



Date: 9/25/09  
 To: **Peter Lowitt**  
 Cc: Neil Angus  
 From: Doug Sheadel  
 RE: Review of the Devens Ambient Levels and Sources

Peter,

At your request, I have canvassed the Devens Industrial Area off Barnum, Saratoga and Independence (the West Rail Industrial Park and the Barnum Road Industrial Park) to identify daytime and nighttime sources that contribute to the ambient noise levels at Devens locations and potentially in neighboring communities. These sources along with traffic on local roadways, construction activities, aircraft, sounds from nature and neighborhood activities represent the ambient backdrop for any analysis of specific sources like Evergreen's operation. Ambient surveys are typically based on conditions that produce quiet conditions for an area. This involves some screening of conditions such as conducting the study when there is little or no wind, no rain and dry roads. In Massachusetts, the baseline levels are based on the L90 statistical metric that eliminates most (90%) of the highest moment-to-moment sound levels. In this way, the ambient study identifies the background levels for an area.

CH2MHill's initial noise report identified ambient sound levels prior to construction of the Evergreen Solar facility. The results of their survey at 62 Old Mill Road are shown in Table 3 from their report.

Table 3 from CH2MHill Noise Report  
 Summary of Continuous Noise Measurements at Noise Monitoring Site M2, 62 Old Mill Road

Date	Start Time	L <sub>eq</sub>	L <sub>50</sub>	L <sub>90</sub>	Date	Time	L <sub>eq</sub>	L <sub>50</sub>	L <sub>90</sub>
7/11/07	13:00	47	44	41	7/12/07	2:00	45	43	40
7/11/07	14:00	55	44	41	7/12/07	3:00	44	43	40
7/11/07	15:00	45	46	41	7/12/07	4:00	46	42	40
7/11/07	16:00	43	42	39	7/12/07	5:00	47	43	41
7/11/07	17:00	42	41	38	7/12/07	6:00	45	45	43
7/11/07	18:00	39	39	35	7/12/07	7:00	49	45	42
7/11/07	19:00	38	36	33	7/12/07	8:00	49	46	43
7/11/07	20:00	51	35	33	7/12/07	9:00	46	43	41
7/11/07	21:00	40	44	34	7/12/07	10:00	44	43	40
7/11/07	22:00	39	38	35	7/12/07	11:00	48	43	41
7/11/07	23:00	39	37	35	7/12/07	12:00	49	45	42
7/12/07	0:00	41	38	36	7/12/07	13:00	52	44	42
7/12/07	1:00	45	39	37					

Under their monitored conditions, the hourly daytime average (Leq) sound level fluctuated from 42 dBA to 55 dBA at the Dunroven Farm monitoring location. The statistical background level (L90) excludes 90 percent of the highest moment-to-moment sound levels, resulting in a daytime baseline of 38 dBA. The hourly average nighttime sound levels ranged from 38 dBA to 51 dBA. The L90 levels on that day ranged from 33 dBA to 41 dBA. . For these reasons, the ambient level in the area fluctuates from baseline levels (around 33 dBA) during the quietest conditions up to 41 dBA during other conditions of the same day. In the same way, this 2009 Devens ambient survey identifies both sources of steady sound and also sources of fluctuating sounds that establish the baseline sound levels. The L90 levels continue to fluctuate based on wind, weather and community conditions. Because of the late summer conditions, the measured A-weighted Levels are substantially affected by seasonal insects. Other short term sources continue to contribute energy that makes the average levels well above the ambient.

With this backdrop, the question is “What ambient sources at Devens are now contributing to the ambient sound field. This review is intended to provide an overview of Devens sources based on two daytime and three nighttime surveys under varying conditions. The scope of the study is limited to identifying the potential of other Devens sources that may be contributing to elevated ambient noise levels in the Devens Harvard area. Figure 1 shows an aerial overview of the West Rail and Barnum Road Industrial Parks. .

