreement, Section 4.1.1 (Oct. 30, 2009). Available on the EFSEC website at:
http://www.efsec.wa.gov/Satsop_Amend%205.shtml

Results of Noise Level Monitoring (Nov. 5, 2009). Available on the EFSEC website at: