

NOISE EVALUATION
ALLIED RECYCLING
SOUTHAMPTON TOWNSHIP
BURLINGTON COUNTY
NEW JERSEY

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Prepared By:

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Introduction

Allied Recycling is located on the north side of New Road in Southampton Township, Burlington County, New Jersey, west of Route 70 and east of Falcon Drive.

Litwornia Associates, Inc. has been retained by Allied Recycling to conduct an investigation into whether or not the site exceeds the maximum permissible noise level thresholds while operating, and to make any recommendations to mitigate the impacts of noise on the residential properties in the area.

Equipment Used

The noise level measurements were taken on September 12, 2014 with a Quest Technologies Model 2400 sound level meter, serial number JN5120045. This meter was inspected and re-calibrated by the manufacturer on August 12, 2014. The meter was equipped with a Type 2 preamplifier and microphone assembly and a windscreen.

The meter was calibrated prior to and after the measurements using a Quest Technologies Acoustical Calibrator, Model Number QC-10 with serial number QE5120032. This calibrator produced a sound pressure level of 114dB at 1000 Hz.

The wind was measured with a Dwyer wind meter. The wind was observed to be less than 5 mph from the west and the temperature was 70 degrees F at 9:00 a.m.

State Noise Criteria

The State of New Jersey sets forth criteria for maximum allowable noise generation levels in N.J.A.C. 7:29. These criteria specify that the A-weighted equivalent sound level (Leq) generated by a particular site as measured at a residential property line must not exceed 65 dBA between the hours of 7:00 a.m. and 10:00 p.m., and 50 dBA between the hours of 10:00 p.m. and 7:00 a.m. For adjacent commercial sites, the standard is 65 dBA at the property line all of the time. Figure 1 illustrates common examples of various sound pressure levels.

Since the hours of operation of the Allied Recycling facility activities on the site are within the daytime period of the State requirements, the hours of 7:00 a.m. and 10:00 p.m., there is no possibility that the site will cause an exceedance of the 50 dBA nighttime limit. A significant noise source exists in the form of traffic on New Road on which Allied Recycling fronts. It is the purpose of this investigation to determine the amount of noise that is attributable to the Allied Recycling site as well as from New Road, and to determine whether or not there are any violations of the State's requirements that are a direct result of operations on the site. The primary noise operation on-site consists of the motor vehicle car crusher previously used on-site, as well as the new car crusher equipment proposed to be used.

Background/Theory

Sound Units

Sound is the result of the periodic compression and decompression of air molecules due to the vibration of some object. The maximum pressure reached determines the intensity of the sound, and is termed the *sound pressure level*. The human ear is capable of detecting sound over an extremely large dynamic range including many orders of magnitude of sound pressure levels. For this reason, sound levels are most often measured in logarithmic units called decibels. The formula for decibels is given by:

$$dB = 10 \log \left(\frac{L}{L_0} \right)$$

where L is the quantity in question and L_0 is some reference quantity. In the case of sound level, the lowest or beginning reference level is the lower threshold of human hearing, or the quietest sound that most people are capable of hearing.

It is important to understand some properties of decibel units in order to interpret them properly. First, a sound level of 0dB does not mean the absence of sound altogether. Rather, it represents a sound level that is equal to the lowest audible sound level. A total absence of sound, measured in decibels, would be negative infinity.

Secondly, direct arithmetic manipulation may not be used with decibel values. In other words, decibel values may not be directly added or subtracted. A doubling of sound energy will cause a 3dB increase in sound level, not a doubling in decibels. For example, if a single sound source measures 50dB, then two identical sources, operating simultaneously will cause an overall sound level of 53dB, not 100dB.

Just as 3dB represents a doubling of sound energy, each 10dB represents a 10-fold increase in sound level. A sound with a level of 50dB has 10 times more energy than a sound with a level of 40dB, and a sound with a level of 60dB has 100 times more energy than the 40dB sound.

