**Billing Address**

Public Water Supply District #7
106 E. Main Street, Box 345
Freeman, MO 64746
Phone (816) 250-2300
Fax (816) 250-2900

Shipping Address

Public Water Supply District #7
8906 E. 267th Street
Freeman, MO 64746
Phone (816) 779-6887
Part Time Fax (816) 779-6623
(Must call before sending fax)

Date: 6-6-05

Fax To:

Derry Hedrick
Aquila Inc.

Fax From:

Leonard
(a copy for your files)
Too!!

Fax #:

743-3130

Phone #:

Number of Pages: 5 (Cover Page Included)

Comments:

A copy for your information & your files.
Back and he would get back with us.

ThanksLeonard
JS

PUBLIC WATER SUPPLY DISTRICT #7 OF CASS COUNTY, MO

106 E. MAIN ♦ P.O. BOX 345 ♦ FREEMAN, MO. 64748
Phone 816-250-2300 ♦ Fax 816-250-2900

June 6, 2005

Mr. Rick Krepps
Aquila, Inc.
P.O. Box 11739
10700 350 Highway – Mail Stop 502
Kansas City, MO 64138

Cc: Mr. Terry Hedrick, Aquila
#7 Board of Directors
Barbara Scott, #7 Acct. Mgr.
Ed Lopez, #7 Dist. Mgr.
File

**Re: Notice to Proceed
North Feed Loop #2 and Fire Protection Improvements**

Dear Rick,

Per our phone conversation and your request, I have included a new Notice to Proceed with an estimated cost and a not to exceed amount for Aquila to be responsible for under contract #11008-1003 which you have already issued to Cass #7.

Also as we had discussed and based upon our requirements we require that you submit \$62,500 along with Notice to Proceed. The advance funds are important in that our public concerns are quelled and with both entities' cooperative effort underway, it is a win-win for all involved.

I have rebid the materials and they appear to be about \$2,000 higher than our November 2004 estimate.

Also as we may or may not do in house, a new prevailing wage order if we were to contract is in place as of April 2005 which increases labor costs.

Cass #7 will show you invoices on all materials subject to that project as well as purchase orders and will not exceed the \$125,000 estimated cost in as much as Aquila's participation financially is anticipated.

We are willing to continue under your original contract #11008-1003 for this project also.

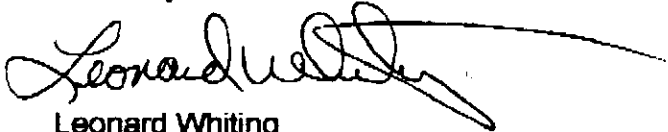
To assist, I have included an invoice with project title **Cass #7 North Feed Loop #2 & Fire Protection Improvements** your contract #11008-1003, File name **CBS-340**, Labor-Resource #1821 and Materials-Resource #1822 and the estimated total amount not to exceed \$125,000. As we finish the project and along the way we will bill Aquila under the contract on a monthly basis after invoicing with paid invoices until we use the \$62,500 advance deposit on the project.

Our key focus is to get the second feed loop done initially for your dual feed protection, then work with the Fire Department and community on hydrant placement. Unless you instruct me differently I will still plan on placing a 4x8 construction sign declaring 100% Aquila participation on this loop and hydrant project. It will list cost of \$125,000, lengths and sizes of main as well as hydrants, their placements and project title.

My board meeting is June 13, 2005. You had indicated you could make this happen prior to that. That would be great! Timing on the \$62,500 can be later if it's easier. Signatures on all the documents to me would be great prior to the 13th, or both would be better. The \$62,500 would need to be in our hands before we'd order materials and/or contract or start work. Please sign or have your representative sign this agreement and forward back also.

Let me know if other details are needed.

Sincerely,



Leonard Whiting
Systems Manager
Sel

I _____ have read this document and
Name - Aquila Representative

understand the details and its context.

Signature

Date

Public Water Supply District #7 of Cass County Missouri

106 E. Main Street, Box 345 • Freeman, Missouri 64746 • (816) 250-2300

◆◆◆ INVOICE

◆◆◆ **TOTAL DUE 62,500.00**

Salesperson Leonard Whiting
 Invoice number
 Invoice date 6/06/2005
 Customer ID
 Terms Payment Due upon Receipt
 Date shipped
 Shipped via
 FOB
 Prepaid / Collect
 Tax exempt
 Reason
 Exemption no.

◆◆◆
SOLD TO

Name Aquila, Inc.
 Address (line 1) Contract Order # 11008-1003
 Address (line 2) P.O. Box 412237
 City, State or Prov. Kansas City, MO
 Postal code, Country 64141
 Phone (816) 650-2950
 Fax
 Company name Aquila Inc.
 File Name: CBS 340

◆◆◆
SHIPPED TO

Retype the following only if the name and address are not the same as the SOLD TO name and address.

Name
 Address (line 1)
 Address (line 2)
 City, State or Prov.
 Postal code, Country
 Company name

Please make checks payable to:

Public Water Supply District #7 of Cass County
 106 E. Main St., box 345
 Freeman, MO 64746

REF NO.	QTY	DESCRIPTION	PRICE EACH	TOTAL
		Cass #7 North Feed Loop #2 & Fire Protection Improvements		
		5200 feet of 6" water main feed loops & fire hydrants as per the 10/29/2004 letter.		
		Estimated total cost of project is \$125,000.00, and not to exceed \$125,000.00.		
	1	Deposit for Project As materials are purchased monthly billings will be sent to show disbursements from the \$62,500.00, updating the credit balance remaining.	62,500.00	62,500.00
		Invoice Coding Activity - # 10019648 Process - # 340 Department - # 7130 Resource - # see below Labor: 1821 Materials: 1822 Engineering: 1808		
		SUBTOTAL		62,500.00
		Sales tax %		
		SHIPPING & HANDLING		
		PAYMENTS		
		PLEASE PAY THIS AMOUNT		62,500.00
		TERMS: Prior to Mat's Purchase		

Notice to Proceed**Per Aquila Contract Order #11008-1003****File Name: CBS 340****Date:** _____

**To: Mr. Leonard Whiting
Public Water Supply District No. 7
of Cass County, Missouri
106 E. Main St., Box 345
Freeman, MO 64746
(816) 250-2300**

Please accept this as your notice to proceed regarding the Aquila Peak Use Power Plant located at 243rd and Harper Rd., Peculiar, Missouri on:

Project Title: Cass #7 North Feed Loop #2 & Fire Protection Improvements

**To include: Add 6200 Feet (+ or -) of 6" Feed Loops
and Fire Hydrants per the 10/29/2004 letter
at an Estimated Cost of \$125,000.00, and not to
exceed \$125,000.00.**

Signature: _____
Authorized Aquila Representative

Date: _____

Printed Name: _____

Title: _____

Notice to Proceed
Per Aquila Contract Order #11008-1003

Date: 11/2/04

To: Mr. Leonard Whiting
Public Water Supply District No. 7
of Cass County, Missouri
106 E. Main St., Box 345
Freeman, MO 64746
(816) 250-2300

Please accept this as your notice to proceed regarding the Aquila Peek Use Power Plant located at 243rd and Harper Rd., Peculiar, Missouri on:

Project Title: Line Lowering at South Harper Peeking Facility Drive Entrance
Per 10/29/04 Letter & Bid

Please check (1) one and Initial

- ☐ 6" Main Lowering - _____ (Initial)
- ☒ 8" Main Lowering - Alternate X MSL (Initial)

Signature: X/Terry S Hedrick
Authorized Aquila Representative

Date: 11/2/04

Printed Name: Terry Hedrick

Title: Project Manager - Aquila

Fire Protection Document



West Peculiar Fire Protection District

James B. Toone
Fire Chief

200 South Main
Peculiar, MO 64078
(816) 779-5766
(816) 758-7423 (Fax)

Mr. Terry Hedrick
Aquila

August 26, 2005

Mr. Hedrick,

Attached is our Standard Operating Guideline for Commercial Structure Fires. This is a standard guideline that we would use for fires in commercial buildings or installations. We, of course would alter the SOG somewhat for the specific occupancy where a fire would occur. Your facility would call for some alterations to the plan, but would, in essence follow the attached Standard Operating Guideline.

Additionally, about 80% of our crews have completed a walk-through of your facility and understand its major hazards and know how to respond to keep your staff, our staff, and most importantly the public safe during an emergency.

Please contact me if you have any further needs or questions.

Respectfully,

James Toone
Fire Chief



West Peculiar Fire Protection District Policies & Procedures

The following is the accepted policy of the West Peculiar Fire Protection District for:

Policy: SOG

Section: Operational

Topic: RESPONSE TO COMMERCIAL STRUCTURE FIRES

March 2003

Purpose

To provide guidance for personnel responding to commercial structure fires.

Scope

This SOG applies to all who have the potential to respond to commercial structure fires within the West Peculiar Fire District.

Guidelines

- **Priorities include:**
 - Personnel safety (hazardous materials, structural integrity, etc.)
 - Protection of exposures
 - Establishing adequate water supply
 - Containment of fire.
 - Preserving property.
- The general attack regiment will be the same as for a residential structure fire but on a larger scale.
- Mutual aid should include a level two staging area with at least two stand-by engines and at least two stand-by tankers in cases where there is limited water supply.
- Specific tactics are left to the discretion of the incident commander.
- The Personnel Accountability System will be used on all commercial structure fires.

APPENDIX I
Noise Studies

Residential Noise Assessment Study

**Aquila
South Harper Peaking Facility
Cass County, Missouri**



Aquila

August 2005



**Noise Compliance Test
Aquila
South Harper Peaking Facility
Cass County, Missouri**

Prepared for:

**Aquila
20 West 9th Street
Kansas City, Missouri 65206**

August 2005

**BURNS & McDONNELL ENGINEERING COMPANY, INC.
ENGINEERS-ARCHITECTS-CONSULTANTS
Kansas City, Missouri**

Project No. 37273

EXECUTIVE SUMMARY

Near-field measurements around each of the three combustion turbines and two far-field measurements (at a single location) were taken for the compliance test for the South Harper Peaking Facility. Noise compliance was demonstrated using the Noise Test Procedure agreed upon by Higgot-Kane, Siemens Westinghouse and Aquila. All combustion turbines and stacks met the Aquila and Higgot-Kane near-field noise guarantees (90 dBA and 85 dBA averaged around the sound envelope contour for the combustion turbine and stack, respectively). While the measured far-field *total plant* sound pressure levels did not satisfy the Higgot-Kane *stack* guarantees, taking the background and other equipment noises into consideration, the stack guarantees are met.

Fenceline noise measurements were also taken to determine compliance with the Cass County Noise Disturbance Ordinance (No. 02-20). Background measurements were higher than expected due to insect noise in the area and other non-Aquila generated noises in the area. Operational noise measurements were also high, due to the extraneous noises from the insects and other uncontrollable noise sources.

1.0 Introduction

Burns & McDonnell conducted operational noise tests at the Aquila South Harper Peaking Facility on August 10, 11, and 12, 2005. Fenceline noise measurements were taken on August 18 and 19, 2005 to demonstrate compliance with the Cass County Noise Ordinance. The power plant currently consists of three Siemens-Westinghouse 501D5A combustion turbine generator sets operating in simple cycle mode.

2.0 Sound Level Guarantees and Noise Ordinance Discussion

Siemens-Westinghouse (S-W) and Higgot-Kane (H-K) specified sound level guarantees for each turbine and each stack, respectively, operating at baseload. The near-field guarantees were based on a distance of three feet from the sound envelope contour. H-K has also specified a sound guarantees for one point (400 feet away from Unit 3 stack) for Unit 3 stack operation only and at the same point for all three stacks operating. These specified sound levels are listed in Tables 2-1 and 2-2, below.

Table 2-1
Near-Field Sound Level Guarantees

Equipment	Near-Field Guarantee	Location of Measurement
Siemens-Westinghouse Supplied Equipment (Combustion turbine)	90 dBA	Averaged as measured on the source envelope contour for each turbine
Higgot-Kane Supplied Equipment (Stack)	85 dBA	3 feet from the duct, 5 feet above grade

Table 2-2
Far-Field Sound Level Guarantees

Equipment	Far-Field Guarantee	Location of Measurement
Higgot-Kane Supplied Equipment (Unit 3 stack operating only)	50 dBA	Receptor No. 1 (See Appendix A)
Higgot-Kane Supplied Equipment (Unit 3 stack operating only)	72 dB 31.5 Hz frequency	Receptor No. 1 (See Appendix A)
Higgot-Kane Supplied Equipment (Unit 1, 2, and 3 stacks operating)	52 dBA	Receptor No. 1 (See Appendix A)
Higgot-Kane Supplied Equipment (Unit 1, 2, and 3 stacks operating)	75 dB at 31.5 Hz frequency	Receptor No. 1 (See Appendix A)

Cass County developed a noise ordinance in 2002. This ordinance (Ordinance No. 02-20, Noise Disturbance) states that anywhere off the property of the sound source, the noise levels in a residential area may not exceed 60 dBA from 7 AM to 10 PM , nor may it exceed 55 dBA from 10 PM to 7 AM.

3.0 Testing Methodology

For the near- and far-field compliance testing, Burns & McDonnell generally followed test procedures in accordance with the Noise Test Procedure, Aquila South Harper Peaking Facility. Deviations from the procedure include the following:

1. Noise measurements were taken at key positions around the turbine. Not necessarily every 6 to 10 feet around the source envelope contour as specified in the noise testing protocol,
2. Background noise measurements were taken at key positions around each side of the turbine, but not at every location as specified in the noise testing protocol,
3. Measured wind speeds due to turbine operation on the south sides of the units exceeded 7 mph on all three turbines, attributable to the exhaust from the generator. Natural wind speeds were below 7 mph for all other measurements, and
4. Near-field measurements on Unit 3 were reduced to 30 seconds because the other turbines were going to startup sooner than expected.

Atmospheric conditions were measured by an anemometer and recorded at each measurement point. Temperatures and relative humidities during the ambient measurements were between 75 and 78 degrees Fahrenheit and 66 to 78 percent. Winds were low (between 0 and 4 miles per hour (mph)) each day. During the operational noise measurements, the ambient temperatures and relative humidity were in the same ranges as the ambient readings. As discussed above, the temperatures, humidity and wind speeds from the south ends of the turbines near the generator exhaust, were much different than ambient. The temperatures increased to over 100 degrees near the exhaust, humidities went down to the 30 percent range and wind velocities were up to 10 mph. These conditions did not appear to affect the noise measurements at these locations.

For the fenceline readings, background measurements were taken when the temperature was between 74 and 84 degrees Fahrenheit, humidity was 69 percent and winds were between 2 and 7 mph. Operational fenceline measurements were taken when the temperature was 95 degrees Fahrenheit and wind was between 2 and 8 mph with gusts up to 12 mph at some locations.

compare to startup
A Carson Davis Model 824 sound level meter was used to record all measurements. The sound level meter was calibrated before each set of measurements. None of the calibration level

changes exceeded 0.5 dBA. Windscreens were used at all times on the meter, and the meter was mounted on a tripod 5 feet above ground and the microphone was directed toward noise creating units.

All near-field measurement locations were selected based on proximity to noise creating units around the turbine. (See Figure B-1 in Attachment B for near-field measurement locations.) Measurement points were located 3 feet from the sound envelope contour, in accordance with the Noise Testing Protocol. The "slow" meter characteristic was used with the sound level meter on A-weighting. The meter measured A-weighted L_{eq} sound levels along with A-weighted octave band frequency sound levels for the operational noise levels and background noise level measurements.

Background measurements were taken at "Receptor No. 1" (far-field) as indicated in the figure in Appendix A, and at representative locations on each side of each turbine before the turbine operational noise measurements (near-field) as indicated in Appendix B. Background measurements were also taken at each fenceline measurement point, as shown in Appendix C.

Operational noise measurements were taken at each point during steady state baseload operation. Far-field operational measurements were taken when only Unit 3 was operating and also when all three units were operating. Tables D-1A through D-3B, in Appendix D, display all near-field measurements, including background and operational, for each turbine. Table D-4A displays the background and operational measurements taken at the far-field guarantee point (Receptor No.1). Table D-5 displays the background and operational fenceline noise measurements, along with the extraneous noises observed during each measurement, if applicable.

During the background noise measurements (turbines not operating), some of the equipment associated with the turbines were operating. This equipment can operate at any time when the turbine is not operating; therefore, it would not be possible to take noise measurements when this equipment is not in operation. The units that were operating during the background noise measurements include the step up transformer fans, vent fans on top of the turbine building, and lube oil pumps. This equipment was also operating during the operational noise measurements.

4.0 Results

All results at each measurement point are displayed in Appendix D. The highest noise level recorded near the combustion turbines (S-W equipment) during turbine operation was 89.3 dBA at Measurement Point 16, near the air inlet expansion joint. The near-field S-W guaranteed sound level (Table 2-1) is 90 dBA; therefore, all equipment associated with the S-W turbine – generator sets (excluding the stacks) for Units 1, 2, and 3 meets the noise guarantees from S-W.

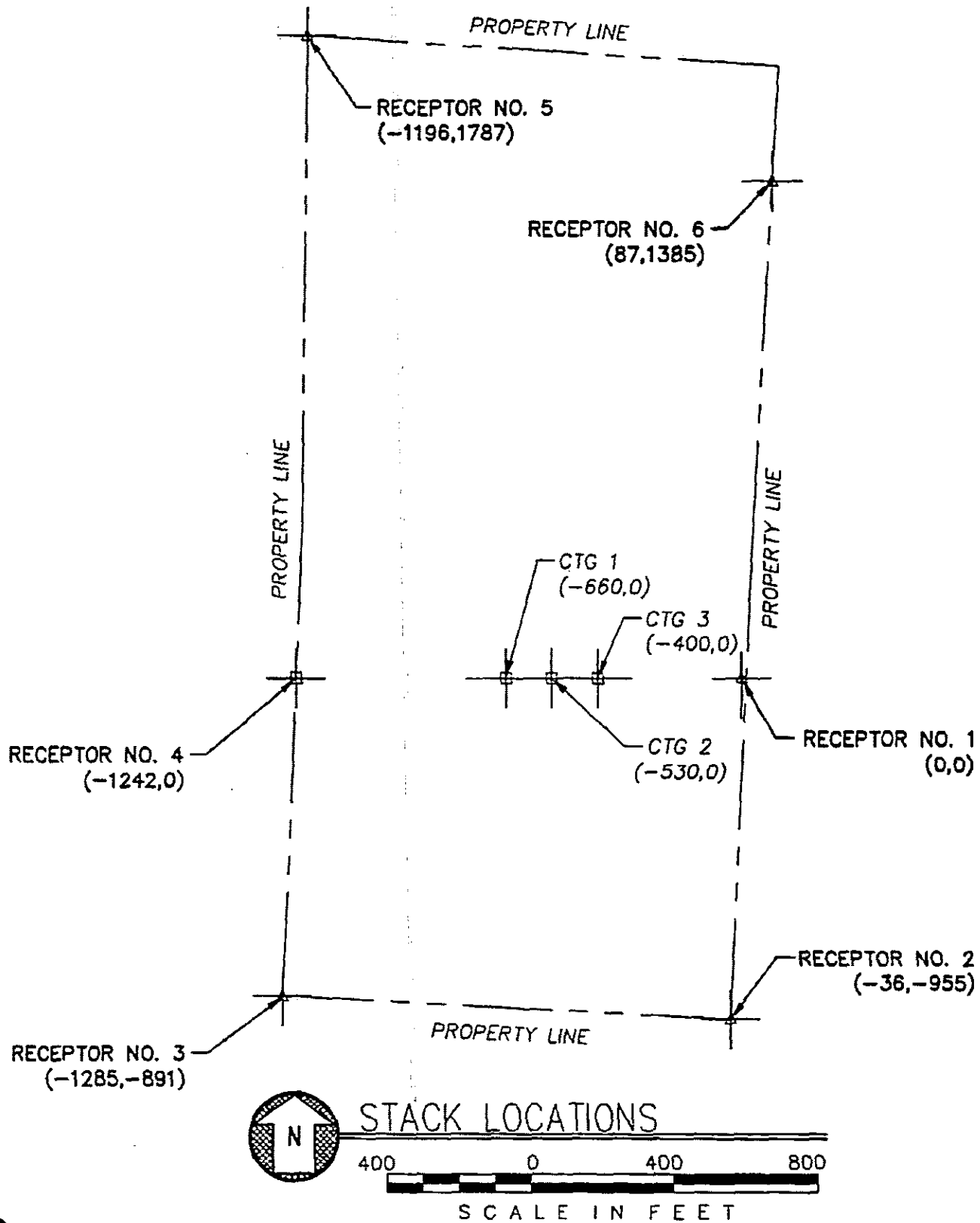
The highest near-field measurement recorded for the exhaust stacks and exhaust ducts on Units 1, 2, and 3 was 84.8 dBA near the exhaust duct. Therefore, Unit 1, 2, and 3 stacks meet the H-K near-field guaranteed noise level of 85 dBA (Table 2-1).

The background far-field noise measurement exceeded the H-K far-field guarantee at Receptor No. 1 (Appendix C) for the overall L_{eq} (dBA) and the 31.5 Hz guarantee. However, the measurement included background noise and noise from the combustion turbine and other extraneous noises (insect noise, compressor station noise, construction noise on-site and etc.), not just noise from the stack. Heavy insect noise and other non-Aquila generated noise was present during all measurements. Because the existing background noise measurements were just as high as the operational measurements, and given that two sound sources that are the same decibel in intensity increase the overall noise level by 3 dB, it may be assumed that 3 to 5 dB may be subtracted from the measurement due to turbine noise, insect noise, compressor station noise and etc. When subtracting out the background noise measurements, the stack guarantees are satisfied.

Fenceline noise measurements at some points exceeded the Cass County nighttime noise limitation (55 dBA) for both background and operational readings. Table D-5 displays the values obtained at each point. Some of the operational noise measurements were actually lower than the background noise measurements. It is difficult to determine the noise levels emitted from the facility alone at the fenceline, due to the extraneous noises present at each measurement point. Under separate cover is a Residential Noise Assessment Study that addresses the noise levels at nearby residences. The noise emitted from this facility does not exceed the 55 dBA noise limit at any of the nearby residences.

APPENDIX A
FAR-FIELD MEASUREMENT POINT LOCATION

Figure A-1
Far-Field Measurement Point Location



Engineers-Architects-Technicians
Design-Construction-Field Service

18041 Foster
P.O. Box 1000
Stillwater, Kansas 66205-1000



Aquila

AQUILA

DWG. TITLE: RECEPTOR LOCATIONS

JOB NO. 04-144

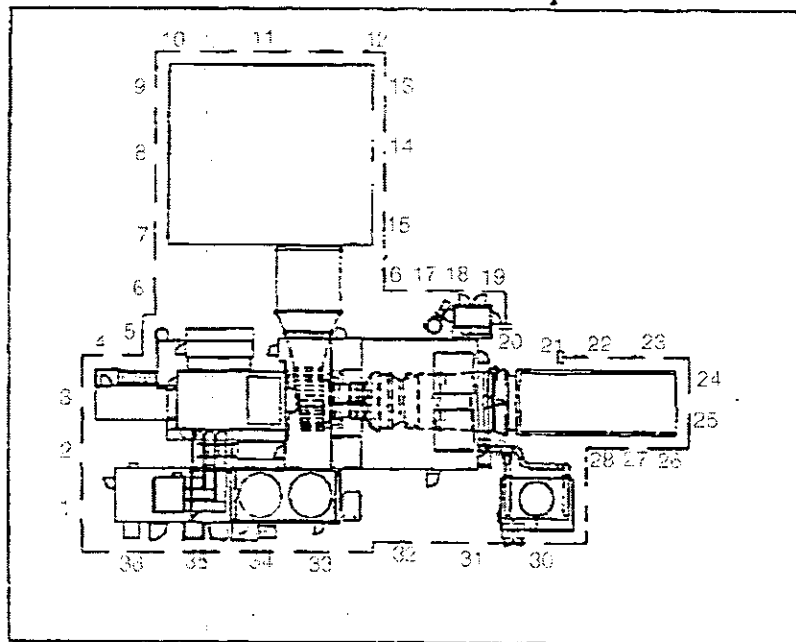
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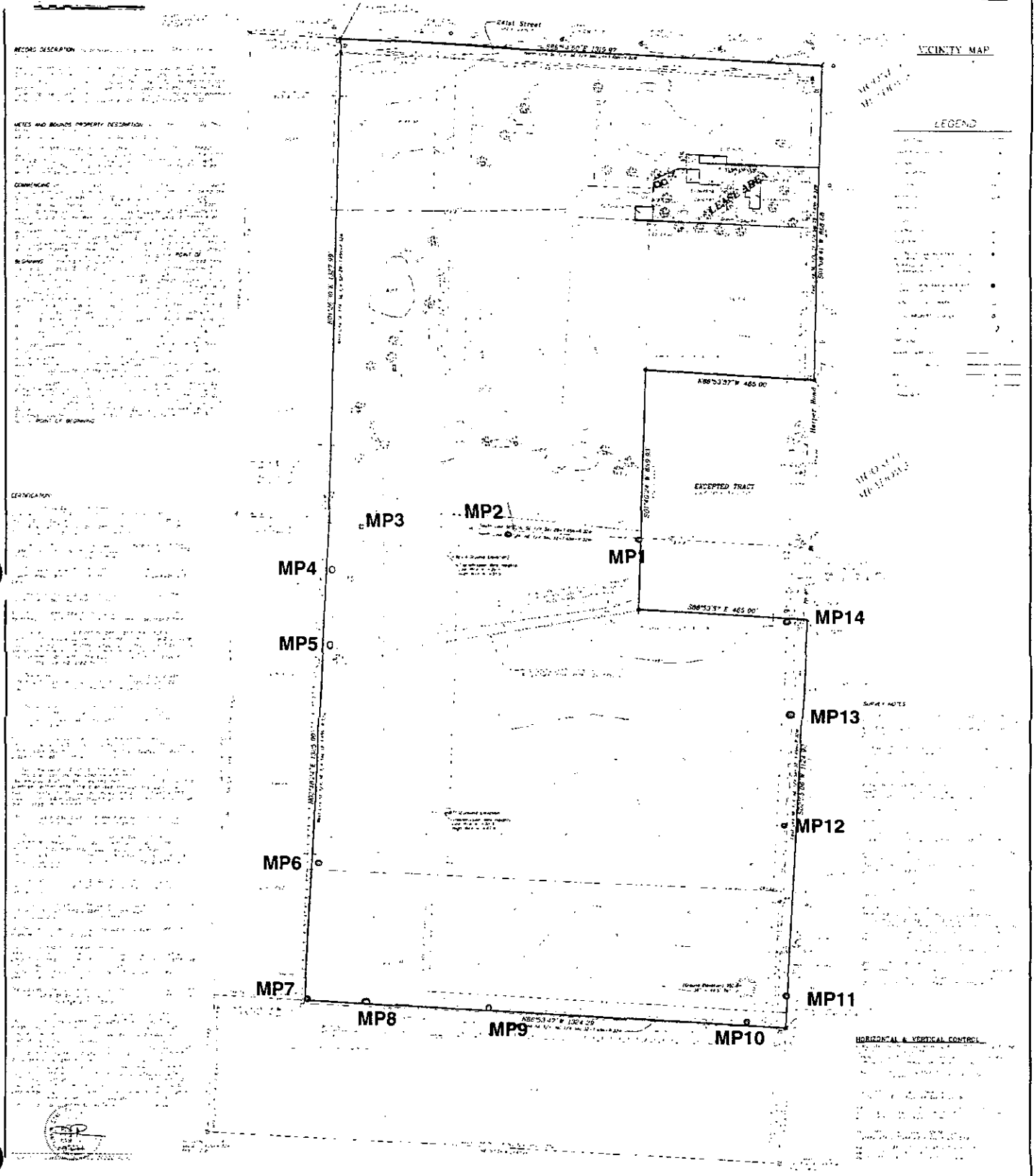
APPENDIX B
NEAR-FIELD MEASUREMENT POINT LOCATIONS

Figure A-1
Far-Field Measurement Point
Noise Measurement Point Locations
Near Field Sound Envelope Contour



APPENDIX C
FENCELINE MEASUREMENT POINT LOCATIONS

Figure C-1
Fenceline Noise Measurement Point Locations



APPENDIX D
NOISE MEASUREMENTS

TABLE D-1A, Unit 1 Near-field Background Measurements

Unit	Unit 1	
Type	Background	
MW	0	
Date	8/10/2005	
Time	5:45 AM	
Measurement Point	Sound Pressure Level, dBA	Notes
3	68.8	Transformer fan noise
11	49.5	Transformer fan noise
19	57.3	Cooling fans on turbine bldg.
24	54.9	
32	64.1	Cooling fans on turbine bldg.

TABLE D-1B, Unit 1 Near-field Operational Measurements

Unit	Unit 1	
Type	Operational	
MW	108	
Date	8/10/2005	
Time	7:15 - 8:15 AM	
Measurement Point	Sound Pressure Level, dBA	Notes
1	80.5	
2	79.9	
3	81.8	
4	81.5	
5	82.6	
6	83.3	
7	84.8	
8	80	
9	77.8	
10	77.1	
11	83.3	
12	83.3	
13	77.5	
14	79.1	
15	83.9	
16	89.3	
17	86.3	
18	85.1	
19	79.9	
20	79.4	Exhaust Duct Expansion Joint
21	79	Stack
22	76.7	Stack
23	74.1	Stack
24	76.2	Stack
25	76.8	Stack
26	81.1	Stack
27	83.9	Stack
28	76.1	
29	84.8	Exhaust Duct Expansion Joint
30	81.4	
31	81.1	
32	80.2	
33	78.4	
34	78.1	
35	75.9	
36	73.1	

TABLE D-2A, Unit 2 Near-field Background Measurements

Unit Unit 2
 Type Background
 MW 0
 Date 8/9/2005
 Time 5- 5:30 AM

Measurement Point	Sound Pressure Level, dBA	Notes
3	67.2	Transformer noise
11	63.1	Fans Unit #1
19	70	Hydraulic Skid Noise
24	57.8	
32	63.4	

TABLE D-2B, Unit 2 Near-field Operational Measurements

Unit Unit 2
 Type Operational
 MW 110
 Date 8/9/2005
 Time 7:15 - 8:15 AM

Measurement Point	Sound Pressure Level, dBA	Notes
1	74.9	
2	75.2	
3	79.7	
4	85.5	
5	84.0	
6	83.5	
7	84.7	
8	80.8	
9	79.8	
10	76.5	
11	83.4	
12	85.3	
13	77.0	
14	79.2	
15	84.8	
16	87.4	
17	87.8	
18	81.6	
19	80.8	
20	78.6	Exhaust Duct Expansion Joint
21	77.7	Stack
22	76.3	Stack
23	74.4	Stack
24	76.0	Stack
25	76.1	Stack
26	75.0	Stack
27	76.4	Stack
28	71.7	
29	83.0	Exhaust Duct Expansion Joint
30	77.8	
31	78.2	
32	77.8	
33	76.7	
34	76.7	
35	75.1	
36	71.8	

TABLE D-3A, Unit 3 Near-Field Background Measurements

Unit Unit 3
 Type Background
 MW 0
 Date 8/11/2005
 Time 5:00-5:20 AM

Measurement Point	Sound Pressure Level, dBA	Notes
3	65	Transformer fan noise
11	67.4	Transformer fan noise
19	66.8	Hydraulic skid operating
24	56.2	
32	74.4	Cooling fans on turbine bldg.

