✓
ORGDP ✓

MASTER

**OAK
RIDGE
GASEOUS
DIFFUSION
PLANT**

**UNION
CARBIDE**

MEASUREMENT OF OUTDOOR NOISE LEVELS
ADJACENT TO K-25 FACILITY, ORGDP

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LEVELS ADJACENT TO K-25
FACILITY, ORGDP

by

Charles W. Rodman
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MEASUREMENT OF OUTDOOR NOISE
LEVELS ADJACENT TO K-25
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INTRODUCTION

In order to obtain baseline data on environmental sound for a report on the expected environmental effects of constructing an incinerator adjacent to the ORGDP, an abbreviated measurement program was carried out. Ten measurement locations were selected for the measurements, six being representative of the ORGDP fenceline, and four representative of the surrounding area. Measurements consisted of short-term octave-band measurements and one-half hour A-weighted exceedance levels. It had been previously determined that the influence of the K-25 plant on the noise environment tends to stabilize the minimum sound level in such a way that nighttime measurements would not be needed.

Locations of Measurements

Figure 1 is a map showing the ten measurement locations.

Location 1

Location 1 is at the intersection of Blair Road and Wheat Road, approximately 100 feet east of the northbound lane of Blair. Wheat Road is closed off at this point. Blair Road serves as the ORGDP perimeter road at this location and carries some local auto and truck traffic in addition to commuter traffic and delivery of materials to the east portal of K-25.

FIGURE 1. LOCATION OF NOISE MEASUREMENT LOCATIONS

Location 2

Location 2 is a fenceline location at the intersection of Blair Road and the rail siding. It is near the northeast corner of K-25. Blair Road traffic must slow and accelerate as it negotiates a turn and the rail grade crossing. Noise levels at Location 2 are influenced by these events. A steady hum is heard in the direction of the process buildings.

Location 3

Location 3 is at the northwest corner of the fenced in area. It is just west of a row of cooling towers and is located on the south edge of the perimeter road. Predominant sounds are continuous hum and a ringing tone. There is some traffic, mostly plant security vehicles.

Location 4

Location 4 is at the southwest corner of the fenced-in area where the perimeter road crosses the switchyard rail siding. There is a water tower in an easterly line from this location. There is a continuous machinery sound at this location. This location, as well as several others south of the plant, is in the range of a gaggle of wild geese which frequents the area. The honking of the geese contributes to the sounds at this location during occasional flights.

Location 5

Location 5 is 75 feet east of the K-25 visitor overlook, located on the south side of Route 58 south of K-25. Except for the area cleared for the overlook (approximately 300 feet by 1500 feet), this location is on the north boundary of forest located on Pine Ridge. During daytime hours traffic is the dominant sound. If there is any wind at all, noise from the trees establishes the noise baseline for this location. Location 5 is 5200 ft (1.6 km) from the stack of the proposed incinerator.

Location 6

Location 6 is 200 feet north of the north switchyard, between the rail siding and Poplar Creek. The baseline sound at this location is transformer hum. During rain or fog, corona discharge would be dominant. Local auto and truck traffic on Blair Road, 800 ft. (.23 km) away, is responsible for the maximum sound levels at this location. (No exceedance levels were obtained at this location.)

Location 7

Location 7 is near the east portal of the ORGDP approximately 200 ft. south of Blair Road. At this location, which is approximately 1000 ft. (.3 km) from the location of the proposed incinerator, the weekday sounds include steady, continuous machinery noise and occasional metallic clangs and sounds of venting gas. Local traffic on Blair Road causes highest sound levels at this location.

Location 8

Location 8 is located at the "Y" in the perimeter road, south of and between buildings K-25 and K-33. This location is below the grade of the process buildings but higher than the highway (Rt 58).

Location 9

Location 9 is approximately 600 feet (.18 km) southeast of Route 58 and 200 feet (60 m) northwest of a pipeline metering station. Highway traffic, especially trucks, dominates the midday sound environment. Other sounds consist of wind in the trees and bird calls. There was no evidence of sound from the buried pipeline or the metering station. No sounds from the ORGDP were observed. This location is approximately 4000 ft (1.22 km) from the proposed incinerator.

Location 10

Location 10 is located south of the pilot plant at the southeast corner of the fenced-in area. It is about 500 ft (150 m) north of the highway (Rt 58). There were no obvious sounds from the ORGDP. Traffic on Route 58 accounts for most of the noise at this location.