### **Nighttime Background Sources**

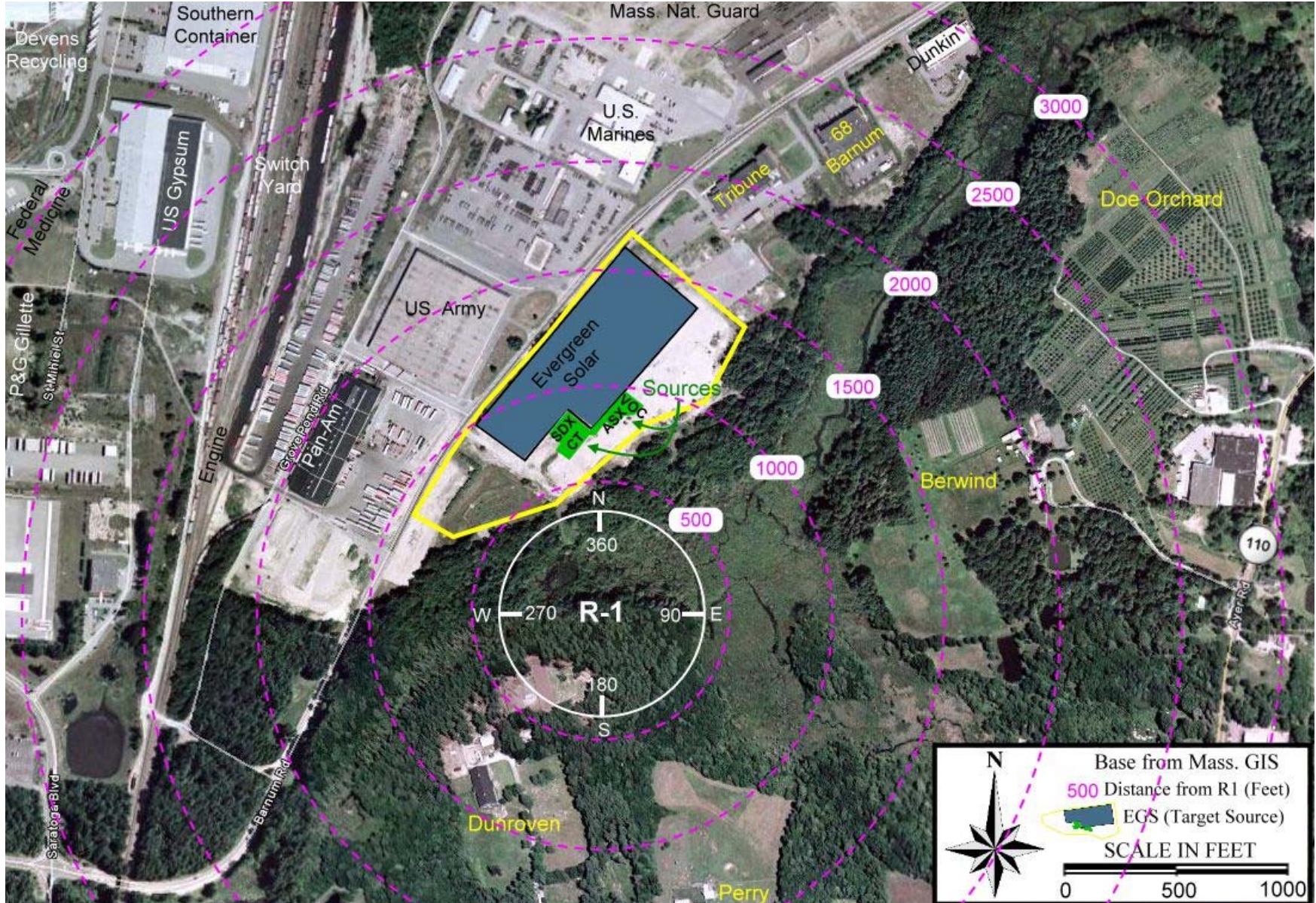
During the late night surveys at R1 there were noted HVAC sounds to the left of Evergreen. This is very likely either building mechanical sounds from some or all of the commercial and industrial buildings or it might have been a more distant source or a switch engine idling when it was located behind the Pan-Am or Magna Motion building. The sound may have been shielded in the direct path but reflected from the side of the commercial building to propagate toward the receptor.

Rock Tenn (formerly Southern Container) and US Gypsum are beyond the Pan-Am facility with respect to R1 receptor. The sounds they produce include trucking and loading with fork lifts and momentary sounds of bands breaking and boards dropping. The building mechanical and dust collector sound was noted both during the daytime and at night. But the loading activities were only noted during the daytime.

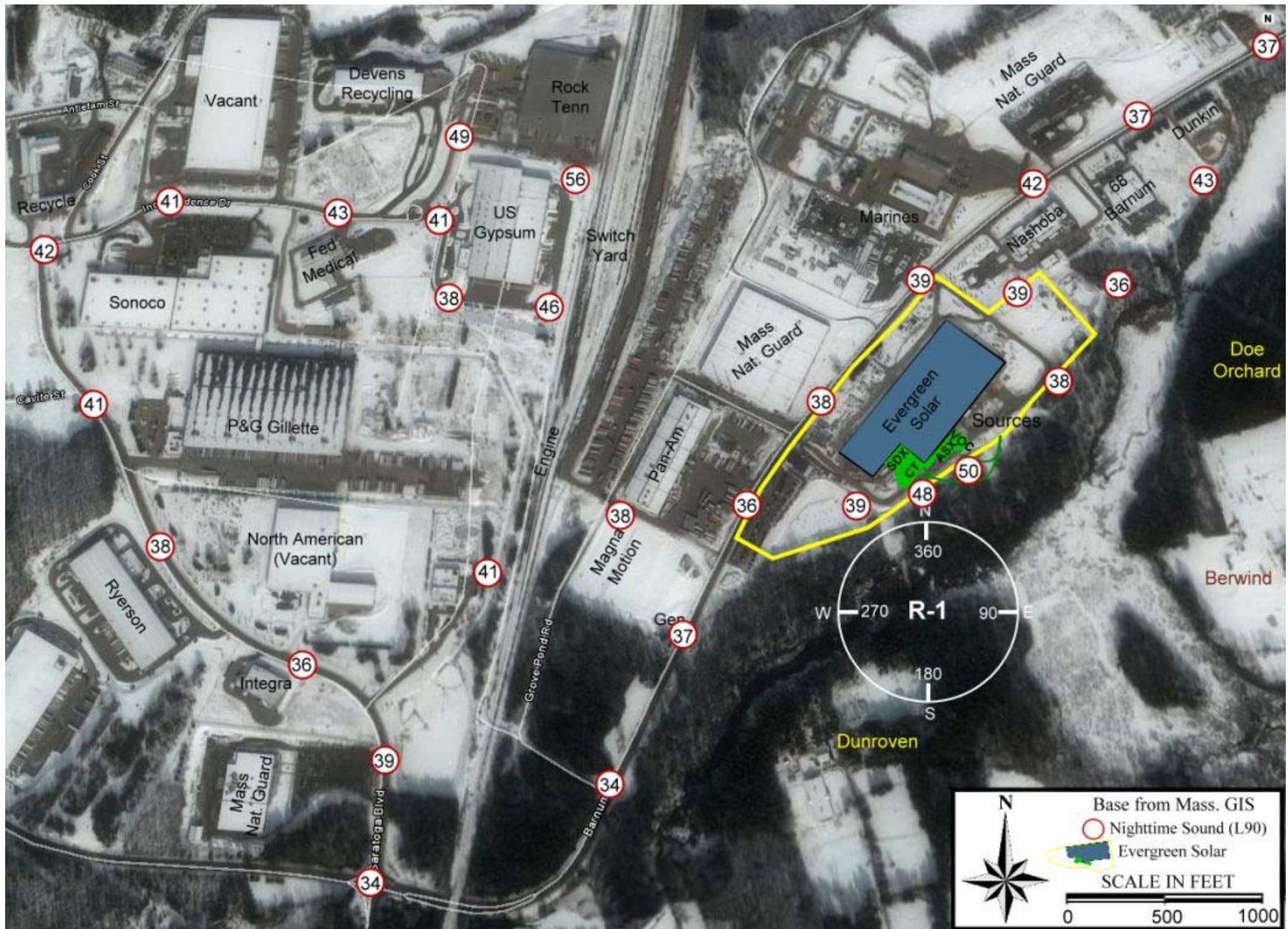
Devens Recycling produces significant sound during daytime work hours. But little of that sound is directed toward the south where it would affect the Harvard boundary. No nighttime sounds were noted at this facility.

