



June 15, 2009

To: Devens Enterprise Commission

From: Evergreen Solar, Inc.

Subject: Noise Compliance Plan

This noise compliance plan is being presented to the Devens Enterprise Commission by Evergreen Solar Inc. This plan was developed based on the findings within the 'Facility Noise Analysis' conducted by Modeling Specialties dated June 1, 2009.

Although the 'Facility Noise Analysis' is an Interim Release and does not include complete results of Sound Level Modeling, Modeling Specialties believes it has identified sources that are "significantly contributing to the offending sound levels" and refers to these sources as 'First Tier' sources. Evergreen Solar is committed to resolving these issues as soon as possible and is presenting this plan based on this interim release document.

The plan includes mitigation for all 'First Tier' noise sources identified in the 'Facility Noise Analysis'. Further noise analysis will need to take place after the First Tier sources have been mitigated to determine what Second Tier sources will need mitigation. Once all first tiers expected noise mitigation results are understood second tier noise evaluations will take place. It is Evergreen Solar's intention to pursue anticipated tier 2 noise sources while tier 1 mitigation is ongoing.

The 'Facility Noise Analysis' indicates that the facility is 9dba over the standard at the property line. The recommended reduction level is 15dba and this is Evergreen Solar's target. The 'Facility Noise Analysis' provides an overview of the definition of decibels, dba and common noise source sound levels.

This document addresses each of the First Tier noise sources, the proposed solutions and expected completion dates.

Evergreen has committed a full time project manager, Brian LaValley, to this issue until it is resolved. The project manager also has the following resources for support; Vice President of World Wide Operations, Vice President of Construction Management, Devens Plant Manager, Devens Facility Manager, Modeling Specialties sound expert, CH2M Hill engineering firm resources, Turner Construction resources and the full support of the Evergreen Solar Process, Equipment and Facility engineers.

## First Tier noise sources

### 1. Process Gas Deliveries:

Parts of the manufacturing operations at Evergreen Solar require process gasses. Some of these process gasses include Nitrogen and Argon. These process gasses are stored in tanks on the south side of the facility. There are frequent deliveries to replenish the storage tanks. The deliveries are handled by tanker trucks which use an on-board, high-pressure delivery system, (325-375 psi). The hydraulic pump used for the delivery system requires the truck portion of the tanker to be running during the delivery process. The sound of the engine, engine exhaust, hydraulic pump noise and the actual off loading of material create an 110dba noise source as recorded 9 yards from the truck. See Figure 1 and the 'Facility Noise Analysis' report for further details.

#### a. Long-Term Solution

The long-term solution, (approx. 10 weeks), has been identified. The solution is to install 2 ground mounted pumps, one for Nitrogen and one for Argon, that will be encased in sound treated enclosures. The PO for this work was received by the vendor on Tuesday June 9<sup>th</sup>. The vendor has started the procurement process for the materials and equipment needed to complete the installation. The target date for installation completion is Friday August 21<sup>st</sup>. Evergreen is actively pursuing opportunities to help expedite this solution with the vendor.

#### b. Short-Term Solution

There are several considerations that needed evaluation regarding the proposed concept sketch in the 'Facility Noise Analysis', safety, effectiveness and timeliness. To insure safety the design would have to be engineered by a structural engineering firm and to insure the effectiveness the shelter design would have to be reviewed and approved by a sound engineer.

Upon further review by Modeling Specialties the proposed 'Concept Sketch' of a shelter for the tank unloading process, as depicted in the 'Facility Noise Analysis', is not a viable option for a short-term solution. Regardless of the design, engineering and construction time for a shelter, this would not address the entire problem. There are 3 separate delivery areas, 1 for nitrogen and 2 for argon. Constructing 3 separate shelters would impede access to the delivery gates and the tanker truck entrance and egress routes. Therefore other options that can potentially be executed in a timelier manner will be explored.

Temporary wall structures on the residential side of the facility between the access road and Cold Spring Brook were explored. Based on data modeled by Modeling Specialties for a wall to be effective it would need to be 48 feet high and 385 feet long, for obvious reasons this is not a valid short-term solution.