Measurements

At each measurement location the normal routine consisted of obtaining two types of acoustic data, along with meteorologic information and documentation of unique noise related events as well as describing obvious noise sources. The measurements consisted of a) octave-band, A-weighted, and flat-weighted, short-term measurements using a sound level meter, and A-weighted exceedance levels over a 1/2-hour period, using a community noise analyzer.

The octave-band and broad-band measurements, correlated with visual and audio observations provide insight into the relative importance and existence of distinct noise sources, such as traffic, birds, insects, on wind noise which tend to be variable, and steady state continuous sounds which establish the noise "floor" of the location. The exceedance level data, on the other hand, represents numerous samples (10,800 over a half-hour measurement period) which permit evaluation of the statistical qualities of the acoustic environment. In addition to exceedance levels varying from $L_{0.1}$ to L_{99} , the instrument calculates and displays the maximum sound level during the measurement period, L_{max} , the minimum level, L_{min} , and the energy equivalent noise level, L_{eq} . The latter is the single-number value of sound level which would, if continuous over the measurement period, represent the same amount of acoustic energy as the measured variable environment.

Figure 2 shows exceedance levels at two fenceline locations. There are several possible reasons for the 5 to 8 dB difference in the two curves. One might expect the ambient level to be lower on Sunday because there is less activity; however there is always the possibility that Location 7 is near a noisier portion of the facility than is Location 2.

Figure 3 shows the effect of commuter traffic at shift change on the level distribution at the visitors' overlook (Location 5).

Figure 4 illustrates the exceedance level data from Location 1 plotted on a normal distribution graph⁽¹⁾. Here it can be seen that the background sounds represent a normal distribution while "intruding" sounds, which are louder, cause the plot to deviate from the normal distribution and tend toward higher values. Introduction of a steady state noise loud enough to increase the background above the existing, or ambient, level would move the upper portion of the curves to the right.

The values of sound data obtained with the two instruments used be used to calculate values for most of the measurement format commonly in use.

The instruments were field calibrated prior to each measurement set, using a portable 5-frequency microphone calibration. More extensive calibration was carried out at Battelle prior to the measurement and again following the trip.

Acoustic Instrumentation

The measurement and calibration procedures used were in accordance with recognized standards and recommended practices (a, b, c). The instrumentation system used for measuring sound levels consisted of a sound level meter, an octave-band filter set, an acoustic calibrator, and a community noise analyzer (with a weatherproof microphone and accessories). The model numbers of specific equipment used are listed in Table 1.

The GR 1933 Precision Sound Level Meter meets the ANSI S1.4-1971 specifications for Type 1 (precision) Sound-Level Meters and ANSI S1.11-1966

(1) Data from a normal distribution would generate a straight line on this graph.

FIGURE 2. COMPARISON OF NOISE EXCEEDANCE LEVELS AT TWO LOCATIONS NEAR THE FENCELINE OF THE ORGDP.

FIGURE 3. EXCEEDANCE LEVELS FOR LOCATION 5 (VISITOR OVERLOOK)
SHOWING THE EFFECT OF COMMUTER TRAFFIC LEAVING
THE OAK RIDGE GASEOUS DIFFUSION PLANT.

FIGURE 4 . PLOT OF EXCEEDANCE LEVELS FOR MONDAY MORNING AND SUNDAY MORNING AT LOCATION No. 1.

for Octave, Half-Octave, and Third-Octave Band Filter Sets for the measurement and analysis of sound and vibration.

Range of the instrument is 10 to 130 dB re 20 μ Pa with a 1-inch microphone. Nominal sensitivity of the microphone is -38 dB re 1V/ μ Pa. Accuracy of the instrument is ± 1 dB over the range of interest. It has 10 octave-band filters with center frequencies from 31.5 Hz to 16 kHz plus A, B, and C weighting networks. The GR-1961-9601 1-inch random incidence microphone was used with this meter. "Slow" response settings were used for measurements of octave-band and A-weighted levels.

TABLE 1. LIST OF EQUIPMENT USED IN MEASUREMENT
OF BASELINE NOISE LEVELS.

Equipment	Manufacturer	Model No.
Community Noise Analyzer	General Radio	GR-1945-9700
Weatherproof Enclosure	General Radio	GR-1945-9640
Weatherproof Microphone System	General Radio	GR-1945-9730
Microphone	General Radio	GR-1962-9601
Preamplifier	General Radio	GR-1560-1042
Sound Level Meter	General Radio	GR-1933-9700
Microphone	General Radio	GR-1961-9601
Sound Level Calibrator	General Radio	GR-1562
Wind Screen and other accessories		
Temperature, humidity and wind speed indicating instruments.		

The GR 1945-9700 Community Noise Analyzer consists of a sound level meter with several choices of weighting networks, followed by a memory, digital processor and LED numerical display. The analyzer performs histogram analyses of noise levels over selectable periods from 1/2 hour to 24 hours. At the end of the measurement period, the integrated sound level (L_{eq}) and the percentage exceedance levels are displayed. L_{dn} can be selected for 24-hour measurement periods. The a-weighting network and "slow" dynamic response were selected for the measurements. Statistical analysis capabilities are 1-dB resolution and 0.25 dB linearity. Analysis duration was selected by a front-panel switch which permits selection of periods from 1/2 hour to 24 hours with corresponding number of samples ranging from 8,191 to 65,528. One, two, or three independent consecutive analyses can be selected. Each sample is included in the computation of L_{eq} over the analysis period, or L_{dn} when a 24 hour run is selected. Start of the first analysis can be delayed up to 24 hours from initial setup, by use of the internal clock.

The range of the instrument is 32 to 120 dB re 20 μ Pa. The microphone used has a nominal open circuit sensitivity of -41 dB re 1V/ μ Pa, and the minimum detected level (rms) is 5 dB above the typical noise floor, which for the microphone (GR 1962-9601) and the preamplifier (Gr 1560-P42) combination used is about 27 dB (A-wt) re 20 μ Pa. The accuracy of the instrumentation system is ± 1 dB over the range of interest.

The GR Type 1562 Sound Level Calibrator which was used to calibrate the sound level meter and community noise analyzer has a sound pressure level of 114 dB re 20 μ Pa at frequencies of 125, 250, 500, 1000 and 200 Hz ± 3 percent. Accuracy (at 23°C and 760 mm Hg) of the calibrator is within ± 0.78 dB for the microphones.

The calibrator is periodically tested and calibrated to all specifications at the factory, as is the 1933 Precision Sound Level Meter. Acoustical response and sensitivity are measured in the free field by comparison with a WE640AA Laboratory Standard Microphone whose calibration is traceable to the U.S. National Bureau of Standards. Also, a built-in calibrator provides a quick test of electrical circuits, and the GR 1562 Sound-Level Calibrator was used for day-to-day confirmation of overall calibration in the field.

Procedure

Upon arrival at a measurement location the community noise analyzer was set up, and the measurement instructions entered into the controller.

During the interval between setup and start of sampling at each location, the instrument was calibrated and the battery condition checked.

While the community noise analyzer was performing its task, the sound level meter was calibrated, the battery checked, and the set of octave-band and broad band measurements was carried out and the data entered in the log book. During the remainder of the half-hour session, the meteorologic data, consisting of wind velocity and direction, temperature and relative humidity, and sky conditions, were entered in the log book. At the completion of the community noise analyzer measurement, the results of the analyses were entered in the log book. Total time at each location was on the order of 45 minutes. Three locations were sampled twice, locations 1, 5, and 6. Two of the samples at location 5 were contiguous.

Results

Tables 2 through 15 are copied from the log book and present the data recorded during the measurement program in the same sequence as the measurements. Each measurement was assigned a run number at the time of the measurement. This number, together with the location number are at the top of the sheet. Meteorological data follow. The data read-out of the community noise analyzer is next, followed by the results of reading the sound level meter. At the bottom of each table are comments of the investigator and footnotes to entries.

- (a) ANSI-S1.13-1971, Methods for the Measurement of Sound Pressure Levels.
- (b) ANSI-S1.4-1971, Specifications for Sound Level Meters.
- (c) ANSI-S1.11-1971, Specifications for Octave, Half-octave, and Third-octave band filter sets.