The Federal medical facility has rooftop equipment including fans and blowers that operate during the daytime and at night. During one nighttime survey, its sources were substantially higher than other nighttime surveys. While the facility is far from the R1 receptor, this mechanical sound could contribute energy in the study area. But its broadband character and smooth operation would make it difficult to clearly distinguish in the distance when the sound is interacting with other ambient sources.

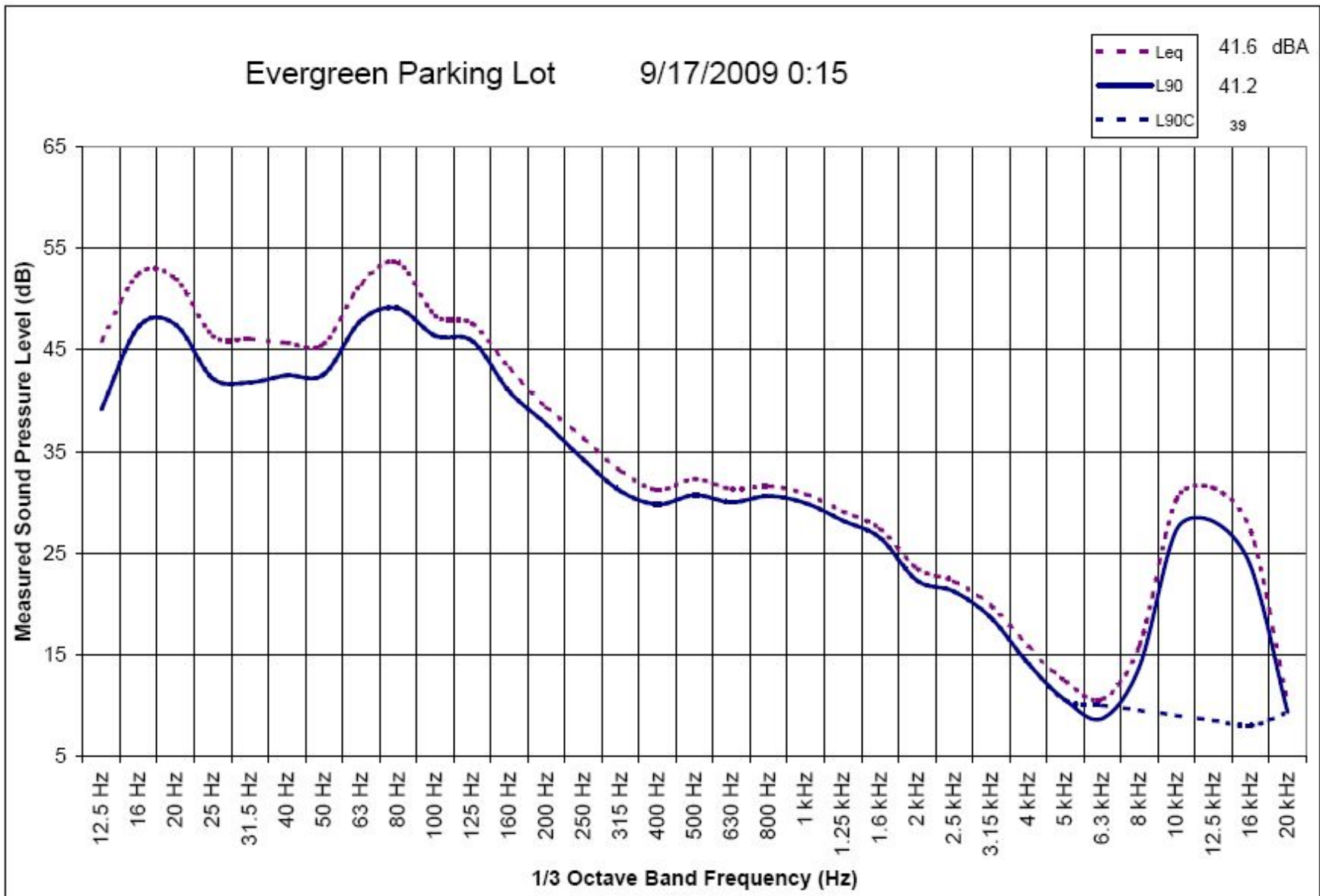
Dunkin Donuts has a single vent fan that can be distinguished at the property line beyond the walking path. It operated during the daytime and at night, but was noticeable only during the quietest hours of the night.