Working with the gas delivery company the delivery process was changed to a lower pressure delivery, (200 psi), initial results indicate the decibel level was not significantly reduced only the dominant frequency changed. The intention was to monitor this change for a few days and have Modeling Specialties compare data. However the neighbors feel this frequency change is worse than the higher pressure delivery and it maybe aborted at the neighbors' request.

During conversations with the neighbors at 62 Old Mill Road on Friday June 12<sup>th</sup>, it was agreed to investigate the possibility of installing scaffolding next to the tanker delivery area. This will need to be reviewed for safety considerations and with the process gas company for delivery considerations.

Another option that will be explored is Noise Cancellation Technology (NCT); this is the technology that basically introduces an ‘opposite’ sound wave between the source and the receiver, effectively cancelling the offending noise. Modeling Specialties will provide contacts for companies that specialize in this technology on Monday June 15<sup>th</sup>.

Modeling Specialties does not believe that this issue is well suited for NCT or that an ‘undersize’ wall will have a discernible effect for Evergreen Solar’s neighbors. However we will pursue these avenues in the interest of due diligence and our sincere desire to determine and avail ourselves of any available solution to improve noise levels for our neighbors.

## 2. Thermal Oxidizer Blowers

The Thermal Oxidizer blowers are part of the Volatile Organic Compound (VOC) scrubber system. The VOC system requires large volumes of air to meet manufacturing requirements and has 3 separate Regenerative Thermal Oxidizer (RTO) units as part of the system. Each RTO unit has a process blower and a combustion blower. Blowers consist of a motor and fan, and are a 106dba sound level as measured at the source. See figure 2.

### a. Process Blowers

The ‘Facility Noise Analysis’ report recommends custom enclosures at each blower. Custom enclosure construction started on Monday June 8<sup>th</sup> and the first enclosure was structurally completed on Friday June 12<sup>th</sup>. (See Figure 3) The second enclosure was started on Wednesday June 10<sup>th</sup>, see figure 4, and the 3<sup>rd</sup> is anticipated to be started by Tuesday June 16<sup>th</sup>. Sound blocking material selection for the enclosures was finalized on Friday June 12<sup>th</sup> and the procurement process is underway. The completion target date for all 3 enclosures is July 10<sup>th</sup>, at the current rate of progress we expect to complete this action item ahead of schedule.

### b. Combustion Blowers

The combustion blowers have had sound blocking material applied to them as a short-term fix. The long-term solution is to purchase and install custom enclosures. The enclosure design and specifications have been received, reviewed and approved. The procurement process was started on Thursday June 11<sup>th</sup> and the vendor has quoted a 6-week lead time. The target completion date is July 17<sup>th</sup>.

## 3. Thermal Oxidizer Exhaust

As stated in section two the Thermal Oxidizer is part of the Volatile Organic Compound (VOC) scrubber system. The VOC system requires large volumes of air to meet manufacturing requirements and has 3 separate Regenerative Thermal Oxidizer (RTO) units as part of the system. Each Regenerative Thermal Oxidizer (RTO) unit has a process exhaust stack that generates 106dba sound levels at the source. (See figure 5)

The recommended solution for the RTO exhaust stack is to install engineered exhaust stack attenuators. An engineering design firm was brought on site Tuesday June 9<sup>th</sup> to make an evaluation, take measurements and provide a quote. The quote was received on Friday June 12<sup>th</sup> and is currently under review, if all criteria are met we anticipate starting the procurement process on Wednesday June 17<sup>th</sup>.

## 4. Cooling Tower Intake

Cooling Towers are used to provide cooling to chiller units, which provide chilled air to air handling units for comfort cooling within the facility. Cooling Towers are used primarily during the warm months/seasons. The Evergreen Solar facility has nine cooling towers located on the south side of the building. The configuration of the nine units is in two rows, phase 1 which has 5 towers and is located closer to the building and phase 2 which has 4 towers which are located in front of the phase 1 towers and between the residential property line.

The phase two towers have air intake attenuators or silencers installed on the southern exposures. None of the phase one towers have intake silencers installed because they were not anticipated to be needed due to the location of the phase two towers. 1 of the 5 towers scheduled to be installed as part of the phase two towers was removed from the engineering plan which has left a phase one tower with a non-silenced face exposed to the south. This tower is the unit which will have a silencer installed. Figure 6 shows 2 of the 4 phase two towers with air intake silencers installed and a partial view of a phase one tower and the tower which requires the air intake silencer. Sound level measurements for the air intake without silencers are 100dba and with silencers are 79dba.