TABLE 2. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 1 Run No. 1Time: Start 0850 (EDST) End 0920 (EDST)Temperature 63 °F. Rel. Humidity 63 %Wind Calm mph/ m/s From Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start OK+1 End OK+0Exceedance Levels: (As L_n , dBA)

<u>67</u> L_{max}	<u>43</u> L_{min}	<u>51</u> L_{eq}
<u>66</u> 0.1	<u>44</u> 99	<u>55</u> .5/8
<u>63</u> 1.0	<u>49</u> 20	<u>48</u> 8/24
<u>53</u> 10	<u>56</u> 5	<u>56</u> 1/24
<u>47</u> 50	<u>60</u> 2	<u>60</u> .5/24
<u>46</u> 90	<u>114</u> Cal (Start)	<u>114</u> Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start OK+1 End OK+0 Calibration 114 dBBroad Band: A-Weighted 46 dB, Flat 64-66 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>59-63</u> 32 Hz.	<u>49</u> 250 Hz.	<u>30-40</u> ⁽¹⁾ 2 kHz.
<u>56-60</u> 64 Hz.	<u>43-45</u> 500 Hz.	<u>19-26</u> ⁽²⁾ 4 kHz.
<u>55-57</u> 125 Hz.	<u>38-45</u> ⁽¹⁾ 1 kHz.	<u>12</u> 8 kHz.

Comments and Footnotes:

(1) Traffic on Route 58.

(2) Bird Calls

Steady hum from K-25 plant. machinery sound, light traffic on Rt. 58,
Occasional autos on perimeter road.

TABLE 3. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 2 Run No. 2Time: Start 0940 (EDST) End 1010 (EDST)Temperature 67 °F. Rel. Humidity 69 %Wind less than 2mph/ m/s From South Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>63</u> L_{max}	<u>42</u> L_{min}	<u>48</u> L_{eq}
<u>57</u> 0.1	<u>43</u> 99	<u>51</u> .5/8
<u>54</u> 1.0	<u>49</u> 20	<u>48</u> 8/24
<u>50</u> 10	<u>52</u> 5	<u>52</u> 1/24
<u>47</u> 50	<u>53</u> 2	<u>53</u> .5/24
<u>45</u> 90	<u>114</u> Cal (Start)	<u>114</u> Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +9 End ok +9 Calibration 114 dBBroad Band: A-Weighted 44 dB, Flat 65-67 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>61-64</u> 32 Hz.	<u>44-46</u> ⁽¹⁾ 250 Hz.	<u>32-40</u> ⁽⁵⁾ 2 kHz.
<u>56-60</u> 64 Hz.	<u>40-42</u> ⁽²⁾ 500 Hz.	<u>29-47</u> ⁽⁵⁾ 4 kHz.
<u>49-52</u> 125 Hz.	<u>37-38</u> ⁽⁴⁾ 1 kHz.	<u>13-21</u> ⁽⁵⁾ 8 kHz.

Comments and Footnotes:

A lot of birds, including robins, red wing blk bird

(1) Auto on rail crossing 50-54 at this freq, (2) auto on crossing 45-50

(4) auto on crossing 41-45 west bound 41-50 east bound, (5) varies with bird song activity

TABLE 4. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 3 Run No. 3Time: Start 1035 (EDST) End 1105 (EDST)Temperature 75 °F. Rel. Humidity 62 %

Gust to 8

Wind Calm to 6 mph/ m/s From SW Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End Exceedance Levels: (As L_n , dBA)

<u>76</u>	L_{max}	<u>51</u>	L_{min}	<u>55</u>	L_{eq}
<u>73</u>	0.1	<u>52</u>	99	<u>55</u>	.5/8
<u>60</u>	1.0	<u>54</u>	20	<u>54</u>	8/24
<u>54</u>	10	<u>55</u>	5	<u>55</u>	1/24
<u>53</u>	50	<u>56</u>	2	<u>56</u>	.5/24
<u>53</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +9 End ok +8 Calibration 114 dBBroad Band: A-Weighted 51-55(1) dB, Flat 70-72 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>61-62</u>	32 Hz.	<u>49-50</u>	250 Hz.	<u>41</u>	2 kHz.
<u>61-63</u>	64 Hz.	<u>48</u>	500 Hz.	<u>31-45</u>	4 kHz.
<u>55-56</u>	125 Hz.	<u>48-51</u>	1 kHz.	<u>18</u>	8 kHz.