TABLE D-3B, Unit 3 Near-Field Operational Measurements

Unit Unit 3
 Type Operational
 MW 107
 Date 8/11/2005
 Time 7:15 - 8:15 AM

Measurement Point	Sound Pressure Level, dBA	Notes
1	75.3	
2	77.1	
3	78.6	
4	81.9	
5	81.4	
6	85.4	
7	81.6	
8	79.2	
9	77.6	
10	75.5	
11	83.7	
12	83.7	
13	75.9	
14	79.5	
15	82.9	
16	89	
17	87.8	
18	83.8	
19	80.9	
20	78.9	Exhaust Duct Expansion Joint
21	78.5	Stack
22	76.7	Stack
23	75.4	Stack
24	75.2	Stack - Meter 2
25	76.6	Stack - Meter 2
26	75.3	Stack
27	76.6	Stack
28	70.7	
29	81.6	Exhaust Duct Expansion Joint
30	77.5	
31	78.2	Forklift on gravel/concrete truck
32	79.6	
33	77.6	
34	77.2	
35	75	
36	75.2	

TABLE D-4, Far-Field Stack Background and Operational Measurements**Type** Far-Field Stack Measurements**Unit** Unit 1 and All three**Date** 8/11/2005**Location** Receptor No. 1

Location	Description	Overall Sound Pressure Level, dBA	31.5 Hz Sound Pressure Level, dBA	Extraneous Noises
Receptor No.1	Ambient - No turbines operating	55.7	43.4	Insect noise, Some fans on-site operating
Receptor No.1	Unit 3 operating	53.0	75.7	Insect noise
Receptor No.1	Unit 1, 2, and 3 operating	56.3	76.9	Insect noise, backup beeping

Table D-5, Fenceline Background and Operational Measurements

Measurement Point	Description	Background Sound Pressure Level, dBA	Background Measurement Notes	Operational Sound Pressure Level, dBA	Operational Measurement Notes
1	12 ft above plant elev.	54.8	Construction/Insect Noise	58.9	Mowers
2	12 ft above plant elev.	63.2	Construction noise	57.9	Mowers (distant)
3	Plant elev.	59.9		51.7	
4	Plant elev.	63.9	Bird noise	58.3	Insect noise
5	15 ft below plant elev.	59.3	Insect/bird/road noise	60.1	Insect noise
6	5 ft below plant elev.	60.6	Insect/bird noise	49.7	
7	5 ft above plant elev.	63.4	Intermittent bird noise	55.3	
8	Plant elev.	61.7	Bird noise/ transformer noise	60.0	Insect/ leaf noise
9	Plant elev.	63.6	Insect noise, transformer noise	59.6	Insect noise
10	25 ft below plant elev.	60.3	Insect noise	54.5	
11	22 ft below plant elev.	51.2	Insect/bird noise, cooling fan noise from plant	49.0	
12	Plant elev.	50.2	Insect/bird noise, cooling fan noise from plant	54.8	
13	Plant elev.	56.2	Insect noise, vehicle noise in plant	55.9	
14	15 ft above plant elev.	57.6	Compressor station noise, construction noise	60.4	Insect noise, compressor station noise

Noise Compliance Test

**Aquila
South Harper Peaking Facility
Cass County, Missouri**



Aquila

August 2005



**Residential
Noise Assessment Study
Aquila
South Harper Peaking Facility
Cass County, Missouri**

Prepared for:

**Aquila
20 West 9th Street
Kansas City, Missouri 65206**

August 2005

**BURNS & McDONNELL ENGINEERING COMPANY, INC.
ENGINEERS-ARCHITECTS-CONSULTANTS**

Kansas City, Missouri

Project No. 37273

EXECUTIVE SUMMARY

Background and operational sound measurements were taken at residences near the Aquila South Harper Peaking Facility. Operational measurements were taken when all three combustion turbines at the facility were operating at full load. Background sound measurements were taken while the facility was not operating. When the background noise measurements are compared to the operational noise measurements, the difference is insignificant. Although one can perceivably "hear" the sound from the plant, the change in the overall noise level is barely perceptible (3-5 dB increase at the closest residences).

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Figure B-1, 241st Street One-third Octave Band Frequency Background and Operational Sound Pressure Levels (dBA)	B-1

1.0 Introduction

Burns & McDonnell was contracted by Aquila to conduct a noise assessment study for the South Harper Peaking Facility (Facility) located in Cass County, Missouri. The Facility consists of three Siemens-Westinghouse 501D5A combustion turbines that operate in simple cycle mode. The existing land use in the vicinity of the project site can be characterized as a mixture of agricultural, industrial, and residential use. The site consists of 73 acres, located on flat to rolling terrain, in Township 45N, Range 32W, Section 29 and 32 approximately three miles southwest of the City of Peculiar on South Harper Road near 243rd Street. The nearest residences to the facility are located to the east and south of the site.

The objectives of this study are to conduct noise measurements to capture the ambient and operational sound levels in the vicinity of the project site, quantify the sound emissions from the Facility, and compare those measured sound levels to the Cass County noise ordinance (Ordinance No. 02-20, Noise Disturbance).

2.0 Acoustical Terminology

The human response to sound is complex and is influenced by a variety of acoustic and non-acoustic factors. Acoustic factors generally include the sound's amplitude, duration, frequency content, and fluctuations. Non-acoustic factors typically include the listener's ability to become acclimated to the sound, the listener's attitude towards the sound and the sound source, the listener's interpretation of the necessity of the sound, and the predictability of the sound. As such, response to sound is highly individualized.

Amplitude and frequency physically characterize sound energy. Sound amplitude is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 microPascals). The reference sound pressure corresponds to the typical threshold of human hearing. A 3 to 5 dB change in a continuous broadband sound is generally considered "just barely perceptible" to the average listener. Similarly, a 6 dB change is generally considered "clearly noticeable" and a 10 dB change is generally considered a doubling (or halving) of the apparent loudness.

Frequency is measured in Hertz (Hz), which is the number of cycles per second. The typical human ear can hear frequencies ranging from approximately 20 Hz to 20,000 Hz. Typically, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the low and high frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in

the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 2-1. Most ordinances, including Cass County's, are based on the A-weighting scale.

Table 2-1
Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment	
		Outdoor	Indoor
140	Deafening	Jet aircraft at 75 ft	
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 ft	
120	Threshold of feeling	Elevated train	Hard rock band
110		Jet flyover at 1000 ft	Inside propeller plane
100	Very loud	Power mower, motorcycle at 25 ft, auto horn at 10 ft, crowd sound at football game	
90		Propeller plane flyover at 1000 ft, noisy urban street	Full symphony or band, food blender, noisy factory
80	Moderately loud	Diesel truck (40 mph) at 50 ft	Inside auto at high speed, garbage disposal, dishwasher
70	Loud	B-757 cabin during flight	Close conversation, vacuum cleaner, electric typewriter
60	Moderate	Air-conditioner condenser at 15 ft, near highway traffic	General office
50	Quiet		Private office
40		Farm field with light breeze, birdcalls	Soft stereo music in residence
30	Very quiet	Quiet residential neighborhood	Bedroom, average residence (without t.v. and stereo)
20		Rustling leaves	Quiet theater, whisper
10	Just audible		Human breathing
0	Threshold of hearing		
Source: Adapted from <i>Architectural Acoustics</i> , M. David Egan, 1988 and <i>Architectural Graphic Standards</i> , Ramsey and Sleeper, 1994.			

Another weighting scale is the C-weighting scale. The C-weighting scale simulates the human ear's response to relatively high frequency sound levels. At high frequency sound levels, the response of the human ear to different frequencies is relatively constant. The C-weighting scale generally applies to

sound levels that are much higher than typical environmental sound levels. Nonetheless, the C-weighting scale can be useful in evaluating low-frequency sound levels. Excessive levels of low frequency noise, while not being readily perceptible to the human ear, can be sensed as airborne vibrations. These vibrations can be felt as much as they can be heard. In extreme cases, these vibrations may cause light frame structures to vibrate causing a noticeable vibration within residences. In general, low-frequency impacts to residences in the way of perceptible vibrations are minimized when the C-weighted sound pressure levels are at or below 75-80 dBC.

Sound in the environment is constantly fluctuating, such as when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound levels. The exceedance sound level, L_x , is the sound level exceeded "x" percent of the sampling period and is referred to as a statistical sound level.

The most common L_x values are L_{eq} , L_{90} , L_{50} , and L_{10} . L_{eq} is the level of a constant sound over a specific time period that has the same sound energy as the actual sound over the same period. L_{90} is the sound level exceeded 90 percent of the sampling period. L_{90} represents the sound level without the influence of loud, transient sound sources and is therefore often referred to as the residual or background sound level.

L_{50} is the sound level exceeded 50 percent of the sampling period. L_{10} represents the occasional louder sounds and is often referred to as the intrusive sound level.

For this sound report, the most logical metric for sound measurements is L_{eq} . This report examines L_{eq} values and compares these measured levels with the applicable noise regulations.

3.0 Applicable Regulations

Burns & McDonnell reviewed applicable state, county and local noise regulations for the project. Cass County has developed a noise ordinance (Ordinance No. 02-20, Noise Disturbance) in 2002. This noise ordinance states that in residential areas, anywhere off property of the sound source shall not exceed 60 dBA during the daytime hours (7 AM through 10 PM), nor shall it exceed 55 dBA during the nighttime hours (10 PM to 7 AM) at the property boundaries of the noise source. This noise assessment study will compare measured noise levels at nearby residences to these noise ordinance specified noise levels.

4.0 Sound Measurement Methodology

On August 11, 2005 between 5:25 and 6:00 AM, ambient (background) sound measurements were taken at representative locations in the neighborhoods (Figure A-1 and Table 4-1) near the facility. None of the

combustion turbines on-site were operating. According to American National Standard, ANSI B133.8-1977, "measurements should not be made when average wind velocity exceeds 7 mph. Cloudy or overcast, or nighttime conditions are preferred". During the ambient sound readings, temperatures were approximately 78 degrees Fahrenheit, relative humidity was approximately 71 percent and average wind velocity was zero to two miles per hour (mph).

