

PRIVILEGED AND CONFIDENTIAL

MEMORANDUM

To: Devens Enterprise Commission
From: Michael Lannan, P.E. and Marc Wallace, QEP
Date: January 25, 2010
Subject: Devens Noise Policy and its Application to Evergreen Solar

Ref 3248

Executive Summary

The Devens Enterprise Commission (DEC) adopted Industrial Performance Standards for noise and vibration that were based upon existing standards promulgated by MassDEP, the APA, the EPA, and HUD. The DEC rules and regulations were adopted with the intent of protecting resident health and welfare while encouraging development in the Devens Regional Enterprise Zone (DREZ). The DEC standards are more conservative (i.e. more stringent) than the standards upon which they were based, especially as pertains to evening hours.

As part of the unified permitting process, Evergreen Solar hired an environmental consultant to perform a pre-construction noise assessment of its proposed Devens facility. This assessment asserted that the facility would be in compliance with applicable DEC standards. Unfortunately, after the Evergreen facility began operation, it became clear through numerous complaints from surrounding property owners and subsequent investigations by the DEC that the pre-construction assessment was either incomplete or did not accurately reflect the noise impacts of the facility, as built.

As a result, the DEC and Evergreen began an extensive and extraordinary process to address noise. Evergreen specified and ordered silencers and permanent enclosures for sound sources, while constructing temporary sound enclosures to address the concern in the interim. In addition to these operational changes, Evergreen made changes to their truck delivery schedule to further reduce noise impacts to the residential neighborhood. Permanent sound monitors were installed at a variety of locations to track sound levels at the facility and in residential areas. Sound sources that could not be enclosed were re-directed away from residences, and sound barriers were erected to block sound waves from affecting residential areas. New pumps were installed to eliminate loud, short-term noise exceedances. As silencers and permanent barriers were procured from vendors, they were installed to replace the temporary solutions already put in place. Ultimately, DEC was able to determine that Evergreen Solar is now in compliance with applicable regulations by measuring sound levels at the facility when background conditions were quietest.

While it is clear that some neighbors would like to see the continuous-monitoring program carried on indefinitely and with emphasis on “true” DREZ boundary, even those located in inaccessible wetlands, MassDEP guidance and scientific logic do not agree with this approach. Instead, the DEC will use the knowledge gained from the monitoring program thus far to ensure that Evergreen remains in compliance, while requiring the facility to modify operations when necessary to maintain compliance.

DEC Noise Rules: A Two-Pronged Approach

The stated purpose of the Devens Enterprise Commission (DEC) Industrial Performance Standards for noise and vibration is to “preclude or significantly mitigate conditions that could cause nuisance to any receptor within or without Devens Regional Enterprise Zone (herein referred to as Devens).”

This chapter goes on to state, “While it is the intent of 974 CMR 4.05 to provide a local complaint mechanism for receptors that might be experiencing nuisance from the generation of noise or vibration, it is recognized that complaints can often be minimized by identifying and acting upon potential problems before they become contentious.”

The DEC noise and vibration rules and regulations were based upon two separate components:

1. **The Incremental Limit(s):** Any project requiring air plan approval (i.e. air permit) in Massachusetts must at least comply with Massachusetts Department of Environmental Protection (MassDEP) Noise Regulations that require a maximum incremental increase in sound above background conditions, and
2. **The Absolute Limit(s):** The American Planning Association (APA), United States Environmental Protection Agency (EPA), and the United States Department of Housing and Urban Development (HUD) all suggest that there is a ceiling limit at which sound is widely considered acceptable, so including an upper bound sound limit would add further protection for the residents.

The DEC Incremental Noise Limit(s)

The MassDEP Noise Policy imposes site-specific allowable incremental increase above ambient.¹ “Ambient” is defined as the background A-weighted sound level that is exceeded 90% of the time, measured during equipment operating hours.² MassDEP’s approach defines a noise nuisance as occurring only if a steady-state condition (that is, an existing sound level that the population tacitly accepts) is significantly increased by more than 10 dBA. MassDEP’s incremental noise policy results in more stringent limits in quiet rural areas than in noisy urban locales.