Comments and Footnotes:

Machinery noise, tones: low hum and ringing tone, birds, auto traffic (occasional)

(1) birds

TABLE 5. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 4 Run No. 4Time: Start 1130 (EDST) End 1200 (EDST)Temperature 73 °F. Rel. Humidity 62 %Wind 5-7 mph/ m/s From South Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>76</u>	L_{max}	<u>51</u>	L_{min}	<u>56</u>	L_{eq}
<u>72</u>	0.1	<u>52</u>	99	<u>56</u>	.5/8
<u>63</u>	1.0	<u>55</u>	20	<u>54</u>	8/24
<u>55</u>	10	<u>56</u>	5	<u>57</u>	1/24
<u>54</u>	50	<u>59</u>	2	<u>59</u>	.5/24
<u>53</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +5 End ok +7 Calibration 114 dBBroad Band: A-Weighted 53 dB, Flat 71-94⁽¹⁾ dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>68-70</u>	32 Hz.	<u>55-59</u>	250 Hz.	<u>38-39</u>	2 kHz.
<u>65-66</u>	64 Hz.	<u>49-51</u>	500 Hz.	<u>29-35⁽⁴⁾</u>	4 kHz.
<u>65</u>	125 Hz.	<u>47-48</u>	1 kHz.	<u>16-24⁽⁵⁾</u>	8 kHz.

Comments and Footnotes:

Machinery sound, roar, tone, birds, incl. crows.

(1) passing auto for all above 75, (2) mostly 56-57, difference appears to be small aircraft to north (4) varies with bird song (5) insects & birds

Early part of 1/2 hr sample contains sound from a pair of Canadian Geese which flew around the area for approx 2 min.

TABLE 6. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 5 Run No. 5Time: Start 12:20 (EDST) End 12:50 (EDST)Temperature 78 °F. Rel. Humidity 61 %Wind 0-5, gust 7 mph/ m/s From SW Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels:⁽³⁾ (As L_n , dBA)

<u>78</u>	L_{max}	<u>40</u>	L_{min}	<u>61</u>	L_{eq}
<u>77</u>	0.1	<u>40</u>	99	<u>66</u>	.5/8
<u>74</u>	1.0	<u>62</u>	20	<u>58</u>	8/24
<u>64</u>	10	<u>66</u>	5	<u>67</u>	1/24
<u>52</u>	50	<u>70</u>	2	<u>70</u>	.5/24
<u>42</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +7 End ok +6 Calibration 114 dBBroad Band: A-Weighted 43-66⁽¹⁾ dB, Flat 60-75⁽¹⁾ dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>56-63</u> ⁽¹⁾ 32 Hz.	<u>44-59</u> ⁽¹⁾ 250 Hz.	<u>37-59</u> ⁽¹⁾ ⁶⁵ (2) 2 kHz.
<u>55-59</u> ⁽¹⁾ 64 Hz.	<u>37-58</u> ⁽¹⁾ 500 Hz.	<u>29-32</u> ⁽¹⁾ 4 kHz.
<u>52-65</u> ⁽¹⁾ 125 Hz.	<u>36-56</u> ⁽¹⁾ 1 kHz.	<u>19-46</u> 8 kHz.

Comments and Footnotes:

Traffic is constant, 20-40 cars/min.

(1) passing autos account for high, (2) pickup with aggressive tire tread

(3) Semi passed during analyzes run. (4) 2K is 118 dB.

TABLE 7. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATA

Date April 26 1981 Location No. 6 Run No. 6
 Time: Start 1440 (EDST) End 1510 (EDST)
 Temperature 80 °F. Rel. Humidity 55 %
 Wind 6-8 mph/ m/s From SW SkyScat CLds North

Community Noise
Analyzer (1945)⁽¹⁾

Bat. Cond: Start ok End ok

Exceedance Levels: (As L_n , dBA)

<u>68</u> L_{max}	<u>63</u> L_{min}	<u>68</u> L_{eq}
<u>68</u> 0.1	<u>66</u> 99	<u>68</u> .5/8
<u>68</u> 1.0	<u>68</u> 20	<u>68</u> 8/24
<u>68</u> 10	<u>68</u> 5	<u>68</u> 1/24
<u>68</u> 50	<u>68</u> 2	<u>68</u> .5/24
<u>68</u> 90	<u>114</u> Cal (Start)	<u>114</u> Cal (End)

Sound Level
Meter (1933)

Bat. Cond: Start ok +7 End ok +6 Calibration 114 dB

Broad Band: A-Weighted 42-43 dB, Flat 78-81 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>66</u> 32 Hz.	<u>22-31</u> 250 Hz.	<u>24-26</u> 2 kHz.
<u>64-1/2</u> 64 Hz.	<u>42-47</u> ⁽¹⁾ 500 Hz.	<u>20-29</u> ⁽²⁾ 4 kHz.
<u>62-1/2</u> 125 Hz.	<u>35-37</u> 1 kHz.	<u>16-27</u> ⁽²⁾ 8 kHz.