The silencers are custom built and have long lead times. The vendor quote and spec has been received and is under review, we anticipate the procurement process to start by June 15<sup>th</sup>. The lead time is 10-12 weeks and the target installation date is September 4<sup>th</sup>. Evergreen Solar will pursue opportunities to expedite the installation process.

#### 5. Cooling Tower Discharge

As stated above Cooling Towers are used to provide cooling to chiller units, which provide chilled air to air handling units for comfort cooling within the facility. Cooling Towers are used primarily during the warm months/seasons. The Evergreen Solar facility has nine cooling towers located on the south side of the building. Cooling towers draw in ambient air from two sides and exhaust/discharge the air out the top of the unit. The inset in figure 6 shows the top view of a cooling tower.

The discharge air measured at individual units was measured at 105dba. In order to mitigate this noise level air discharge attenuators will need to be installed on all 9 units.

A proposal was received from the cooling tower manufacturer and the data provided was modeled by Modeling Specialties. The model data revealed the proposed solution was not adequate.

The vendor will supply new model data, based on higher air discharge attenuators, on Monday June 12<sup>th</sup> for evaluation by Modeling Specialties.

When the appropriate solution has been identified the procurement process will start. We anticipate a solution by Wednesday June 17<sup>th</sup>.

The anticipated lead time is 10 -12 weeks and the target installation date is September 4<sup>th</sup>. Evergreen Solar will pursue opportunities to expedite the installation process.

