



**King County**

Department of Natural Resources and Parks  
**Solid Waste Division**

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PRELIMINARY SURVEY OF NOISE LEVELS IN  
THE VICINITY OF CEDAR HILLS REGIONAL  
LANDFILL

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March 2011



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Department of Natural Resources and Parks  
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March 2011

*Prepared for King County by:*  
AMEC Geomatrix, Inc.



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## GLOSSARY

**A-weighting:** A method of processing measured sound to reflect how audible that sound is to people. The measured sound pressure in each frequency composing the sound is adjusted by a weighting factor to match human hearing sensitivity to that frequency.

**A-weighted decibels (dBA):** The most-commonly used measure of noise exposure among people, which uses a logarithmic scale (the decibel) to represent a wide range of sound pressure levels.

**ambient noise levels:** The level of noise arising from all sources, as measured at a location.

**amplitude:** The range representing the height (from peak to valley) of the waves that comprise sound at a given frequency (distance between peaks).

**average (equivalent) sound level ( $L_{eq}$ ):** The constant sound level in a given time period that conveys the same sound energy as the actual time-varying sound.

**BEW:** Bio-Energy Washington

**CHRLF:** Cedar Hills Regional Landfill

**decibels (dB):** The sound level measured in decibels

**hertz:** The frequency from peak to peak of sound waves (in cycles per second)

**noise:** The intensity, duration and character of sounds from any or all sources.

**maximum permissible sound level limits:** The limits on noise levels at a receptor as established by King County in Title 12, Chapter 12.88 of the King County Code.

**maximum sound level ( $L_{max}$ ):** The maximum sound level over a measurement interval determined by using a sound level meter set to “fast” response time.

**pitch:** A term to describe the frequency of a noise— a “high pitched” noise has a high frequency (short distance between sound waves).

**receptor site:** The location receiving the sound.

**sound:** A wave-form disturbance of pressure propagating through a medium, such as the air.

**Sound Level Meter (SLM):** An instrument for measuring sound levels that measures rapid variations in air pressure with time, using a microphone and signal processing electronics.

**vibration:** Repetitive displacement of an object in two or more dimensions, usually caused by a physical source of energy to an object.

**white noise:** Noise that has significant pressure in many frequencies, such that no one frequency dominates the spectrum.

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# **PRELIMINARY SURVEY OF NOISE LEVELS IN THE VICINITY OF CEDAR HILLS REGIONAL LANDFILL**

Cedar Hills Regional Landfill  
Maple Valley, Washington

## **EXECUTIVE SUMMARY**

### **PROJECT SCOPE**

AMEC Geomatrix, Inc. (AMEC), was contracted by King County Department of Natural Resources and Parks, Solid Waste Division (KCSWD) to measure ambient noise levels at four secure locations along the perimeter of Cedar Hills Regional Landfill (CHRLF) in late fall of 2010. This preliminary survey was planned to measure A-weighted ambient noise levels for two consecutive days at each location, with automated capture of a short audio recording when clearly distinct ambient noises occurred. The resulting noise data was analyzed to characterize the 24-hourly noise levels at each location, including statistical descriptors appropriate for comparison to community noise standards established by King County (the County) and the State of Washington. The noises recorded at each site were summarized by source category, to attempt to identify whether they were originating from activities at CHRLF or from other nearby sources such as the Cedar Grove Composting operations, the Bio-Energy Washington (BEW) plant, or local business and residential activities.

### **PROJECT RESULTS**

The fieldwork occurred between October 28 and November 4, 2010. During this time, AMEC measured hourly ambient noise levels at four separate locations along the CHRLF perimeter fences during three 24-hour periods, obtaining 120 unique location-hours of data. Inclement weather caused cancellation of noise measurements from the evening of October 29 through November 1, and wind-related noise may have adversely affected the data quality during many of the remaining hours of the survey. The effect on data could not be definitively evaluated because the available wind speed data was limited to hourly average observations at the central CHRLF meteorological station; however, this preliminary noise survey was able to show these key findings:

- Of the 120 location-hours measured, there were 12 monitored hours when the ambient noise levels at the perimeter of CHRLF were above the King County maximum permissible sound level limits: one hour at the east property line, near 227th Avenue SE and the SE corner of the property; one hour at the north fence line, NE portion of the property; and 10 hours at the west fence line, southern portion of the property.
- Ambient noise sources were identifiable in 4 of the 12 hours. They were found to be: 1) aircraft; 2) vehicular traffic on local roads; and 3) two CHRLF staff visits to check on the noise equipment (which is an atypical occurrence). Wind-related noises contributed to the

measured noise levels as well, based on identified sounds and hourly average ambient wind data obtained from the CHRLF central hill meteorological station.

- Noises measured at the CHRLF perimeter were attributable to many sources. The main noise sources identified during the survey period were traffic on local roads, aircraft, wildlife and domestic animals, various neighborhood noises such as lawn maintenance and neighborhood vehicles in their driveways, the wind, and visits by CHRLF staff to the noise measurement equipment. Briefly during five of these 120 location-hours, industrial noises were recorded, similar to those heard from the BEW plant candlestick flare and other gas handling equipment at the plant.
- Based on the data from this survey period, non-CHRLF sources dominated the identifiable sounds contributing to the ambient noise levels measured at the perimeter of the landfill. At times, the source of ambient noise was not identifiable during this preliminary noise survey. Because many aircraft and neighborhood sources were found to contribute to the ambient noise levels at these locations and the preliminary noise survey was not designed to quantitatively allocate the ambient noise into one source or another, it cannot be shown whether any one source exceeds the K.C.C. maximum permissible noise limits, as measured at the site perimeter.

## **RECOMMENDATIONS**

Based on the results of this preliminary noise survey, further study of ambient noise conditions is recommended. A study could be designed to quantify the degree to which KCSWD and non-KCSWD noise sources contribute to the ambient noise level. The recommended study must occur during good weather with little to no wind, as measured with site-specific instruments obtaining 1-minute average wind speeds.

The recommended study should measure noise at multiple receptor locations around the CHRLF perimeter to represent ambient conditions at each location. Based on the results reported in this preliminary survey, these locations might include the southeast perimeter near 227th Avenue SE, and the southwest perimeter (e.g., at two of the locations used in this preliminary survey). The study should also measure noise at the key potential sources of industrial/commercial noise in the area: The CHRLF main operations area near the site entrance (including BEW operations), businesses along 227th Avenue SE, and the western portion of the south fence line by Cedar Grove Composting.

The recommended study should use observers and/or recorded audio at all locations to identify the noise sources. By matching the times that noises are audible at the receptor locations on the perimeter with the noise and activity observations at the source locations, it should be evident if any of the key potential sources of industrial/commercial noise in the area are the cause. It is recommended that such a study occur over multiple days (including midweek and weekend days) to gather enough data to represent the ambient noise environment. The study should record 1-second ambient noise levels and provide time for post-processing the data to quantify the amount of noise that each source



contributes to the ambient noise levels in the area. The total ambient noise level at each receptor site can then be divided into the contribution due to sources at CHRLF, and sources not at CHRLF (e.g., by mathematically removing the noise in each hour that is attributable to aircraft or to cars on local roads, the remaining noises can be evaluated for compliance with County noise standards, whatever the source).

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# PRELIMINARY SURVEY OF NOISE LEVELS IN THE VICINITY OF CEDAR HILLS REGIONAL LANDFILL

Cedar Hills Regional Landfill  
Maple Valley, Washington

## 1.0 INTRODUCTION

AMEC Geomatrix, Inc. (AMEC), was contracted by King County Department of Natural Resources and Parks, Solid Waste Division (KCSWD) to measure ambient noise levels at four secure locations within the perimeter of Cedar Hills Regional Landfill (CHRLF) in late fall of 2010. Ambient noise includes noise from all sources audible at a given location. This preliminary survey was designed to measure A-weighted ambient noise levels for two consecutive days at each location, with automated capture of a short audio recording when clearly elevated noise levels occurred. The resulting noise data was analyzed to characterize the 24-hourly noise levels at each location, including statistical descriptors appropriate for comparison to noise standards established by King County (the County) and the State of Washington. The noises recorded at each site were summarized by source category, to attempt to identify whether they were originating from activities at CHRLF or from other nearby sources such as the Cedar Grove Composting operations, the Bio-Energy Washington (BEW) plant, or local business and residential activities.

If the ambient sound levels were found to be below applicable noise standards, this would support a conclusion that no noise sources currently exceed the standards at the property boundary. Conversely, if ambient noise levels were found to exceed the noise standards, a more extensive noise monitoring program may be appropriate.

## 1.1 SOUND MEASUREMENT UNITS

Noise, in the environmental sense, is defined as any sound that is undesired or interferes with one's hearing of something.<sup>1</sup> Essentially, it is unwanted sound. Sounds occur from many sources, but a sound is considered noise when we expect peace and quiet, or it interferes with sleep, thought, or our enjoyment of desirable sounds like conversation, nature, or music. Sound in a physical sense is a rapid fluctuation in ambient air pressure versus a reference level, transmitted through the air by spherical wave propagation.<sup>2</sup> As the variations in air pressure become larger (the waves increase in amplitude), a sound increases in loudness. The loudness is measured in decibels (dB), a logarithmic scalar that conveniently represents a wide range of pressure variation. People vary in their ability to

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<sup>1</sup> Webster's New Collegiate Dictionary. G.&C. Merriam Co., Springfield, MA 1980.

<sup>2</sup> Mestre, V.E., and D.C. Wooten. Noise Impact Analysis, Chapter 4 in Environmental Impact Analysis Handbook. Rau, J.G., and D.C. Wooten, Editors. McGraw-Hill, Inc., New York, NY 1980.

detect sounds, but human hearing generally ranges from about zero dB (barely detectible) to about 120 dB (the threshold of pain).<sup>3</sup> Our sensitivity to changes in sound levels varies, but typically a sound level increase of 3 dB is perceptible under ideal listening conditions, 5 dB is clearly perceptible in most environments, and 10 dB is perceived as a doubling of loudness.<sup>2,4</sup> For comparison, typical levels of some common sounds are<sup>2,5</sup>:

<b>Typical Noise Environment</b>	<b>Sound Pressure Level (dB)</b>
Jet aircraft takeoff at 100 feet	120
Motorcycle at 25 feet	90
Heavy truck at 50 feet	85
Garbage disposal	80
City street corner	70
Large store	65
Conversational speech	60
TV listening at 10 feet	55
Typical office	50
Living room	40
Quiet bedroom at night	30

Along with the amplitude of sound waves, the distance between their peaks is important because it defines the pitch (or frequency) of the sound. This is measured in hertz, the wave cycles per second.<sup>3</sup> Many sound sources are things that vibrate - as when a hammer strike causes a sheet of steel to vibrate, or when a guitar string is plucked - the resulting vibration moves the air around the vibrating source, each movement creating a wave with a certain frequency. The vibration of the guitar string is at a single frequency, so it generates a pure tone, while the vibration of the sheet of steel is a combination of tones, each at a different frequency. Sound is therefore comprised of multiple waves that move with specific amplitude and frequencies. So, sound can be physically described by its loudness (in dB) as a function of frequency (in hertz). Noises that are louder in one or several frequencies can be very annoying, while noises that are equally loud in many frequencies can be described as “white noise,” which tends to be less intrusive.<sup>3</sup>

People with excellent hearing can detect sounds over a frequency range of 20 to 20,000 hertz. But people do not hear all frequencies equally well—we are most sensitive to frequencies around 4,000 hertz, and our sensitivity drops off at lower and higher frequencies.<sup>2</sup> So, the A-weighting system was developed to represent the characteristic sensitivity of human hearing by frequency.

<sup>3</sup> Peterson, A.P.G., and E.E. Gross, Jr. Handbook of Noise Measurement, 7th Edition. General Radio Co., Concord, MA. 1972.

<sup>4</sup> U.S. Department of Transportation (U.S. DOT), Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch. Highway Traffic Noise Analysis and Abatement Policy and Guidance. U.S. DOT, Washington, DC, 1995.

<sup>5</sup> U.S. Environmental Protection Agency, Office of Noise Abatement and Control. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. 550/9-74-004. USEPA. Washington DC, 1974.

A-weighting assigns an appropriate “weight” to the decibels measured at each “octave band” of frequencies that corresponds to our sensitivity to that octave band. After mathematical combination of the weighted levels in each octave band, we have a single numerical description of the loudness of a sound, as apparent to people. This value is in A-weighted decibels (dBA), and this is the basic measure of sound level for environmental noise measurements.<sup>2</sup>

Ambient noise levels vary continuously with time. As various sources of noise occur, the ambient noise level is louder at some times, and quieter at others. Statistical descriptors have been developed to describe this variation.<sup>2</sup> The maximum sound level ( $L_{max}$ ) is the highest sound level recorded, including instantaneous sounds that last only milliseconds. The average (equivalent) sound level for any time interval (such as a minute or an hour) is the logarithmically averaged sound level over that time interval, denoted as its  $L_{eq}$ . Along with the  $L_{eq}$  are other statistical values that define the percentage of time that exceeds a specific sound level. In the example of an hour, noise levels may be above a relatively quiet level 90 percent of the time (54 minutes [min]), or exceed a relatively loud level only 2.5 percent of the time (1.5 min), expressed as the  $L_{90}$  and  $L_{2.5}$ , respectively. It is useful to note that the  $L_{90}$  is commonly accepted as an approximate representation of background noise levels. In other words, events that exceed a noise level for 10 percent of the time (e.g., 1 hour) can be attributed to infrequent and clearly audible short-term events, not considered representative of background conditions.

In general, the degree of a perceived noise impact depends, among other factors, on existing ambient sound levels versus the noise source in question, the frequency spectrum of the noise source, the timing and duration of the noise event, and the hearing abilities of the person listening.

## **1.2 KING COUNTY CODE**

The noise criteria established in the King County Code are applicable to the CHRLF site and surrounding properties. These criteria are defined in Title 12, Chapter 12.88 of the King County Code (K.C.C. 12.88) and are summarized in Table 1 of this report.

**TABLE 1**  
**MAXIMUM PERMISSIBLE SOUND LEVELS**  
**(KING COUNTY)** <sup>1,2,3</sup>

Cedar Hills Regional Landfill  
Maple Valley, Washington

District of:	Receiving Property Within King County			
Sound Source	Rural	Residential	Commercial	Industrial
<b>Rural</b>	49 dBA	52 dBA	55 dBA	57 dBA
<b>Residential</b>	52 dBA	55 dBA	57 dBA	60 dBA
<b>Commercial</b>	55 dBA	57 dBA	60 dBA	65 dBA
<b>Industrial</b>	57 dBA	60 dBA	65 dBA	70 dBA

Notes

King County criteria established in King County Code (K.C.C.), Chapter 12.88.

1. Between 10:00 p.m. and 7:00 a.m. on weekdays, and between 10:00 p.m. and 9:00 a.m. on weekends, the levels are reduced by 10 dBA where the receiving property lies within a rural or residential district of King County.
2. For any source of sound that is of short duration, the levels established are increased by: 5 dBA for a total of 15 minutes in any 1-hour period, or 10 dBA for a total of 5 minutes in any 1-hour period, or 15 dBA for a total of 1.5 minutes in any 1-hour period.
3. For the equipment and activities described in this subsection, the maximum permissible sound levels specified in K.C.C. 12.88.020A and 12.88.030 may be exceeded as measured at the real property of another person or fifty feet from the equipment, whichever is greater, between 7:00 a.m. and 10:00 p.m. on weekdays and between 9:00 a.m. and 10:00 p.m. on weekends, by no more than: (1) 25 dB(A) for equipment used on construction sites, including crawlers, tractors, bulldozers, rotary drills and augers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, trenchers, compactors, compressors and pneumatic-powered equipment; (2) 20 dB(A) for portable powered equipment used in temporary locations in support of construction activities or used in the maintenance of public facilities, including chainsaws, log chippers, lawn and garden maintenance equipment and powered hand tools; or (3) 15 dB(A) for powered equipment used in temporary or periodic maintenance or repair of the grounds or appurtenances of any property, including lawnmowers, powered hand tools, snow-removal equipment and composters.

Abbreviations

dBA = A-weighted decibels  
K.C.C. = King County Code

Note that night time noise limits are 10 dBA lower than daytime/evening limits. In K.C.C. 12.88, King County allows for short-term increases above the maximum permissible limits identified in Table 1 as follows:

- up to 5 dBA for no more than 15 minutes in an hour (L<sub>25</sub>),
- up to 10 dBA for no more than 5 minutes in an hour (L<sub>8,3</sub>), and
- up to 15 dBA for no more than 1.5 minutes in an hour (L<sub>2,5</sub>).

In addition to the maximum permissible sound level limits, K.C.C. 12.88 regulates noise from construction activity. Noise from construction is permitted between the hours of 7:00 a.m. to 10:00 p.m. on weekdays (9:00 a.m. to 10:00 p.m. on weekends), provided the source sound levels do not exceed the maximum permissible limits by more than the following:

- 25 dBA, when equipment includes construction site equipment like off-highway trucks, loaders, bulldozers, etc.;
- 20 dBA, when activity includes temporary construction support and equipment includes portable powered equipment like chainsaws, log chippers, hand tools, etc.; or
- 15 dBA, when activity includes periodic maintenance and repair, and equipment like power hand-tools, snow blowers, etc.

Additional sound level limit exemptions exist for impact-type construction equipment, as specified in K.C.C. 12.88.040 (B). It should be noted that KCSWD restricts solid waste truck hauling to CHRLF and landfill operation (and associated heavy equipment operations) as follows:

Truck trips to CHRLF: 6:00 a.m. to 9:30 p.m. weekdays (6:00 a.m. to 6:30 p.m. weekends)

Landfill operation: 6:00 a.m. to 6:00 p.m. on weekdays (6:00 a.m. to 5:00 p.m. weekends)

### 1.3 TECHNICAL APPROACH

AMEC measured hourly A-weighted ambient noise levels and associated statistical noise descriptors at specific locations on the north, west, and east sides of CHRLF (see following table), with automated capture of a short noise recording when clearly distinct ambient noises occurred. KCSWD identified possible sources of noise in the area that could be audible at neighboring residential and industrial/commercial properties, including activity within CHRLF (such as the maintenance shops, landfill construction, on-site truck and equipment operation, flares at the North Flare Station), activity at the Cedar Grove Compost facility on the west side of CHRLF, and activity at the BEW landfill gas-to-energy plant on the southeast portion of the CHRLF property. Noise measuring locations were therefore selected to represent sensitive receiving locations potentially affected by these distinct activities. The four ambient noise measuring locations used for this preliminary survey are identified below, and shown in Figure 1.

#### SOUND LEVEL MEASUREMENT LOCATIONS

Monitoring Site ID	Description
Location 5	At the east CHRLF property line near residential property, north of the southeast corner of the site, and east of 227th Avenue SE
Location 10	Near the east fence line by residential property, central third of CHRLF
Location 11	Near the north CHRLF fence by residential property to the NE of CHRLF
Location 15	Near the west CHRLF fence line, towards the south end of the property

Ambient hourly noise levels were to be measured for two consecutive 24-hour periods at each location, beginning on October 28, 2010. Inclement weather precluded sound level measurements between October 29 and November 1. Noise monitoring resumed on November 2 through November 4. AMEC assembled and calibrated the following noise measurement equipment at each location:

- Larson Davis Model 831 Type 1 Integrating Sound Level Meter (SLM);
- Larson Davis Model 828 Preamplifier;
- PCB Model 377B02 ½ inch Free Field Microphone; and
- Larson Davis Model Cal200 Calibrator.

The microphone was placed in a vertical orientation at about 7 feet elevation, protected by a windscreen with bird spikes. Hourly  $L_{eq}$  and  $L_{max}$  values and the statistical noise descriptors  $L_{90}$  (background noise),  $L_{25}$ ,  $L_{8.3}$ , and  $L_{2.5}$  were measured at each location.

The sound level meters were equipped with audio recording software to record audio files of noise events that exceeded specified thresholds. Initially, a threshold of 10 dBA above the current  $L_{90}$  was used to capture audible noises. Thresholds to trigger audio recordings were then lowered to 6 dBA above the current  $L_{90}$  after review of the initial data suggested the thresholds could be set lower to capture fainter noises without exceeding available data storage capacity while the measurements occurred all night.

Measurement Location 5 (at the southeast portion of the east CHRLF property line) was ideally situated to represent the noise affecting adjacent properties, but it was not securely fenced. An alternate secure site inside the CHRLF fence line (west of 227th) was initially authorized for measurements but then abandoned because it was too far from the east property line to represent conditions there. After the inclement weather precluded further sampling on October 29, 2010, KCSWD and AMEC agreed that instead of resuming data collection at Location 15 (the west CHRLF fence line) and the secure location west of 227th, AMEC would reallocate resources to have staff on site for the entire 24-hour measurement period at Location 5, to provide security for the equipment and to document audible noises. AMEC staff implemented this change of plan, and made time-synchronized notes documenting the audible noises they heard at Location 5. These notes were matched with audio recordings to identify when specific noise events occurred, and if possible, to identify the sound sources listed in Appendix A.

Data on wind speeds during the survey period were obtained by KCSWD from their existing meteorological station at the main landfill hill within CHRLF. The hourly average wind speed data were obtained from KCSWD following the monitoring program.



## 1.4 DATA QUALITY

The two sound level meters were each checked for calibration response in the field before and after each 24-hour monitoring period and met the manufacturer's tolerance for response to the calibrator, indicating the instruments measured noise levels accurately. There were no losses of data during the sampled time periods, so the data are representative of the continuous noise levels during those periods. Noise measurements were canceled when significant rain occurred, so as to avoid measuring the noise of the rain. However, wind noise was a problem at times during the scheduled week of the noise survey. The State of Washington Department of Ecology specifies in Title 173 of the Washington Administrative Code, Chapter 173-58-040, that sound level measurements shall not be made when ambient wind speeds exceed 12 miles per hour (mph). Wind can be a problem even though a microphone is equipped with a wind screen because the sounds wind makes (e.g., leaves rustling in trees) can dominate the sound environment.

Only hourly average wind data from the KCSWD meteorological station were available for use. Based on these data, the hourly average wind speeds during the scheduled week ranged from less than 1 mph to over 12 mph, as shown in Appendix B.<sup>6</sup> The Washington State Department of Ecology (Ecology) rule noted above requires ambient noise measurements to be done when wind speeds are below 12 mph. Clearly, any hourly average wind speed that is greater than or equal to 12 mph invalidates that hour of noise data (site-wide, e.g., across both monitoring locations operating in that hour of the day), and these hours were annotated accordingly in the results below (Section 2.1). However, wind speed varies with time (gusts are above and below the average speed), and an hourly average is unlikely to represent minute-by-minute wind speeds in that hour. AMEC reviewed meteorological literature<sup>7</sup> and applied professional judgment to conclude that when an hourly average wind speed was above 5 mph, noise data during that hour should be interpreted with caution because the wind likely gusted above 12 mph at times during that hour. Those hours are also annotated accordingly in Section 2.1.

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<sup>6</sup> Average hourly wind speed data provided in Appendix B represent data from the nearest wind monitoring location. Note the monitoring station used to collect wind speed data did not correct for daylight savings time (please subtract one hour). Also, note that the data are time stamped at the end of each hour.

<sup>7</sup> Lambert, W.C., Extended Statistical Short-Range Guidance for Peak Wind Speed Analyses at the Shuttle Landing Facility: Phase II Results. National Aeronautics and Space Administration (NASA) Office of Management, Scientific and Technical Information Program. Contractor Report NASA/CR-2003-211188. Kennedy Space Center, FL. 2003.

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## 2.0 RESULTS

This section presents the measured ambient hourly noise levels (Section 2.1) and the identified sound sources (Section 2.2).

### 2.1 AMBIENT NOISE LEVELS

Sound level data from each monitoring location are presented in tabular format (Tables 2 through 6), and graphically (Figures 2a through 6c), found at the end of this report, and are summarized as follows:

Location	Location Description	Time Period	Hours with valid weather (percent) <sup>1</sup>	Figures and Table
15	Near the west CHRLF fence line, towards the south end of the property	6:00 p.m. Oct. 28 – 6:00 p.m. Oct. 29, 2010	79%	Figures 2a-c, Table 2
11	Near the north CHRLF fence by residential property to the NE of CHRLF	9:00 a.m. Nov. 2 – 9:00 a.m. Nov. 3, 2010	17%	Figures 3a-c, Table 3
10	Near the east CHRLF fence line by residential property	9:00 a.m. Nov. 2 – 9:00 a.m. Nov. 3, 2010	17%	Figures 4a-c, Table 4
5	At the east CHRLF property line near residential property, north of the southeast corner of the site, and east of 227th Avenue SE	11:00 a.m. Nov. 3 – 11:00 a.m. Nov. 4, 2010	0%	Figures 5a-c, Table 5
10	Near the east CHRLF fence line by residential property	10:00 a.m. Nov. 3 – 10:00 a.m. Nov. 4, 2010	0%	Figures 6a-c, Table 6

#### Notes

1. Valid weather was defined as no significant rain and wind speed demonstrably below 12 mph.

The graphs in Figures 2a through 6c show the measured hourly sound level statistical values for the  $L_{25}$  (the sound level exceeded 15 minutes per hour),  $L_{8.3}$  (the sound level exceeded 5 minutes per hour), and  $L_{2.5}$  (the sound level exceeded 1.5 minutes per hour) by time of day. The graphs also depict the corresponding maximum permissible hourly short-duration sound level limits ( $L_{25}$ ,  $L_{8.3}$ , and  $L_{2.5}$ ) from K.C.C. 12.88 for a rural source and rural receptor during daytime/evening and night time periods. These limits were not exceeded during any of the 9 hours where the site-wide hourly average wind speeds exceeded Ecology's 12 mph criterion. Of the remaining data, ambient noise levels were higher than the K.C.C. limits at three locations during 12 of the 73 site-wide hours when noise was measured. Of these 12 hours, 1 hour occurred at Location 5, 1 hour occurred at Location 11, and 10 hours occurred at Location 15. During these hours:

- The measured  $L_{25}$  was above the K.C.C. limit at Location 5 (East CHRLF property line, north of the southeast corner of the site and east of 227th Avenue SE) from 10:00 p.m. to 11:00 p.m. on November 3, 2010. The corresponding  $L_{8.3}$  and  $L_{2.5}$  were not above the K.C.C. limits.
- The measured  $L_{25}$  was above the K.C.C. limit at Location 11 (North CHRLF fence line, NE of CHRLF) from 6:00 a.m. to 7:00 a.m. on November 3, 2010. The corresponding  $L_{8.3}$  and  $L_{2.5}$  were not above the K.C.C. limits. Airplanes contributed to this hourly noise level, as well as a visit by CHRLF operations staff to check on the site, an occurrence that would not be representative of normal conditions.
- The measured  $L_{25}$  was above the K.C.C. limit at Location 15 from 10:00 p.m. October 28, 2010, to 7:00 a.m. October 29; and from 8:00 a.m. to 9:00 a.m. on October 29 (Figure 2a). The corresponding  $L_{8.3}$  was above the K.C.C. limit from 1:00 a.m. to 2:00 a.m.; 6:00 a.m. to 7:00 a.m.; and 8:00 a.m. to 9:00 a.m. on October 29 (Figure 2b). The ambient  $L_{2.5}$  was barely above the K.C.C. limit at this location from 6:00 a.m. to 7:00 a.m. on October 29 (Figure 2c). Few noise events during this first day of monitoring were high enough above background noise levels to trigger an audio recording and enable sound identification. During the hour of 8-9 PM on October 28, an aircraft flew overhead. On October 29, between 8:00 a.m. and 9:00 a.m., noise was dominated by a visit by CHRLF operations staff to check on the site, an occurrence that would not be representative of normal conditions.

From a data quality standpoint, it is possible that the wind may have adversely affected the representativeness of the results in 50 out of the 73 site-wide hours of the scheduled noise survey. This was clearly the case during the 9 site-wide hours of the survey when the average hourly wind speed at CHRLF was above 12 mph. The wind may have adversely affected the representativeness of the data during another 41 site-wide hours when the average hourly wind speed at CHRLF was above 5 mph. For example, during 6 of the 12 hours when ambient noise exceeded the K.C.C. limits, ambient wind speeds at the CHRLF meteorological station were over 5 mph. Thus the wind may have been contributing to noise during these 6 hours. With only hourly time resolution, the CHRLF meteorological station wind speed data cannot prove that wind speeds were always below 12 mph during the total of 41 site-wide hours where the hourly average wind speeds were above 5 mph.

## 2.2 IDENTIFIABLE NOISE SOURCES

Audio recordings were captured when noise events were well above background levels. Only a few discrete noise events exceeded thresholds during the first 2 days of measurements. Lowered thresholds for the second two days of noise measurements resulted in many more recordings of fainter noises, and the audio files enabled AMEC to clearly identify most sources. A detailed summary of the identifiable noise sources is found in Appendix A. Where possible, a distinction was made between truck traffic and car traffic. The following bullets summarize the identifiable noise sources, as noted from recorded audio, or observations AMEC made while attending the noise monitoring equipment.

- **Location 5** (East CHRLF property line, north of the southeast corner of the site and east of 227th Avenue SE): The noise environment was mostly dominated by traffic, aircraft, domestic animals and wildlife, and neighborhood lawn maintenance. Noise attributed by the observer to gas transfers in pressurized equipment and flaring operations at the BEW facility was occasionally audible by the observer at this location. It should be noted that truck traffic audible at this location included noise from trucks on public roads, and possibly within the CHRLF site (noise from trucks that meet vehicle noise standards is not subject to the K.C.C. limits when they operate on public roads).
- **Location 10** (East fence line, central third of CHRLF): Dominant noise sources were attributed to aircraft, a visit by CHRLF operations personnel to check on the noise equipment, wind in trees and wild animal sounds, and vehicles on neighborhood roads.
- **Location 11** (North CHRLF fence line, NE of CHRLF) **and Location 15** (West CHRLF fence line, southern end of the property): Noise sources included aircraft flying over the area and pickup trucks moving within the CHRLF site (checks on the noise equipment by CHRLF operations staff). Despite potential wind effects, ambient sound levels were mostly well within applicable K.C.C. limits at Location 11. The noise level during the single hour that exceeded the K.C.C. limit at Location 11 was influenced by two aircraft, and also likely influenced by the operations staff checking on the sound level equipment—an incident that may not be representative of normal conditions.

Based on observer's notes and playback of triggered recorded audio events, AMEC finds that aircraft noise was occasionally audible at all locations, and that CHRLF noise was seldom audible at these locations during the survey. Most of the audible noise events during the survey were from non-CHRLF sources such as off-site traffic, airplanes, domestic and wild animals, the BEW plant, and the wind.

## 2.3 CONCLUSIONS

This preliminary noise survey measured ambient noise levels and identified the contributing noise sources around the CHRLF perimeter during 3 days in the fall of 2010. Adverse weather conditions arose during the scheduled survey period. These conditions resulted in the collection of data that may include a high proportion of wind-related noise. Ecology requires ambient noise measurements to occur while ambient wind speeds are below 12 mph. With only hourly-average wind speeds from a central location at CHRLF, it was not possible to prove that ambient winds were always below 12 mph during portions of the time when the site-wide hourly average ambient wind speed was over 5 mph.

Brief excursions above the 12 mph wind speed rule may not be critical, however. With due consideration for the potential effects on data quality during periods when wind speeds may have exceeded 12 mph, AMEC can draw the following conclusions from the preliminary noise survey:

- Ambient noise levels were mostly below K.C.C. maximum permissible sound level limits at the CHRLF perimeter locations during the period of the preliminary survey. In a total of

120 unique hourly measurements of ambient noise among four sites over 3 days, the ambient noise levels exceeded K.C.C. limits during 12 hours.

- Ambient noise levels were above one or more of the K.C.C. maximum permissible sound level limits for a total of 1 hour at Location 5 (east CHRLF property line, north of the southeast corner of the site and east of 227th Avenue SE), one hour at Location 11 (north CHRLF fence line, NE of CHRLF), and 10 hours at Location 15 (near the west CHRLF fence line, towards the south end of the property). Ambient noise levels did not exceed the K.C.C. limits at Location 10 (east fence line, central third of CHRLF).
- Noises at the CHRLF perimeter during the preliminary survey were rarely due to CHRLF operations. During hours where the ambient noise level was above K.C.C. limits for permissible noise at the facility perimeters, CHRLF operations only briefly contributed to the ambient noise. These were at Location 11 (north CHRLF fence line, NE of CHRLF) and Location 15 (near the west CHRLF fence line, towards the south end of the property), when CHRLF operations personnel checked on the equipment security. At all locations, audible noises included traffic, aircraft, animals, and miscellaneous residential neighborhood activities. Noises associated with gas pressure changes and the candlestick flare at the BEW facility were occasionally audible at measurement Location 5.
- Based on the data from this survey period, non-CHRLF sources dominated the identifiable sounds contributing to the ambient noise levels measured at the perimeter of the landfill. At times, the source of ambient noise was not identifiable during this preliminary noise survey. Because many aircraft and neighborhood sounds were found to contribute to the ambient noise levels at these locations and the preliminary noise survey was not designed to quantitatively allocate the ambient noise into one source or another, it cannot be shown whether any one source exceeds the K.C.C. maximum permissible noise limits, as measured at the site perimeter.

## 2.4 RECOMMENDATIONS

Based on the results of this preliminary noise survey, further study of ambient noise conditions is recommended. A study could be designed to quantify the degree to which KCSWD and non-KCSWD noise sources contribute to the ambient noise level. The recommended study must occur during good weather with little to no wind, as measured with site-specific instruments obtaining 1-minute average wind speeds.

The recommended study should measure noise at multiple receptor locations around the CHRLF perimeter to represent ambient conditions at each location. Based on the results reported in this preliminary survey, these locations might include the southeast perimeter near 227th Avenue SE, and the southwest perimeter (e.g., at two of the locations used in this preliminary survey). The study should also measure noise at the key potential sources of industrial/commercial noise in the area: The CHRLF main operations area near the site entrance (including BEW operations), businesses along 227th Avenue SE, and the western portion of the south fence line by Cedar Grove Composting.

The recommended study should use observers and/or recorded audio at all locations to identify the noise sources. By matching up the times that noises are audible at the receptor locations on the perimeter with the noise and activity observations at the source locations, it should be evident if any of the key potential sources of industrial/commercial noise in the area are the cause. It is recommended that such a study occur over multiple days (including midweek and weekend days) to gather enough data to represent the ambient noise environment. The study should record 1-second ambient noise levels and provide time for post-processing the data to quantify the amount of noise that each source contributes to the ambient noise levels in the area. The total ambient noise level at each receptor site can then be divided into the contribution due to sources at CHRLF, and sources not at CHRLF (e.g., by mathematically removing the noise in each hour that is attributable to aircraft or to cars on local roads, the remaining noises can be evaluated for compliance with County noise standards, whatever the source).