**Table 4-1
Background Noise Measurement Point Locations**

Measurement Point	Location Description
MP1	South Harper Road, South of Facility on Hill
MP2	24211 South Harper Road
MP3	24005 South Harper Road (Northeast of Facility)
MP4	New House on 241 st Street, North of Facility
MP5	9804 241 st Street, North of Facility
MP6	241 st Street South of 24021 Lucille Residence
MP7	Intersection of Lucille and 241 st Street
MP8	24407 Overfelt Road (on Street at Driveway)

Also on August 11, 2005 between 3:00 and 6:00 PM, Burns & McDonnell personnel conducted an operational noise level survey at nearby residences in the area while the Facility was operating at full load (all three turbines operating at 108 MW each). During the measurements, temperatures were in the mid-90's, humidity was approximately 40 percent and winds blowing an average of 6 miles per hour with gusts up to 12 miles per hour. The wind was predominantly from the southeast and switched to the southwest towards the end of the measurements. Because the wind was gusting at high speeds, secondary measurements were taken on August 12, 2005 at some of the nearest residences between 2 and 4 PM. Temperatures and humidity were relatively the same as on August 11, but measurements were only taken when wind velocities were less than 7 mph. Other measurements in the neighborhood were taken on Friday, August 19, 2005 at locations that were not available on previous measurement days. On that day, wind was 5 to 8 mph with gusts up to 12 mph, temperatures were approximately 99 degrees Fahrenheit, and relative humidity was 50 percent. A description, along with the measurements at each point is presented in Table 6-1.

Measurements were taken in decibels (dB) at one-third (1/3) octave bands (Hz) using two Larson-Davis model 824, American National Standards Institute (ANSI) Type 1 sound level meters. Both meters were

current for certifications and calibrations. At each monitoring location, sound levels at the referenced bands were measured and logged by the sound meter. Measurements were taken and accumulated until a stable sound level was reached, which was between 30 seconds to one minute. When necessary the meter was paused for traffic passing by the measurement point. The average sound level (L_{eq}) for each measurement point location was recorded. The contribution of the frequency bands to the total sound level is customarily weighted to approximate the frequency sensitivity of human hearing (dBA).

5.0 Background Sound Levels

The background noise measurements were taken while the South Harper Peaking Facility was not operating. Background sound was measured at each of the measurement points listed in Table 4-1 (and shown in Figure A-1) during the early morning hours before the plant was turned on and before traffic increased for morning rush hour. During the background noise measurements, some extraneous noises were observed. These noises are included for each measurement point along with the ambient A-weighted background noise levels, as shown in Table 5-1. The noise levels did not vary much between each measurement point; the variations in noise levels that did occur appeared to result from insect noise. Overall, the measured background noise levels are not uncommon for a rural area without traffic.

Table 5-1
Background Sound Pressure Levels, dBA

Measurement Point Number	Description	Sound Pressure Level, L_{eq} (dBA)	Extraneous Noises
MP1	South Harper Road, South of plant on hill	52.1	Insect noise
MP2	24211 S. Harper Road	45.8	Rooster noise
MP3	24005 S. Harper Road (Northeast of Facility)	41.8	
MP4	New house on 241 st Street, North of plant	49.5	Insect noise
MP5	9804 241 st Street, North of plant	58.4	Insect noise - Heavy
MP6	241 st Street, South of 24021 Lucille residence	47.8	Insect and bird noise
MP7	Intersection of Lucille and 241 st Street	44.4	Light insect noise
MP8	24407 Overfelt Road (on street at driveway)	45.3	Insect/bird noise, some distant traffic noise.

6.0 Operational Sound Levels

Operational noise levels were measured at each operational measurement point while the South Harper Peaking Facility was operating at full load (approximately 324 MW) during three different days, as described in Section 4. If vehicles passed by during measurements, the meter was paused so as not to inflate the measurements.

Table 6-1 displays L_{eq} measured noise levels at each measurement point. At some residences, multiple measurements were taken because the residents requested multiple measurements. Figure A-2, in Appendix A, displays the approximate location of each operational noise measurement taken in the surrounding community.

Table 6-1
Measured (L_{eq}) Operational Sound Pressure Levels, dBA

Measure- ment Point Number	Location Description	Sound Pressure Level, L_{eq} (dBA)		Notes
		8/11/2005	8/12/2005	
1A	24121 Lucille – Play area	50.0	43.9	Plant audible, bird noise
1B	24121 Lucille – Table in back	48.4	41.0	Plant audible
1C	24121 Lucille – Near garage	48.5	43.6	Plant audible
1D	24121 Lucille – Near driveway	42.8	41.8	Plant audible
2A	January – Front drive	46.9	39.0	Plant audible
2B	January – Back porch	43.9	44.4	Plant audible
2C	January – Back property line	45.3	44.3	Plant audible
3A	9908 241st St. – Road & Driveway	48.8	41.5	Plant audible
3B	9908 241st St. – Front door	46.6	47.4	Plant audible
4A	9812 241st St. – Road & Driveway	49.1		Plant audible
4B	9812 241st St. – Front Door	50.5		Plant audible
5	9804 241st St. – Driveway	49.9		Plant audible
6	9801 241st St. – Driveway	45.6		Plant audible
7	24000 Lucille – Driveway	47.3		Plant audible
8	9204 241st St. – Driveway	44.6		Plant audible
9	24407 Overfelt – Driveway entrance	47.2		Plant audible
10	Rt. 1, Box 165, Overfelt	48.1		
11	24005 Lucille	45.1		Plant audible
12	23925 Lucille – Driveway	44.6		Plant audible
13	Across Street from 23925 Lucille – Driveway	46.2		Plant audible
14	23910 Lucille – Driveway	42.7		Plant audible
15	23817 Lucille – Driveway	51.1		Plant audible
16	23805 Lucille – Driveway	41.9		Plant audible
17	23717 Lucille – Driveway	40.3		Plant audible
18	23706 Lucille – Driveway	49.8		Plant not audible - electric box audible
19	23623 Lucille – Driveway	39.4		Plant not audible
20	236th Dead-End At trees	46.6		Dog barking
21	23521 Lucille – Driveway	52.4		Dog barking
22	23520 Lucille – Driveway	43.0		Flag in yard making noise
23	23506 S Crest – Driveway	45.2		
24	23615 Greenridge – Driveway	50.0		
25	23601 Greenridge – Driveway	46.9		
26	Tunnichliff – Driveway	40.9		
27	24600 S. Harper – North fenceline	40.9		Plant audible
28	24800 S. Harper – Front yard	47.8		Plant not audible - tractor noise
29	Intersection S. Harper & 243rd St.	58.8		Gas compressor station operating, plant audible, also
30A	10312 243d St. – Front yard	47.0		Plant audible, insect noise
30B	13012 243rd St. – Backyard	51.8		Plant audible, insect noise

Table 6-1, Continued

Measurement Point Number	Location Description	Sound Pressure Level, L_{eq} (dBA)		Notes
		8/11/2005	8/12/2005	
31A	10707 240th St. – Backyard	39.7		Plant audible, insect noise
31B	10707 240th St. – Front yard	43.7		Plant audible, insect noise
32	23300 Aero Dr. – Front yard	50.2		Plant not audible, insect and traffic noise
33	10501 E. 235th St. – Back yard deck	43.7		Plant not audible
34	Intersection S. Harper & 235th St	52.2 ⁻		Insect noise, traffic noise. Plant not audible
35	23903 S. Harper – Front yard	44.9		Plant audible
36	24405 S. Harper – Front yard	45.9		Plant audible, insect noise
37A	24401 S. Harper – Front yard	57.4		Leaves in wind noise - heavy
37B	24401 S. Harper – South side of property	48.5		Plant audible
38	House to north of 24211 S. Harper – Front yard	49.1		Plant audible
39	24211 S. Harper – Front yard	52.0		Plant audible
40	10606 243rd St. – Front yard	45.3		Plant audible
41	24214 S. Tanaine	49.6	47.8*	Plant not audible
42A	Aquila west property boundary, 350 ft. south of 214th St., 22 ft below plant elev.		53.2* ⁻	Plant audible
42B	Aquila west property boundary, 350 ft. south of 214th St., 12 ft below plant elev.		58* ⁻	Plant audible

*Measurement taken on 08/19/05.

⁻Measurement not taken at a residence.

The highest measured operational noise level was the measurement taken at the intersection of 243rd Street and South Harper Road (not a residence). The noise testing personnel observed that the gas compressor station was operating during the measurement. Because the compressor station was operating and was directly between the measurement point and the plant the measurement is high due to the noise from the compressor station. The only other operational measurement at a residence that was higher than 55 dBA was the measurement at 24401 South Harper Road. Noted during this measurement was that the wind was very high and the leaves on the trees were blowing and making significant noise.

In order to determine if any low or high frequencies are dominating the sound at the nearby residences, the octave bands were analyzed. Appendix B contains a sound spectral graph of the A-weighted one-third octave band frequency sound pressure levels at a representative measurement point on 241st Street. The figure displays the measured noise levels at each octave band frequency when the plant is not operating (background) and when the plant is at full load (operational). In reviewing both spectrums, it appears that the high-pitched tone that can be heard at some nearby locations is in the 1000 to 1250 Hz range.

Because the noise levels in these frequencies are 10 dB higher than the other frequencies, this frequency is more audible and may create a more tonal noise that "stands out".

During the near-field measurements around each of the combustion turbines on the site, the possible source of this tonal noise was determined to be the air inlet expansion joint. Aquila is currently obtaining information on possible attenuation that is available for this piece of equipment.

7.0 Conclusions

Noise levels in the neighborhoods around the South Harper Peaking Facility were measured while the facility was operating at full load and these measurements were compared to the existing background noise measurements when the facility is not operating. When the ambient noise measurements are compared to the operational noise measurements, the difference is insignificant. Although one can perceivably "hear" the sound from the plant, the change in the overall noise level is barely perceptible (3-5 dB increase at the closest residences).