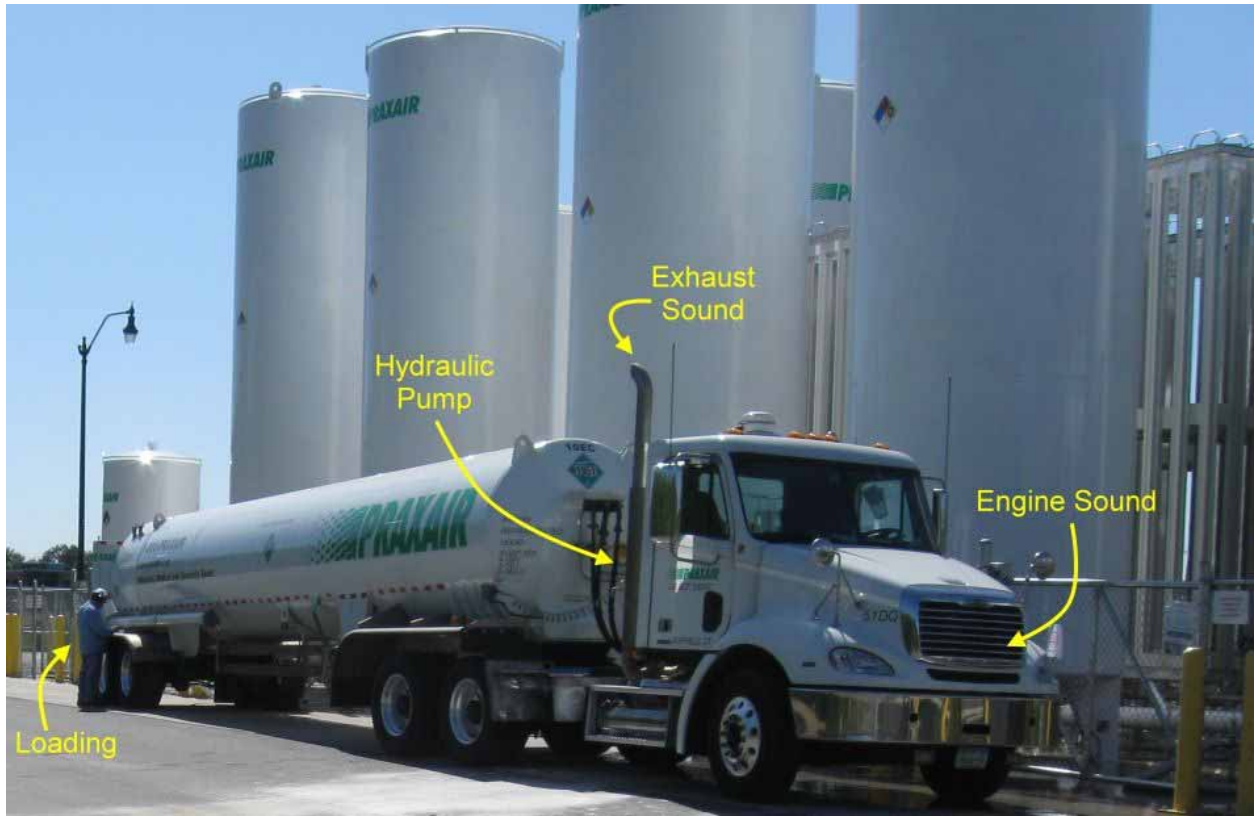


Figure 1



**Figure 2**



**Figure 3**



**Figure 4**



**Figure 5**

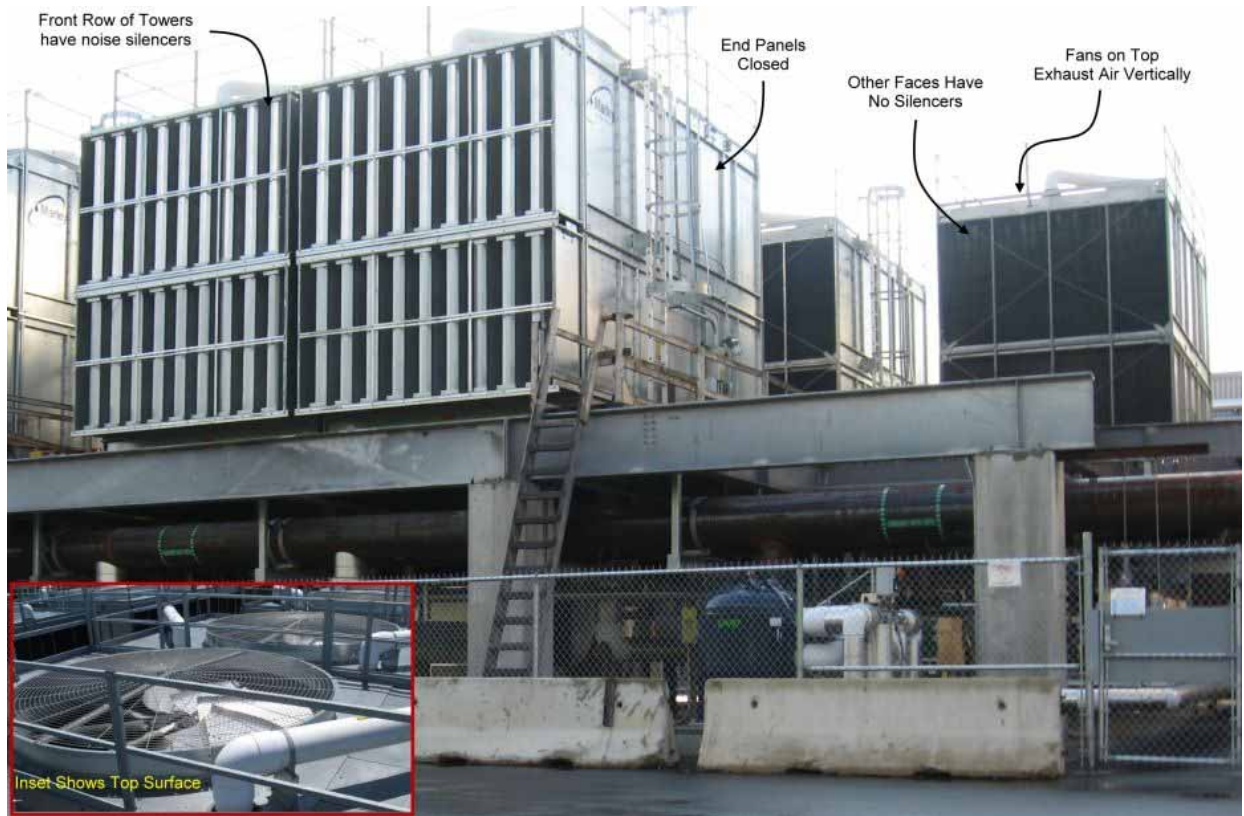


Figure 6