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## **TABLES**

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**TABLE 2**

**HOURLY NOISE LEVEL DATA AT LOCATION 15  
(WEST FENCE LINE, SOUTH PORTION OF PROPERTY)**

**OCTOBER 28-29, 2010**<sup>1,2,3</sup>  
Cedar Hills Regional Landfill  
Maple Valley, Washington

Date	Time	Hourly King County Noise Criteria (Rural/Rural)			Hourly Ambient Noise Levels (A-weighted)					
		L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>
Thursday 10/28/2010	6:00 PM	64	59	54	54.2	48.8	45.9	69.9	47.5	43.4
Thursday 10/28/2010	7:00 PM	64	59	54	54.7	48.4	46.4	72.7	48.2	43.8
Thursday 10/28/2010	8:00 PM	64	59	54	52.7	47.1	45.5	71.0	46.8	42.6
Thursday 10/28/2010	9:00 PM	64	59	54	48.4	46.4	45.5	64.0	45.4	43.2
Thursday 10/28/2010	10:00 PM	54	49	44	47.5*	46.6*	45.5*	52.7*	44.3*	40.8*
Thursday 10/28/2010	11:00 PM	54	49	44	47.4*	46.5*	45.3*	60.2*	44.5*	42.4*
Friday 10/29/2010	12:00 AM	54	49	44	47.7*	46.0*	44.6*	59.8*	44.3*	41.9*
Friday 10/29/2010	1:00 AM	54	49	44	52.9*	51.9*	50.2*	73.9*	48.5*	42.4*
Friday 10/29/2010	2:00 AM	54	49	44	48.8	48.0	47.1	57.2	46.5	44.9
Friday 10/29/2010	3:00 AM	54	49	44	47.3	45.9	44.2	51.9	43.6	40.9
Friday 10/29/2010	4:00 AM	54	49	44	47.5	46.4	45.1	63.6	44.5	40.0
Friday 10/29/2010	5:00 AM	54	49	44	48.5	46.7	44.3	63.6	43.7	40.3
Friday 10/29/2010	6:00 AM	54	49	44	54.1	52.0	49.4	70.4	47.4	41.6
Friday 10/29/2010	7:00 AM	64	59	54	59.8*	55.8*	51.9*	68.2*	52.5*	47.6*
Friday 10/29/2010	8:00 AM	64	59	54	61.4	60.0	57.2	76.4	55.7	47.5
Friday 10/29/2010	9:00 AM	64	59	54	55.8	54.3	51.8	60.8	51.1	47.2
Friday 10/29/2010	10:00 AM	64	59	54	57.4	55.5	52.9	66.2	52.0	45.0
Friday 10/29/2010	11:00 AM	64	59	54	60.1	55.4	49.8	71.6	51.7	37.0
Friday 10/29/2010	12:00 PM	64	59	54	53.8	50.7	44.3	75.1	46.6	36.6
Friday 10/29/2010	1:00 PM	64	59	54	57.7	53.0	48.6	76.9	49.4	40.6
Friday 10/29/2010	2:00 PM	64	59	54	51.0	44.7	39.5	75.2	42.5	35.0
Friday 10/29/2010	3:00 PM	64	59	54	53.2	48.3	41.0	89.1	47.1	36.7
Friday 10/29/2010	4:00 PM	64	59	54	51.4	46.7	40.1	76.2	43.9	36.0
Friday 10/29/2010	5:00 PM	64	59	54	52.6	44.3	42.0	86.2	45.5	38.0

Notes

1. L<sub>2.5</sub> = Level exceeded 2.5% (1.5 minutes) per hour  
L<sub>8.3</sub> = Level exceeded 8.3% (5 minutes) per hour  
L<sub>25</sub> = Level exceeded 25% (15 minutes) per hour  
L<sub>max</sub> = Maximum noise level measured (including impulsive noise)  
L<sub>eq</sub> = Equivalent hourly average noise level  
L<sub>90</sub> = Level exceeded 90% (54 minutes) per hour (equivalent to the background noise level)
2. \* = hourly average wind speed > 5 miles per hour.
3.  = Ambient noise exceeds maximum permissible environmental sound level.

**TABLE 3**

**HOURLY NOISE LEVEL DATA, LOCATION 11  
(NORTH FENCE LINE, NE PORTION OF PROPERTY)  
NOVEMBER 2-3, 2010<sup>1,2</sup>  
Cedar Hills Regional Landfill  
Maple Valley, Washington**

Date	Time	Hourly King County Noise Criteria (Rural/Rural)			Hourly Ambient Noise Levels (A-weighted)					
		L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>
Tuesday 11/2/2010	9:00 AM	64	59	54	47.4	44.0	41.6	56.2	41.3	37.1
Tuesday 11/2/2010	10:00 AM	64	59	54	49.7	43.3	39.4	66.4	41.4	31.4
Tuesday 11/2/2010	11:00 AM	64	59	54	52.7*	44.9*	37.6*	68.2*	42.8*	31.9*
Tuesday 11/2/2010	12:00 PM	64	59	54	51.1*	46.0*	40.6*	63.8*	43.1*	35.1*
Tuesday 11/2/2010	1:00 PM	64	59	54	58.3*	49.9*	39.4*	75.8*	48.1*	34.4*
Tuesday 11/2/2010	2:00 PM	64	59	54	50.5*	45.6*	43.0*	71.6*	44.3*	38.0*
Tuesday 11/2/2010	3:00 PM	64	59	54	48.8 <sup>♦</sup>	44.4 <sup>♦</sup>	42.2 <sup>♦</sup>	64.5 <sup>♦</sup>	43.0 <sup>♦</sup>	39.1 <sup>♦</sup>
Tuesday 11/2/2010	4:00 PM	64	59	54	51.7*	47.8*	44.0*	65.1*	44.8*	39.9*
Tuesday 11/2/2010	5:00 PM	64	59	54	47.6 <sup>♦</sup>	45.8 <sup>♦</sup>	44.0 <sup>♦</sup>	59.2 <sup>♦</sup>	43.8 <sup>♦</sup>	41.5 <sup>♦</sup>
Tuesday 11/2/2010	6:00 PM	64	59	54	49.6*	47.6*	45.6*	64.8*	45.2*	40.6*
Tuesday 11/2/2010	7:00 PM	64	59	54	49.0*	46.3*	43.9*	61.1*	43.5*	39.6*
Tuesday 11/2/2010	8:00 PM	64	59	54	51.5*	46.7*	42.7*	66.6*	43.8*	38.1*
Tuesday 11/2/2010	9:00 PM	64	59	54	47.0	42.8	40.7	60.4	41.2	37.6
Tuesday 11/2/2010	10:00 PM	54	49	44	44.8*	41.9*	40.0*	56.1*	40.0*	37.5*
Tuesday 11/2/2010	11:00 PM	54	49	44	45.6*	41.6*	39.0*	59.2*	39.4*	35.5*
Wednesday 11/3/2010	12:00 AM	54	49	44	40.7*	39.6*	38.1*	50.4*	37.4*	35.0*
Wednesday 11/3/2010	1:00 AM	54	49	44	41.3	40.1	39.0	50.0	38.2	35.9
Wednesday 11/3/2010	2:00 AM	54	49	44	39.7*	38.7*	37.8*	48.6*	37.2*	35.2*
Wednesday 11/3/2010	3:00 AM	54	49	44	40.9*	39.1*	37.7*	54.1*	37.1*	33.5*
Wednesday 11/3/2010	4:00 AM	54	49	44	42.6*	41.1*	39.6*	55.8*	38.9*	36.0*
Wednesday 11/3/2010	5:00 AM	54	49	44	44.5*	43.5*	41.7*	70.8*	42.7*	38.3*
Wednesday 11/3/2010	6:00 AM	54	49	44	49.4*	47.2*	46.0*	66.9*	45.9*	42.7*
Wednesday 11/3/2010	7:00 AM	64	59	54	54.5*	48.9*	46.4*	70.3*	47.9*	43.3*
Wednesday 11/3/2010	8:00 AM	64	59	54	53.5*	49.8*	47.2*	68.9*	47.5*	43.8*

**Notes**

- L<sub>2.5</sub> = Level exceeded 2.5% (1.5 minutes) per hour  
L<sub>8.3</sub> = Level exceeded 8.3% (5 minutes) per hour  
L<sub>25</sub> = Level exceeded 25% (15 minutes) per hour  
L<sub>max</sub> = Maximum noise level measured (including impulsive noise)  
L<sub>eq</sub> = Equivalent hourly average noise level  
L<sub>90</sub> = Level exceeded 90% (54 minutes) per hour (equivalent to the background noise level)
- \* = hourly average wind speed > 5 miles per hour.  
<sup>♦</sup> = hourly average wind speed > 12 miles per hour, data invalidated.
- = Ambient noise exceeds maximum permissible environmental sound level.

**TABLE 4**

**HOURLY NOISE LEVEL DATA, LOCATION 10  
(EAST FENCE LINE, CENTRAL THIRD OF PROPERTY)  
NOVEMBER 2-3, 2010<sup>1,2</sup>  
Cedar Hills Regional Landfill  
Maple Valley, Washington**

Date	Time	Hourly King County Noise Criteria (Rural/Rural)			Hourly Ambient Noise Levels (A-weighted)					
		L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>
Tuesday 11/2/2010	9:00 AM	64	59	54	48.0	45.8	44.0	60.9	44.3	40.8
Tuesday 11/2/2010	10:00 AM	64	59	54	48.8	45.4	42.1	89.6	45.4	36.3
Tuesday 11/2/2010	11:00 AM	64	59	54	50.5*	45.5*	40.3*	68.0*	42.4*	35.3*
Tuesday 11/2/2010	12:00 PM	64	59	54	47.7*	45.3*	41.5*	62.5*	41.5*	35.9*
Tuesday 11/2/2010	1:00 PM	64	59	54	53.6*	44.7*	40.3*	67.9*	45.4*	36.8*
Tuesday 11/2/2010	2:00 PM	64	59	54	48.8*	45.7*	42.9*	71.9*	43.1*	39.2*
Tuesday 11/2/2010	3:00 PM	64	59	54	47.9 <sup>♦</sup>	43.2 <sup>♦</sup>	41.7 <sup>♦</sup>	62.7 <sup>♦</sup>	42.0 <sup>♦</sup>	39.4 <sup>♦</sup>
Tuesday 11/2/2010	4:00 PM	64	59	54	50.6*	46.8*	43.9*	62.4*	44.1*	40.1*
Tuesday 11/2/2010	5:00 PM	64	59	54	48.0 <sup>♦</sup>	45.4 <sup>♦</sup>	43.5 <sup>♦</sup>	65.6 <sup>♦</sup>	43.6 <sup>♦</sup>	40.5 <sup>♦</sup>
Tuesday 11/2/2010	6:00 PM	64	59	54	49.5*	44.8*	42.7*	68.8*	43.9*	39.4*
Tuesday 11/2/2010	7:00 PM	64	59	54	49.2*	45.9*	43.1*	62.5*	43.1*	39.4*
Tuesday 11/2/2010	8:00 PM	64	59	54	51.3*	48.0*	44.1*	64.1*	44.1*	37.4*
Tuesday 11/2/2010	9:00 PM	64	59	54	47.0	42.2	39.3	61.5	39.9	34.8
Tuesday 11/2/2010	10:00 PM	54	49	44	42.4*	39.3*	37.7*	55.0*	37.5*	34.5*
Tuesday 11/2/2010	11:00 PM	54	49	44	45.1*	40.1*	37.3*	62.2*	38.0*	32.9*
Wednesday 11/3/2010	12:00 AM	54	49	44	37.8*	36.1*	34.6*	46.8*	34.1*	31.5*
Wednesday 11/3/2010	1:00 AM	54	49	44	39.1	37.1	35.2	61.2	35.0	32.3
Wednesday 11/3/2010	2:00 AM	54	49	44	37.9*	36.2*	34.7*	54.3*	34.1*	31.4*
Wednesday 11/3/2010	3:00 AM	54	49	44	41.0*	37.6*	35.5*	51.2*	35.3*	31.8*
Wednesday 11/3/2010	4:00 AM	54	49	44	40.6*	38.7*	36.6*	61.2*	36.1*	32.7*
Wednesday 11/3/2010	5:00 AM	54	49	44	43.4*	41.4*	39.3*	56.9*	38.6*	35.1*
Wednesday 11/3/2010	6:00 AM	54	49	44	47.0*	44.7*	43.3*	64.6*	43.1*	40.2*
Wednesday 11/3/2010	7:00 AM	64	59	54	52.6*	47.5*	43.5*	65.5*	45.0*	40.1*
Wednesday 11/3/2010	8:00 AM	64	59	54	52.1*	48.4*	45.0*	67.6*	45.3*	40.8*

**Notes**

1. L<sub>2.5</sub> = Level exceeded 2.5% (1.5 minutes) per hour  
 L<sub>8.3</sub> = Level exceeded 8.3% (5 minutes) per hour  
 L<sub>25</sub> = Level exceeded 25% (15 minutes) per hour  
 L<sub>max</sub> = Maximum noise level measured (including impulsive noise)  
 L<sub>eq</sub> = Equivalent hourly average noise level  
 L<sub>90</sub> = Level exceeded 90% (54 minutes) per hour (equivalent to the background noise level)
2. \* = hourly average wind speed > 5 miles per hour.  
<sup>♦</sup> = hourly average wind speed > 12 miles per hour, data invalidated.

TABLE 5

**HOURLY NOISE LEVEL DATA, LOCATION 5  
(EAST PROPERTY LINE, SE PORTION OF PROPERTY BY 227TH AVENUE SE)  
NOVEMBER 3-4, 2010 <sup>1,2,3</sup>  
Cedar Hills Regional Landfill  
Maple Valley, Washington**

Date	Time	Hourly King County Noise Criteria (Rural/Rural)			Hourly Ambient Noise Levels (A-weighted)					
		L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>
Wednesday 11/3/2010	11:00 AM	64	59	54	55.2 <sup>♦</sup>	50.9 <sup>♦</sup>	47.5 <sup>♦</sup>	69.5 <sup>♦</sup>	48.5 <sup>♦</sup>	41.5 <sup>♦</sup>
Wednesday 11/3/2010	12:00 PM	64	59	54	55.0 <sup>♦</sup>	51.8 <sup>♦</sup>	48.6 <sup>♦</sup>	67.2 <sup>♦</sup>	48.7 <sup>♦</sup>	41.3 <sup>♦</sup>
Wednesday 11/3/2010	1:00 PM	64	59	54	52.9 <sup>♦</sup>	49.6 <sup>♦</sup>	46.2 <sup>♦</sup>	62.9 <sup>♦</sup>	46.4 <sup>♦</sup>	40.4 <sup>♦</sup>
Wednesday 11/3/2010	2:00 PM	64	59	54	53.0 <sup>♦</sup>	50.5 <sup>♦</sup>	48.0 <sup>♦</sup>	62.4 <sup>♦</sup>	47.4 <sup>♦</sup>	41.5 <sup>♦</sup>
Wednesday 11/3/2010	3:00 PM	64	59	54	61.4 <sup>♦</sup>	53.5 <sup>♦</sup>	48.6 <sup>♦</sup>	68.4 <sup>♦</sup>	51.9 <sup>♦</sup>	42.5 <sup>♦</sup>
Wednesday 11/3/2010	4:00 PM	64	59	54	56.9 <sup>♦</sup>	52.5 <sup>♦</sup>	48.2 <sup>♦</sup>	73.2 <sup>♦</sup>	51.5 <sup>♦</sup>	43.2 <sup>♦</sup>
Wednesday 11/3/2010	5:00 PM	64	59	54	53.0 <sup>♦</sup>	49.6 <sup>♦</sup>	47.6 <sup>♦</sup>	67.5 <sup>♦</sup>	47.8 <sup>♦</sup>	43.4 <sup>♦</sup>
Wednesday 11/3/2010	6:00 PM	64	59	54	49.8 <sup>*</sup>	47.2 <sup>*</sup>	45.5 <sup>*</sup>	59.1 <sup>*</sup>	45.1 <sup>*</sup>	41.7 <sup>*</sup>
Wednesday 11/3/2010	7:00 PM	64	59	54	55.2 <sup>*</sup>	49.9 <sup>*</sup>	46.1 <sup>*</sup>	70.1 <sup>*</sup>	48.2 <sup>*</sup>	41.5 <sup>*</sup>
Wednesday 11/3/2010	8:00 PM	64	59	54	51.2 <sup>*</sup>	46.5 <sup>*</sup>	44.2 <sup>*</sup>	67.9 <sup>*</sup>	46.2 <sup>*</sup>	41.3 <sup>*</sup>
Wednesday 11/3/2010	9:00 PM	64	59	54	50.0 <sup>*</sup>	46.9 <sup>*</sup>	44.7 <sup>*</sup>	56.4 <sup>*</sup>	44.6 <sup>*</sup>	41.4 <sup>*</sup>
Wednesday 11/3/2010	10:00 PM	54	49	44	49.0 <sup>*</sup>	47.5 <sup>*</sup>	45.7 <sup>*</sup>	60.5 <sup>*</sup>	45.1 <sup>*</sup>	41.3 <sup>*</sup>
Wednesday 11/3/2010	11:00 PM	54	49	44	45.0 <sup>*</sup>	42.3 <sup>*</sup>	39.6 <sup>*</sup>	62.4 <sup>*</sup>	40.1 <sup>*</sup>	36.9 <sup>*</sup>
Thursday 11/4/2010	12:00 AM	54	49	44	42.2 <sup>*</sup>	40.8 <sup>*</sup>	39.4 <sup>*</sup>	54.2 <sup>*</sup>	39.0 <sup>*</sup>	37.1 <sup>*</sup>
Thursday 11/4/2010	1:00 AM	54	49	44	43.7 <sup>*</sup>	42.2 <sup>*</sup>	40.6 <sup>*</sup>	55.4 <sup>*</sup>	40.4 <sup>*</sup>	38.1 <sup>*</sup>
Thursday 11/4/2010	2:00 AM	54	49	44	41.5 <sup>*</sup>	39.4 <sup>*</sup>	38.2 <sup>*</sup>	58.8 <sup>*</sup>	38.7 <sup>*</sup>	36.1 <sup>*</sup>
Thursday 11/4/2010	3:00 AM	54	49	44	43.8 <sup>*</sup>	39.7 <sup>*</sup>	38.2 <sup>*</sup>	61.5 <sup>*</sup>	40.6 <sup>*</sup>	36.1 <sup>*</sup>
Thursday 11/4/2010	4:00 AM	54	49	44	40.8 <sup>*</sup>	39.3 <sup>*</sup>	38.0 <sup>*</sup>	45.0 <sup>*</sup>	37.7 <sup>*</sup>	36.1 <sup>*</sup>
Thursday 11/4/2010	5:00 AM	54	49	44	45.5 <sup>*</sup>	43.5 <sup>*</sup>	41.0 <sup>*</sup>	49.1 <sup>*</sup>	40.6 <sup>*</sup>	37.7 <sup>*</sup>
Thursday 11/4/2010	6:00 AM	54	49	44	52.9 <sup>*</sup>	47.0 <sup>*</sup>	43.6 <sup>*</sup>	61.3 <sup>*</sup>	44.9 <sup>*</sup>	39.8 <sup>*</sup>
Thursday 11/4/2010	7:00 AM	64	59	54	52.0 <sup>*</sup>	48.1 <sup>*</sup>	44.2 <sup>*</sup>	60.1 <sup>*</sup>	44.6 <sup>*</sup>	39.1 <sup>*</sup>
Thursday 11/4/2010	8:00 AM	64	59	54	52.3 <sup>*</sup>	48.7 <sup>*</sup>	45.6 <sup>*</sup>	65.8 <sup>*</sup>	46.0 <sup>*</sup>	40.7 <sup>*</sup>
Thursday 11/4/2010	9:00 AM	64	59	54	54.6 <sup>*</sup>	52.3 <sup>*</sup>	49.7 <sup>*</sup>	60.2 <sup>*</sup>	48.9 <sup>*</sup>	43.5 <sup>*</sup>
Thursday 11/4/2010	10:00 AM	64	59	54	56.0 <sup>*</sup>	55.0 <sup>*</sup>	53.5 <sup>*</sup>	58.2 <sup>*</sup>	51.4 <sup>*</sup>	44.5 <sup>*</sup>

Notes

- L<sub>2.5</sub> = Level exceeded 2.5% (1.5 minutes) per hour  
 L<sub>8.3</sub> = Level exceeded 8.3% (5 minutes) per hour  
 L<sub>25</sub> = Level exceeded 25% (15 minutes) per hour  
 L<sub>max</sub> = Maximum noise level measured  
 L<sub>eq</sub> = Equivalent hourly average noise level  
 L<sub>90</sub> = Level exceeded 90% (54 minutes) per hour (equivalent to the background noise level)
- \* = hourly average wind speed > 5 miles per hour.  
 ♦ = hourly average wind speed > 12 miles per hour, data invalidated.
- = Ambient noise exceeds maximum permissible environmental sound level.

**TABLE 6**

**HOURLY NOISE LEVEL DATA, LOCATION 10  
(EAST FENCE LINE, CENTRAL THIRD OF PROPERTY)  
NOVEMBER 3-4, 2010 <sup>1,2</sup>  
Cedar Hills Regional Landfill  
Maple Valley, Washington**

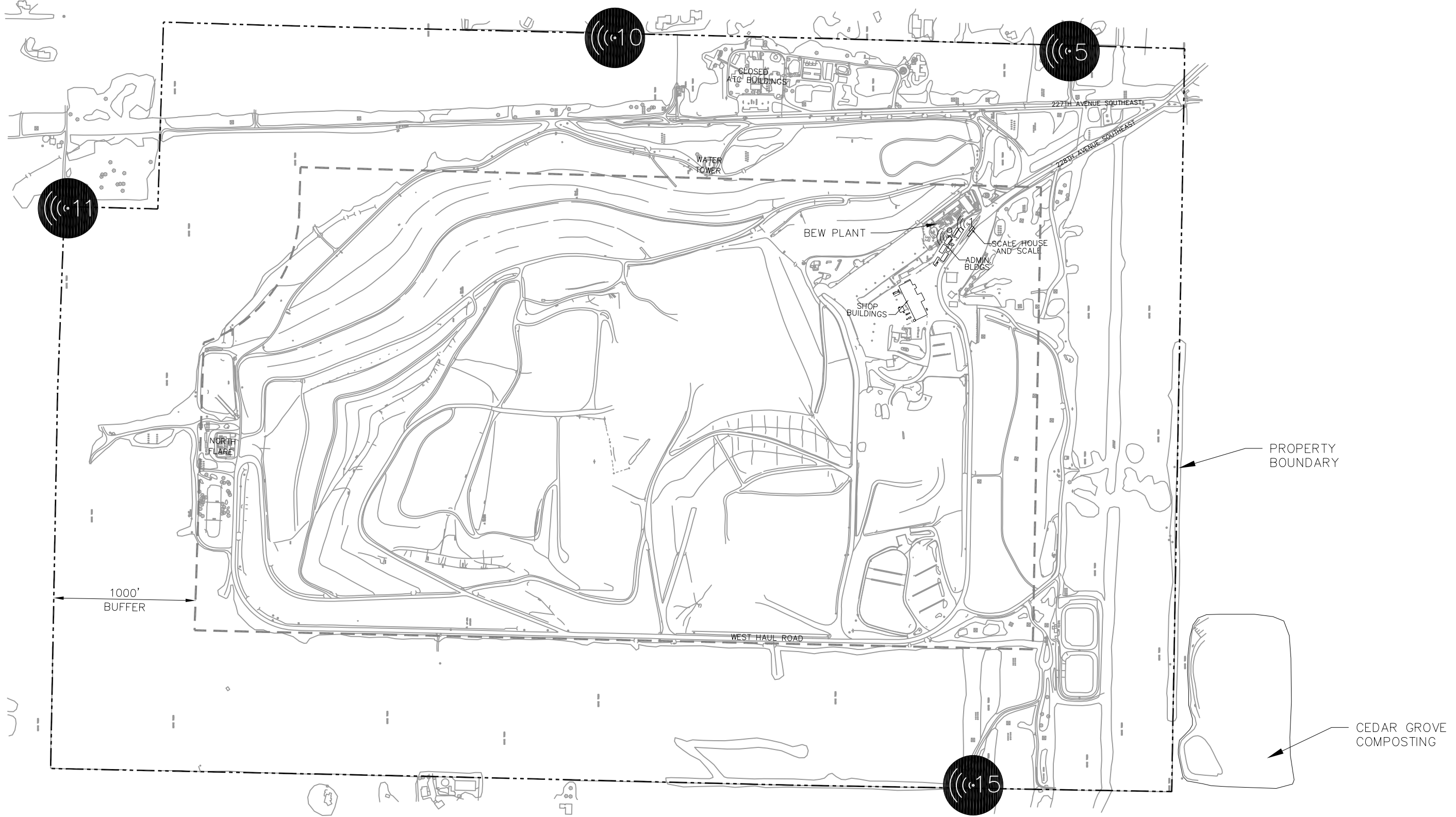
Date	Time	Hourly King County Noise Criteria (Rural/Rural)			Hourly Ambient Noise Levels (A-weighted)					
		L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>2.5</sub>	L <sub>8.3</sub>	L <sub>25</sub>	L <sub>max</sub>	L <sub>eq</sub>	L <sub>90</sub>
Wednesday 11/3/2010	10:00 AM	64	59	54	52.9 <sup>♦</sup>	51.0 <sup>♦</sup>	48.7 <sup>♦</sup>	58.4 <sup>♦</sup>	47.7 <sup>♦</sup>	41.7 <sup>♦</sup>
Wednesday 11/3/2010	11:00 AM	64	59	54	51.8 <sup>♦</sup>	48.3 <sup>♦</sup>	45.0 <sup>♦</sup>	59.8 <sup>♦</sup>	45.2 <sup>♦</sup>	40.2 <sup>♦</sup>
Wednesday 11/3/2010	12:00 PM	64	59	54	54.4 <sup>♦</sup>	50.8 <sup>♦</sup>	47.2 <sup>♦</sup>	62.6 <sup>♦</sup>	47.3 <sup>♦</sup>	40.2 <sup>♦</sup>
Wednesday 11/3/2010	1:00 PM	64	59	54	51.6 <sup>♦</sup>	49.4 <sup>♦</sup>	46.5 <sup>♦</sup>	58.5 <sup>♦</sup>	45.9 <sup>♦</sup>	40.2 <sup>♦</sup>
Wednesday 11/3/2010	2:00 PM	64	59	54	53.9 <sup>♦</sup>	51.5 <sup>♦</sup>	48.7 <sup>♦</sup>	60.4 <sup>♦</sup>	47.9 <sup>♦</sup>	41.7 <sup>♦</sup>
Wednesday 11/3/2010	3:00 PM	64	59	54	55.2 <sup>♦</sup>	52.6 <sup>♦</sup>	48.7 <sup>♦</sup>	61.8 <sup>♦</sup>	48.5 <sup>♦</sup>	42.1 <sup>♦</sup>
Wednesday 11/3/2010	4:00 PM	64	59	54	54.3 <sup>♦</sup>	50.2 <sup>♦</sup>	46.0 <sup>♦</sup>	61.0 <sup>♦</sup>	46.9 <sup>♦</sup>	41.9 <sup>♦</sup>
Wednesday 11/3/2010	5:00 PM	64	59	54	52.1 <sup>♦</sup>	48.9 <sup>♦</sup>	46.4 <sup>♦</sup>	63.2 <sup>♦</sup>	46.7 <sup>♦</sup>	42.1 <sup>♦</sup>
Wednesday 11/3/2010	6:00 PM	64	59	54	50.7*	48.2*	45.3*	55.0*	45.0*	40.9*
Wednesday 11/3/2010	7:00 PM	64	59	54	51.6*	47.3*	44.0*	61.6*	45.0*	39.0*
Wednesday 11/3/2010	8:00 PM	64	59	54	48.9*	42.8*	39.3*	66.7*	42.9*	34.8*
Wednesday 11/3/2010	9:00 PM	64	59	54	45.7*	40.6*	37.4*	58.3*	38.8*	34.0*
Wednesday 11/3/2010	10:00 PM	54	49	44	40.8*	38.3*	35.9*	51.3*	36.0*	32.2*
Wednesday 11/3/2010	11:00 PM	54	49	44	39.7*	36.4*	34.1*	53.7*	34.7*	29.8*
Thursday 11/4/2010	12:00 AM	54	49	44	38.5*	36.1*	33.6*	41.9*	33.2*	29.9*
Thursday 11/4/2010	1:00 AM	54	49	44	35.5*	33.8*	32.0*	40.4*	31.5*	29.0*
Thursday 11/4/2010	2:00 AM	54	49	44	35.9*	32.6*	30.7*	54.0*	33.4*	28.0*
Thursday 11/4/2010	3:00 AM	54	49	44	37.5*	35.1*	32.7*	43.0*	32.4*	29.4*
Thursday 11/4/2010	4:00 AM	54	49	44	37.7*	35.0*	33.1*	46.8*	32.9*	29.8*
Thursday 11/4/2010	5:00 AM	54	49	44	41.8*	39.9*	38.2*	47.3*	37.4*	33.0*
Thursday 11/4/2010	6:00 AM	54	49	44	50.2*	43.7*	41.2*	58.6*	42.6*	38.8*
Thursday 11/4/2010	7:00 AM	64	59	54	50.1*	46.0*	42.0*	57.1*	43.2*	38.9*
Thursday 11/4/2010	8:00 AM	64	59	54	47.4*	44.8*	42.4*	57.8*	42.6*	39.8*
Thursday 11/4/2010	9:00 AM	64	59	54	47.9*	44.0*	42.2*	60.1*	43.0*	39.0*

Notes

1. L<sub>2.5</sub> = Level exceeded 2.5% (1.5 minutes) per hour  
 L<sub>8.3</sub> = Level exceeded 8.3% (5 minutes) per hour  
 L<sub>25</sub> = Level exceeded 25% (15 minutes) per hour  
 L<sub>max</sub> = Maximum noise level measured  
 L<sub>eq</sub> = Equivalent hourly average noise level  
 L<sub>90</sub> = Level exceeded 90% (54 minutes) per hour (equivalent to the background noise level)
2. \* = hourly average wind speed > 5 miles per hour.  
 ♦ = hourly average wind speed > 12 miles per hour, data invalidated.

## **FIGURES**

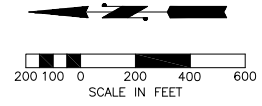
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**SOUND LEVEL MEASUREMENT LOCATIONS**

Monitoring Site	Description
Location 5	At the east CHRLF property line near residential property, north of the southeast corner of the site, and east of 227th Avenue SE
Location 10	Near the east CHRLF fence line by residential property
Location 11	Near the north CHRLF fence by residential property to the NE of CHRLF
Location 15	Near the west CHRLF fence line, towards the south end of the property

**Legend**  
 ((° Noise Monitoring Location  
 - - - Property Boundry line



DATE	REVISION	BY

KING COUNTY DEPARTMENT OF NATURAL RESOURCES AND PARKS  
 SOLID WASTE DIVISION  
**CEDAR HILLS LANDFILL**  
**NOISE MONITORING**  
**SITE MAP**  
 MARCH 2011

APPROVED \_\_\_\_\_ DATE \_\_\_\_\_  
 RECOMMENDED \_\_\_\_\_ DATE \_\_\_\_\_  
 DESIGNED \_\_\_\_\_ DRAWN \_\_\_\_\_  
 PROJECT NO. \_\_\_\_\_ SURVEY NO. \_\_\_\_\_ FIGURE 1



**Figure 2a. Hourly ambient L25 noise level at Location 15 (West Fence Line, South Portion of the Property), Cedar Hills Regional Landfill, October 28-29, 2010**

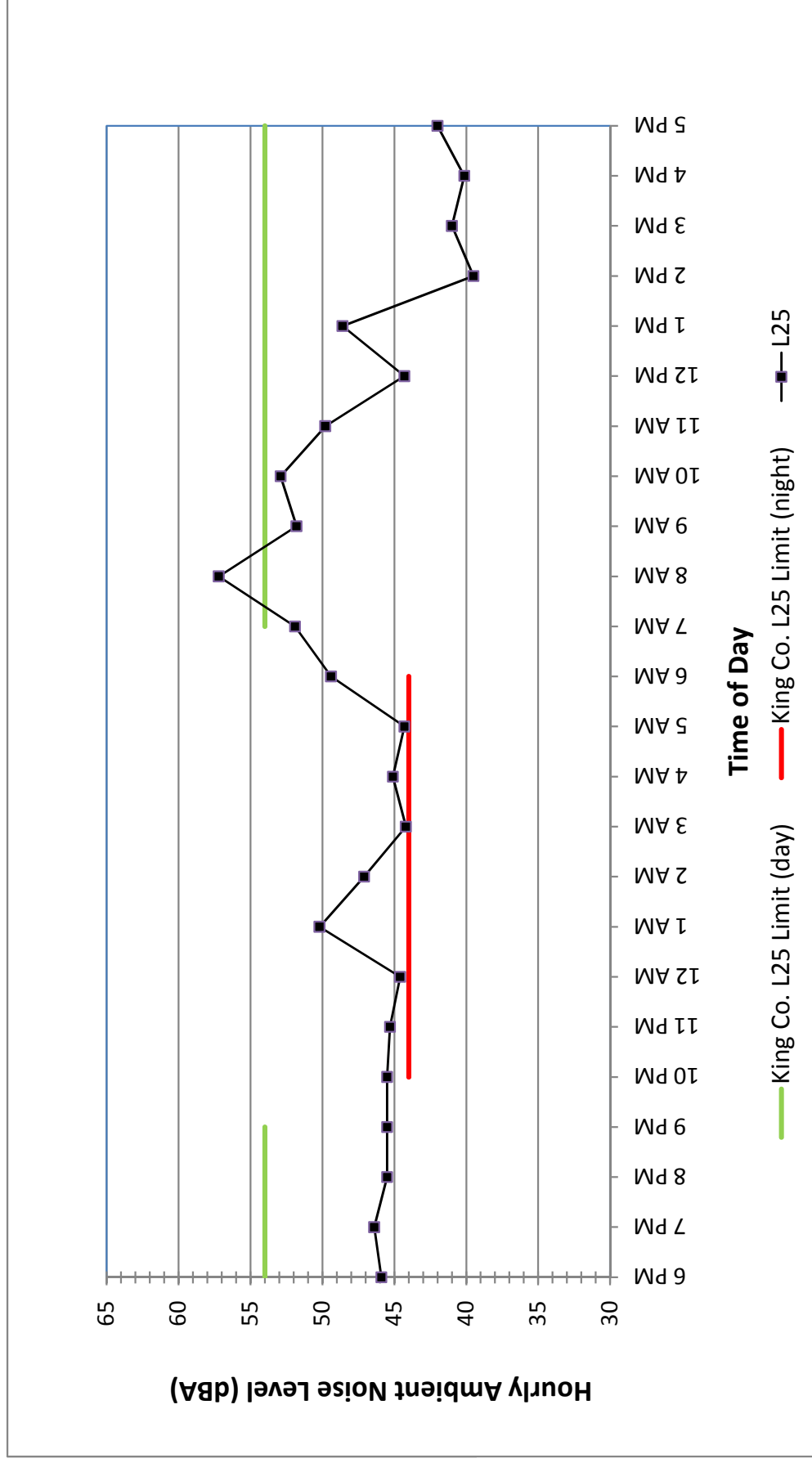


Figure 2b. Hourly ambient L8.3 noise level at Location 15 (West Fence Line, South Portion of the Property), Cedar Hills Regional Landfill, October 28-29, 2010

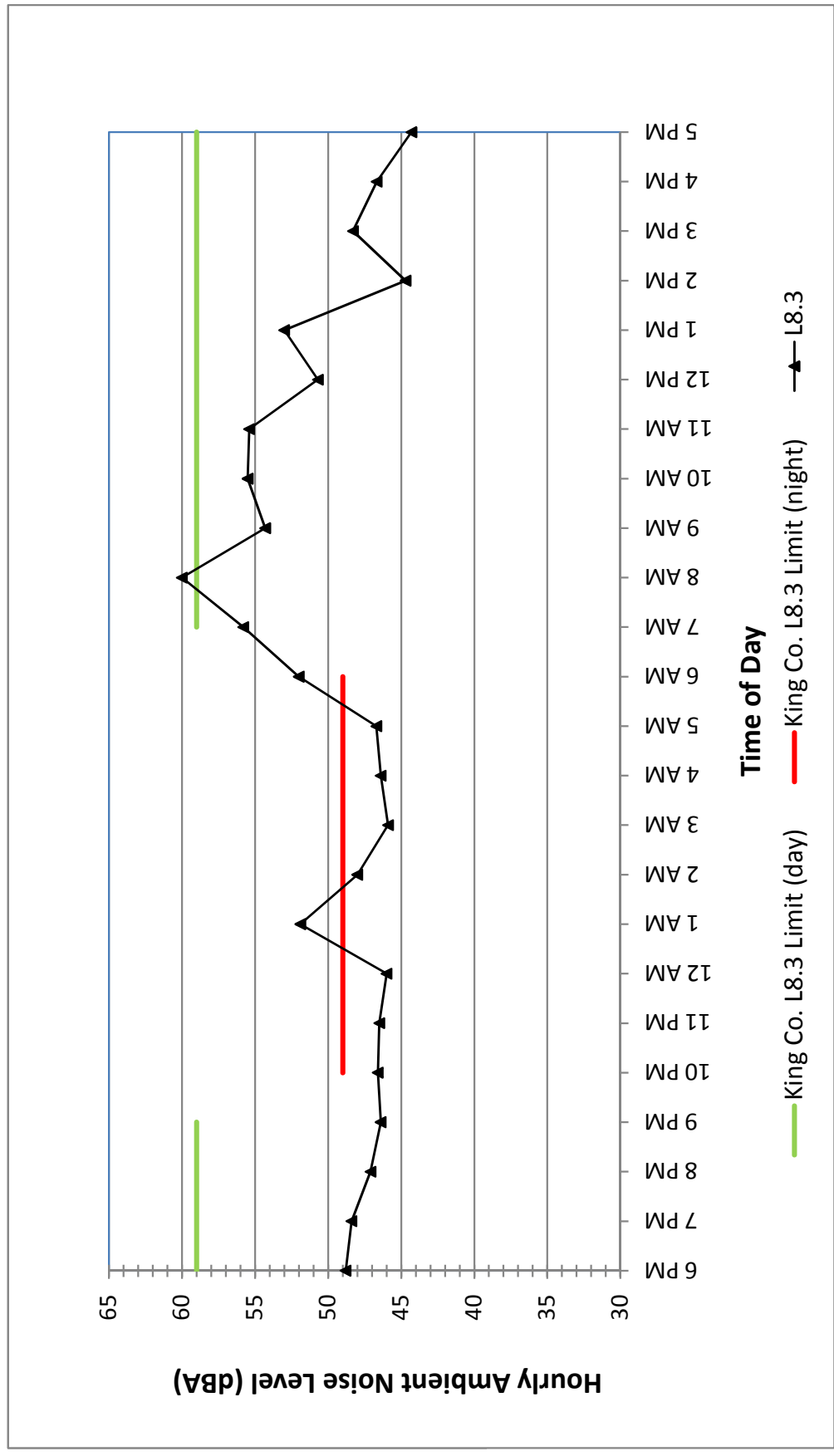


Figure 2c. Hourly ambient L2.5 noise level at Location 15 (West Fence Line, South Portion of the Property), Cedar Hills Regional Landfill, October 28-29, 2010

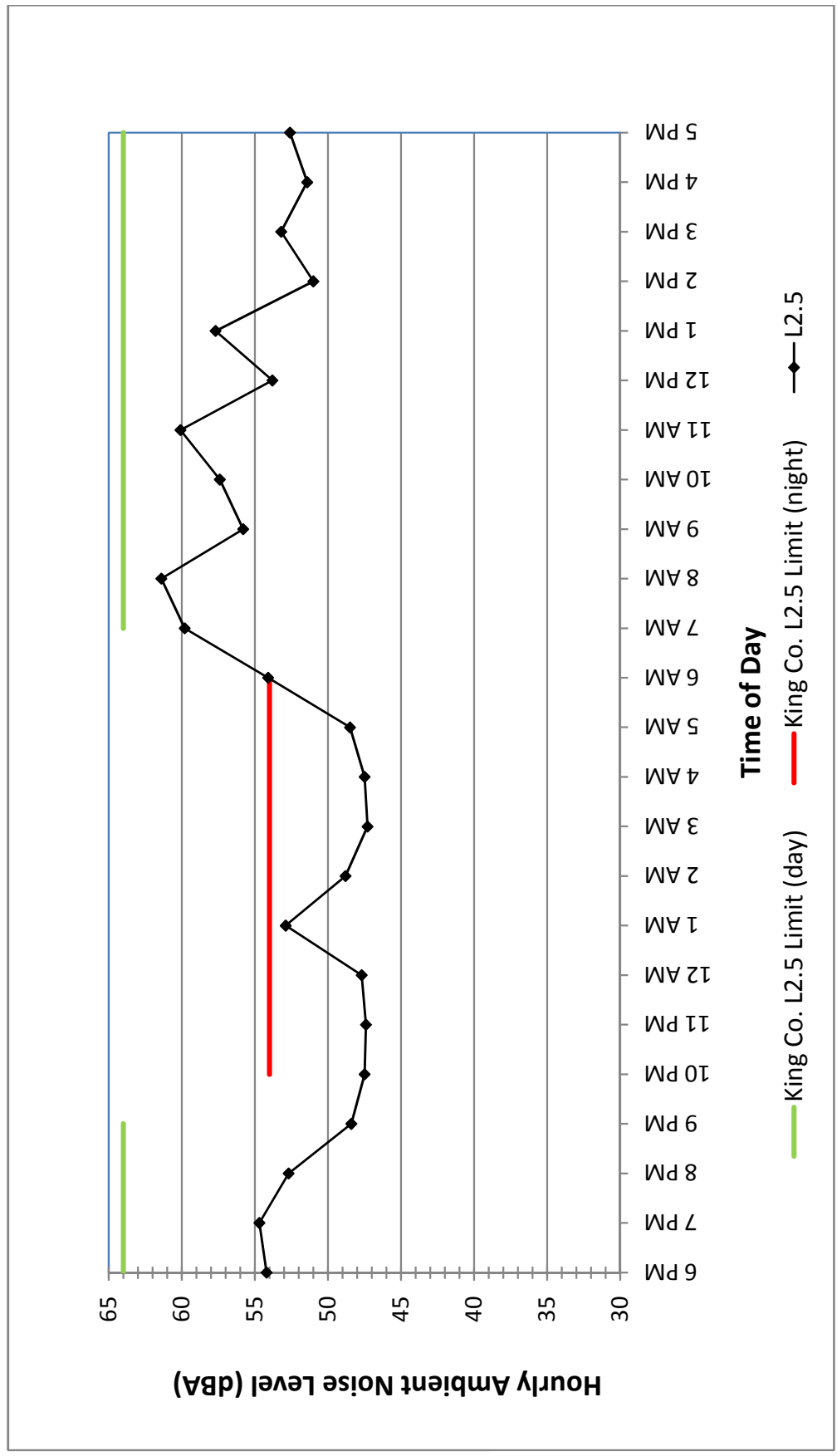
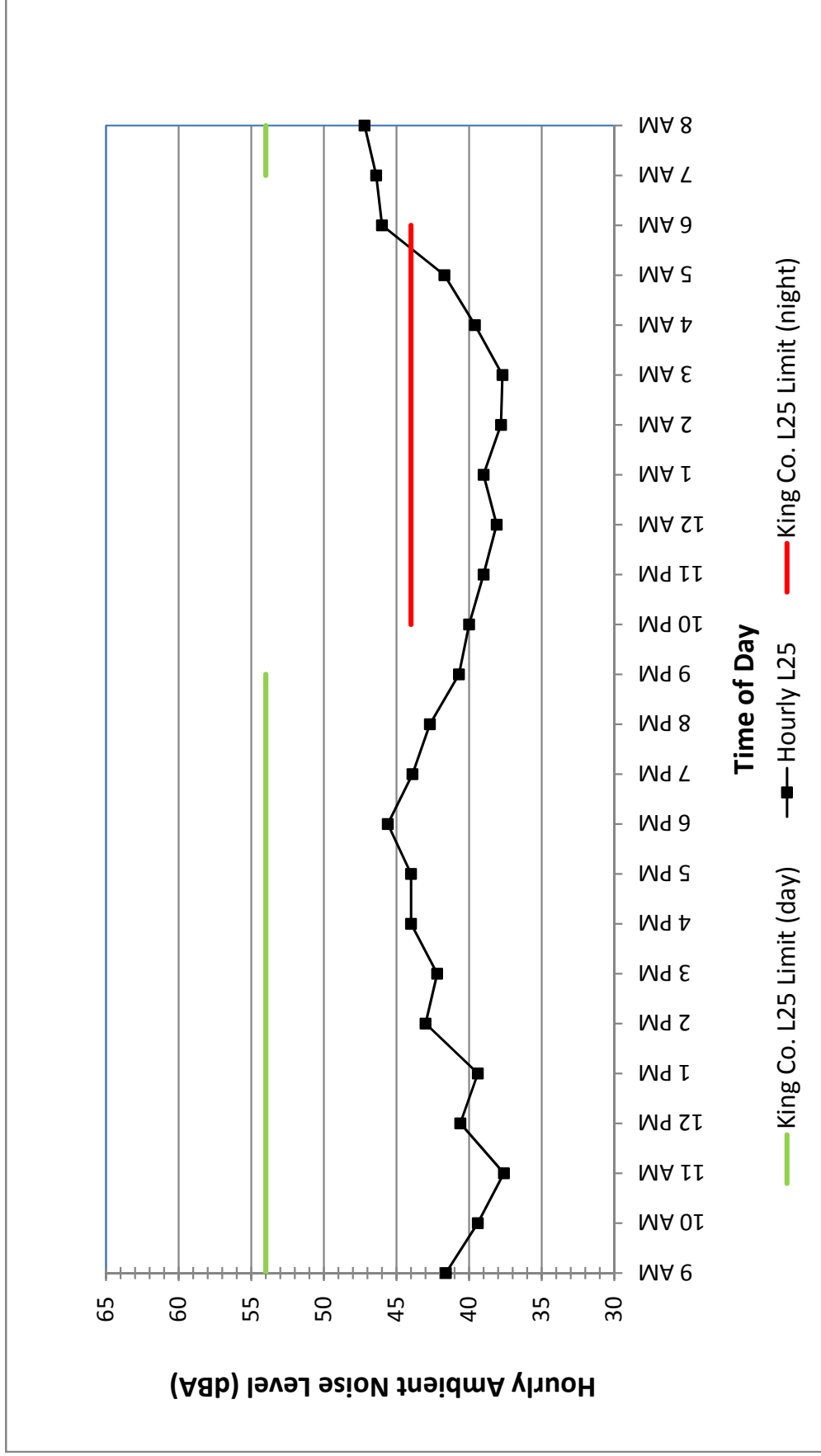
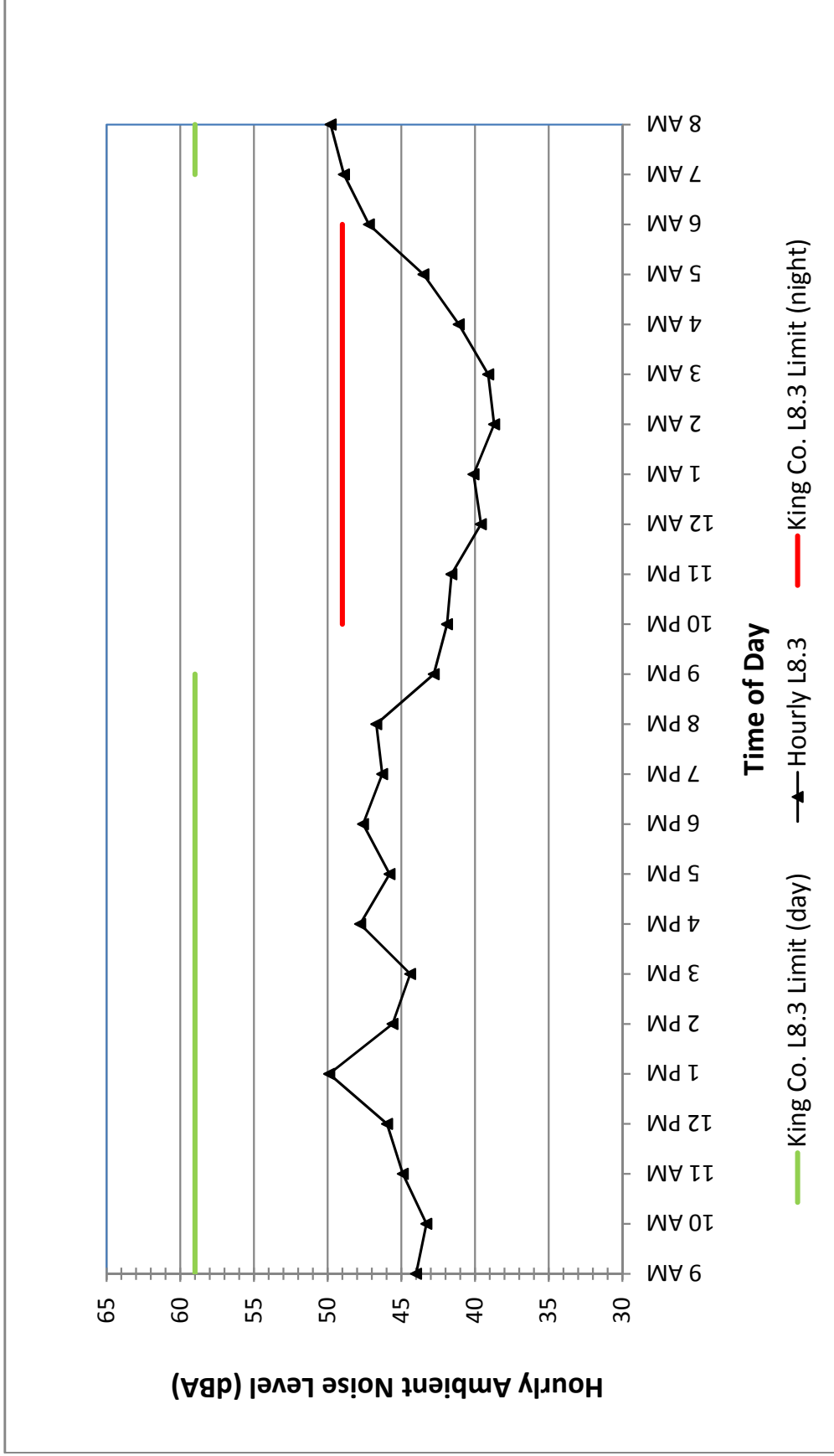


Figure 3a. Hourly ambient L25 noise level at Location 11 (North Fence Line, NE Portion of Property), Cedar Hills Regional Landfill, November 2-3, 2010



**Figure 3b. Hourly ambient L8.3 noise level at Location 11 (North Fence Line, NE Portion of Property), Cedar Hills Regional Landfill, November 2-3, 2010**



**Figure 3c. Hourly ambient L2.5 noise level at Location 11 (North Fence Line, NE Portion of Property), Cedar Hills Regional Landfill, November 2-3, 2010**

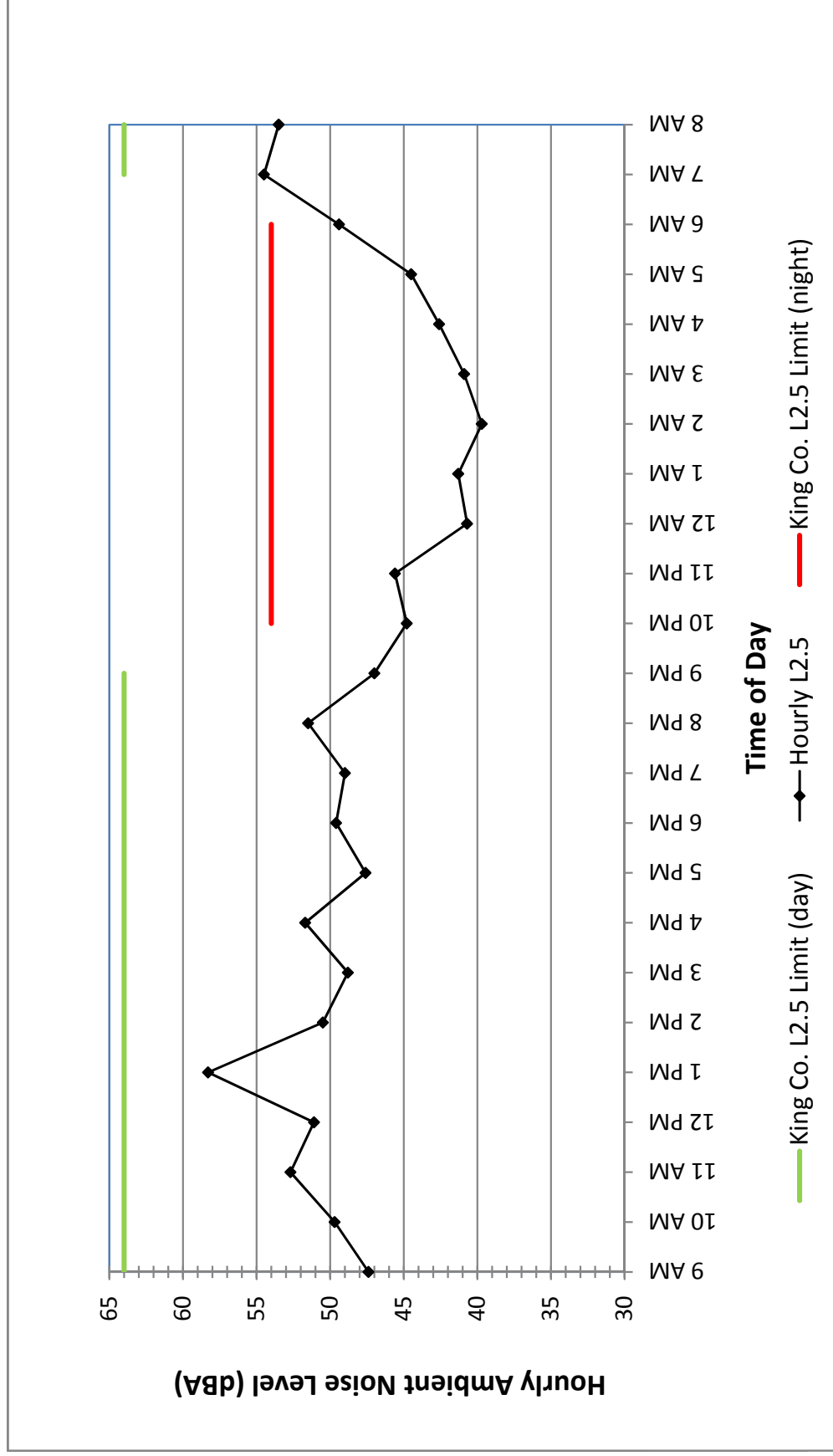
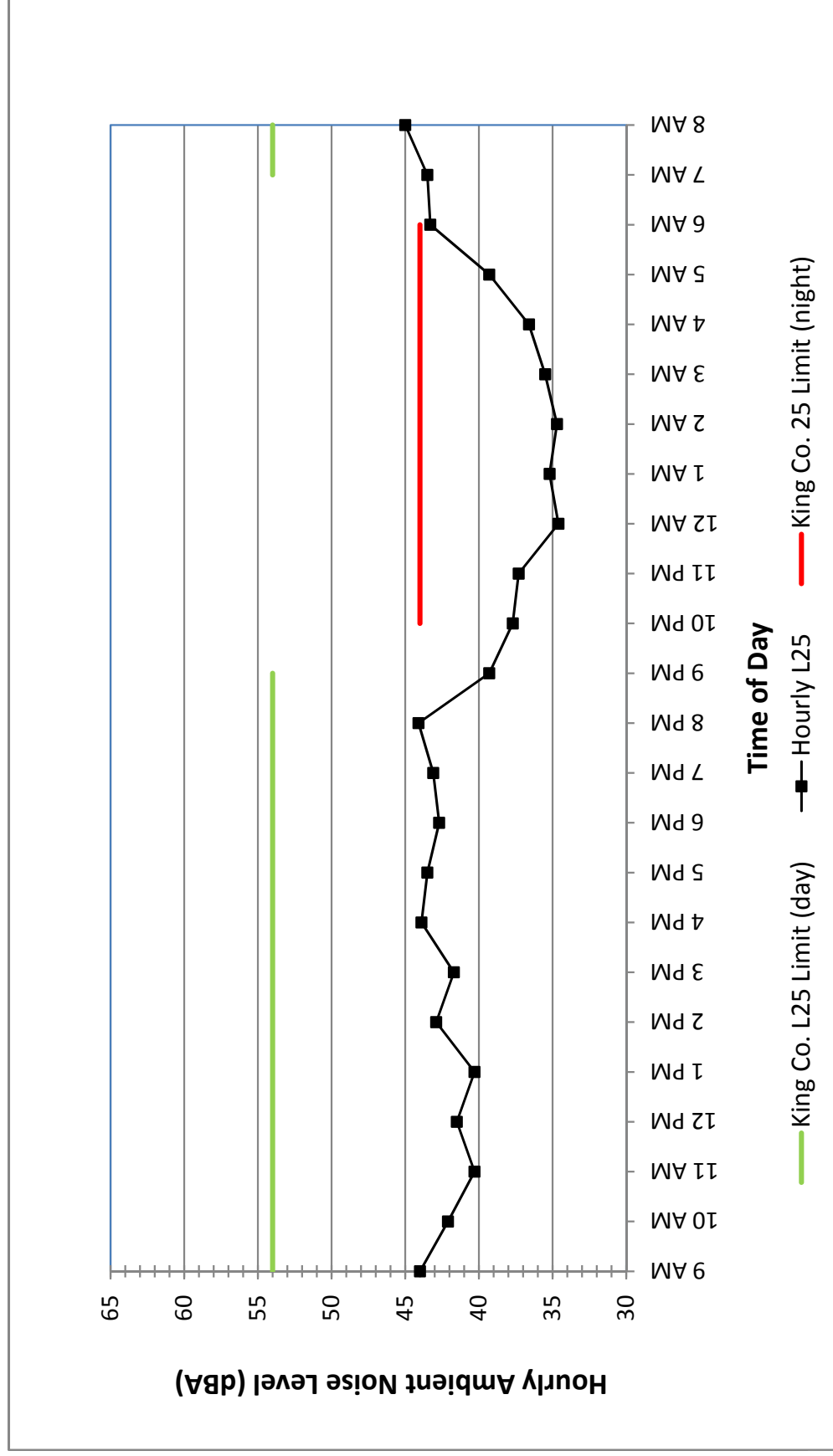


Figure 4a. Hourly ambient L25 noise level at Location 10 (East Fence Line, Central Third of Property), Cedar Hills Regional Landfill, November 2-3, 2010



**Figure 4b. Hourly ambient L8.3 noise level at Location 10 (East Fence Line, Central Third of Property), Cedar Hills Regional Landfill, November 2-3, 2010**

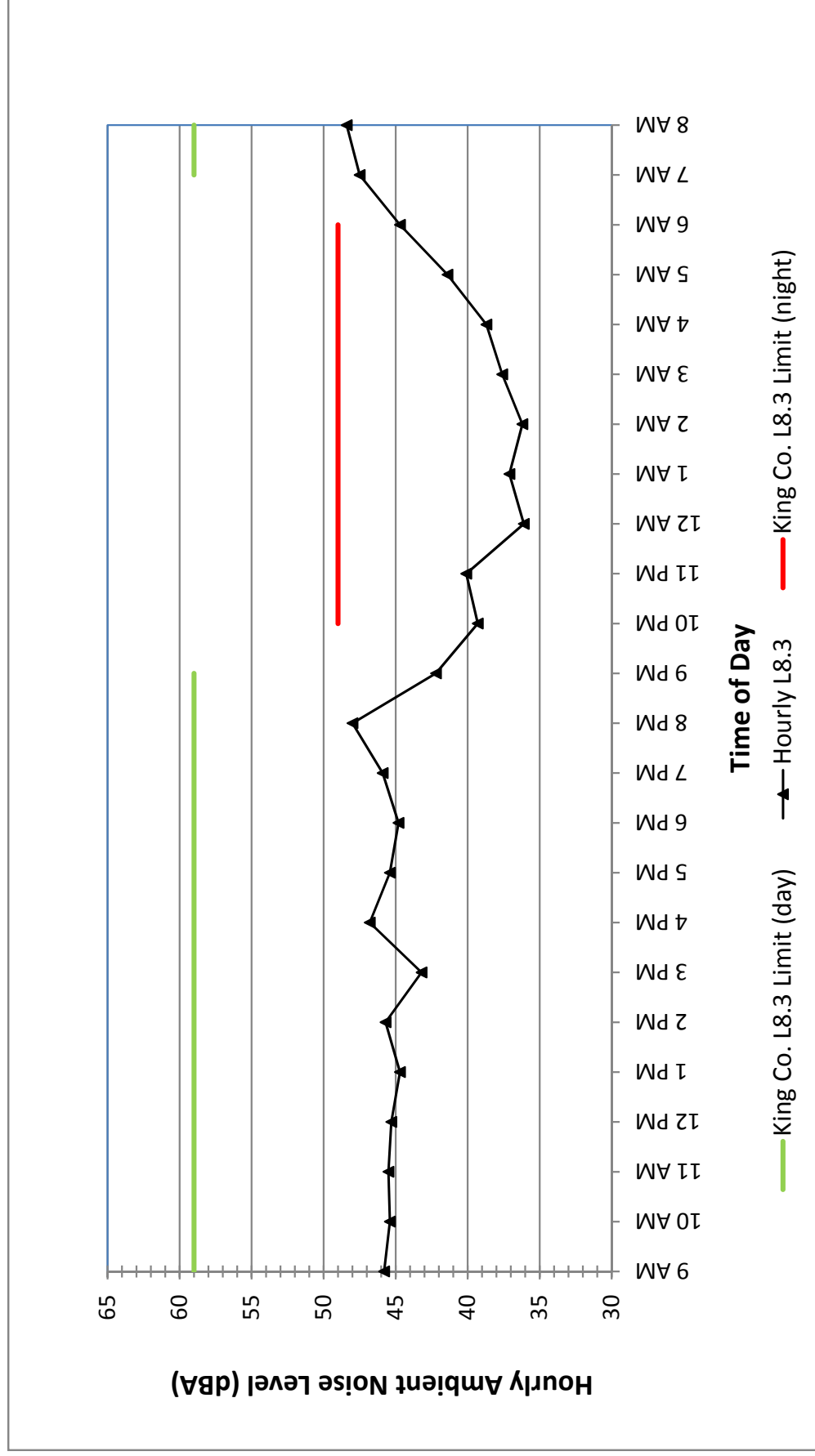




Figure 4c. Hourly ambient L2.5 noise level at Location 10 (East Fence Line, Central Third of Property), Cedar Hills Regional Landfill, November 2-3, 2010

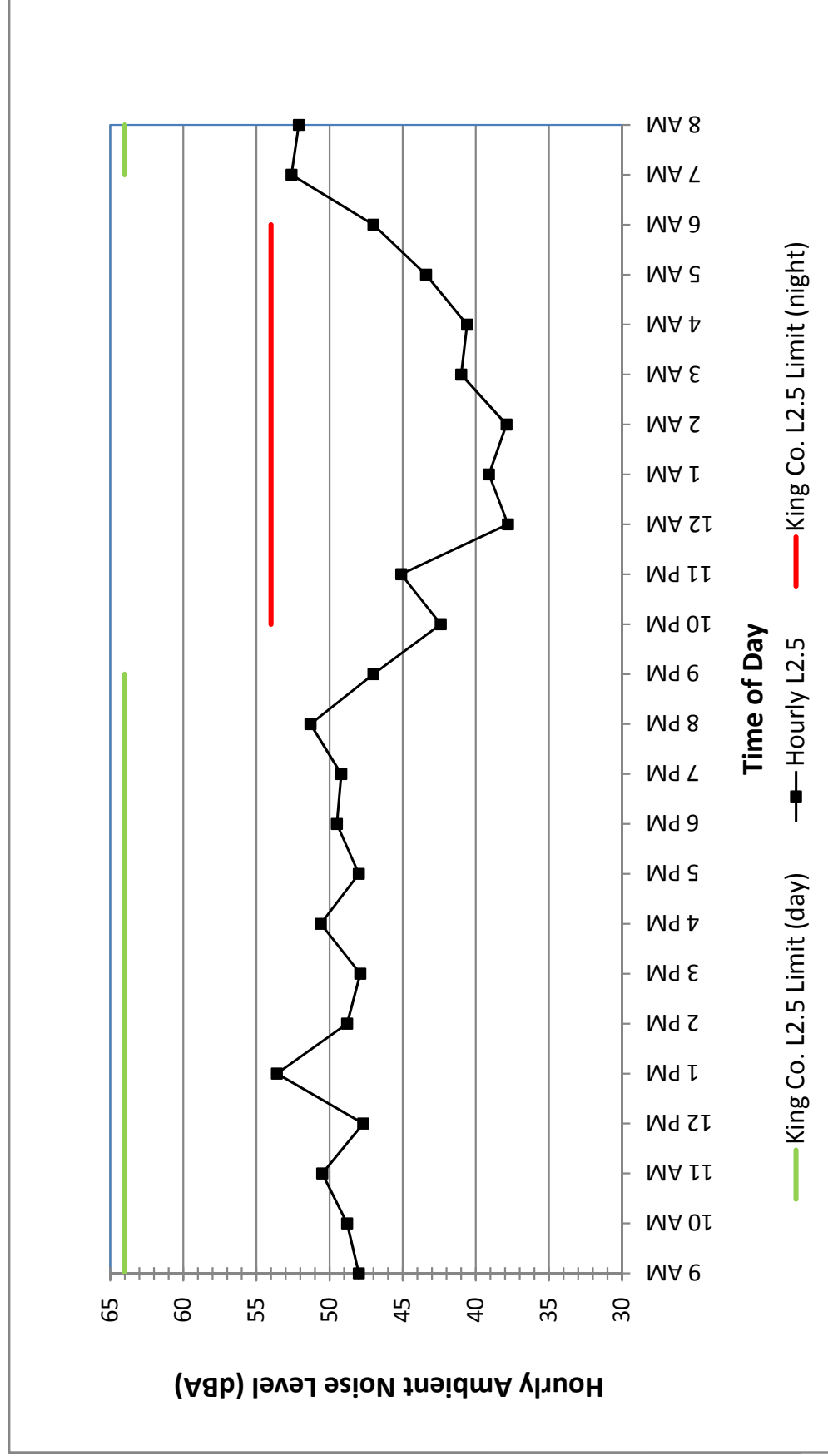
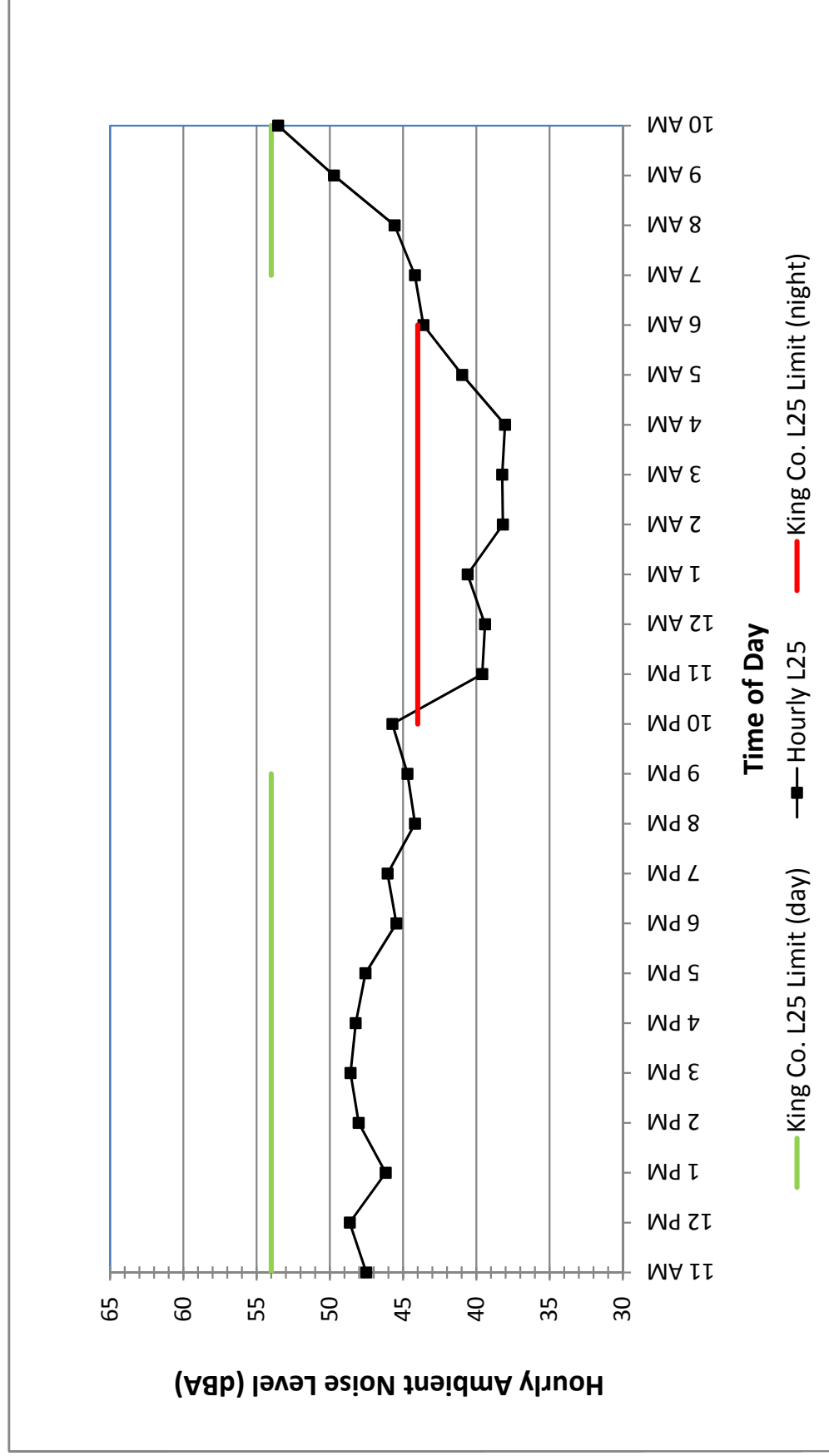


Figure 5a. Hourly ambient L25 noise level at Location 5 (East Property Line, SE Portion of Property by 227th Avenue SE) Cedar Hills Regional Landfill, November 3-4, 2010



**Figure 5b. Hourly ambient L8.3 noise level at Location 5 (East Property Line, SE Portion of Property by 227th Avenue SE), Cedar Hills Regional Landfill, November 3-4, 2010**

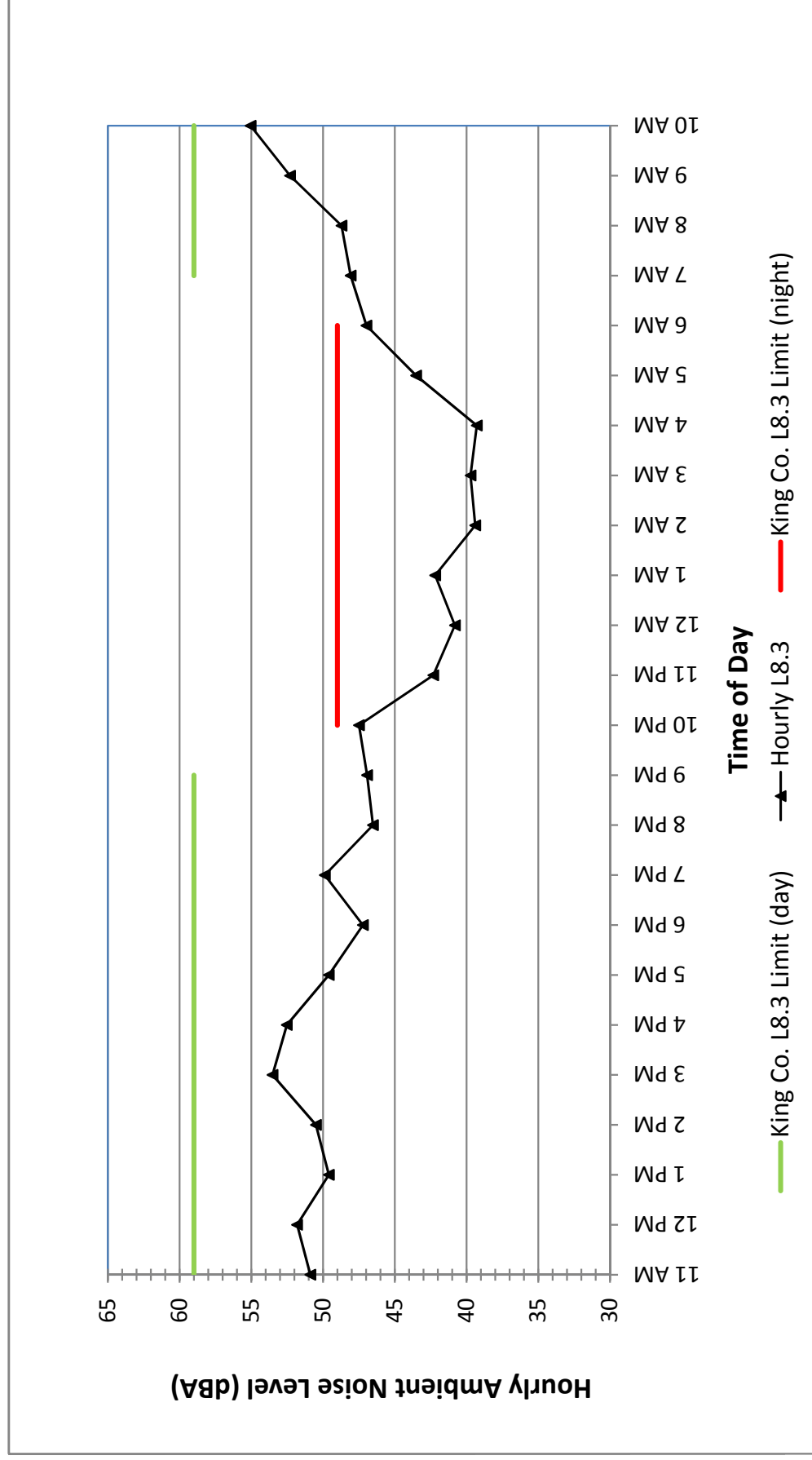


Figure 5c. Hourly ambient L2.5 noise level at Location 5 (East Property Line, SE Portion of Property by 227th Avenue SE), Cedar Hills Regional Landfill, November 3-4, 2010

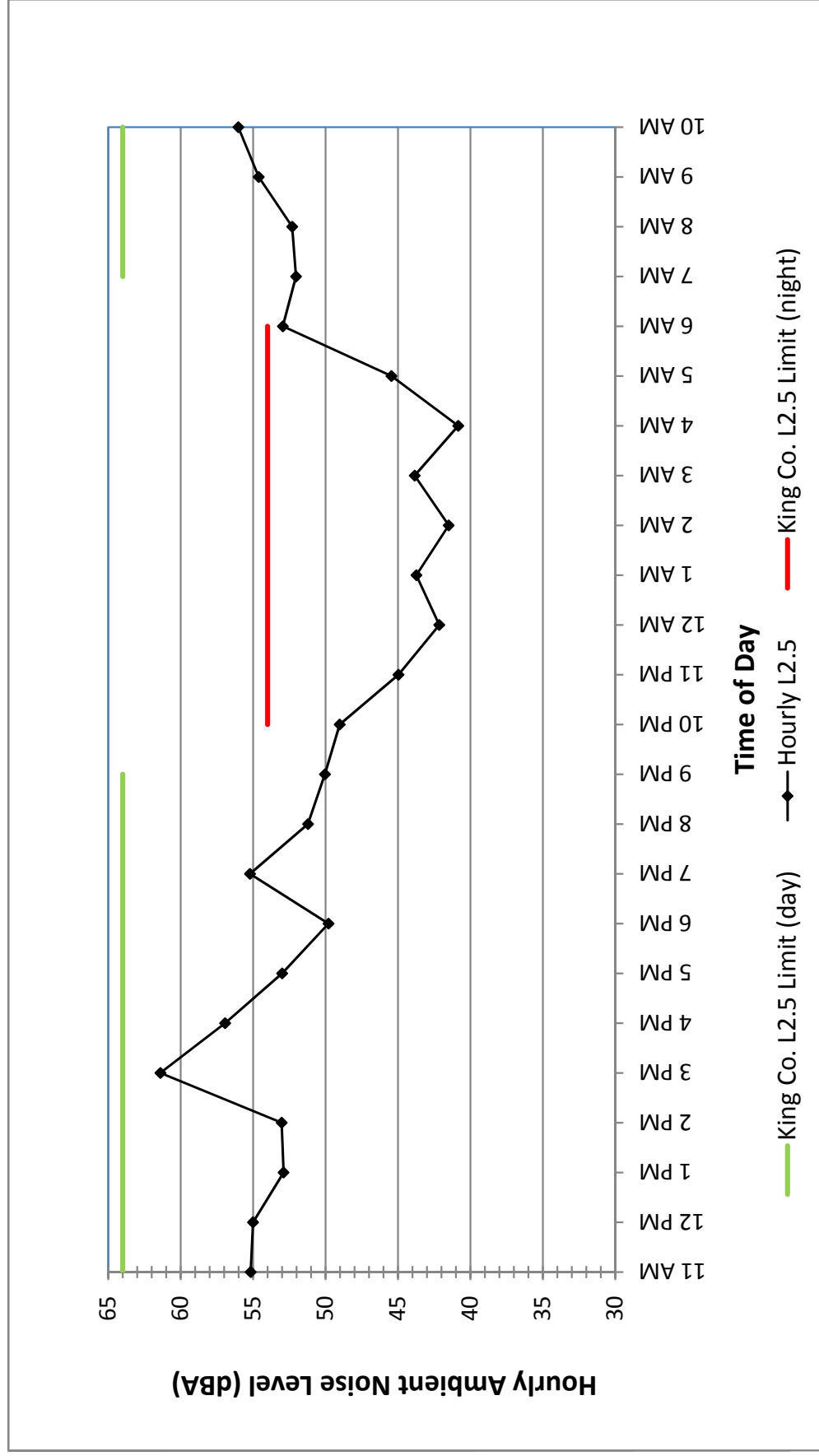
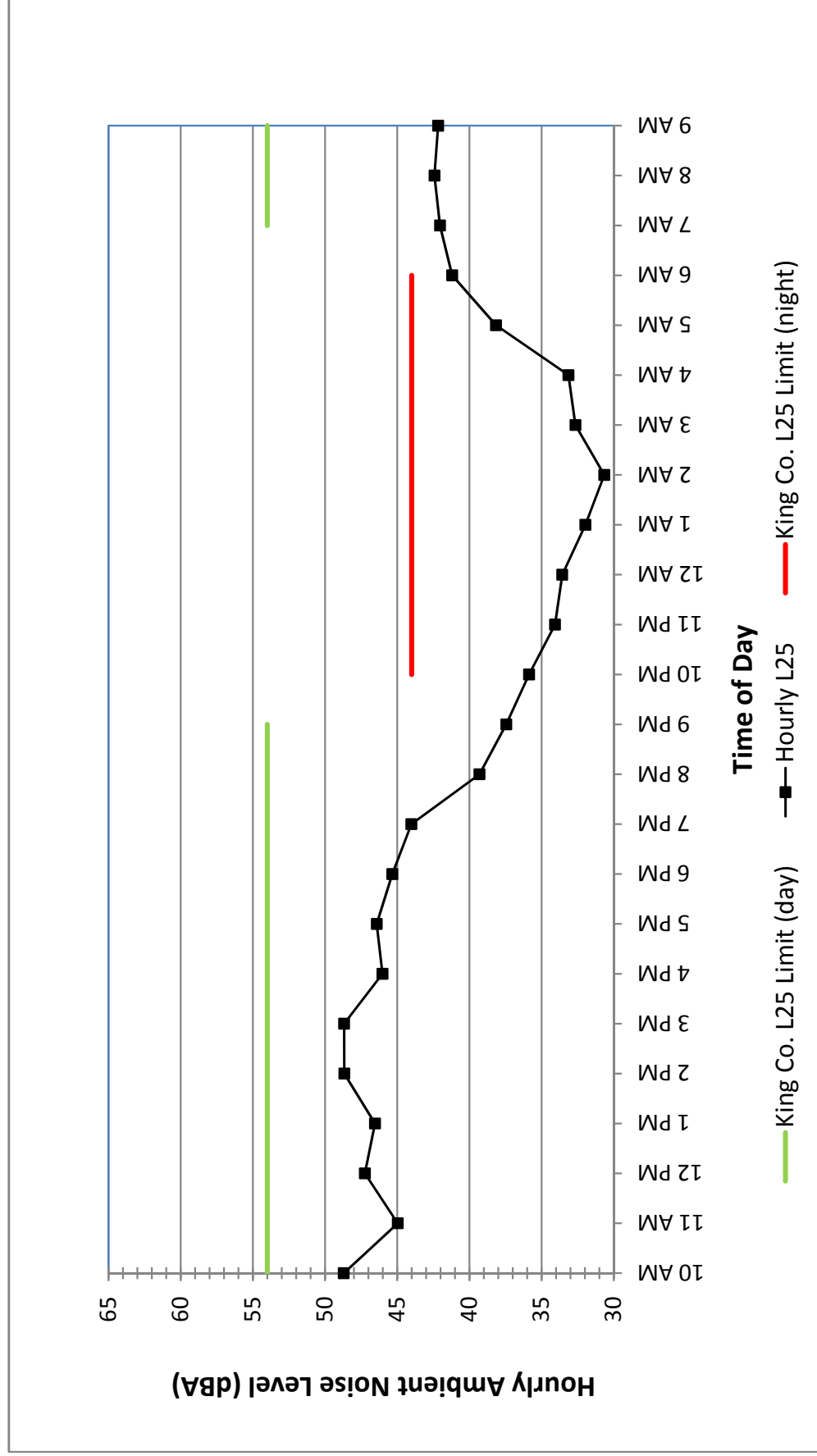


Figure 6a. Hourly ambient L25 noise level at Location 10 (East Fence Line, Central Third of Property), Cedar Hills Regional Landfill, November 3-4, 2010



**Figure 6b. Hourly ambient L8.3 noise level at Location 10 (East Fence Line, Central Third of Property), Cedar Hills Regional Landfill, November 3-4, 2010**

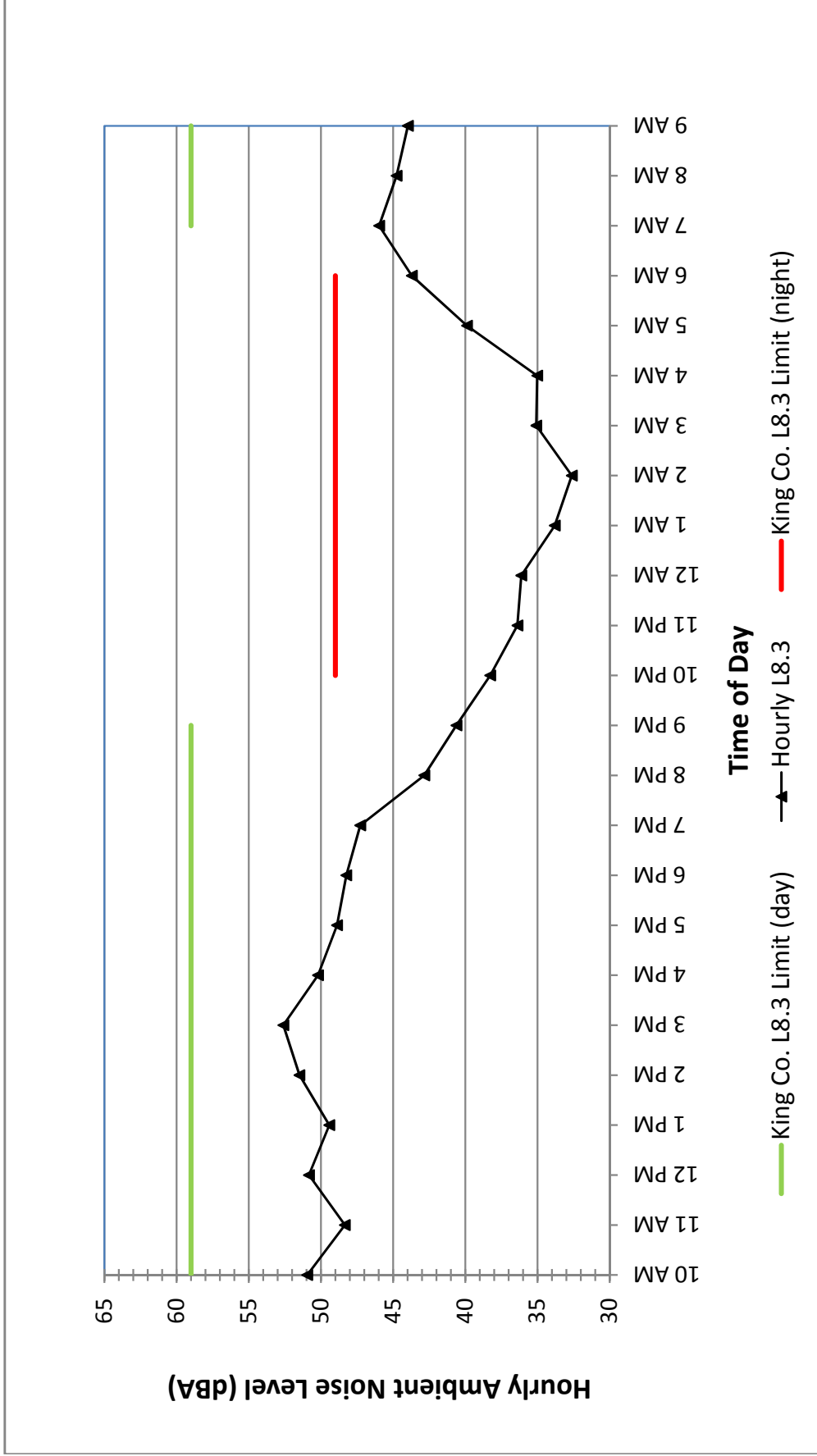
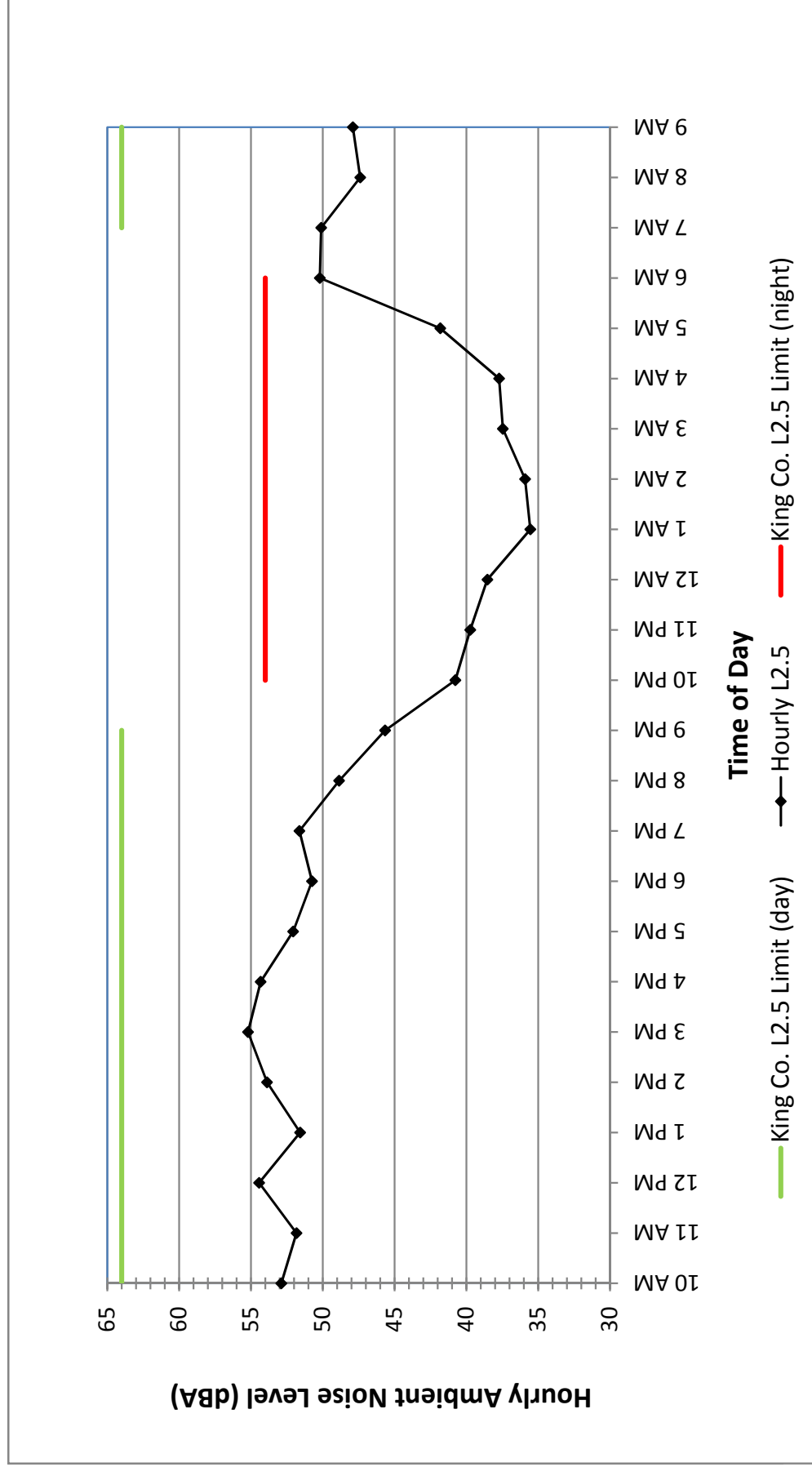


Figure 6c. Hourly ambient L2.5 noise level at Location 10 (East Fence Line, Central Third of Property), Cedar Hills Regional Landfill, November 3-4, 2010



**APPENDIX A**

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Identifiable Sounds at Ambient Noise Monitoring Locations



**IDENTIFIABLE NOISES AT LOCATION 15  
(WEST FENCE LINE, SOUTHERN PORTION OF CHRLF)  
OCTOBER 28-29, 2010**

<b>October 28</b>	
<b>Hour</b>	<b>Identified Noises</b>
10 PM	1: Aircraft
<b>October 29</b>	
<b>Hour</b>	<b>Identified Noises</b>
8 AM	1: CHRLF operations/security vehicle at monitoring site
11 AM	1: Aircraft 2: CHRLF operations/security vehicle at monitoring site

**IDENTIFIABLE NOISES AT LOCATION 11  
(NORTH FENCE LINE, NE PORTION OF CHRLF)  
NOVEMBER 3, 2010**

<b>Hour</b>	<b>Identified Noises</b>
5 AM	1: CHRLF operations/security vehicle at monitoring site
6 AM	1: CHRLF operations/security vehicle at monitoring site 2: Aircraft 3: Aircraft

**IDENTIFIABLE NOISES AT LOCATION 10  
(EAST FENCE LINE, CENTRAL THIRD OF CHRLF)  
NOVEMBER 3, 2010**

<b>Hour</b>	<b>Identified Noises</b>
6 AM	1: Aircraft
7 AM	1: Aircraft 2: Aircraft 3: Aircraft 4: Aircraft 5: Aircraft 6: CHRLF operations/security vehicle at monitoring site

**IDENTIFIABLE NOISES AT LOCATION 10  
(EAST FENCE LINE, CENTRAL THIRD OF CHRLF)  
NOVEMBER 3-4, 2010**

<b>November 3</b>	
<b>Hour</b>	<b>Identified Noises</b>
10 AM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Aircraft, and hammering</li> <li>3: Electric saw</li> <li>4: Bird</li> <li>5: Bird, and Aircraft</li> <li>6: Aircraft</li> <li>7: Car</li> <li>8: Aircraft</li> </ul>
11 AM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Aircraft</li> <li>3: Wind in trees</li> <li>4: Vehicle backup alarm</li> <li>5: Aircraft</li> </ul>
12 PM	<ul style="list-style-type: none"> <li>1: Bird</li> <li>2: Birds, and aircraft</li> <li>3: Birds, and aircraft</li> <li>4: Birds, and aircraft</li> <li>5: Wind in trees</li> <li>6: Aircraft</li> <li>7: Wind in trees</li> <li>8: Aircraft</li> <li>9: Wind in trees</li> <li>10: Aircraft</li> <li>11: Aircraft, and wind in trees</li> </ul>
1 PM	<ul style="list-style-type: none"> <li>1: Bird and wind in trees</li> <li>2: Wind in trees</li> <li>3: Wind in trees</li> <li>4: Dog, and wind in trees</li> <li>5: Aircraft</li> <li>6: Wind in trees</li> </ul>
2 PM	<ul style="list-style-type: none"> <li>1: Wind in trees, aircraft, and dog</li> <li>2: Aircraft, and dog</li> <li>3: Wind in trees</li> <li>4: Aircraft</li> <li>5: Wind in trees</li> <li>6: Aircraft</li> <li>7: Wind in trees</li> <li>8: Aircraft</li> <li>9: Aircraft</li> <li>10: Wind in trees</li> <li>11: Aircraft, and wind in trees</li> <li>12: Wind in trees</li> <li>13: Aircraft, and wind in trees</li> </ul>

3 PM	1: Wind in trees 2: Aircraft 3: Wind in trees 4: Aircraft 5: Wind in trees 6: Aircraft, and bird 7: Wind in trees 8: Aircraft, and wind in trees 9: Aircraft, and wind in trees 10: Aircraft, and wind in trees 11: Wind in trees 12: Aircraft 13: Wind in trees 14: Wind in trees 15: Wind in trees 16: Wind in trees 17: Wind in trees, and aircraft
4 PM	1: Aircraft 2: Aircraft 3: Wind in trees 4: Aircraft, and wind in trees 5: Aircraft 6: Wind in trees 7: Aircraft, wind in trees, and vehicle on public road 8: Wind in trees 9: Aircraft 10: Wind in trees 11: Aircraft 12: Wind in trees
5 PM	1: Aircraft 2: Pickup checking monitor site 3: Aircraft 4: Wind in trees 5: Wind in trees, aircraft 6: Wind in trees 7: Aircraft, and bird 8: Wind in trees 9: Wind in trees 10: Aircraft, and wind in trees
6 PM	1: Wind in trees 2: Aircraft, and wind in trees 3: Aircraft, and wind in trees 4: Wind in trees 5: Aircraft, bird, and wind in trees 6: Wind in trees 7: Wind in trees, and aircraft 8: Wind in trees

7 PM	<ul style="list-style-type: none"> <li>1: Wind in trees</li> <li>2: Wind in trees</li> <li>3: Wind in trees</li> <li>4: Wind in trees, and bird</li> <li>5: Bird, and wind in trees</li> <li>6: Aircraft, and wind in trees</li> <li>7: Wind in trees</li> <li>8: Aircraft, and wind in trees</li> <li>9: Wind in trees</li> <li>10: Aircraft</li> <li>11: Wind in trees</li> <li>12: Aircraft</li> <li>13: Wind in trees</li> <li>14: Wind in trees, and aircraft</li> <li>15: Wind in trees</li> </ul>
8 PM	<ul style="list-style-type: none"> <li>1: Bird</li> <li>2: Wind in trees</li> <li>3: Aircraft</li> <li>4: Aircraft</li> <li>5: Aircraft, and frog</li> <li>6: Aircraft</li> </ul>
9 PM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Aircraft</li> <li>3: Wind in trees</li> <li>4: Aircraft, and wind in trees</li> <li>5: Aircraft</li> <li>6: Aircraft</li> <li>7: Motorcycle</li> <li>8: Aircraft</li> <li>9: Aircraft</li> </ul>
10 PM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Wind in trees</li> <li>3: Aircraft</li> <li>4: Aircraft</li> <li>5: Aircraft</li> </ul>
11 PM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Aircraft</li> <li>3: Car on public road, owl</li> <li>4: Aircraft</li> <li>5: Aircraft</li> <li>6: Aircraft</li> </ul>
<b>November 4</b>	
<b>Hour</b>	<b>Identified Noises</b>
12 AM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Wind in trees</li> <li>3: Aircraft</li> <li>4: Wind in trees</li> <li>5: Wind in trees</li> <li>6: Wind in trees</li> </ul>
1 AM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Wind in trees</li> </ul>

2 AM	1: Snapping twigs 2: Aircraft 3: Wind in trees 4: Aircraft 5: Snapping branches
3 AM	1: Aircraft 2: Wind in trees 3: Wind in trees 4: Aircraft 5: Vehicle on public road
4 AM	1: Vehicle on public road 2: Vehicle on public road 3: Aircraft
5 AM	1: Vehicle on public road 2: Aircraft 3: Aircraft
6 AM	1: Aircraft 2: Aircraft 3: Aircraft 4: Aircraft 5: Aircraft
7 AM	1: Aircraft 2: Aircraft 3: Aircraft, and squirrel 4: Bird, and aircraft 5: Bird, squirrels, and aircraft 6: Birds 7: Birds, and squirrels 8: Aircraft
8 AM	1: Bird, and aircraft 2: Birds, and aircraft 3: Aircraft, and birds
9 AM	1: Pickup checking monitor site 2: Birds, aircraft 3: Aircraft, birds

**IDENTIFIABLE NOISES AT LOCATION 5  
(EAST FENCE LINE, SE PORTION OF CHRLF BY 227TH AVENUE SE)  
NOVEMBER 3-4, 2010**

<b>November 3</b>	
<b>Hour</b>	<b>Identified Noises</b>
12 PM	1: Wind in trees 2: Aircraft 3: Aircraft 4: Wind in trees 5: Aircraft 6: Aircraft 7: Wind in trees 8: Aircraft, bird 9: Wind in trees, ringing sound 10: Wind in trees 11: Neighbor's car 12: Aircraft 13: Wind in trees, ringing sound 14: Aircraft 15: Neighbor's SUV 16: Aircraft 17: Truck on 228 <sup>th</sup> 18: Aircraft 19: Truck on 228 <sup>th</sup> 20: Aircraft 21: Aircraft 22: Truck on 227 <sup>th</sup>
1 PM	1: Truck on 228 <sup>th</sup> 2: Neighbor SUV and visitor 3: AMEC observer 4: AMEC observer 5: Truck on 227 <sup>th</sup> 6: Aircraft, and bird 7: Wind in trees 8: Aircraft 9: Neighbor's car 10: Aircraft, and truck on 227 <sup>th</sup>
2 PM	1: Truck on 228 <sup>th</sup> 2: Car door, and dog barking 3: Aircraft 4: Aircraft, and bird 5: Truck, and dog barking 6: Vehicle on 227 <sup>th</sup> 7: Aircraft 8: Truck on 227 <sup>th</sup> 9: Neighbor's car 10: Aircraft

3 PM	<ul style="list-style-type: none"> <li>1: Truck on 227<sup>th</sup></li> <li>2: Neighbor walking by</li> <li>3: Dog barking</li> <li>4: Dog barking</li> <li>5: AMEC observer vehicle, and Dog barking</li> <li>6: Dog barking</li> <li>7: Aircraft, and dog barking</li> <li>8: Aircraft</li> <li>9: Aircraft, and rooster</li> <li>10: Truck on 227<sup>th</sup></li> <li>11: Neighbor whistled</li> </ul>
4 PM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Aircraft</li> <li>3: Nearby vehicle</li> <li>4: Dog barked</li> <li>5: Neighbor visit</li> <li>6: Truck on 228<sup>th</sup></li> <li>7: Aircraft</li> <li>8: Aircraft</li> <li>9: Truck on 228<sup>th</sup></li> <li>10: Aircraft</li> <li>11: SUV on 227<sup>th</sup></li> <li>12: Aircraft</li> <li>13: AMEC observer</li> <li>14: Truck on 228<sup>th</sup></li> <li>15: Aircraft</li> <li>16: Aircraft, truck on 228<sup>th</sup></li> <li>17: Aircraft</li> </ul>
5 PM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Aircraft, and rooster</li> <li>3: Truck in distance</li> <li>4: Rooster</li> <li>5: Aircraft</li> <li>6: Motorcycle to neighbor's</li> <li>7: AMEC observer's car</li> <li>8: Aircraft</li> </ul>
6 PM	<ul style="list-style-type: none"> <li>1: Neighbor lawnmower</li> <li>2: Neighbor car</li> <li>3: Car on distant road</li> <li>4: Aircraft</li> <li>5: AMEC observer's car</li> </ul>
7 PM	<ul style="list-style-type: none"> <li>1: Aircraft</li> <li>2: Vehicle on 228<sup>th</sup></li> <li>3: New AMEC observer arrive</li> <li>4: AMEC observer leaves</li> <li>5: Aircraft</li> <li>6: Aircraft</li> </ul>
8 PM	<ul style="list-style-type: none"> <li>1: Aircraft (continued)</li> <li>2: Aircraft</li> <li>3: Aircraft</li> <li>4: Aircraft</li> <li>5: Aircraft</li> <li>6: Car on 227<sup>th</sup></li> </ul>

9 PM	1: Car on 227 <sup>th</sup> , and aircraft 2: Truck on 228 <sup>th</sup> 3: Truck on 228 <sup>th</sup> 4: Truck on 228 <sup>th</sup> 5: Aircraft 6: Aircraft 7: Aircraft
10 PM	1: Aircraft 2: Aircraft 3: Distant car 4: Car on 228 <sup>th</sup> 5: Distant car
11 PM	1: Aircraft 2: Aircraft 3: Car in distance
<b>November 4</b>	
<b>Hour</b>	<b>Identified Noises</b>
12 AM	1: AMEC observer car door 2: Low whistling noise from CHRLF direction
1 AM	1: Dog in distance 2: Dog yelping
2 AM	1: Car in distance 2: Aircraft 3: Distant low-frequency noise with whistling
3 AM	1: AMEC observer arrives 2: AMEC observer 3: Aircraft, BEW pressure change noise 4: Aircraft, AMEC observer 5: BEW pressure change noise
4 AM	1: Faint BEW pressure change sound 2: Rooster 3: Cars in distance
5 AM	1: BEW rumbling noise, and rooster 2: Car in distance, and rooster 3: Cars on 228 <sup>th</sup>
6 AM	1: Aircraft, rooster 2: Cars on 228 <sup>th</sup> 3: Cars in distance 4: Rooster 5: Motor in direction of BEW 6: Aircraft 7: Dog barking 8: Car on 227 <sup>th</sup> , cars and truck on 228 <sup>th</sup> 9: Aircraft, and rooster 10: Aircraft, and rooster 11: Neighbor's pickup 12: Aircraft, and rooster



7 AM	<ul style="list-style-type: none"> <li>1: Truck on 228<sup>th</sup></li> <li>2: Truck on 227<sup>th</sup></li> <li>3: Truck on 228<sup>th</sup>, rooster</li> <li>4: Aircraft</li> <li>5: Truck on 228<sup>th</sup></li> <li>6: Aircraft</li> <li>7: Aircraft, truck on 228<sup>th</sup></li> <li>8: Truck on 228<sup>th</sup></li> <li>9: Aircraft, and bird</li> <li>10: Aircraft, and birds</li> <li>11: Truck on 228<sup>th</sup></li> <li>12: Aircraft, and birds</li> <li>13: Truck on 228<sup>th</sup></li> <li>14: Dog barking</li> <li>15: Bird, and aircraft</li> <li>16: Bird, truck on 228<sup>th</sup></li> <li>17: Truck on 228<sup>th</sup>, and birds</li> <li>18: Trucks on 228<sup>th</sup>, and birds</li> <li>19: Aircraft</li> </ul>
8 AM	<ul style="list-style-type: none"> <li>1: Truck on 228<sup>th</sup></li> <li>2: Truck on 228<sup>th</sup>, and dog barking</li> <li>3: Truck on 228<sup>th</sup></li> <li>4: Truck on 228<sup>th</sup></li> <li>5: Truck on 228<sup>th</sup>, and bird</li> <li>6: Dog barking</li> <li>7: Truck on 227<sup>th</sup>, and bird</li> <li>8: Aircraft, and bird</li> <li>9: Truck on 227<sup>th</sup></li> <li>10: Compressor noise from BEW area</li> <li>11: Compressor noise from BEW</li> <li>12: Truck on 228<sup>th</sup></li> <li>13: Truck on 228<sup>th</sup></li> </ul>
9 AM	<ul style="list-style-type: none"> <li>1: Truck on 228<sup>th</sup></li> <li>2: Truck on 228<sup>th</sup></li> <li>3: Neighbor's leafblower</li> <li>4: Neighbor's leafblower</li> <li>5: Neighbor's leafblower, and aircraft</li> <li>6: Neighbor's leafblower, truck on 228<sup>th</sup></li> <li>7: Neighbor's leafblower, birds</li> <li>8: Neighbor's leafblower</li> <li>9: Truck on 227<sup>th</sup>, leafblower</li> <li>10: Car on 227<sup>th</sup>, leafblower</li> <li>11: Truck on 228<sup>th</sup></li> </ul>

10 AM	1: Neighbor's leaf blower 2: Truck 3: Neighbor's riding mower 4: Neighbor's riding mower 5: Neighbor's riding mower 6: Neighbor's riding mower, and crow 7: Neighbor's riding mower 8: Neighbor's riding mower 9: Neighbor's riding mower 10: Neighbor's riding mower 11: Neighbor's riding mower 12: Truck on 228th 13: Neighbor's riding mower 14: Neighbor's riding mower 15: Neighbor's riding mower 16: Neighbor's riding mower 17: Neighbor's riding mower 18: Neighbor's riding mower
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**APPENDIX B**

Hourly Average Wind Speed Data from Cedar Hills Regional Landfill  
Meteorological Station

**APPENDIX B**

**METEOROLOGICAL MONITORING SYSTEM FOR WIND SPEED FOR CEDAR HILLS LANDFILL FOR THE MONTH OF OCTOBER 2010**

(in miles per hour)

Day	Hour Ending <sup>1</sup>																								Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
28	15.4	15.7	14.1	10.9	10.2	10.9	12.9	14.5	10.4	14.3	14	13.3	9.1	9.3	6.1	5.2	5.7	3.4	3.2	4.9	3	2.8	3.8	5.8	9.1
29	5	5.9	5	3.2	2.9	3.7	3.1	4.4	6	4.8	2.5	1.9	2.1	3.6	0.9	1.2	1.3	3.4	3.9	3.2	4.9	5.5	8.1	6.2	3.9
30	9.1	9.7	12.3	15.6	11.2	12.3	8.2	10.2	13.9	9.6	5.3	3	3.7	2.8	4.7	6.8	7.2	9.1	7.8	7.4	11.9	12.5	11	8.5	8.9
31	7.8	5.5	9.2	10.1	8.5	7.3	10.5	10.3	10.2	9.2	10.1	9	9.6	8.9	6.7	3.7	2.6	4.5	7.3	11.6	11.2	13.9	13.5	14.1	9

**METEOROLOGICAL MONITORING SYSTEM FOR WIND SPEED FOR CEDAR HILLS LANDFILL FOR THE MONTH OF NOVEMBER 2010**

(in miles per hour)

Day	Hour Ending <sup>1</sup>																								Average
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
1	15.6	14.3	12.3	12.8	12.9	11.4	6.6	10.6	9.4	6	4.5	5.9	6.8	6.3	10.8	11.5	13.7	13.6	10	8	6.9	8.9	6.4	5.6	9.6
2	5.2	6.6	5.7	3.9	4.5	3.1	2.7	2.5	2.4	1.6	3.6	3.4	7.7	10	10.1	11.3	12.7	10.9	13.1	11.2	7.6	5.6	4.3	6.4	6.5
3	7.1	5.6	4.6	6.5	8.2	6.1	9.4	7.7	6.3	9	12.5	15.1	12.7	14.6	15	14.5	14	14.2	14.8	9.4	6.9	7.1	7.6	10.5	10
4	7.3	8	10.1	8.3	7.7	6.9	6.2	6.3	7.4	6.6	5.8	6.1	5.2	5	5.5	3.9	2.9	2.9	6.1	4.3	1.8	3.2	3	4.7	5.6

Notes

1. Times are in Pacific Standard Time (subtract one hour from tabulated value to arrive at corrected ending hour).