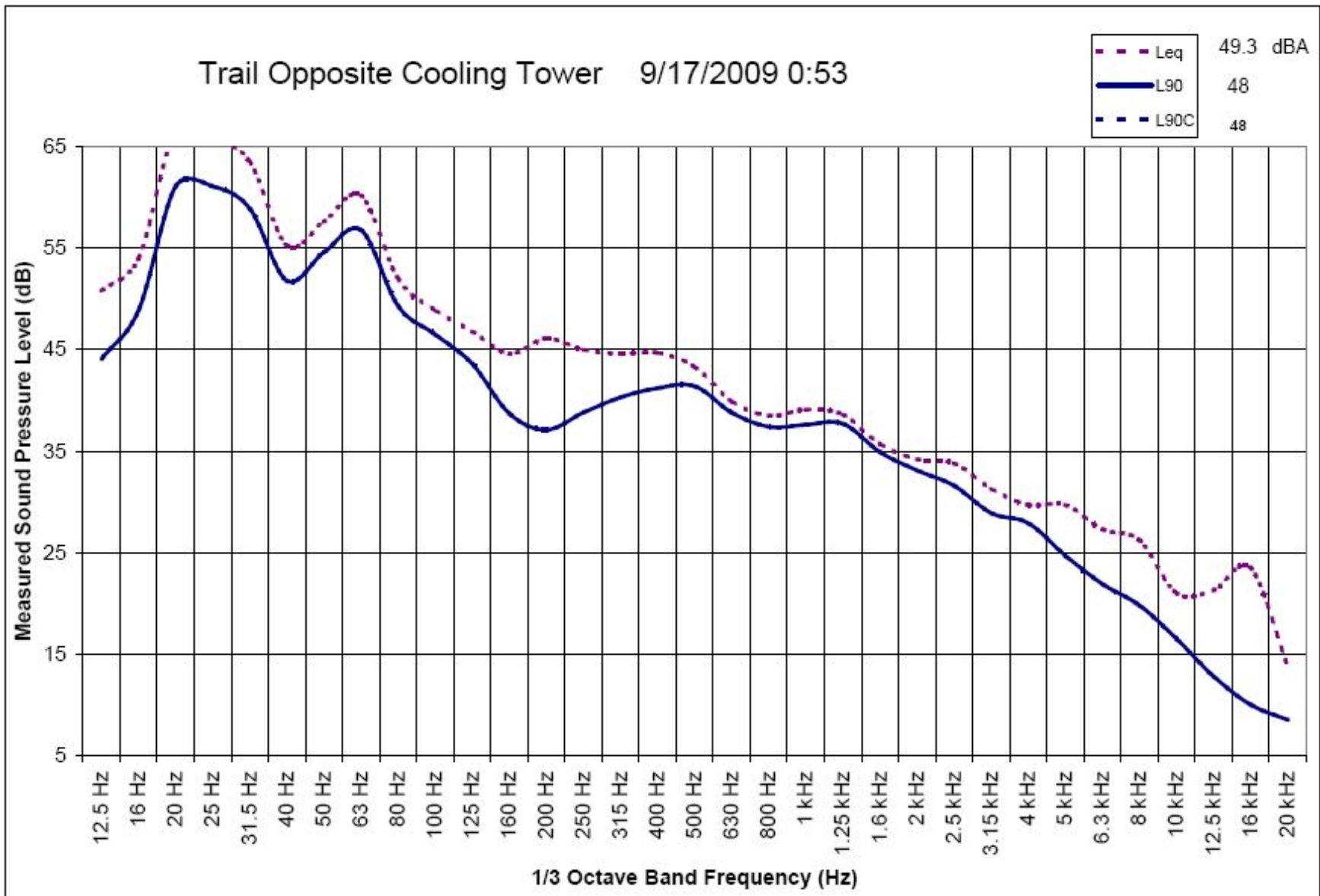
**Figure 1:** Graphical Orientation of the Measured Sources at Devens Compared to Community Locations



**Figure 2:** Graphical Summary of the A-Weighted Nighttime Sound Levels (Corrected to remove Insects)



**Figure 3:** Graphical Spectrum of the Measured Spectrum Showing the Correction for High Frequency Insect Sound



**Figure 4:** Graphical Spectrum of a Spectrum Showing Low Frequency Sound from the Evergreen Cooling Towers

## Trains, Trucks and Army Activities

There are widespread Devens facilities that have a potential to affect daytime sounds. Table 1 summarizes the sources that were identified in the survey to contribute to the ambient. Most facilities are supported by truck deliveries that can affect the sound levels both off their respective site and off-Devens. But this overview distinguishes between permanent facility sounds and related roadway truck sounds. Construction and demolition was clearly noted at the new Army training facility, but only during daytime surveys. None of the nighttime surveys identified any nighttime sounds from the Army, Marines or Mass. National Guard facilities. Trucks, especially when used in interstate commerce are regulated by federal standards and are not usually under the control of the local industry and are not subject to the DEC standards.

Trains in general are regulated by Federal Railroad Administration at 49 CFR 210 and 40 CFR 201. Regulating facilities like Pan-Am is challenging because there are separate federal regulations for the trucking side, the train side and for Intermodal facilities. Intermodal facilities involved with trains are not subject to DEC regulations or standards. Train movements, switching, horns and loading activities were noted at Pan-Am both during the daytime and at night. Between two of the survey nights, there was noted a huge variation in nighttime train activities. Some of the difference may be related to the varying levels of train operations between a Sunday night and Thursday night survey condition.