Comments and Footnotes: Hum from Switchyard transformers. Occasional auto traffic on Blair.

Light plane at beginning of analysis (1) Pick up trucks with boats on trailer (2) high caused by auto on Blair

(1) See note for Run 12

TABLE 8. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 27 1981 Location No. 7 Run No. 7Time: Start 0832 (EDST) End 0902 (EDST)Temperature 65 °F. Rel. Humidity 91 %Wind calm mph/ m/s From Sky clearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>62</u> L_{max}	<u>50</u> L_{min}	<u>55</u> L_{eq}
<u>62</u> 0.1	<u>51</u> 99	<u>57</u> .5/8
<u>60</u> 1.0	<u>55</u> 20	<u>55</u> 8/24
<u>56</u> 10	<u>57</u> 5	<u>57</u> 1/24
<u>54</u> 50	<u>59</u> 2	<u>58</u> .5/24
<u>53</u> 90	<u>114</u> Cal (Start)	<u>114</u> Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +7 End ok +6 Calibration 114 dBBroad Band: A-Weighted 51-52 dB, Flat 68-71 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>64-68</u> 32 Hz.	<u>51-52</u> 250 Hz.	<u>39-41</u> 2 kHz.
<u>61-62</u> 64 Hz.	<u>51</u> 500 Hz.	<u>32-45</u> ⁽²⁾ 4 kHz.
<u>51-60</u> ⁽¹⁾ 125 Hz.	<u>48-50</u> 1 kHz.	<u>20-34</u> ^(1,2) 8 kHz.

Comments and Footnotes: Occasional sound of impact or venting gas, mettalic clangs, machinery noise, tone

(1) passing auto caused high (2) birds caused high

TABLE 9. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 27 1981 Location No. 8 Run No. 8Time: Start 0925 (EDST) End 0955 (EDST)Temperature 72 °F. Rel. Humidity 78 %Wind calm to 5-6mph/ m/s From S Sky clearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>77</u>	L_{max}	<u>43</u>	L_{min}	<u>55</u>	L_{eq}
<u>75</u>	0.1	<u>44</u>	99	<u>58</u>	.5/8
<u>68</u>	1.0	<u>52</u>	20	<u>49</u>	8/24
<u>56</u>	10	<u>59</u>	5	<u>60</u>	1/24
<u>48</u>	50	<u>64</u>	2	<u>64</u>	.5/24
<u>45</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +6 End ok +5 Calibration 114 dBBroad Band: A-Weighted 45-46 dB, Flat 66-67 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>60-63</u>	32 Hz.	<u>43</u>	250 Hz.	<u>41-46</u> ⁽¹⁾	2 kHz.
<u>59-61</u>	64 Hz.	<u>37-39</u>	500 Hz.	<u>28-39</u> ⁽²⁾	4 kHz.
<u>58-59</u>	125 Hz.	<u>37-41</u>	1 kHz.	<u>17-29</u> ⁽²⁾	8 kHz.

Comments and Footnotes: Geese flying, honking, etc. Traffic on 58, occasional plant road traffic, van stopped beside microphone for 10 sec, drove away. (1) truck on 58, geese caused high (2) birds