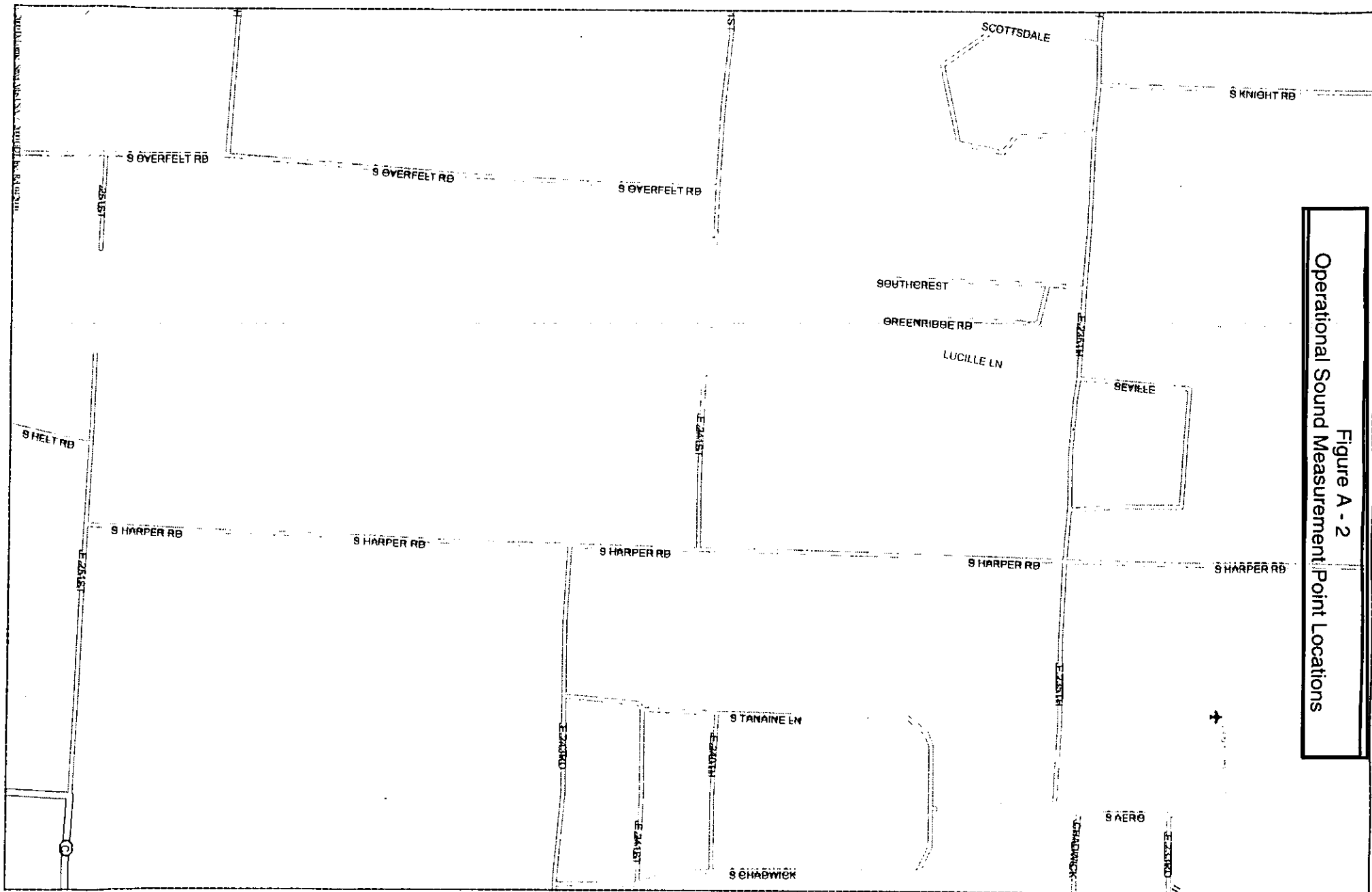
APPENDICES

APPENDIX A
BACKGROUND AND OPERATIONAL
NOISE MEASUREMENT POINTS

Figure A-
Background Measurement Point Locations



Figure A - 2
Operational Sound Measurement Point Locations



APPENDIX B
1/3 OCTAVE BAND FREQUENCY SOUND PRESSURE LEVELS
FOR BACKGROUND AND OPERATIONAL NOISE

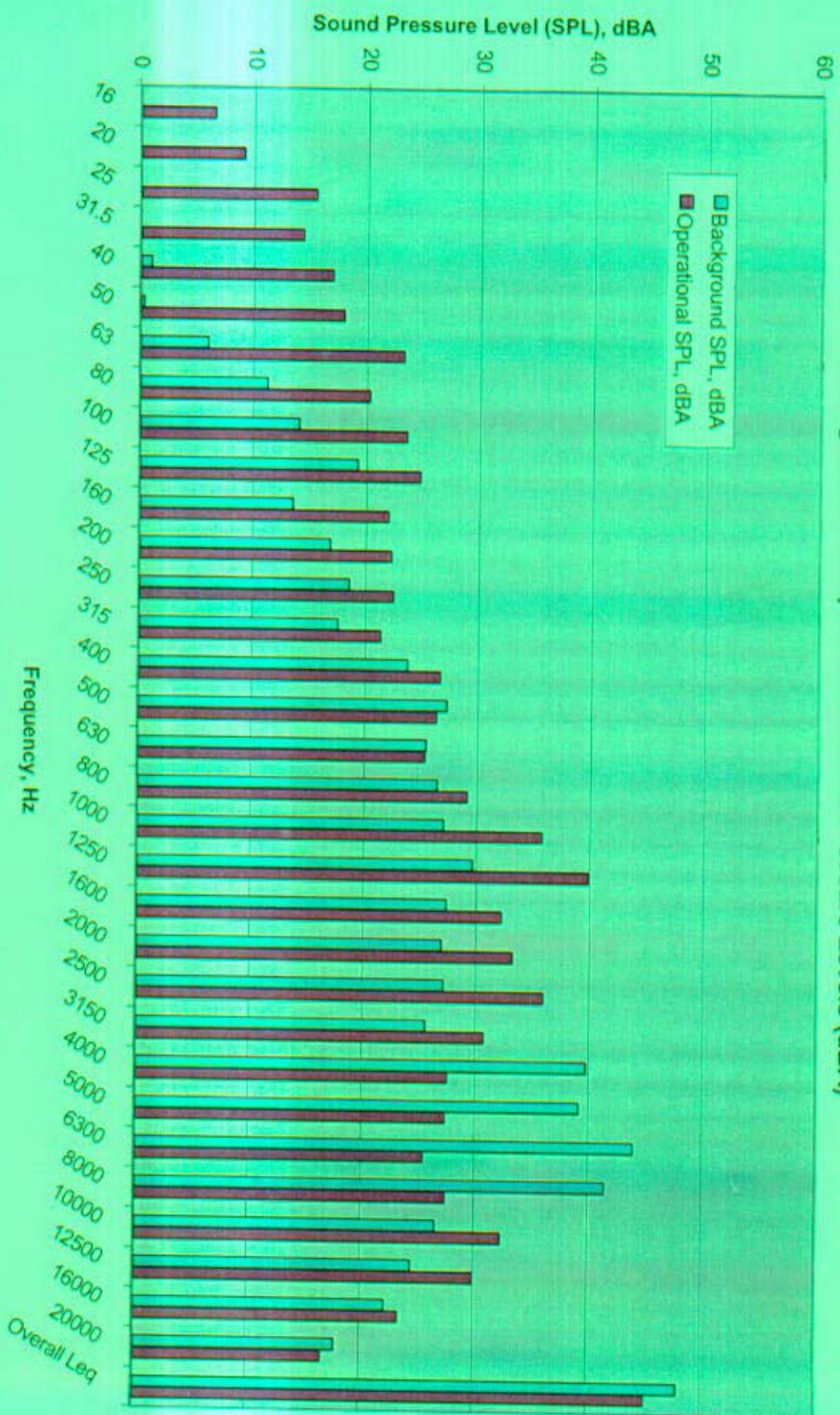


Figure B-1
241st Street One-third Octave Band Frequency
Background and Operational Sound Pressure Levels (dBA)

APPENDIX J
UNIVERSITY OF KANSAS
TOXICOLOGIST RESUMES



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The project is staffed by Mark S. Frankel, Project Director; Deborah Runkle, Project Manager; and Kristina Schaefer, Program Associate.

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John Doull, M.D., Ph.D.

Recruitment and Screening Panel

Dr. John Doull is Professor Emeritus of Pharmacology and Toxicology in the Department of Pharmacology, Toxicology and Therapeutics at the University of Kansas Medical School. Prior to coming to Kansas, he was the Assistant Director of the University of Chicago Toxicity Laboratory and Associate Professor in the Department of Pharmacology at the University of Chicago. He has a BS degree in chemistry from Montana State University and PhD (pharmacology) and MD degrees from the University of Chicago.

He served on the Toxicology Study Section of NIH and the council of the National Institute of Environmental Health Sciences (NIEHS). He is past president of the Society of Toxicology and the American Board of Toxicology, has chaired the Threshold Limit Value Committee of the American Conference of Governmental Industrial Hygienists. He has served on the Expert Panels of the International Life Sciences Institute (ILSI), the Flavor Extract Manufacturing Association (FEMA), and the Distilled Spirits Council of the United States (DISCUS), and was a member of the Presidential Clean Air Commission. He has chaired the Committee on Toxicology of the National Research Council of the National Academy of Sciences, served on the scientific advisory panels of the Environmental Protection Agency (EPA), the National Institute of Occupational Safety and Health (NIOSH), among others, and consults with many governmental, state, industrial and private organizations.

He received the Kenneth DuBois Award in 1981 from the Mid-America chapter of Society of Toxicology, the Samuel Kuna Award in 1989 from Rutgers University (Robert Wood Johnson Medical School), the International Achievement Award in 1990 from the International Society for Regulatory Toxicology and Pharmacology, and the Commanders Award for Public Service from the Department of the Army Armed Forces Epidemiological Board (AFEB). In 1991, he received the Toxicology Ambassador Award from the Mid Atlantic

Chapter of the Society of Toxicology and a Distinguished Medical Alumnus Award from the University of Chicago. In 1992 he received the Stockinger Award from the American Conference of Governmental Industrial Hygienists (ACGIH) and was the first recipient of the John Doull Award, which was established by the Central States Chapter of the Society of Toxicology to recognize his contributions to the discipline of toxicology. In 1993, he received the Merit award of the Society of Toxicology and in 1994 he was honored as the Snider Awardee of the Arkansas Toxicology Symposium Series. In 1996 he received the Founder's Award from the Chemical Industry Institute of Toxicology (CIIT), was awarded an honorary doctorate degree from the University of Kuopio in Finland, the Meritorious Service Award from ACGIH and the Distinguished Service Award from the American College of Toxicology.

CURRICULUM VITAE

Karl K. Rozman, Ph.D., D.A.B.T.

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Matura (Secondary education and college): Realgymnasium, Innsbruck, Austria, 1963

Cand. phil. (M.S. equivalent): Leopold Franzen's University, Innsbruck, Austria, 1970 (Chemistry)

Dr. phil. (Ph.D. equivalent): Leopold Franzen's University, Innsbruck, Austria, 1973 (Organic and Pharmaceutical Chemistry)

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American Board of Toxicology: 1981, recertified 1986, 1991, 1996, 2001

Academic Appointments:

Instructor, Institute of Organic and Pharmaceutical Chemistry, Leopold Franzen's University, Innsbruck, Austria, 1970-1973

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Assistant Professor, Department of Pharmacology, Toxicology and Therapeutics, University of Kansas Medical Center, Kansas City, KS, 1981-1982

Associate Professor, Department of Pharmacology, Toxicology and Therapeutics, University of Kansas Medical Center, Kansas City, KS, 1983-1985

Professor, Department of Pharmacology, Toxicology and Therapeutics, University of Kansas Medical Center, Kansas City, KS, 1986-present

Professional Affiliations:

Research Associate, Institute of Ecological Chemistry, National Research Center for Environment and Health, Neuherberg, F.R.G. (GSF-Forschungszentrum für Umwelt und Gesundheit, GmbH), at Holloman AFB, NM, 1974-1977

Group Leader, Institute of Toxicology, National Research Center for Environment and Health, Neuherberg, F.R.G. at Holloman AFB, NM and Kansas City, KS 1978-1988.

Visiting Scientist, Department of Experimental Pathology, Karl Thomae (Böhringer-Ingelheim) GmbH, Biberach an der Riß, F.R.G., Nov.-Dec., 1984

Visiting Scientist, Department of Experimental Pathology, American Cyanamid Co., Pearl River, NY, Jan.-March, 1985

Sabbatical Leave, National Research Center for Environment and Health, Neuherberg, F.R.G., 1988-1989

Head, Section of Environmental Toxicology, GSF-Institut für Toxikologie, Neuherberg, F.R.G., 1989-present

Languages:

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Professional Societies:

International Society of Ecotoxicology and Environmental Safety, 1978-

New York Academy of Sciences, 1979-

American Association for the Advancement of Science, 1980-

Society of Toxicology, 1983-

International Society for the Study of Xenobiotics, 1983-

Deutsche Gesellschaft für Pharmakologie und Toxikologie, 1984-

Sigma Xi, 1984-

American Society for Pharmacology and Experimental Therapeutics, 1985-

American Association of Pharmaceutical Scientists, 1986-

Society of Toxicologic Pathologists, 1988-

American Conference of Governmental and Industrial Hygienists, 1995-

Academy of Toxicological Sciences, 2002-

Organizations:

Member, Awards Committee, Society of Toxicology, Washington, DC, 1986-1988

Member, Executive Council, Environmental and Occupational Health Center, University of Kansas Medical Center, Kansas City, KS, 1986-

Chairman, Platform Session, Pesticides, 25th Annual Meeting of the Society of Toxicology, New Orleans, LA, March 5, 1986

Scientific Program Chairman, 6th International Symposium of the Society of Toxicologic Pathologists, Gastrointestinal Toxicologic Pathology, Philadelphia, PA, June 1-3, 1987

Chairman, Symposium, Morphological, Functional, Biochemical and Immunological Aspects of the Gut, 6th International Symposium of the Society of Toxicologic Pathologists, Philadelphia, PA, June 1, 1987

Liaison Representative, Society of Toxicology to Eurotox, Washington, DC, 1988-present

Member, BMFT Study Section on Dioxins and Furans, Bonn, F.R.G., 1988-1993

Member, Education Committee, Society of Toxicology, Washington, DC, 1989-1990

Member, Environmental Health & Safety Council, American Health Foundation, Valhalla, NY, 1989-1997

Chairman, Platform Session, TCDD I, 30th Annual Meeting of the Society of Toxicology, Dallas, TX, Feb. 25, 1991

Member, TLV Committee, American Conference of Governmental and Industrial Hygienists, Cincinnati, OH, 1992-1998

Liaison Representative, TLV Committee to the German MAK Kommission, 1992-present

Member, IEHR Expert Scientific Group on EPA's Dioxin Document, 1994-1995

Chairman, Platform Sessions, TCDD I, 35th Annual Meeting of the Society of Toxicology, Anaheim, CA, March 12, 1996

Vice-chair, TLV Committee, American Conference of Governmental and Industrial Hygienists, Cincinnati, OH, 1998

Member, Air Force Panel of Experts, ACTA, Torrance, CA, Commissioned by NRC, 1999

Member, NICEATM Expert Panel, Washington, D.C., 2000-20001

Chairman, Poster Discussion Session, Developmental and Reproductive Toxicology in Mammals, 40th Annual Meeting, Society of Toxicology, San Francisco, March 28, 2001

Member, Steering Committee, ILSI Agriculture Chemical Safety Assessment, Washington, D.C., 2001

Member, Site Visiting Team, Environmental Toxicology Program, Wilmington, NC, August 21-23, 2001.

Chairman, Advisory board to IBSA, Kansas City, KS, 2002 – present.

Member, NTP-CERHR Expert Panel, Reproductive and Developmental Toxicity of Propylene Glycol and Ethylene Glycol, 2002-2003.

Editor:

Gastrointestinal Toxicology, Elsevier, New York/Amsterdam/Oxford, pp. 606, 1986

Associate Editor:

Archives of Toxicology, 1991-present

Editorial Board:

Pharmaceutical Research, 1987-1995

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Toxicology, 2000 – present

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Consultant:

American Cyanamid Co., Pearl River, NY, 1985-1988

Environmental Protection Agency, Washington, D.C., 1986-present

Reviewed Chlorobenzene, Drinking Water Criteria Document, 1986

Reviewed Dichlorobenzenes, Drinking Water Criteria Document, 1986

Reviewed Hexachlorobenzene, Drinking Water Criteria Document, 1986

Reviewed Polychlorinated Dibenzofurans, Drinking Water Criteria Document, 1986

Reviewed Dichloromethane, Health Assessment Document, 1987

Reviewed Trichloroethylene, Health Assessment Document, 1987

Reviewed 2,3,7,8-Tetrachloro-dibenzo-p-dioxin (TCDD) and Related Compounds, Health Assessment Document, 1996

Environmental Protection Agency, Region VII, Kansas City, KS, 1986-1987

Reviewed 2,3,7,8-Tetrachlorodibenzo-p-dioxin Risk Assessment, 1986

National Research Council, Subcommittee on Dioxin, Washington, D.C., 1987-1988

Co-authored Acceptable Levels of Dioxin Contamination in Office Building

Following a Transformer Fire, 1988

BGA/UBA (Bundesgesundheitsamt/Umweltbundesamt) Berlin, F.R.G., Gesundheitliche Beurteilung von Dioxinen und Furanen, ISBN 3-89254-1174-4, 1992

BAGS (Behörde für Arbeit, Gesundheit und Soziales) Hamburg, F.R.G., Untersuchung der Schilddrüse und ihrer Funktion in der epidemiologischen Studie der Bille-Siedlung, 1994-1996

Teaching:

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Kristian Fried, 2000 - present

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Honors:

Matura (Secondary education and college): Realgymnasium, Innsbruck, Austria, 1963, summa cum laude (= mit Auszeichnung)

Cand. phil. (M.S. equivalent): Leopold Franzen's University, Innsbruck, Austria, 1970 (Chemistry), summa cum laude

Dr. phil. (Ph.D. equivalent): Leopold Franzen's University, Innsbruck, Austria, 1973 (Organic and Pharmaceutical Chemistry), summa cum laude

Carriè-Schneider Award of the German Dermatological Society, Munich, F.R.G., 1988

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BIBLIOGRAPHY

Thesis:

Acylierungsprodukte (NH)- und (CH)-acider Verbindungen und deren Abwandlung durch Cyclisierung und Umlagerung.

(Acylation products of (NH)- and (CH)-acidic compounds and their modification by cyclisation and rearrangement).

Full-length Publications:

1. Rozman, K.K., Müller, W.F., Iatropoulos, M.J., Korte, F. and Coulston, F.: Ausscheidung, Körperverteilung und Metabolisierung von Hexachlorbenzol nach oraler Einzeldosis in Ratten und Rhesusaffen. *Chemosphere* 4:289-298, 1975.
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10. Rozman, T., Rozman, K.K., Williams, J. and Greim, H.: Enhanced fecal excretion of mirex in rhesus monkeys by 5% mineral oil in the diet. *Drug Chem. Toxicol.* 4:251-262, 1981.
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143. Storm, J.E., Rozman, K.K., and Doull, J.: Occupational exposure limits (OELS) for 30 organophosphate pesticides (OPS) and supporting rationale. *Toxicologist* 54 (1-S): 273, 2000.
144. Son, D., Roby, K.F., Rozman, K.K., and Terranova, P.F.: Differential effects of estradiol congeners on the expression of CYP1A1 induced by 2,3,7,8-tetrachlorodibenzo-p-dioxin in a mouse ovarian epithelial cancer cell line. *Toxicologist* 54 (1-S): 275, 2000.
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147. Gao, X., Terranova, P.F., and Rozman, K.K.: Blockage of ovulation by polychlorinated dibenzofurans (PCDFS), biphenyls (PCBS) and their mixture with dibenzo-p-dioxins (PCDDS) supports the toxic equivalency (TEQ) concept. *Toxicologist* 54 (1-S): 280, 2000.

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150. Gao, X., Mizuyachi, K., Terranova, P.F., and Rozman, K.K.: 2,3,7,8-Tetrachlorodibenzo-p-dioxin decreases responsiveness of the hypothalamus to estradiol as a feedback inducer of preovulatory gonadotropin secretion in the immature gonadotropin-primed rat. *Toxicologist* 60 (1-S): 273, 2001.
151. Williams, S.R., Son, D.S., Rozman, K.K., and Terranova, P.F.: Protein kinase C (PKC) isoform expression in mouse ovarian surface epithelial cancer cells: upregulation of PKC delta protein expression by 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). *Toxicologist* 60 (1-S): 443, 2001.
152. Son, D.S., Rozman, K.K., and Terranova, P.F.: Dexamethasone reduces the expression of CYP1A1 induced by 2,3,7,8-tetrachlorodibenzo-p-dioxin in a mouse ovarian epithelial cancer cell line. *Toxicologist* 60 (1-S): 443, 2001.
153. Mizuyachi, K., Son, D.S., Rozman, K.K., and Terranova, P.F.: Alteration in ovarian gene expression in response to TCDD: the role of Cox-2 in the blockage of ovulation. *Toxicologist* 60 (1-S): 444, 2001.
154. Croutch, C., Lebofsky, M., and Rozman, K.K.: Quantification of time-response along with dose-response in the induction of EROD by TCDD and HxCDD in female rats. *Toxicologist* 60 (1-S): 445, 2001.
155. Lebofsky, M., Croutch, C.R., and Rozman, K.K.: Subchronic toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) obeys Haber's c x t rule after oral administration. *Toxicologist* 66 (1-S): 168, 2002.
156. Croutch, C.R., Lebofsky, M., DeZoysa, A., Son, D.S., Fried, K.W., and Rozman, K.K.: Time dependence of TCDD- and HxCDD-induced CYP 1A1 expression as measured by EROD activity, Western and Northern blots. *Toxicologist* 66 (1-S): 169, 2002.
157. Fried, K.W., Gao, X., Petroff, B.K., Schramm, K.W., Terranova, P.F., and Rozman, K.K.: Effect of chlorinated phenothiazines on ovulation in rats. *Toxicologist* 66 (1-S): 171, 2002.
158. Son, D.S., and Rozman, K.K.: 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) induces plasminogen activator inhibitor-1 through an aryl hydrocarbon receptor-mediated pathway in a mouse hepatoma cell line. *Toxicologist* 66 (1-S): 258, 2002.
159. Petroff, B.K., Gao, X., Ohshima, K., Shi, F., Son, D.S., Roby, K.F., Rozman, K.K., Watanabe, G., Taya, K., and Terranova, P.F.: Effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) on serum inhibin concentrations and inhibin immunostaining during follicular development in Sprague-Dawley rats. *Toxicologist* 66 (1-S): 376, 2002.
160. Gao, X., Petroff, B.K., Oluola, O., Rozman, K.K., and Terranova, P.F.: Effects of indole-3-carbinol and tamoxifen on ovulation and its hormonal regulation—comparison to 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). *Toxicologist* 66 (1-S): 376, 2002.
161. Croutch, C.R., Lebofsky, M., Cherrington, N.J., Klaassen, C.D., and Rozman, K.K.: Differential reversibility of CYP1A1 induction in TCDD versus HxCDD treated rats. *Toxicologist* 72 (1-S): 360, 2003.

Invited Lectures:

Sept. 5, 1978	University of Amsterdam	Amsterdam, Holland ✓
June 30, 1980	Michigan State University	East Lansing, MI ✓
July 2, 1980	University of Marburg	Marburg, F.R.G. ✓
July 4, 1980	University of Wageningen	Wageningen, Holland ✓
March 25, 1982	University of Kansas	Lawrence, KS ✓
May 24, 1982	American Chemical Society Toxicology-Short Course	Washington, DC ✓
Sept. 15, 1982	American Chemical Society National Meeting	Kansas City, MO
Nov. 4, 1982	Velsicol Chem. Corp.	Chicago, IL ✓
Dec. 3, 1982	University of Pecs	Pecs, Hungary
Dec. 19, 1982	University of Bern	Bern, Switzerland
June 15, 1983	American Chemical Society Toxicology-Short Course	New York City, NY
April 3, 1984	Banbury Conference	Cold Spring Harbor, NY
April 24, 1984	INTERx/Merck & Co.	Lawrence, KS
May 24, 1984	Merck, Sharp & Dohme Research Laboratories	Rahway, NJ ✓
June 13, 1984	25th Congress of the European Society of Toxicology	Budapest, Hungary
Oct. 30, 1984	National Research Center for Environment and Health	Neuherberg, F.R.G.
Feb. 25, 1985	American Cyanamid Co.	Pearl River, NY
March 4, 1985	University of Amsterdam	Amsterdam, Holland
April 18-19, 1985 (2)	New Mexico State University	Las Cruces, NM
June 19, 1985	University of Kuopio	Kuopio, Finland
June 20, 1985	National Public Health Institute	Kuopio, Finland
June 24, 1985	University of Lübeck	Lübeck, F.R.G.
June 27, 1985	University of Innsbruck	Innsbruck, Austria
July 30, 1985	Gordon Research Conferences	Meriden, NH
Aug. 9, 1985	American Academy of Clinical Toxicology	Kansas City, MO

March 14, 1986	Deutsche Gesellschaft für Pharmakologie und Toxikologie	Mainz, F.R.G.
April 3, 1986	New Mexico State University	Las Cruces, NM
Nov. 3, 1986	American Association of Pharmaceutical Scientists	Washington, DC
March 9, 1987	Monsanto Co.	St. Louis, MO
June 1, 1987	Society of Toxicologic Pathologists	Philadelphia, PA
Sept. 1, 1987	Environmental Protection Agency, Region VII	Kansas City, KS
Oct. 25, 1988	University of Würzburg	Würzburg, F.R.G.
Nov. 14-16, 1988 (3)	ETH and University of Zürich	Schwerzenbach, Switzerland
Apr. 6, 1989	University of Tübingen	Tübingen, F.R.G.
May 12, 1989	University of München	München, F.R.G.
Jan. 16, 1990	The Toxicology Forum	Karlsruhe, F.R.G.
June 19, 1990	University of Zürich	Zürich, Switzerland
Nov. 5-9, 1990 (6)	New Mexico State University	Las Cruces, NM
March 1, 1991	American Health Foundation	Valhalla, NY
April 12, 1991	SOT/Central States	St. Louis, MO
April 24, 1991	American Association of Pharmaceutical Scientists	Arlington, VA
April 25, 1991	EPA	Washington, DC
May 27-28, 1991 (2)	GSF-Forschungszentrum	Neuherberg, F.R.G.
Sept. 24, 1991	Dioxin '91	Research Triangle Park, NC
Nov. 12, 1991	Dioxin-Information	Augsburg, F.R.G.
Nov. 13, 1991	GSF-Institut für Ökologische Chemie	Neuherberg, F.R.G.
Jan. 16, 1992	Comett III Module	Kuopio, Finland

Feb. 4, 1992	EPA	Research Triangle Park, NC
April 23, 1992	First Conference of of Toxicologic Pathologists	Nagoya, Japan
July 17, 1992	Tulane University	New Orleans, LA
Jan. 28, 1993	University of Würzburg	Würzburg, F.R.G.
Feb. 24, 1994	University of Louisville	Louisville, KY
Feb. 28, 1994	IEHR	Chicago, IL
Apr. 20, 1994	Analytica 94	München, F.R.G.
May 17, 1994	SECOTOX	Balatonaliga, Hungary
Oct. 11, 1994	Da Vinci Society	Kansas City, KS
Nov. 10, 1994	Third Annual Arkansas Toxicology Symposium	Little Rock, AR
Feb. 12, 1996	University of Oklahoma	Oklahoma City, OK
Sept. 4, 1996	Environmental Medicine Conference	Aspen, CO
Nov. 16, 1998	National Research Council (Deployed Forces)	Washington, DC
Jan. 29, 1999	National Research Council (Deployed Forces)	Washington, DC
Apr. 18, 1999	National Research Council (AEGLE)	Washington, DC
March 21, 2000	S.O.T.	Philadelphia, PA
Dec. 14, 2000	Ethics and Sustainability Dialogue Group	Washington, DC
Jan. 24, 2001	University of Missouri	Kansas City, MO
Dec. 3, 2001	University of Kansas	Kansas City, KS
Dec. 19, 2001	NIEHS	Research Triangle Park, NC
June 11, 2002	Int. Conference on Non-Linear Dose- Response Relationships in Biology, Toxicology and Medicine	Amherst, MA

Principal Investigator:

GSF (F.R.G.), 1981-1983, Enhanced removal of halogenated hydrocarbons from tissue stores, \$172,000.

Penreco, a division of Pennzoil, Inc., 1982, Enhanced fecal excretion of DDE in dairy cattle, \$5,000

Velsicol Chem. Corp., 1983, Decontamination of humans and livestock exposed to chlordane and heptachlor, \$33,000

BRSB, 1983, Is induction of porphyria cutanea tarda by hexachlorobenzene Ca^{2+} mediated?, \$3,000

GSF (F.R.G.), 1984-1986, Mechanism of halogenated hydrocarbon toxicity I, \$212,000

Dow Chem. Co., 1984, Mechanisms of toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin, \$15,000

The Standard Oil Co., 1985, Training in Toxicology, \$10,000.

BSLU (F.R.G.), 1985-1987, Role of brown adipose tissue in the toxicity of 2,3,7,8-tetrachlorodibenzo-p-dioxin, \$189,000

The Standard Oil Co., 1986, Training in Toxicology, \$15,000

GSF (F.R.G.), 1987-1989, Mechanisms of halogenated hydrocarbon toxicity II, \$292,000

Basotherm GmbH (F.R.G.), 1987, Dermal penetration of Tamol-DN, \$16,000

The Hartz Mountain Corp., 1988, Pesticide research and development, \$15,000

Basotherm GmbH (F.R.G.), 1988, Dermal penetration of Pandel7 with or without pretreatment with Tannolact, \$43,000

GSF (F.R.G.), 1990-1991, Toxicity of mixtures of chlorinated dibenzo-p-dioxins, \$86,000

Basotherm, GmbH (F.R.G.), 1990-1991, Dermal penetration of benzoylperoxide with or without urea, \$33,800

GSF (F.R.G.), 1990-1992, Mechanisms of halogenated hydrocarbon toxicity III, \$242,600

EPA (C R820241-01-0), 1992-1995, Subchronic toxicity of chlorinated dibenzo-p-dioxins (CDDs) and their mixture, \$372,500

Basotherm, GmbH (F.R.G.), 1994, Dermal and ocular toxicity of drugs, \$28,860.

GSF (F.R.G.), 1993-1994 Mechanism of toxicity of chlorinated dibenzo-p-dioxins, \$105,250.

GSF (F.R.G.), 1993-1995, Research in toxicology, \$300,000

GSF (F.R.G.), 1981-present, Equipment and service contracts, 410,170

Basotherm, GmbH (F.R.G.), 1995, Dermal and ocular toxicity of drugs, \$36,500

Research Institute, 1995-1996, Pesticide research, \$25,800

GSF (F.R.G.), 1996-1998, Research in toxicology, \$360,000

GSF (F.R.G.) 1997-1999, Mechanisms of toxicity, \$60,000

Research Institute, 1997-1998, Time as a variable in toxicology, \$56,504

Research Institute, 1999-2001, Chlorinated phenothiazines as endocrine disruptors, \$117,000

GSF (F.R.G.), 1999-2001, Research in toxicology, \$384,000

GSF (F.R.G.), 2001-2003, Research in toxicology, \$372,000

Co-principal investigator:

EPA 1997-2000, Models assessing direct effects of dioxins and related compounds on the ovary,
\$398,569

July 14, 2003