The following figure illustrates the sound level of common activities.

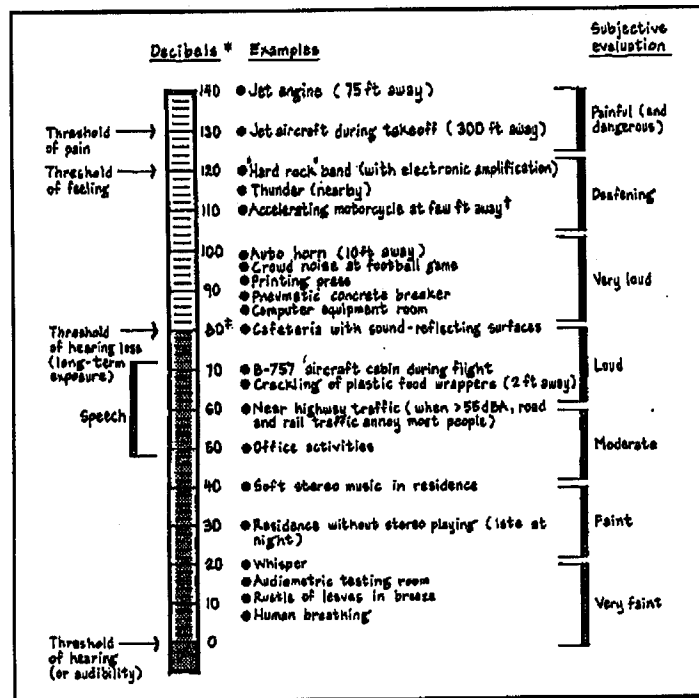


Figure 1: Sound Levels of Common Activities

Measuring Sound

Measuring the total sound level of a single source is very simple and accurate with an electronic sound level meter. It is very difficult, however, to isolate the contribution of a single sound source in an environment with multiple sources. The general method for doing so involves measuring the total sound level, including the source in question, and then comparing it with the neighborhood residual sound level. The residual sound level is that of all sources of sound, with the source in question off. Once the total and residual sound levels have been determined, the following formula may be used in order to determine the contribution of sound from the source in question:

$$\text{Source level [dB]} = 10 \log(10^{(\text{total sound level}/10)} - 10^{(\text{neighborhood residual}/10)})$$

In practice, the following table (Table 1) is often used. The value obtained in the right column for a given difference in the left column is subtracted from the total sound level, yielding the source level.

Table 1. Sound Level Adjustment Factors

Difference between Total and Residual Sound Levels	Quantity to be subtracted from the Total Sound Level
0.5 dB	9.6 dB
1.0 dB	7.0 dB
2.0 dB	4.0 dB
3.0 dB	3.0 dB
4.0 dB	1.8 dB
5.0 dB	1.6 dB
6.0 dB	1.2 dB
7.0 dB	1.0 dB
8.0 dB	0.75 dB
9.0 dB	0.6 dB
10.0 dB	0.5 dB
> 10.0 dB	0.0 dB

Sound Reading Locations

The sound levels were measured at 8 points in the residential areas in order to determine the sound level attributable to the highway and Allied's operation. A description of the locations of the 8 points where readings were taken follows:

Location 1 was located at the gate entering the Allied Recycling Facility off of New Road.

Location 2 was located at the right of way line on the south side of New Road opposite mailbox 435.

Location 3 was located at the catch basin on the south side of New Road opposite mailbox 439.

Location 4 was located on the south side of New Road opposite mailbox 443.

Location 5 was located on the north side of New Road in the backyard of the home at 448 New Road.

Location 6 was located on the north side of New Road and east of Falcon Drive in the backyard of the house at 1 Falcon Drive at the estimated property line.

Location 7 was located on the north side of New Road and east of Falcon Drive in the area of the fence projection furthest west from the Property in Question (PIQ).

Location 8 was located on the north side of New Road and east of Falcon Drive in the backyard of the house at 3 Falcon Drive at the estimated property line.

Results

The results of the readings are shown in Table 2.

Table 2.
Unadjusted Sound Readings (dBA)

<u>Location</u>	<u>Background</u>	<u>Highway</u>	<u>Background & New Equipment</u>	<u>Background & Old Equipment</u>
1	41.0-42.6	63.8	45.0-46.3	44.7-45.3
2	46.6-48.5	65.3-76.7	57.4-58.9	40.7-41.1
3	46.0-53.0	76.4-78.6	56.4-58.3	47.7-50.4
4	50.2-52.4	73.0	52.7-53.1	49.1-52.7
5	42.5-44.1	-	53.2-57.0	44.5-52.0
6	42.8-44.8	-	54.0-57.2	49.6-54.0
7	38.4-39.5	-	56.0-63.0	47.9-49.2
8	42.7-42.8	-	45.9-62.4	46.4-51.2

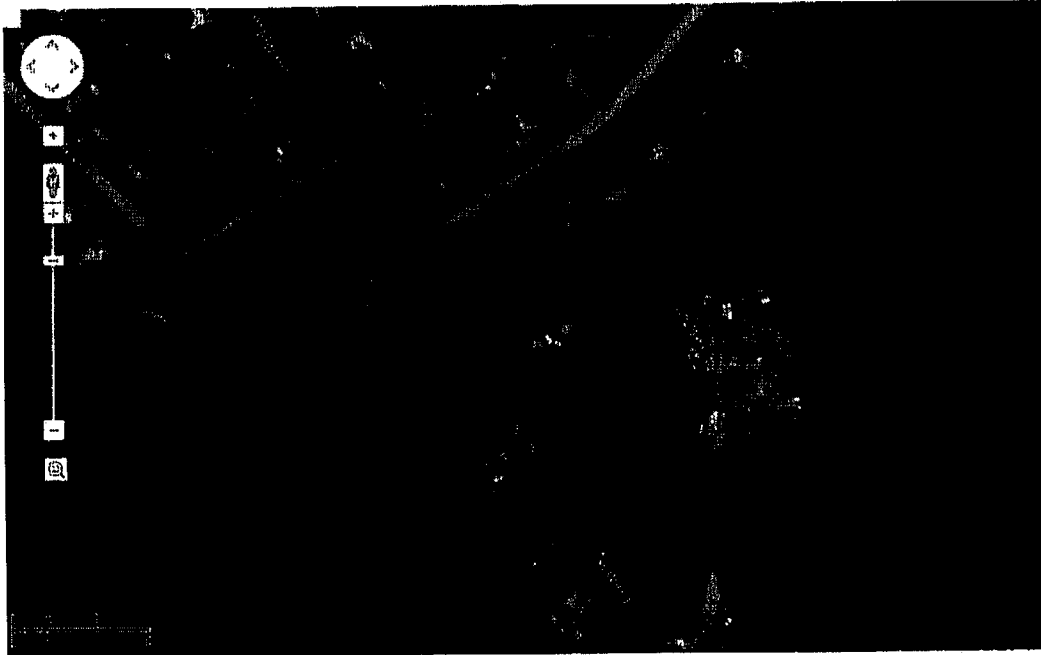


Figure 2: Measurement Locations

Conclusions

Our observations indicate that the site had no exceedances of the New Jersey noise criteria of 65dBA.

From these analyses, it is concluded that:

1. The site is not in violation of the noise statutes at the residential property lines.
2. The older equipment was quieter than the new equipment.
3. Along New Road, the highway noise (78.6 dBA) was much greater than the maximum noise emanating from the Allied Recycling site (58.9 dBA).
4. It is recommended that there be no use of heavy equipment between the hours of 10:00 p.m. and 7:00 a.m., since the noise standards are more conservative during nighttime conditions.