TABLE 10. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 27 1981 Location No. 1 Run No. 9Time: Start 1015 (EDST) End 1045 (EDST)Temperature 78 °F. Rel. Humidity 67 %Wind 0-5 mph/ m/s From SW Sky clearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>71</u>	L_{max}	<u>39</u>	L_{min}	<u>56</u>	L_{eq}
<u>70</u>	0.1	<u>41</u>	99	<u>61</u>	.5/8
<u>68</u>	1.0	<u>55</u>	20	<u>52</u>	8/24
<u>58</u>	10	<u>62</u>	5	<u>63</u>	1/24
<u>49</u>	50	<u>67</u>	2	<u>66</u>	.5/24
<u>44</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +6 End ok +6 Calibration 114 dBBroad Band: A-Weighted 43-49⁽²⁾ dB, Flat 65-75⁽¹⁾ dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>59-63</u> ⁽³⁾ 32 Hz.	<u>39-44</u> ⁽³⁾ 250 Hz.	<u>14-4</u> ^(4,7) 2 kHz.
<u>55-73</u> ⁽⁴⁾ 64 Hz.	<u>39-51</u> ⁽⁵⁾ 500 Hz.	<u> </u> 4 kHz.
<u>60-63/79</u> ⁽⁴⁾ 125 Hz.	<u>35-54</u> ⁽⁶⁾ 1 kHz.	<u>14-47</u> ^(4,7) 8 kHz.

Comments and Footnotes:

(1) Autos account for high (2) Bird accounts for high (3) auto on 58,
 (5) Truck (tires) on 58 (6) Truck exhaust on 58-48 (7) Motorcycle on
 Blair = 48, (4) Trucks passing this location on a grade either way,
 also traffic on 58

TABLE 11. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 9 Run No. 10Time: Start 1110 (EDST) End 1140 (EDST)Temperature 79 °F. Rel. Humidity 62 %Wind calm to 5mph/ m/s From N-W var Clear Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>62</u>	L_{max}	<u>37</u>	L_{min}	<u>49</u>	L_{eq}
<u>61</u>	0.1	<u>39</u>	99	<u>54</u>	.5/8
<u>58</u>	1.0	<u>50</u>	20	<u>48</u>	8/24
<u>53</u>	10	<u>54</u>	5	<u>55</u>	1/24
<u>46</u>	50	<u>57</u>	2	<u>57</u>	.5/24
<u>42</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok 6 End ok +5 Calibration 114 dBBroad Band: A-Weighted 41-57⁽¹⁾ dB, Flat 64-77⁽¹⁾ dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>58-60⁽¹⁾</u>	32 Hz.	<u>41-44</u>	250 Hz.	<u>31-37^(1,2)</u>	2 kHz.
<u>58-63⁽¹⁾</u>	64 Hz.	<u>35-39</u>	500 Hz.	<u>20-47⁽²⁾</u>	4 kHz.
<u>47-53</u>	125 Hz.	<u>35-37</u>	1 kHz.	<u>14-39⁽²⁾</u>	8 kHz.

Comments and Footnotes: (1) Trucks on 48, (2) birds, insects,
Trucks are on a grade, traffic fairly heavy, no obvious noise from valve
station or pipeline.

TABLE 12. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 10 Run No. 11Time: Start 1345 (EDST) End 1415 (EDST)Temperature 87 °F. Rel. Humidity 53 %Wind Calm to 7 mph/ m/s From SW Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>73</u> L_{max}	<u>41</u> L_{min}	<u>55</u> L_{eq}
<u>71</u> 0.1	<u>42</u> 99	<u>60</u> .5/8
<u>66</u> 1.0	<u>55</u> 20	<u>54</u> 8/24
<u>58</u> 10	<u>61</u> 5	<u>61</u> 1/24
<u>51</u> 50	<u>64</u> 2	<u>64</u> .5/24
<u>46</u> 90	<u>114</u> Cal (Start)	<u>114</u> Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +6 End ok +6 Calibration 114 dBBroad Band: A-Weighted 49-59 dB, Flat 69-77 ⁽¹⁾ dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>59-60</u> 32 Hz.	<u>51-57</u> ⁽²⁾ 250 Hz.	<u>41-51</u> 2 kHz.
<u>57-60</u> 64 Hz.	<u>37-42</u> 500 Hz.	<u>29-50</u> ⁽³⁾ 4 kHz.
<u>55-56</u> 125 Hz.	<u>42-51</u> 1 kHz.	<u>19-30</u> ⁽⁴⁾ 8 kHz.