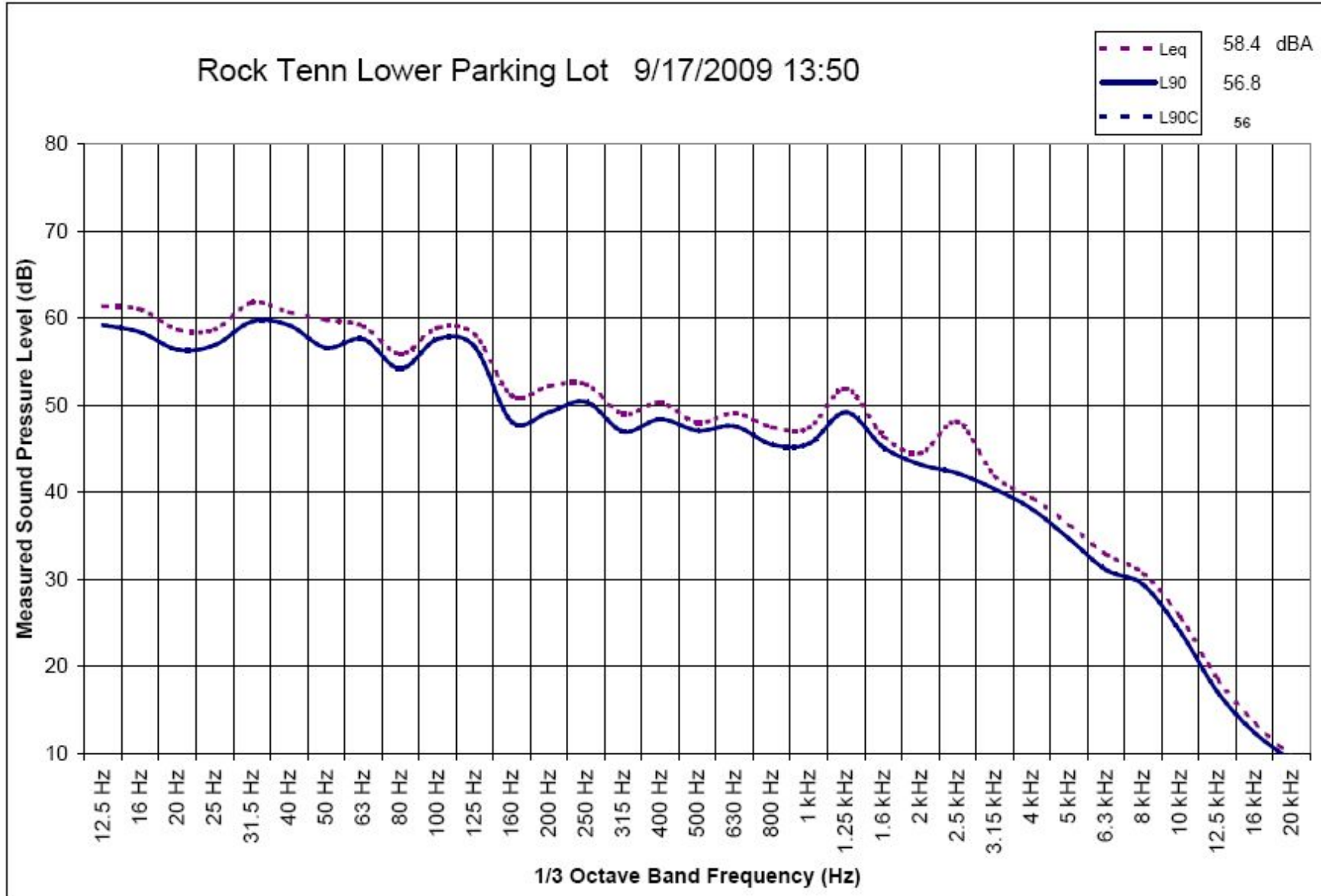
The US Army and National Guard activities are not regulated at the local level (974 CMR 4.05 (4)(b)(3)). The Army facility to the north of Evergreen Solar is currently in active construction of a new facility. Based on street side observations, much of the demolition, foundations and steel erection are complete. These phases of construction tend to produce the highest sound intrusions because of the heavy equipment necessary for their completion.

**Table 1: Summary of Identified Sources at Devens Industrial Park**

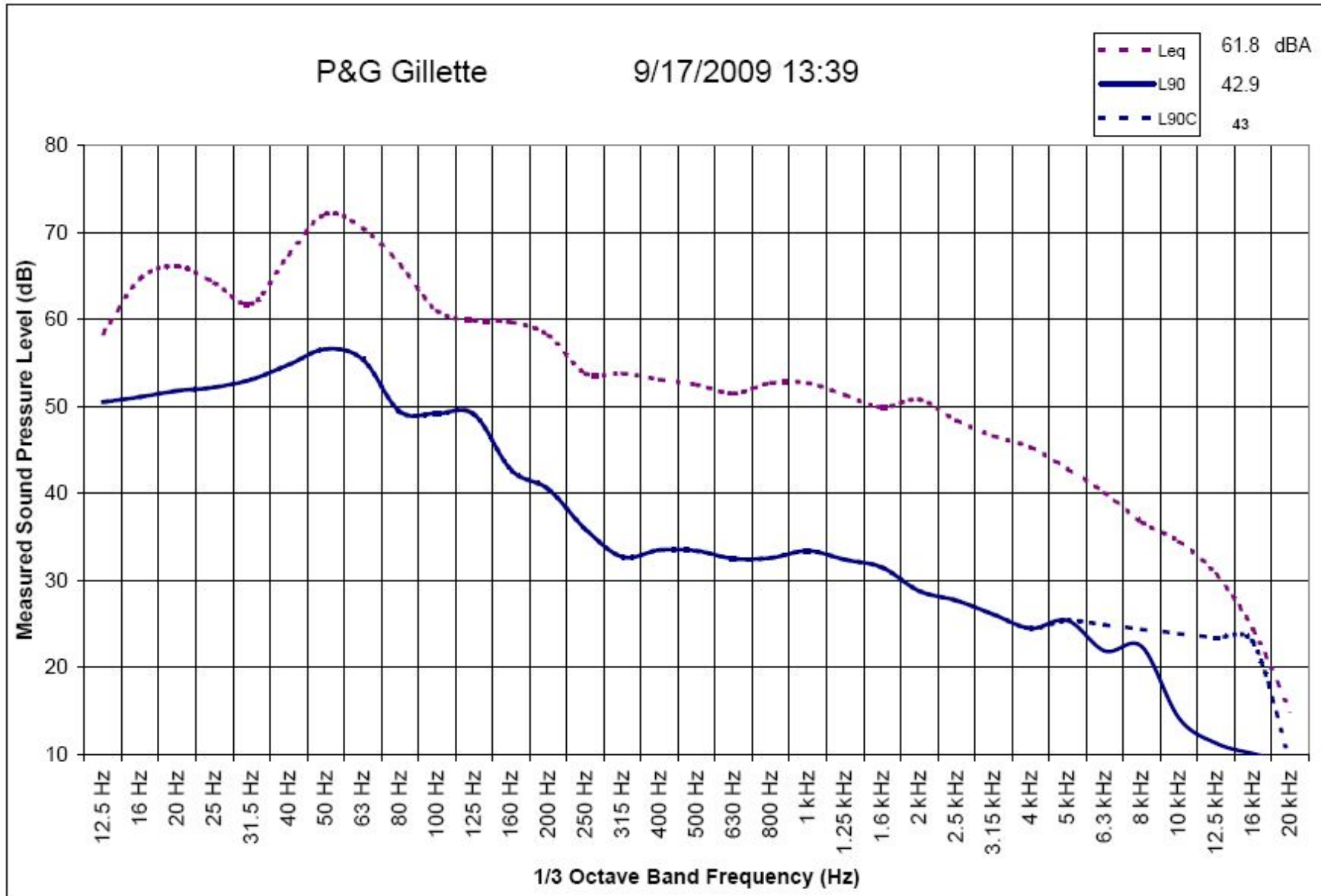
Source Description	Distance (ft) from R-1	Day/Ngt	Sources Identified
Pan Am Building	1375	D/N	Building Mechanical
Pan Am Switch Engine	1700	D/N	Low frequency from Switch Engine
Pan Am Rail Yard	2500-5500	D/N	Engines, train movement and coupling
Corporate Office Building	1300	D/N	Rooftop Mechanical
Water Department Generator	1300	--	No operation observed
US Gypsum	2560	D	Fork trucks w/beepers, trucks, mechanical
Southern Container	3050	D	Trucks, equipment, dust collector, loading
Devens Recycling	3750	D	Trucks, loaders, equipment
Federal Medical	3500	D/N	Rooftop mechanical day and night
Sonoco	4100	D/N	Worker traffic, rooftop mechanical
P&G Gillette	3000	D	Trucking
Trucking Facility	3000	D	Trucking
US Army	1250	D	Construction
Marines	1920	--	None
Massachusetts Nat. Guard	2575	--	None
Nashoba Publications	1950	D/N	Building Mechanical (slight sound)
68 Barnum Rd	2320	D/N	Building Mechanical (slight sound)
Dunkin' Donuts	2960	D/N	Vent fan, Building Mechanical
Cold Storage for Apples	4320	D/N	Chiller, trucking, loading

Figure 5 shows a summary of the A-weighted sound levels across the Industrial Park areas. Some of the sounds have a steady character and other types of sources have a fluctuating character as shown in Figures 6 and 7. Note the dramatic difference in distance between the Graphed Leq curve and the L90 curve when the sound fluctuates.





**Figure 6:** Graphical Spectrum of the Rock Tenn Source Measured Near the Building  
 Little Variation between the Leq and L90 Indicates being Dominated by Sound with a Steady Character



**Figure 7:** Graphical Spectrum of the Saratoga Blvd Sources Measured Near the P&G Gillette Driveway  
 Large Variation between the Leq and L90 Indicates being Dominated by Sound with a Fluctuating Character

Devens noise sources will contribute to the ambient sound field at R1, but the amount they contribute is based on their respective sound level and their distance from that receptor. Received noise is reduced by 6 dB for every doubling of distance to the source, so the more distant the source, the less potential effect on the Harvard sound levels. The highest sound levels noted are from the trains, Rock Tenn and otherwise from the Pan-Am Intermodal facility. The train sounds include engine operation, train movement, switching and coupling sounds. Even when no switching activities are under way, the switch engine tends to idle at the southern end of the switchyard. The frequency character of the idling switch engine is low frequency (~20 Hz). Other intermodal activities are essentially loading, unloading and trucking sounds and include backup beepers. These sounds can be noted from observations at R1, especially when they occur at night.

Several sources of note are shown as frequency spectrum curves in Figures 8 9 and 10. The Construction sounds fluctuate based on the specific activity and location of the activity. In a similar way, the train intrusion depends heavily on the specific location of the engine, the load on the engine and whether it is shielded by the intervening buildings.

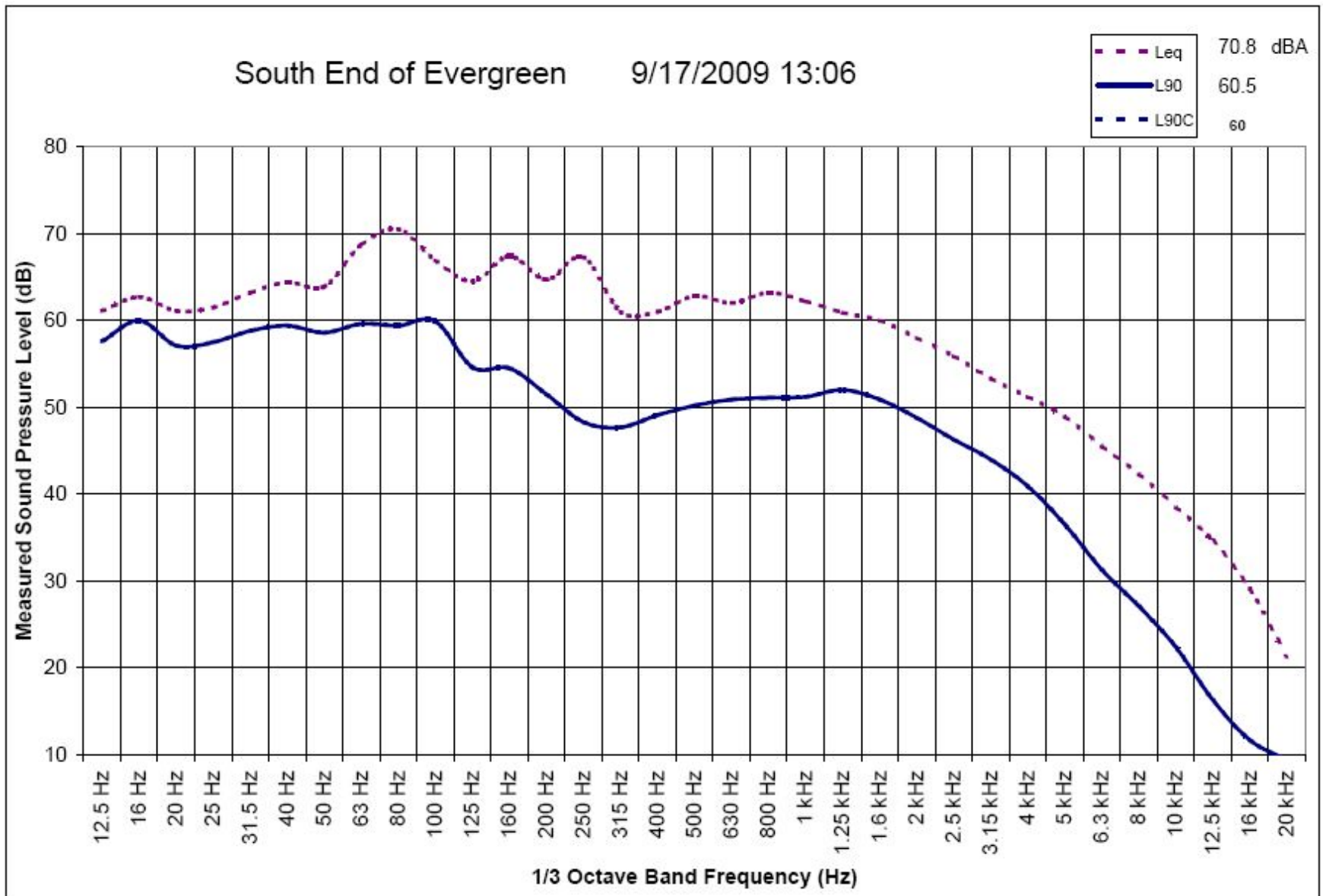
### **Conclusions**

As a result of these observations and measurements, Modeling Specialties was able to identify the Devens sources that contribute to the ambient sound levels. During the night, many facilities operate rooftop mechanical equipment that produces modest sound that fluctuates by season. During the night, the Evergreen facility, trains and the Rock Tenn facility contribute more sound that can dominate the nighttime ambient sound in their respective parts of the Industrial Park area. The nighttime levels are routinely in the upper 30's or the low 40's dBA with occasional intrusions. Those intrusions are often clearly identified when noted in a survey. Daytime levels tend to be dominated by sources like construction activities, trucking, trains and traffic. Daytime levels occasionally are noted in the mid 50's, but generally remain in the 40's dBA. Based on a comparison of the current Devens levels and the ambient sound levels measured by CH2MHill to establish the baseline, the existing levels are similar to the measured baseline levels at most locations.

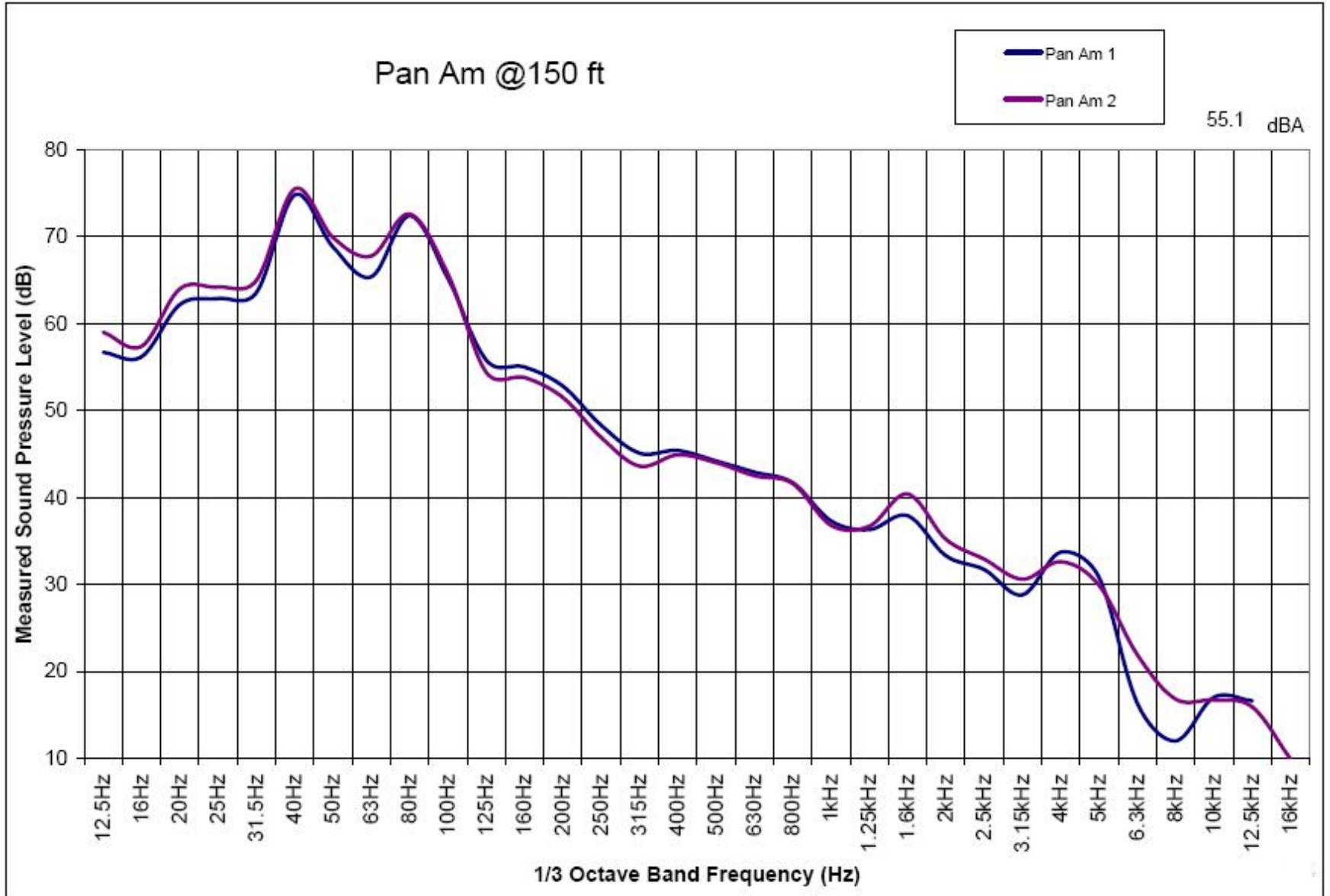
Sincerely,  
Modeling Specialties,



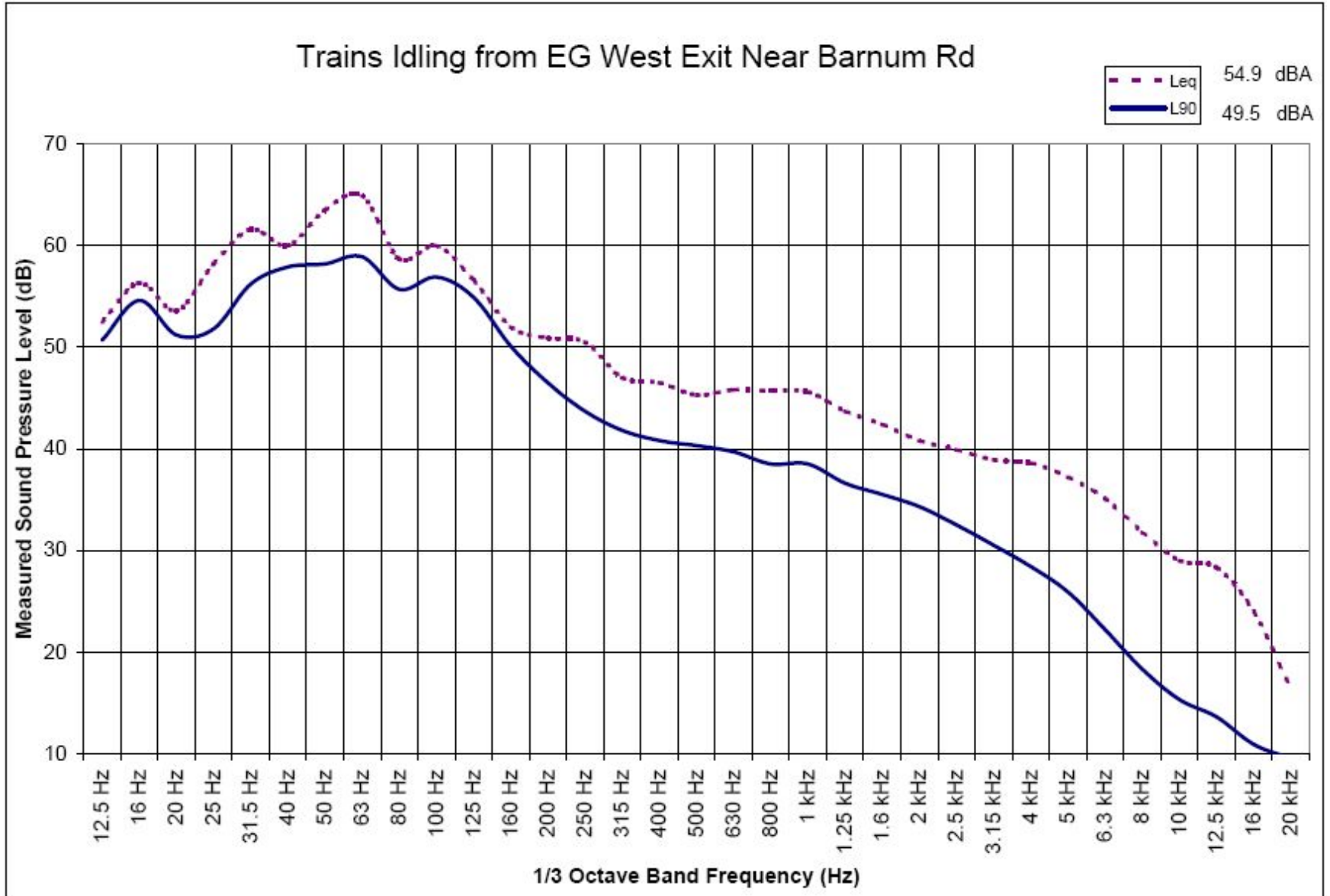
Douglas L Sheadel  
Principal Scientist



**Figure 8:** Graphical Spectrum of the A-Weighted Daytime Construction Sound Levels along Barnum Road



**Figure 9:** Graphical Spectrum of the Train Idling Sound at a Distance of Approximately 15 feet



**Figure 10:** Graphical Spectrum of the Train Idling Sound at a Distance of Approximately 1000 feet