The DEC noise rules and regulation in Chapter 4.05 were based on the MassDEP incremental noise policy. It was decided during development of the rules that it was in the best interest of all stakeholders to decrease the allowed increment for each project from 10 dBA to 5 dBA when considering impacts on residential lands both within Devens and at the Devens boundary. This lower limit reflects the presence of multiple potential noise sources in Devens, and a desire by the DEC to ensure that no single facility used too much of the available sound increase below the upper limit.

The DEC Absolute Noise Limit(s)

The DEC also wanted to include a ceiling limit to ensure that the adjacent residential area that is continually impacted by Army operations, rail yard activities, aircraft and normal residential activities

¹ MassDEP has summarized their Noise Policy as follows: “A noise source will be considered to be violating the Department’s noise regulation (310 CMR 7.10) if the source: 1) Increases the broadband sound level by more than 10 dB(A) above ambient, or 2) Produce a “pure tone” condition – when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.

² <http://www.mass.gov/dep/air/community/noise/s.pdf>

would not be adversely affected by the new facilities in Devens. The ceiling limit chosen is one that is based on the APA, EPA, and HUD definitions of acceptability.

The APA standards mention that the U.S. Department of Housing and Urban Development (HUD) residential sound guidelines consider a DNL of 65 dBA as acceptable.³ A DNL (Day Night Sound Level) is a 24-hour average sound level that assumes a 10-dBA penalty at night, from 10 p.m. to 7 a.m. The HUD DNL is a limit on average outdoor sound of 65 dBA daytime and 55 dBA at night.

The APA standards recommended in the Developing Noise and Land Use Compatibility Standards section⁴ go one step further and suggest a more protective residential standard is a DNL of 55 dBA, meaning daytime average sound levels no higher than 55 dBA and nighttime average sound levels no higher than 45 dBA. The U.S. Environmental Protection Agency (EPA) has also published residential guidelines on environmental sound levels to protect public health and welfare⁵. The EPA residential guidelines are designed to protect against: Hearing Loss – 70 dBA 24-hour L_{eq} and Outdoor Activity Interference and Annoyance – 55 dBA DNL. EPA observes that maintenance of an outdoor DNL not exceeding 55 dBA will permit normal speech communication and protect against sleep interference.

The DEC adopted noise regulations mirroring the APA recommendation of 55/45 dBA for day/night, but the DEC provided extra protection to residential areas by defining the nighttime period as beginning at 6 p.m. instead of 10 p.m. While an exceedance of the noise standard is not defined as a single loud event, but by an average sound level that exceeds the time-of-day standard, the DEC noise regulations apply at all times. The average sound from all of the facilities under DEC's jurisdiction must be below 55 dBA during daytime and below 45 dBA during nighttime.

Noise Considerations during Permitting and Operations

Many states and localities only address noise reactively, and only do so qualitatively. The DEC Industrial Performance Standards were developed to be both proactive and reactive.

1. **Proactive Noise Considerations:** New facilities require that potential noise is considered prior to construction. New, larger facilities must complete noise assessments to demonstrate how they plan to achieve compliance.
2. **Reactive Noise Considerations:** The DEC rules and regulations require compliance with noise limits during operation. If noise complaints are made, the DEC investigates to determine potential source or sources of complaints and requires a plan to meet compliance.

Numerical Noise Limits and Standards were developed to assist with proactive studies and reactive enforcement. Numerical limits were never intended as benchmarks for continuous monitoring. Continuous monitoring is not required by the MassDEP Noise Policy, APA standards, EPA, or HUD.

³ Jim Schwab, Industrial Performance Standards for a New Century: APA Planners Advisory Service Report Number 444, 1993 and American Planning Association, Planning and Urban Design Standards, 2006, p. 175

⁴ American Planning Association, Planning and Urban Design Standards, 2006, p. 176

⁵ U.S. EPA, Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety, Publication EPA-550/9-74-004, March, 1974.

The DEC Noise Regulations and Evergreen Solar

As part of the unified permitting process, Evergreen Solar employed CH2MHill's Portland, Oregon division to perform a noise assessment for their newly proposed facility in August, 2007. The CH2MHill noise assessment asserted that there would be no adverse noise impact from the construction or operation of the Evergreen solar panel manufacturing plant. The goal of a pre-construction assessment is to examine the existing conditions at the site of a proposed project. The lower the initial ambient condition, the more influence the facility will have in terms of an incremental noise increase. It is best to make a conservative background assumption so that the noise assessment remains valid for the quietest conditions.

Once the facility began operations, however, it was clear that the original noise assessment was inaccurate. At this point, the Evergreen Solar project became enforcement issue, subject to the Complaint and Enforcement Process.⁶ Compliance situations are not limited to only the quietest conditions: complaint-based compliance requires diagnostic response even during elevated ambient levels. Unfortunately, this complicates the compliance process, because it is often difficult to determine whether a facility is responsible for overall sound exceedances, or if the expected ambient sound level plus the facility allowance may have been exceeded as a result of louder-than-expected ambient sound.

CH2MHill's August 2007 noise assessment measured the lowest ambient daytime and nighttime conditions at a location on Dunroven Farm at 33 dBA during the night and 38 dBA during the day. If a measurement of ambient sound at Dunroven Farm during the day with the facility operating is less than 43 dBA (or 38 dBA at night), the facility is not exceeding its permit limit. If the measurement at the complaint location is over one of these thresholds, however, it is not necessarily due to the facility exceeding its allowable noise increment. This may not be welcome news to residential neighbors, but it is unfortunately a scientific fact.

There are two common ways to verify complaints. The first is to take measurements at the complaint location, with and without the facility operating; unfortunately, this is not feasible in the case of a facility that operates 24 hours per day and has a very detailed start-up and shut-down procedure. The second is to collect sound source data and compare it to source sound limits established to ensure compliance.

While continuous monitoring of facility sound is desired by some neighbors, nowhere in the DEC regulations is it mandated that a facility shall install quasi-permanent onsite sound meters to measure sound sources or install a complaint sound meter. Similarly, nowhere is it suggested that continuous monitoring is required to confirm sound levels after a complaint. This is because permanent and continuous sound measurements are not solutions by themselves: they do not distinguish between all the sources contributing to total sound measurements.

974 CMR 4.05, Item 2, Complaint and Enforcement, states: *"Upon receipt of a noise or vibration complaint from a receptor, the Building Inspector or other duly authorized Devens Enterprise Commission (DEC) official shall respond to said complaint and attempt, by means of circumstantial and field investigative evidence, to attribute the potential nuisance to a point source."* The DEC has been responding to complaints at the closest upland location at the nearest receptor, Dunroven Farm. There

⁶ 974 CMR 4.00 INDUSTRIAL PERFORMANCE STANDARDS AND GENERAL REGULATIONS Chapter 4.05 Noise and Vibration, Item 2, February 2003.

have been comments from the public that this location does not represent the proper fenceline⁷, as outlined in the DEC noise rules and regulations, and some neighbors have requested that measurements be taken at the actual fenceline boundary, which is located within wetlands. While the rules indeed state that the responder should report to the Devens perimeter boundary abutting a residential External Receptor, these rules also require that the responder be able to confirm or deny a complaint at this location. As discussed above, the DEC rules were based on the MassDEP Noise Policy, the intent of which is to protect dwellings and the useable portions of property.

MassDEP has clarified this very issue in the MassDEP “Noise Pollution Policy Interpretation”.⁸ This document states that “*Noise levels that exceed the criteria at the source’s property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10 U)*”. This means that a fenceline measurement is not absolute, or “*not necessarily...a violation*”. In other words, if property is not utilized to the fenceline, then a nuisance complaint must be taken at the boundary of the utilized area, and nuisances cannot be determined to exist in a non-utilized area. In this case, the DEC acknowledges that Dunroven Farm uses its property for the raising of animals, so the DEC located the sound meter at a conservative location with respect to the farm animals, and at the closest upland point that is in direct line with the facility’s sound sources: the most appropriate receptor location, nearest the facility within the portion of property that is actually in use.

Moreover, the DREZ boundary has not been surveyed, which makes it less clear where the exact location to setup a long-term monitor representing the fenceline should be. Additionally, attempts to collect sound measurements in the wetlands could negatively affect the overall monitoring results: noise instruments are highly sensitive to dampness, which can lead to failure and loss of data. High humidity can also affect the microphone, which could also adversely impact the measurements. In addition, the logistics of operating and maintaining a long-term meter in such an area over an extended period of time would also make more likely that the equipment could be damaged.

The enforcement of the DEC incremental limits should follow the MassDEP Noise Policy from which they are derived. It is clear from this interpretation that while measurements at the fenceline are necessary for those properties with usable land abutting the fenceline, the governing parameter for selecting a measurement location is that it be within utilized property. For all of the above reasons, it is inappropriate and inconsistent with MassDEP guidance to place the monitoring location at the actual fenceline boundary within the wetlands.

Reconsideration of the Long-Term Monitoring Protocol

Evergreen Solar’s noise consultant developed a continuous long-term monitoring protocol (December 3, 2009) after the president of the firm met with local residents and promised to go above and beyond to ensure that they are a good neighbor. Evergreen promised a monitoring program to demonstrate that the facility was reducing its sound output and that it would continue to reduce its output until it was in compliance. While this approach clearly goes well beyond standard practice for confirming and denying a complaint, it was considered a good-faith gesture that would allow the facility to quickly identify a change in sound and make adjustments, hopefully before noise was raised to complaint levels. The program also had the side benefit of demonstrating that not all noise identified in the neighborhood was

⁷ Fenceline is defined as Devens Regional Enterprise Zone (DREZ property boundary).

⁸ See <http://www.mass.gov/dep/air/laws/noisepol.htm>.

attributable to Evergreen Solar, and therefore Devens. Rail activities and other sources outside of the control of the DEC were clearly adding to the neighborhood sound level.

Evergreen Solar's noise consultant developed the continuous long term measurement protocol as a requirement of the July 14, 2009 noise resolution adopted by the DEC. The idea was simple: Measure the loudest sources at Evergreen Solar that are responsible for most of the noise, and then measure noise in the neighborhood and at the facility continuously. The goal was to track, or back into, an acceptable sound at Evergreen Solar during the quietest conditions. The two measurement points at Evergreen Solar are referred to as R5 and R7, and the neighborhood location is R1. This plan worked well, and it was determined that during quiet daytime conditions R5 and R7 could be 66 dBA and 61 dBA, respectively, and during quiet nighttime conditions R5 and R7 could be 61 dBA and 56 dBA, respectively. Today, as long as measurements at R5 and R7 are less than 66/61 dBA and 61/56 dBA, respectively, the facility demonstrates compliance at R1. As long as the R5 and R7 levels are below those specified, any elevated noise in the neighborhood must be from another source.

R1 is no longer necessary for calibration now that the sound levels that assure compliance of Evergreen Solar at microphones R5 and R7 are known. Given that there has been opposition to the location of R1, it should be removed. Furthermore, over the next few months calibration of R5 and R7 and local sound power measurement locations should be made so that eventually these continuous monitors can be replaced with a standard complaint, and discreet monitoring program as typically applied. In the meantime, R5 and R7 will continue to demonstrate compliance and also be used by Evergreen Solar to better understand and to obtain instant feedback of their sound output.