Comments and Footnotes: (1) Truck on 58, birds (2) Small pick up truck on exit road, 150 ft (3) Tank truck on 58, (4) Utility vehicle (jeep) on 58, Locomotive Whistle

TABLE 13. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 26 1981 Location No. 6 Run No. 12Time: Start 1445 (EDST) End 1515 (EDST)Temperature 88 °F. Rel. Humidity 50 %Wind 0-7 mph/ m/s From SW Sky ClearCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>68</u>	L_{max}	<u>38</u>	L_{min}	<u>64</u>	L_{eq}
<u>67</u>	0.1	<u>39</u>	99	<u>66</u>	.5/8
<u>67</u>	1.0	<u>66</u>	20	<u>66</u>	8/24
<u>66</u>	10	<u>66</u>	5	<u>66</u>	1/24
<u>66</u>	50	<u>66</u>	2	<u>66</u>	.5/24
<u>41</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start ok +5 End ok +5 Calibration 114 dBBroad Band: A-Weighted 41-42 dB, Flat 61-66 dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u>60-61</u>	32 Hz.	<u>50-51</u>	250 Hz.	<u>30-35</u>	2 kHz.
<u>58-60</u>	64 Hz.	<u>40-41</u>	500 Hz.	<u>18-24</u>	4 kHz.
<u>55</u>	125 Hz.	<u>35-39</u> ⁽¹⁾	1 kHz.	<u>13-18</u>	8 kHz.

Comments and Footnotes: (1) Auto caused all over 36

The data from the community noise analyzer is suspect at this location. Although it is 200 feet (horizontal distance) to the nearest high voltage line, there appears to be some response of the microphone or analyzer to the high voltage circuit. Same as run #6.

TABLE 14. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATADate April 27 1981 Location No. 5 Run No. 13-aTime: Start 1606 (EDST) End 1636 (EDST)Temperature 85 °F. Rel. Humidity 50 %Wind 7 mph/ m/s From W Sky Scat CloudsCommunity Noise
Analyzer (1945)Bat. Cond: Start ok End okExceedance Levels: (As L_n , dBA)

<u>78</u> L_{max}	<u>47</u> L_{min}	<u>67</u> L_{eq}
<u>78</u> 0.1	<u>48</u> 99	<u>71</u> .5/8
<u>76</u> 1.0	<u>68</u> 20	<u>67</u> 8/24
<u>70</u> 10	<u>72</u> 5	<u>71</u> 1/24
<u>65</u> 50	<u>74</u> 2	<u>74</u> .5/24
<u>55</u> 90	<u>114</u> Cal (Start)	<u>114</u> Cal (End)

Sound Level
Meter (1933)Bat. Cond: Start End Calibration 114 dBBroad Band: A-Weighted dB, Flat dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u> </u> 32 Hz.	<u> </u> 250 Hz.	<u> </u> 2 kHz.
<u> </u> 64 Hz.	<u> </u> 500 Hz.	<u> </u> 4 kHz.
<u> </u> 125 Hz.	<u> </u> 1 kHz.	<u> </u> 8 kHz.

Comments and Footnotes: This run was started just before beginning of shift changes.

TABLE 15. DATA LOG SHEET FOR OUTDOOR SOUND MEASUREMENTS

MEASUREMENT DATA

Date April 26 1981 Location No. 5 Run No. 13-b
 Time: Start 1636 (EDST) End 1706 (EDST)
 Temperature 85 °F. Rel. Humidity 50 %
 Wind 7 mph/ m/s From W Sky Scat Clouds

Community Noise
Analyzer (1945)

Bat. Cond: Start End

Exceedance Levels: (As L_n , dBA)

<u>79</u>	L_{max}	<u>43</u>	L_{min}	<u>67</u>	L_{eq}
<u>78</u>	0.1	<u>44</u>	99	<u>71</u>	.5/8
<u>76</u>	1.0	<u>68</u>	20	<u>66</u>	8/24
<u>70</u>	10	<u>72</u>	5	<u>72</u>	1/24
<u>64</u>	50	<u>74</u>	2	<u>74</u>	.5/24
<u>51</u>	90	<u>114</u>	Cal (Start)	<u>114</u>	Cal (End)

Sound Level
Meter (1933)

Bat. Cond: Start End Calibration 114 dB

Broad Band: A-Weighted dB, Flat dB

Octave Band: (By Octave-Band Center Frequency, Hz.)

<u> </u> 32 Hz.	<u> </u> 250 Hz.	<u> </u> 2 kHz.
<u> </u> 64 Hz.	<u> </u> 500 Hz.	<u> </u> 4 kHz.
<u> </u> 125 Hz.	<u> </u> 1 kHz.	<u> </u> 8 kHz.

Comments and Footnotes: