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Issue: Various issues
Witness: Harold Stanley
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Sponsoring Party: StopAquila.org
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Missouri Public Service Commission

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Exhibit No. 26
Date ______ Case No. EA-2006-0309
Reporter ______

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the matter of the Application of Aquila, Inc. for Permission and Approval and a Certificate of Public Convenience and Necessity Authorizing it to Acquire, Construct, Install, Own, Operate, Maintain, and otherwise Control and Manage Electrical Production and Related Facilities in Unincorporated Areas of Cass County, Missouri Near the Town of Peculiar.	)	Case No. EA-2006-0309

WRITTEN TESTIMONY OF HAROLD R. STANLEY, P.E.

I appreciate this opportunity to present written testimony to the Missouri Public Service Commission in the instant case. First, allow me to explain my absence from the public meetings. In the summer of 2004, I agreed to engineer electrical upgrades for Spring 2006 at a 26-year client's 262-MW coal-fired steam-electric generating unit. Detailed design began in early 2005, and as the April 15, 2006 outage start date approached, I specifically agreed March 7 to be on site March 20 in Western New Mexico to technically direct work crews in pre-outage work. With outage delay costs approaching $250,000 per day, I could not delay my arrival, and therefore could not attend the March 20 or March 30 public meetings in Harrisonville. I therefore appreciate the Commission considering this written testimony. I stand ready to participate real-time in the Commission's proceedings by teleconference or video conference, but will not be able to leave New Mexico until after the outage concludes in late May.

To present my personal interest in testifying in the instant case, I have lived on a 6-acre property at 10707 E. 240th Street in unincorporated Cass County since June 1999. That property is located roughly one-half mile from the South Harper Peaking Facility (SHPF) property. At the time my wife and I decided to move there, our neighbors for several blocks South, East, and North, and for 2 blocks to the West, also lived on acreage lots, 3 acres or more in size. At the time of our purchase, we assessed ourselves to be "safe" from undesirable intrusions that would degrade our property's value or quality of life. My wife and I shared many neighbors' plans to live at our present location until we die. At least that was our plan until Aquila invaded our quiet neighborhood in 2004.

To present my qualifications to testify in the instant case, my professional resume' is attached for the Commission's review, as Exhibit HRS-10. To condense into a brief statement, I have designed numerous power generation installations and upgrades over the past 33 years, as a consulting engineer in companies as large as the General Electric Company, and as small as my present self-employment. My responsibilities in engineering projects have included Project Manager, Construction Manager, and Start-up Coordinator. My responsibilities in engineering companies have included Vice President and Branch Office Manager.

My 30-plus years in the power industry initially biased me toward supporting the SHPF. However, as I investigated Aquila's plans for the SHPF, reviewed the emissions of the plant, and reviewed the details of the installation, I quickly became enamored against the facility in this location one-half mile from where I live and work. I have read numerous assertions by Aquila and its supporters living some distance from the SHPF, that the SHPF is consistent with the character and use of the surrounding area.

I **vehemently** disagree with Aquila and its supporters' assertions of consistency. I believe that, as the Commission and Commission technical staff consider the complete facts, the Commission will agree with my position that **the SHPF is inconsistent with the character and use of the surrounding area**, and should not be granted the requested certificate(s).

This written testimony contains three major parts. First, I discuss four planks of Aquila's consistency arguments to the Commission. Second, I present some intensity-of-use comparisons between the SHPF and surrounding areas. Third, I offer comments on the import of the instant case to the future of the electric utility industry.

AQUILA'S CONSISTENCY ARGUMENTS

Aquila asserts, throughout their application to the Commission, that the SHPF is consistent with surrounding facilities and land use. Their assertion relies on four major arguments: the pre-existing gas compressor station, motor vehicles common to the area, unpaved road pollution, and noise level. Aquila's widely-publicized arguments do not withstand the scrutiny of the more complete explanations I offer in this testimony.

Gas Compressor Station

The gas compressor station dates back to the 1950's. To my knowledge, it was last upgraded in 2000 to support gas supply to the Aries Station being constructed by Aquila's unregulated subsidiary. As a side note, that gas compressor upgrade was preceded by several month's written notice to the neighbors, including my wife and I, with opportunity for comments, and a complete environmental impact study with opportunity for comments, sent to us several months prior to the start of construction. By way of comparison, Aquila's construction of the SHPF began roughly 1 week after the first public meeting, with no written notification to neighbors, no opportunity for comments other than at the public meeting, and without an environmental impact study performed to the level of detail performed for the relatively minor gas compressor upgrade.

Aquila Generation Services Manager Terry Hedrick, in his written testimony to the Commission, Page 8, Lines 1-3, asserts that "The [South Harper] location was adjacent (contiguous) to the existing Southern Star gas compressor station, …supporting the concept that the plant would be compatible with land use for existing, adjacent facilities." In my opinion, this compatibility assertion does not survive the scrutiny of a full comparison of the

Southern Star and Aquila facilities, summarized below:

Equipment	Gas Compressor Station	Aquila SHPF
Southern Star E01, Aquila Unit 1	2,000 bhp	>140,750 bhp (105 MW @ 100% efficiency)
Southern Star E02, Aquila Unit 2	2,000 bhp	>140,750 bhp (105 MW @ 100% efficiency)
Southern Star E03, Aquila Unit 3	112 bhp	>140,750 bhp (105 MW @ 100% efficiency)
Southern Star E04	1,535 bhp	
Total Horsepower for the facility	5,647 bhp	>422,250 bhp
Maximum permitted emissions	22.4 lb/hr	558.08 lb/hr

Gas compressor station data taken from Missouri Department of Natural Resources Intermediate Operating Permit Application for the Peculiar Compressor Station, dated January 4, 2005, downloaded from the MoDNR website, pertinent excerpts attached as Exhibit HRS-1. Aquila bhp ratings calculated by the conversion factor of 746W/hp, Aquila emissions from Missouri Department of Natural Resources New Source Review Permit, dated December 29, 2004, pertinent excerpts attached as Exhibit HRS-2.

The compatibility argument by Aquila is seriously flawed. The gas compressor station is miniscule compared to the SHPF: in physical space (5 acres versus 74 acres), in individual horsepower ratings, in total horsepower of the facility, and in total permitted emissions rate. The SHPF **overwhelms** the gas compressor station as a **heavy industrial facility** in this residential neighborhood.

Motor Vehicle Emissions

Aquila, in Exhibit 1 submitted for the March 2005 hearings at the PSC, Page 2, asserted "Similar facilities emit no more pollution than a diesel-powered pickup truck traveling 35 to 50 miles per hour." Aquila's comparison insinuates that the SHPF emissions are no greater than motor vehicles common to the neighborhood. In cross-examination at the March hearings, Aquila Director of Environmental Services Block Andrews asserted that this statement referred to the emissions rate in grams per brake-horsepower-hour. Mr. Andrews was, however, unable to testify as to the horsepower ratings of either the cited diesel-powered pickup truck or Aquila's SHPF turbines.

The March 2005 hearing was terminated before I had opportunity to testify, but I later published my comparison on the StopAquila.org web site. Mr. Andrews asserts in his written testimony for the instant case, on Page 6, lines 11-19, that he has refuted this comparison posted on the StopAquila website. His refute re-emphasizes the emissions rate **per horsepower**, but does **not** refute the comparison of total facility emissions in pounds per hour. For Commission staff review of the comparison, I'd like to present my website statement, sentence by sentence, with background material supporting each statement:

StopAquila.org Website (SAO): "The turbines, operating at full load, can emit up to 558 pounds per hour of pollutants, as permitted by the Missouri DNR."

Background: The construction permit issued by the Missouri Department of Natural Resources on December 29, 2004, lists on Page 13, the "Conditioned Potential Based on Hours Limitation" in tons per year. (pertinent excerpts attached as Exhibit HRS-2) The figures in this table total 558.08 tons per year (Staff note that the Arolein, Formaldehyde, and PAH amounts are included in the "Total HAPs" amount and should not be included when totaling this column). The hours limitation, on Page 12, is "based on an annual limit of 2,000 hours per year for each [of] the three turbines and 6,000 hours for the gas heater." Using the worst case permitted operation of all three turbines at full load for 2,000 hours per year, and the conversion of 2,000 pounds per ton, the allowable emissions rate for the plant is 558.08 pounds per hour.

SAO Website, in a parenthetical note: "(Emissions testing last summer confirmed that the plant actually emits slightly less than the permit, but not significantly less)."

Background: Aquila, in one of the neighborhood meetings last summer, offered an "Analysis of Permitted and Actual Emissions" based on their emissions testing in August 2005. The results were:

Pollutant	**Permitted**	**Actual**
Nitrogen Oxides	15 ppm	12 ppm

Carbon Monoxide	25 ppm	22 ppm
Particulate Matter	10 lb/hr	6.1 lb/hr
Formaldehyde	1.03 lb/hr	Non-detectable

It should be noted that the most significant pollutants, totaling nearly 500 lb/hr when converted from parts per million (ppm) to pounds per hour (lb/hr), tested 20 percent and 12 percent lower than permitted. However, it should also be noted that the tested (actual) rate is not a guarantee under all operating conditions. In fact, SHPF Unit 3 ran above the permitted maximum of 15 ppm on December 6, 2005 for 2 hours, as reported to the DNR on January 27, 2006.

SAO Website: "A modern diesel pickup truck, cruising at a load of 50 hp, will emit slightly over 1/2-pound per hour of pollutants."

Background: I own a modern diesel pickup truck, specifically a 2005 Chevrolet Silverado, with a 6.6-liter Duramax diesel engine. According to the EPA website listing certified emissions for the engine model code, this engine emits 4.702 grams of pollutants per brake horsepower-hour of operation. That engine is rated 300 hp maximum, to tow trailers nearly twice the truck's own weight. Cruising without a trailer, the demand on the engine is significantly less than 300 hp. Fuel consumption under cruising conditions suggests that the load is less than 50 horsepower. Using 50 horsepower, and 4.7 grams of pollution per horsepower, total truck emissions are 235 grams per hour. Converting grams to pounds at 453.59 grams per pound, the truck emissions are just over one-half pound per hour.

SAO Website: "When operating, South Harper's emissions in pounds per hour are therefore equivalent to that of over 1,000 cruising diesel pickup trucks."

Background: The ratio of the permitted plant emissions rate of 558 pounds per hour, divided by the truck emissions rate of 0.518 pound per hour, yields a ratio of 1,077. The plant emissions rate in pounds per hour is therefore greater than the emissions rate of 1,000 diesel pickup trucks.

The emissions of the SHPF exceed the emissions of 1,000 diesel pickup trucks. This is far more trucks than would be operated on this 78-acre site under any conceivable residential or agricultural use. Aquila's attempted refute re-emphasizes the emissions per horsepower, but does not refute the total emissions comparison: 558 pounds per hour of emissions from SHPF is equivalent to the total emissions of **over 1,000 diesel pickup trucks**, not "a" pickup truck as asserted in their widely publicized comparison. Aquila's comparison insinuates that the SHPF emissions are no greater than motor vehicles common to the neighborhood. The SHPF emits an **industrial quantity of emissions** totally out of character for this residential area.

"Unpaved" Roads

Aquila stated, in their attempted refute of my SAO website article, that their pavement of some road sections has reduced road particulate emissions by more than the plant's particulate emissions: see Block Andrews' written testimony, Page 7, Lines 5-11. First, the particulate emissions from the plant are only a small percentage of the total emissions from the plant. The 18 pounds per hour of particulate emissions cited by Aquila are less than 4 percent of the total permitted emissions for the plant of over 500 pounds per hour.

I believe the EPA document cited by Aquila is actually titled "c13s0202.pdf", which I found on the EPA website under AP-42 and Chapter 13 on miscellaneous sources. I presume the asserted 2.6 pounds of particulate matter per mile was calculated from Equation 1b on Page 4 of the document. On Page 1 of the document (Pages 1-4 included as Exhibit HRS-3), the last paragraph reads: "Since the silt content of a rural dirt road will vary with geographic location, it should be measured for use in projecting emissions." With this reference to dirt roads, I reviewed the background document of the cited article, titled "Emission Factor Documentation for AP-42, Section 13.2.2, Unpaved Roads, Final Report" at www.epa.gov/ttn/chief/ap42/ch13/bgdocs/b13s02-2.pdf. Page 2-3 of that document, Section 2.4 discusses "Emission Control Technology" (Pages 2-1 through 2-4 included as Exhibit HRS-4). In the fourth paragraph, after a discussion of paving, it reads: "Other surface improvements include covering the road surface with a new material of lower silt content. For example a dirt road could be covered with gravel or slag." Since the roads paved by Aquila were graveled roads, not dirt roads, I am unclear as to these documents' accuracy for the roads paved around the SHPF.

Even if the cited document can be accurately applied, the fact remains that the particulate matter is less than 4 percent of the total emissions of the plant. This attempted refute by Aquila pales as an **insignificant reduction** in the **industrial quantity of emissions** in this residential area.

Noise

The Commission may recall my plans to play a turbine sound clip at the March 2005 hearings: my Harmon-Kardon speakers and subwoofer (popular among Apple computer users) were initially thought to be "recording equipment" by Aquila counsel. I had planned to play a jet turbine sound clip at sound levels approximating those predicted in Aquila's October 2004 sound study, to give the Commissioners a general idea of the sound level that would be experienced by the neighbors. The noise problem actually experienced by the neighbors in the summer of 2005 far exceeded my planned simulation, especially in "quality" of the noise generated.

Aquila has asserted that the plant's noise levels, predicted and actual, met Cass County noise ordinance levels. That assertion is made in detail in Block Andrews' testimony, Page 3, lines 15-17 – "The noise studies previously mentioned [prior to and after construction in lines 8-13] indicate that the plant's noise levels were typically several decibels lower than the Cass County residential noise ordinance levels of 60 dBA during the daytime and 55 dBA during the nighttime." To the best of my knowledge, the pre-construction noise study referenced was prepared by Burns & McDonnell, dated October 2004. Excerpts are included as Exhibit HRS-5 for convenient reference.

On Page 4 of the referenced pre-construction study, Aquila, through its engineer B&McD, asserts "there is no noise ordinance for the City of Peculiar." At the time, the facility site was not part of the City, but the County noise ordinance should have applied within the City unless a more stringent standard were applied by the City. On Page 5 of the pre-construction study, Table 4-1, the monitoring points used in the study are listed as residences, and the last page of the study shows the modeled points on a map of the area. The monitoring points are within the neighbors' property; the noise level at the residences will be lower than at the property lines, where noise ordinances customarily apply.

Page 9 of the pre-construction study, Table 6-2, displays the results of the modeling study. The "Predicted New Equipment Noise Levels" for the 4 monitored points are 62, 59, 58, and 62 dBA, **all** of which are **greater than** the nighttime noise ordinance for Cass County. The two higher numbers are **greater than** the daytime noise ordinance for Cass County. Further, the noise ordinance specifies that levels are taken at the property line, where the sound levels will be larger than the modeled numbers. **The pre-construction noise study therefore predicted NON-compliance with the Cass County noise ordinance**, contrary to Aquila's assertions.

I am aware of two operating noise studies in the public domain, performed by

Burns&McDonnell, dated August 2005 and submitted as Appendix I with Aquila's application to Cass County for a special use permit. That study also did **not** conclusively demonstrate compliance with the Cass County noise ordinance. From the Noise Compliance Test study's executive summary (pertinent excerpts included as Exhibit HRS-6), "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." [emphasis added] The Commissioners that also live in rural Missouri areas are familiar with the insect noise that occurs for a few weeks in late summer, from winged insects commonly called "tree locusts" or "cicadas". For reliable conclusions as to the impact of the plant, the study needs to be repeated when such insect sources are not present. To my knowledge, Aquila did not repeat the study during the succeeding 4 months with lower insect noise and prior to the court's prohibition against operation.

Aquila did not seriously consider nor fully document the low-frequency noise, sometimes characterized as a "rumble", that is extremely offensive to humans' senses. Most of us that travel in urban areas have encountered vehicles, commonly owned by young adults, with high-watt amplifiers and large speakers, that "boom" out low-frequency "bass" sounds that permeate other vehicles in the area. Such low-frequency noises are the reason for turbine stack guarantees of specific low frequencies, or guarantees of the "C"-weighted sound pressure level. The pre-construction (October 2004) noise study, Page 2, comments on the undesirable effects of low frequencies, but does not predict the "C"-weighted level around the site. The operational noise study (Exhibit HRS-6), Appendix D, Table D-4, shows the dramatic increase in one specific low frequency, 31.5-Hz, from background to operating conditions. I personally measured, with an inexpensive sound pressure meter, "C"-weighted levels in excess of 70 dB, on both Harper and 241st Street with the plant operating. The Vincents, who moved from property on 241st Street after the plant started up, reported an upstairs window vibrating from the turbines running, an indicator of low-frequency noise.

Figure B-1 is taken from the residential noise study also submitted with the later-withdrawn Cass County special use permit application (pertinent excerpts included as Exhibit HRS-7). Uncharacteristic insect noise at the tested time of year clearly affected the sound levels above 100 Hz, but the plant clearly dominated at 100 Hz and below. This frequency spectrum leads to my belief that, even if the SHPF eventually meets Cass County noise ordinance levels on the "A"-weighted scale in the absence of insect noise and after proposed improvements, the frequency spectrum of the emitted noise will continue unacceptable for the neighbors. In fact, early in my investigations, a business associate who manages a combustion turbine peaking plant warned me that the low-frequency noise, emanating from the stacks, was his biggest problem in noise control.

In summary, the SHPF creates **industrial noise**, in magnitude and especially in "quality" (the low frequencies not normally present in a residential neighborhood), and is therefore unacceptable as a residential neighbor.

INTENSITY-OF-USE

The three turbines' combined power output rating of over 300 MW, after allowing for transmission and distribution system losses, can drive over 70-thousand whole-house air conditioners, which are typically 4 hp (roughly 4 tons or 48,000 Btu of cooling) or less. The total population of Cass County is in the vicinity of 100,000 people, with far fewer than 70,000 households. Clearly, the SHPF output provides peaking power to many areas other than Cass County. StopAquila counsel has requested detailed power demand information for Cass County from the Southwest Power Pool; I will be interested in reviewing this more precise information.

The turbines, operating at full load, consume approximately 4-1/2-billion British Thermal Units (Btu's) of natural gas per hour. In my experience, a typical suburban house, on a cold winter day (circa 20F), averages 50 thousand Btu's of natural gas per hour. The gas burned by South Harper is therefore equivalent to the gas burned – and pollution emitted – by some 90,000 suburban houses on a cold winter day. Considering that the neighborhood is presently composed of acreage lots averaging about 3 acres each, the SHPF site would accommodate less than 25 houses. The gas burned – and pollution emitted – by SHPF is therefore 3600 times as intense as the neighboring area. Again, the SHPF is a **heavy industrial facility** using the area **many times more intensely** than the surrounding area.

THE FUTURE

Over my 33-year career, I have usually been proud to claim association with the electric utility industry. My own electric utility clients have voluntarily followed state laws, local ordinances, and best industry practice, upholding a high standard of business and engineering ethics. Many of my clients have voluntarily exceeded the mandates, in the interest of being good corporate citizens.

Such has not been the case with Aquila and the SHPF. To this point in my testimony, I have focused on power technology and the engineering sciences in Aquila's application. I would now like to focus the Commission's attention on two "business decision" segments of Aquila's application.

First, consider Schedule CR-2 from Aquila's application in the instant case, included for convenient reference as Exhibit HRS-8. This discussion focuses attention on the last column, listing "Fatal Flaw" and "Σ Δ Cost" [differential cost compared to the base]. On <u>all but one</u> of the lower-ranked alternates, the identified fatal flaw was "<u>Schedule Impact</u>". Each of the lower-ranked alternates was judged infeasible because it was clear the project would be delayed by the process of getting lawful approval for the site or for the interconnecting transmission lines. Bottom line, Aquila had waited too long to follow normal processes of approval. The only feasible alternate was one where the complicity of the City of Peculiar, offered by its officials acting *ultra vires*, was expected to circumvent normal approval processes.

Also on Schedule CR-2, and of particular import to the ratepayers of Missouri, the projected cost of three of the lower-ranked alternates was lower than at South Harper, specifically those ranked 3, 4, and 7. Along this line, refer also to the testimony of Jerry G. Boehm, Page 12, Lines 12-13, where Aquila asserts: "Aquila addressed the cost of other options in its evaluation shown in Schedule JGB-2. Those options were significantly more costly than building South Harper." For convenient reference, I have attached Schedule JGB-2 as Exhibit HRS-9. Note the acronym used for the preferred option, "CBEC". South Harper was not added as a site for evaluation until July of 2004, see Chris Rogers' testimony, Page 3, Lines 3 and 4. "CBEC" clearly stands for "Camp Branch Energy Center", the option Chris Rogers identifies as being the site of choice prior to Cass County Planning and Zoning Commission's recommendation of denial of a special use permit for Camp Branch (see Chris Rogers testimony, Page 3, Lines 2 and 3). Aquila's assertion of South Harper as the preferred site was based on the costs associated with Camp Branch. Schedule CR-2 projected the cost of South Harper to be $6.9M higher than Camp Branch. **Schedule JGB-2 is therefore inaccurate at best in justifying South Harper**.

The instant case is crucial to the future of the electric power industry in Missouri, and will send an important message to electric utilities across the country. If the Commission grants Aquila the requested certificate(s), the Commission will appear to condone lack of planning, disregard for local ordinances, and other undesirable behaviors by Aquila during this schedule "emergency". This will effectively reward Aquila's management for their undesirable conduct, providing an unequal financial advantage compared to many other utilities that follow higher standards of conduct. If the Commission denies Aquila the requested certificate(s), the Commission will send a clarion call to utilities serving the public trust, that all will be held to the high standards of conduct that have historically characterized this industry.

Thank you for your time and your consideration of this written testimony. I stand ready to serve the Commission in its deliberations on this important matter, consistent with my prior obligations to the present key client.

County of McKinley)
) ss.
State of New Mexico)

AFFIDAVIT OF HAROLD STANLEY

Harold Stanley, being first duly sworn, deposes and says that he is the witness who sponsors the accompanying testimony entitled "Direct Testimony of Harold Stanley" that said testimony was prepared by him and under his direction and supervision; that if inquiries were made as to the facts in said testimony and schedules, he would respond as therein set forth; and that the aforesaid testimony and schedules are true and correct to the best of his knowledge, information, and belief.

Harold R. Stanley

Harold R. Stanley

Subscribed and sworn to before me this 3rd day of April, 2006.

Sherry J. Darcin

Notary Public

My Commission expires: 7/19/07

STATE OF MISSOURI   Bob Holden, Governor • Stephen M. Mahfood, Director

DEPARTMENT OF NATURAL RESOURCES

www.dnr.mo.gov

JAN - 4 2005

CERTIFIED MAIL: 7001 2510 0005 7346 8553
RETURN RECEIPT REQUESTED

Bruce Lurtz
District Manager
Peculiar Compressor Station
24304 S. Harper St.
Peculiar, MO 64078

RE: Intermediate Air Operating Permit Application - Project Number: 2001-06-036

Dear Mr. Lurtz:

The Air Pollution Control Program has completed the preliminary review of your Intermediate Operating Permit application. A public notice will be placed in the Cass County Democrat-Missourian, Harrsionville, MO on January 7, 2005.

The draft permit is open for comment by the public and yourself until February 9, 2005. The APCP will accept comments regarding this operating permit that are postmarked on or before the closing date. Please address comments or recommendations for changes to my attention at:

Operating Permits Unit
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65101

After the end of the comment period, you will be asked to work with us to address any comments. A notification of application acceptance will be issued after all comments have been appropriately addressed. A copy of this application/notification has also been forwarded to EPA Region VII and the Kansas Bureau of Air & Radiation in Topeka, KS, for their review during the public comment period as required by 10 CSR 10-6.065(7)(A).

Should you have any questions, or wish clarification on any items in the draft permit, please feel free to contact me at (573) 751-4817, or you may write to the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, Missouri 65102. Thank you for your time and attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM

Slawomir Szydlo
Environmental Engineer

Exhibit HRS-1
Pg 1 of 7

SS/lb

c: Kansas City Regional Office
PAMS File: 2001-06-036

Integrity and excellence in all we do

Missouri Department of Natural Resources 30

FORM OP - D01 EXISTING PLANT-WIDE PERMIT CONDITIONS Section D

Facility Name	County No.	Plant No.	Year Submitted
Peculiar Compressor Station	0840	0048	2001

Please list in the space provided below any permit conditions which are currently applicable on a plant-wide basis:
(i.e. Production is limited to 10,000 units per 12 month rolling average, or a limit on the facility's hours of operation)

Permit No.	Applicable Permit Condition
072000-009	NOx emissions from the 2 compressor engines (E1-E2) and the turbine (E4) are limited to 98 tpy and 22.4 lb/hr (total).
037-0048-001	There are no applicable specific conditions in this permit. There are applicable regulatory requirements that are summarized on Forms OP-A03 and OP-D04.

Permit No.	Compliance Demonstration Method	Describe Method and Give Reference
072000-009	Initial Testing	The construction permit requires initial testing (NOx, CO, VOC) of the 2 compressor engines and the turbine using EPA reference methods.
072000-009	Recordkeeping	The 2 compressor engines have operating limitations under certain conditions. Records of engine/turbine operating performance will be used to determine compliance with the operating limitations.
072000-009	Routine Engine Monitoring	Semi-annual NOx monitoring must be conducted for any unit operating more than 240 hours during the previous six month period.

Exhibit HRS-1

FORM OP - D02 PROPOSED PLANT-WIDE PERMIT CONDITIONS Section D

Facility Name	County No.	Plant No.	Year Submitted
Peculiar Compressor Station	0840	0048	2001

Please list in the space provided below any proposed permit conditions which you wish to establish in this operating permit: (i.e. Production is limited to 10,000 units per 12 month rolling average, or a limit on the facility's hours of operation)

Proposed Condition	
	WGPC proposes that all of the limits and compliance determination methods from the most recent construction permit (Permit No. 072000-009) be included in the operating permit. These existing conditions are summarized on Form OP-D01. No new conditions are proposed with this application.

Please describe what methodologies you intend to use to demonstrate compliance with each of the proposed plant-wide condition(s) that are being established above: (i.e. testing, monitoring, recordkeeping, etc.)

Proposed Condition Number	Compliance Demonstration Method	Describe Method and Give Reference

Exhibit HRS-1

Facility Name	County No.	Plant No.	Year Submitted
Peculiar Compressor Station	0840	0048	2001

Emission Point No.	Emission Unit No.	Source Classification Code (SCC)
E01	E01	20200252

1. Emission Unit(s) Information

Description of Unit(s)	Manufacturer, Model No., Date of Manufacture	Stack IDs	Maximum Design Rate/Capacity
Natural Gas-Fired Reciprocating Engine	Cooper-Bessemer GMVH-10C2	S01	2,000 bhp (Rated)
	(Modified 5/01)		

Will this unit be operated under an alternate operating sceanrio?
Yes: X No: ______ If yes, you must complete a separate Section D.2 on FORM OP-D03 for each scenario

Total Maximum Design Rate/Capacity

2. Alternate Operating Scenario (Flexibility)

Alternate Sceanrio ID:	SIC Code Associated with Scenario:
Mode 1	4922

Description: Only one reciprocating enigne operating with or without the turbine. There are no operating limitations when operating in this mode.

Alternate Sceanrio ID:	SIC Code Associated with Scenario:
Mode 2	4922

Description: Both reciprocating enignes are operating together without the turbine. In this mode, there are no operating limitations as long as the engine is operating above 285 revolutions per minute (rpm). If the engine operates below 285 rpm, then its engine loading is limited to 98% torque. This limitation is included in the construction permit for this station.

Alternate Sceanrio ID:	SIC Code Associated with Scenario:
Mode 3	4922

Description: Both reciprocating enignes and the turbine are all operating together. This reciprocating engine is required to operate within a specific operating envelope that is defined in the construction permit. The operating envelope is defined by the engine speed (in rpm) and load (in % torque).

Use FORM OP-F01 or the back of this page if additional space is needed for multiple Alternative Operating Scenarios.

3. Voluntary Permit Conditions *(for reducing potential emissions; conditions will become federally enforceable)*

Condition(s) Requested	Description	Limitation	Pollutant Controlled
WGPC is requesting that all of the operating limitations contained in the most recent construction permit (Permit No. 072000-009) be included in this operating permit. There are no new permit conditions being proposed in this application.			

Exhibit HRS-1

Facility Name	County No.	Plant No.	Year Submitted
Peculiar Compressor Station	0840	0048	2001

Emission Point No.	Emission Unit No.	Source Classification Code (SCC)
E02	E02	20200252

1. Emission Unit(s) Information

Description of Unit(s)	Manufacturer, Model No., Date of Manufacture	Stack IDs	Maximum Design Rate/Capacity
Natural Gas-Fired Reciprocating Engine	Cooper-Bessemer GMVH-10C2	S02	2,000 bhp (Rated)
	(Modified 5/01)		

Will this unit be operated under an alternate operating sceanrio?
Yes: X No: ______ If yes, you must complete a separate Section D.2 on FORM OP-D03 for each scenario

Total Maximum Design Rate/Capacity

2. Alternate Operating Scenario (Flexibility)

Alternate Sceanrio ID:	SIC Code Associated with Scenario:
Mode 1	4922

Description: Only one reciprocating enigne operating with or without the turbine. There are no operating limitations when operating in this mode.

Alternate Sceanrio ID:	SIC Code Associated with Scenario:
Mode 2	4922

Description: Both reciprocating enignes are operating together without the turbine. In this mode, there are no operating limitations as long as the engine is operating above 285 revolutions per minute (rpm). If the engine operates below 285 rpm then its engine loading is limited to 98% torque. This limitation is included in the construction permit for this station.

Alternate Sceanrio ID:	SIC Code Associated with Scenario:
Mode 3	4922

Description: Both reciprocating enignes and the turbine are all operating together. This reciprocating engine is required to operate within a specific operating envelope that is defined in the construction permit. The operating envelope is defined by the engine speed (in rpm) and load (in % torque).

Use FORM OP-F01 or the back of this page if additional space is needed for multiple Alternative Operating Scenarios.

3. Voluntary Permit Conditions (for reducing potential emissions, conditions will become federally enforceable)

Condition(s) Requested	Description	Limitation	Pollutant Controlled
WGPC is requesting that all of the operating limitations contained in the most recent construction permit (Permit No. 072000-009) be included in this operating permit. There are no new permit conditions being proposed in this application.			

Exhibit HRS-1

Facility Name	County No.	Plant No.	Year Submitted
Peculiar Compressor Station	0840	0048	2001

Emission Point No.	Emission Unit No.	Source Classification Code (SCC)
E03	E03	20200201

1. Emission Unit(s) Information

Description of Unit(s)	Manufacturer, Model No., Date of Manufacture	Stack IDs	Maximum Design Rate/Capacity
Natural Gas-Fired Emergency Generator	Waukesha 195GKU	S03	112 bhp

Will this unit be operated under an alternate operating sceanrio?
Yes: _______ No: __X__ If yes, you must complete a separate Section D.2 on FORM OP-D03 for each scenario

Total Maximum Design Rate/Capacity

2. Alternate Operating Scenario (Flexibility)

Alternate Sceanrio ID:	SIC Code Associated with Scenario:

Description: None proposed for this unit.

Use FORM OP-F01 or the back of this page if additional space is needed for multiple Alternative Operating Scenarios.

3. Voluntary Permit Conditions *(for reducing potential emissions, conditions will become federally enforceable)*

Condition(s) Requested	Description	Limitation	Pollutant Controlled

Exhibit HRS-1

FORM OP - D03 **EMISSION UNIT INFORMATION** Section D

Facility Name	County No.	Plant No.	Year Submitted
Peculiar Compressor Station	0840	0048	2001

Emission Point No.	Emission Unit No.	Source Classification Code (SCC)
E04	E04	20200201

1. Emission Unit(s) Information

Description of Unit(s)	Manufacturer, Model No., Date of Manufacture	Stack IDs	Maximum Design Rate/Capacity
Natural Gas-Fired Turbine	Solar Saturn 20-T1600	S04	1,535 bhp
	(Installed 6/01)		(Rated at ISO Conditions)

Will this unit be operated under an alternate operating scenario?
Yes: ______ No: __X__ If yes, you must complete a separate Section D.2 on FORM OP-D03 for each scenario

Total Maximum Design Rate/Capacity

2. Alternate Operating Scenario (Flexibility)

Alternate Sceanrio ID:

SIC Code Associated with Scenario:

Description: None proposed for this unit. It can operate without limitations under all of the scenarios for the reciprocating engines.

Use FORM OP-F01 or the back of this page if additional space is needed for multiple Alternative Operating Scenarios.

3. Voluntary Permit Conditions *(for reducing potential emissions; conditions will become federally enforceable)*

Condition(s) Requested	Description	Limitation	Pollutant Controlled
WGPC is requesting that all of the operating limitations contained in the most recent construction permit (Permit No. 072000-009) be included in this operating permit. There are no new permit conditions being proposed in this application.			

Exhibit HRS-1

STATE OF MISSOURI
Bob Holden, Governor • Stephen M. Mahfood, Director
DEPARTMENT OF NATURAL RESOURCES
www.dnr.mo.gov

DEC 29 2004

Mr. Block Andrews
Director of Environmental Services
Aquila, Incorporated
20 West 9th Street
Kansas City, MO 64105

RE: New Source Review Permit - Project Number: 2004-03-143

Dear Mr. Andrews:

Enclosed with this letter is your permit to construct. Please study it carefully. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files.

Operation in accordance with these conditions, your new source review permit application and with your Part 70 Operating Permit Application is necessary for continued compliance.

The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

If you have any questions regarding this permit, please do not hesitate to contact me at (573) 751-4817, or you may write to the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102.

Thank you,

AIR POLLUTION CONTROL PROGRAM

Kendall B. Hale

Kendall B. Hale
New Source Review Unit Chief

KLM:lkb

Enclosures

c: Kansas City Regional Office
PAMS File: 2004-03-143

Permit Number: 122004-017

Exhibit HRS-2
Page 1 of 3

Recent permits issued by the Air Pollution Control Program have limited each turbine to 2,000 hours per year with a limitation of 5,000 hours per year for all the turbines combined. The same limitations apply to the Aquila installation. For record keeping purposes, operational time is considered to be the total number of hours that Aquila has any of the three or combination of the three turbines connected to the utility grid by closure of the generator breaker.

EMISSIONS/CONTROLS EVALUATION

All of the criteria pollutants will be emitted from the operation of these units, with PM_{10}, NO_X, and CO being emitted in amounts greater than significance levels (i.e. greater than de minimis levels). HAP emissions are also expected due to the operation of the turbines, with the main HAP of concern being formaldehyde. Potential emissions of both formaldehyde and VOCs are indirectly limited to their respective de minimis levels by the hours of operation conditions in this permit. The emission factor used to determine formaldehyde emissions will be verified through stack testing. Dry low-NO_X burners will be used to control NO_X emissions from the turbines. The Special Conditions of this permit limits the NO_X emissions to 15 ppmvd on a three-hour rolling average. Good combustion practices will be used to control CO emissions from the turbines. The CO emissions of the turbines are limited to 25 ppmvd on a one-hour rolling average by the Special Conditions of this permit.

The emission factors used to estimate emissions from the Siemens-Westinghouse Model 501D5A turbines for the criteria pollutants were provided by the equipment manufacturer.

Potential emissions of the application represent the potential of the proposed equipment, assuming continuous operation (8760 hours per year). Conditioned potential emissions are based on an annual limit of 2,000 hours for each the three turbines and 6,000 hours for the gas heater. The potential emissions in Table 1 represent the emission rate at 100% loading and ambient conditions of 0.0°F. Emissions from start-up and shutdown are not included in the emission estimates in the table.

Exhibit HRS-2

Table 1: Emissions Summary (tons per year)

Air Pollutant	Regulatory *De Minimis* Levels	Existing Potential Emissions	Existing Actual Emissions	Potential Emissions of the Application	Conditioned Potential Based on Hours Limitation	New Installation Conditioned Potential
PM_{10}	15.0	N/A	N/A	154.72	35.47	N/A
SO_x	40.0	N/A	N/A	12.00	2.86	N/A
NO_x	40.0	N/A	N/A	1,075.16	247.42	N/A
VOC	40.0	N/A	N/A	75.13	17.26	N/A
CO	100.0	N/A	N/A	1,090.22	250.53	N/A
Acrolein	0.04*/10.0	N/A	N/A	0.12	0.03	N/A
Formaldehyde	2.0*/10.0	N/A	N/A	13.58	3.10	N/A
PAH	0.01*/10.0	N/A	N/A	0.04	0.01	N/A
Total HAPs	10.0/25.0	N/A	N/A	19.72	4.54	N/A

N/A = Not Applicable

* Threshold level for the HAP of concern.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of NO_X and CO are above major thresholds. Potential emissions of PM_{10} are above significant levels (i.e. de minimis levels). Potential emissions of all other pollutants are at de minimis levels.

APPLICABLE REQUIREMENTS

South Harper Peaking Facility shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit application.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110

  The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required April 1 for the previous year's emissions.

Exhibit HRS-2

13.2.2 Unpaved Roads

13.2.2.1 General

When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

The particulate emission factors presented in the previous draft version of this section of AP-42, dated October 2001, implicitly included the emissions from vehicles in the form of exhaust, brake wear, and tire wear as well as resuspended road surface material[25]. EPA included these sources in the emission factor equation for unpaved public roads (equation 1b in this section) since the field testing data used to develop the equation included both the direct emissions from vehicles and emissions from resuspension of road dust.

This version of the unpaved public road emission factor equation only estimates particulate emissions from resuspended road surface material [23,26]. The particulate emissions from vehicle exhaust, brake wear, and tire wear are now estimated separately using EPA's MOBILE6.2 [24]. This approach eliminates the possibility of double counting emissions. Double counting results when employing the previous version of the emission factor equation in this section and MOBILE6.2 to estimate particulate emissions from vehicle traffic on unpaved public roads. It also incorporates the decrease in exhaust emissions that has occurred since the unpaved public road emission factor equation was developed. The previous version of the unpaved public road emission factor equation includes estimates of emissions from exhaust, brake wear, and tire wear based on emission rates for vehicles in the 1980 calendar year fleet. The amount of PM released from vehicle exhaust has decreased since 1980 due to lower new vehicle emission standards and changes in fuel characteristics.

13.2.2.2 Emissions Calculation And Correction Parameters[1-6]

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic. Characterization of these source parameters allow for "correction" of emission estimates to specific road and traffic conditions present on public and industrial roadways.

Dust emissions from unpaved roads have been found to vary directly with the fraction of silt (particles smaller than 75 micrometers [µm] in diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen, using the ASTM-C-136 method. A summary of this method is contained in Appendix C of AP-42. Table 13.2.2-1 summarizes measured silt values for industrial unpaved roads. Table 13.2.2-2 summarizes measured silt values for public unpaved roads. It should be noted that the ranges of silt content vary over two orders of magnitude. Therefore, the use of data from this table can potentially introduce considerable error. Use of this data is strongly discouraged when it is feasible to obtain locally gathered data.

Since the silt content of a rural dirt road will vary with geographic location, it should be measured for use in projecting emissions. As a conservative approximation, the silt content of the parent soil in the area can be used. Tests, however, show that road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher

Exhibit HRS-3
Page 1 of 4

percentage of coarse particles.

Other variables are important in addition to the silt content of the road surface material. For example, at industrial sites, where haul trucks and other heavy equipment are common, emissions are highly correlated with vehicle weight. On the other hand, there is far less variability in the weights of cars and pickup trucks that commonly travel publicly accessible unpaved roads throughout the United States. For those roads, the moisture content of the road surface material may be more dominant in determining differences in emission levels between, for example a hot, desert environment and a cool, moist location.

The PM-10 and TSP emission factors presented below are the outcomes from stepwise linear regressions of field emission test results of vehicles traveling over unpaved surfaces. Due to a limited amount of information available for PM-2.5, the expression for that particle size range has been scaled against the result for PM-10. Consequently, the quality rating for the PM-2.5 factor is lower than that for the PM-10 expression.

Exhibit HRS-3

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL UNPAVED ROADS[a]

Industry	Road Use Or Surface Material	Plant Sites	No. Of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16 - 19	17
Iron and steel production	Plant road	19	135	0.2 - 19	6.0
Sand and gravel processing	Plant road	1	3	4.1 - 6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4 - 16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4 - 7.1	4.3
	Haul road to/from pit	1	12	3.9 - 9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8 - 18	8.4
	Plant road	2	2	4.9 - 5.3	5.1
	Scraper route	3	10	7.2 - 25	17
	Haul road (freshly graded)	2	5	18 - 29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2 - 21	6.4

[a]References 1,5-15.

Exhibit HRS-3

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\,(s/12)^a (W/3)^b \tag{1a}$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k\,(s/12)^a (S/30)^d}{(M/0.5)^c} - C \tag{1b}$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions. The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows:

1 lb/VMT = 281.9 g/VKT

The constants for Equations 1a and 1b based on the stated aerodynamic particle sizes are shown in Tables 13.2.2-2 and 13.2.2-4.

Exhibit HRS-3

2. SOURCE DESCRIPTION

2.1 SOURCE CHARACTERIZATION[1]

Particulate emissions occur whenever vehicles travel on unpaved roads. Dust plumes trailing behind vehicles on unpaved roads are a familiar sight in rural areas of the United States. Many industrial areas also have active unpaved roads. When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

2.2 EMISSIONS[1,3]

The emission of concern from unpaved roads is particulate matter (PM) including PM less than 10 microns in aerodynamic diameter (PM-10) and PM less than 2.5 microns in aerodynamic diameter (PM-2.5). The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on correction parameters that characterize (a) the condition of a particular road and (b) the associated vehicle traffic. Parameters of interest in addition to the source activity (number of vehicle passes) include the vehicle characteristics (e.g., vehicle weight), the properties of the road surface material being disturbed (e.g. silt content, moisture content), and the climatic conditions (e.g., frequency and amounts of precipitation).

Dust emissions from unpaved roads have been found to vary directly with the fraction of silt in the road surface material. Silt consists of particles less than 75 µm in diameter, and silt content can be determined by measuring the proportion of loose dry surface dust that passes through a 200-mesh screen, using the ASTM-C-136 method.

2.3 HISTORY OF THE UNPAVED ROAD EMISSION FACTOR EQUATION IN AP-42

The current version of the AP-42 unpaved road emission factor equation for dry conditions has the following form:[1]

$$E = k\, 5.9 \left(\frac{s}{12}\right)\left(\frac{S}{30}\right)\left(\frac{W}{3}\right)^{0.7}\left(\frac{w}{4}\right)^{0.5} \qquad (2\text{-}1)$$

where:

E = Emission factor, pounds per vehicle-mile-traveled, (lb/VMT)
k = Particle size multiplier (dimensionless)
s = Silt content of road surface material (%)
S = mean vehicle speed, miles per hour (mph)
W = mean vehicle weight, ton
w = mean number of wheels (dimensionless)

The AP-42 discusses how Equation 2-1 can be extrapolated to annual conditions through the simplifying assumption that emissions are present at the "dry" level on days without measurable

Exhibit HRS-4
Page 1 of 4

precipitation and conversely, are absent on days with more than 0.01 in. (0.254 mm) of precipitation. Thus, the emission factor for annual conditions is:

$$E = k\,5.9\left(\frac{s}{12}\right)\left(\frac{S}{30}\right)\left(\frac{W}{3}\right)^{0.7}\left(\frac{w}{4}\right)^{0.5}\left(\frac{365-p}{365}\right) \qquad (2\text{-}1a)$$

where all quantities are as before and:

p = number of days with at least 0.254 mm (0.01 in.) of precipitation per year

The particle size multiplier "k" for different particulate size ranges is shown below.

Aerodynamic Particle Size Multiplier (k) for Equation 2-1					
30μm[a]	30μm	15μm	10μm	5μm	2.5μm
1.0	0.80	0.50	0.36	0.20	0.095

[a]Stoke's diameter

The earliest emission factor equation for unpaved roads first appeared in AP-42 in 1975. The current version of the emission factor equation appeared in 1983 as part of Supplement 14 to the third edition of AP-42.

The earliest version of the unpaved road emission factor equation included the first two correction terms shown in Equation 2-1 (i.e., silt content and mean vehicle speed). However, the data base for that version was limited to tests of publicly accessible unpaved roads travelled by light-duty vehicles and had a small range of average travel speeds (30 to 40 mph).[3] Subsequent emission testing (especially roads at iron and steel plants) expanded the ranges for both vehicle weight and vehicle speed. In 1978, a modified equation that included silt, speed, and weight was published in an EPA report.[4] In 1979, the current version (Equation 2-1) was first published;[5] it incorporated a slight reduction in the exponent for vehicle weight and added the wheel correction term.

Although the emission factor equation for unpaved roads has been modified over the past 20 years, all versions have important common features. All were developed using multiple linear regression of the suspended particulate emission factor against correction parameters that describe source conditions. The silt content has consistently been found to be of critical importance in the predictive equation. The first version of the predictive equation (and each subsequent refinement) included a roughly linear (power of 1) relationship between the emission factor and the road surface silt content.[a]

In addition to the unpaved road emission factor equation discussed above, other studies have been undertaken to model emissions from unpaved road vehicular traffic. For example, the 1983 background

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[a] Note that during the 1970's, the exponent for the silt content was rounded to unity because of the greater computational ease. Recall that this equation predated inexpensive calculators with "x to the y" capability.

Exhibit HRS-4

document for this section of AP-42 has three other candidate emission factor equations.[5] Equation 2-1 was recommended over the other candidates on the basis of its wider applicability.

Additional studies addressed emissions from restricted classes of unpaved roads. In particular, a 1981 report included separate emission factors for (a) light-to medium-duty traffic, and (b) haul trucks on unpaved roads for use at western surface coal mines.[7] Neither equation bore resemblance to the generic unpaved road emission factor (Equation 2-1). A 1991 study (described in Section 4 of this report) addressed emissions due to relatively high-speed traffic on publicly accessible roads in Arizona.[2] Furthermore, in response to Section 234 of the Clean Air Act Amendments, the western surface coal mining emission factors were reexamined.[8,9] Results from that study are also described in Section 4.

2.4 EMISSION CONTROL TECHNOLOGY[1,8-11]

Controls to reduce particulate emissions from unpaved roads fall into three general categories as follows: source extent reductions, surface improvements, and surface treatment. Each of the categories is discussed below.

Source extent reductions limit the amount of traffic to reduce particulate emissions. The emissions directly correlate to the vehicle miles traveled on the road. An example of limiting traffic is restricting road use to certain vehicle types. The iron and steel industry, for example, has instituted some employee busing programs to eliminate a large number of vehicle passes during shift changes.

Surface improvements offer a long term control technique. Paving is a surface improvement that is a highly effective control, but can be cost prohibitive especially on low volume roads. From past experience, paving has an estimated 99 percent control efficiency for PM-10. Control efficiencies achievable by paving can be estimated by comparing emission factors for unpaved and paved road conditions. The predictive emission factor equation for paved roads, given in AP-42 Section 13.2.1, requires estimation of the silt loading on the traveled portion of the paved surface, which in turn depends on (a) the intensities of deposition processes that add silt to the surface, and (b) whether the pavement is periodically cleaned.

Other surface improvements include covering the road surface with a new material of lower silt content. For example a dirt road could be covered with gravel or slag. Also, regular maintenance practices, such as grading of gravel roads, help to retain larger aggregate sizes on the traveled portion of the road and thus help reduce emissions. The amount of emissions reduction is tied directly to the reduction in surface silt content.

Surface treatments include control techniques that require reapplication such as watering and chemical stabilization. Watering increases the road surface moisture content, which conglomerates the silt particles and reduces their likelihood to become suspended when a vehicle passes over the road surface. The control efficiency of watering depends upon (a) the application rate of the water, (b) the time between applications, (c) traffic volume during the period, and (d) the meteorological conditions during the period.

Chemical stabilization suppresses emissions by changing the physical characteristics of the road surface. Many chemical unpaved road dust suppressants form a hardened surface that binds particles together. As a result of grinding against the improved surface, the silt content of loose material on a highly

Exhibit HRS-4

controlled surface may be substantially higher than when the surface was uncontrolled. Thus, the predictive emission factor equation for unpaved roads usually cannot be used to estimate emissions from chemically stabilized roads.

Although early studies of unpaved road dust control showed a strong correlation between efficiency and the silt content of the surface material, this correlation was based on the very high (e.g., >90 percent) control efficiencies and very low silt values typically found over the first few days after application. Because these conditions represent only a small, restricted portion of the range of possible conditions encountered during a control application cycle, the high degree of correlation was misleading.

Later study of long-term control indicated no significant correlation between silt content and control efficiency. In addition, fairly high (~50 percent) control efficiencies were found to occur with silt contents at or above the uncontrolled level. Because of these findings, attention turned to the use of the amount of silt per unit area (i.e., "silt loading") as a performance indicator.

A long-term study of the performance of 4 chemical dust suppressants of interest to the iron and steel industry was conducted through EPA in 1985. This study found that although emission factors varied over an order of magnitude, the silt loading values varied over two orders of magnitude, and did not appear to follow a specific trend with time. Furthermore, the results for the different suppressants tended to be clustered together; this indicated that the various suppressant types did not affect silt loading in the same way.

The control effectiveness of chemical dust suppressants depends on the dilution rate, application rate, time between applications, and traffic volume between applications. Other factors that affect the performance of dust suppressants include the vehicle characteristics (e.g., average vehicle weight) and road characteristics (e.g., bearing strength). The variabilities in the above factors and in individual dust control products make the control efficiencies of chemical dust suppressants difficult to calculate. Past field testing of emissions from controlled unpaved roads has shown that chemical dust suppressants provide a PM-10 control efficiency of about 80 percent when applied at regular intervals.

Because no simple relationship of control efficiency with silt or silt loading could be found to successfully model chemical dust suppressant performance, other types of performance models were developed based on the amount of chemical applied to the road surface. Figure 2-1 presents control efficiency relationships for petroleum resins averaged over two common application intervals, 2 weeks and 1 month.[10]

Exhibit HRS-4

Noise Assessment Study

Aquila, Inc.
South Harper Peaking Facility
Peculiar, Missouri

October 2004

Aquila

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Exhibit HRS-5

1. Introduction

Burns & McDonnell has been contracted by Aquila, Inc. (Aquila) to conduct an environmental sound level assessment study for the South Harper Peaking Facility (Project). This proposed project will be a simple-cycle facility consisting of three Siemens-Westinghouse 501D5A combustion turbines. The existing land use in the vicinity of the project site can be characterized as a mixture of agricultural 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 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 new combustion turbines will be housed in an enclosure designed with sound abatement features. The inlet air and exhaust sections of the combustion turbines will also have silencing equipment to minimize sound levels. The assumed stack attenuation package used in this evaluation is the Econopac for the 501D5A turbines

The objectives of this study are to conduct an ambient noise monitoring effort to measure the ambient sound levels in the vicinity of the proposed project site, quantify the sound emissions from the project, perform noise modeling to predict the project's projected sound levels at property boundary and on the closest sound receptors in the surrounding community, and compare those predicted sound levels to the identified applicable local noise ordinances.

2. 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 noise and the noise source, the listener's interpretation of the necessity of the noise, and the predictability of the noise. As such, response to noise 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 microPa). The reference sound pressure corresponds to the typical threshold of human hearing. A 3 dB change in a continuous broadband noise is generally considered "just barely perceptible"

Exhibit HRS-5

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 noise sources are listed in Table 2-1.

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.

Exhibit HRS-5

Table 2-1:
Typical Sound Pressure Levels Associated with Common Noise 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 noise 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 Architectural Acoustics, M. David Egan, 1988 and Architectural Graphic Standards, Ramsey and Sleeper, 1994.

There are also objective factors to consider when determining the noise and how people may be affected by the noise. A noise spectrum that contains audible pure tones is typically more annoying than a spectrum with the same overall level but without the tones. It has been shown that when noise complaints were received from a power plant when registering noise levels

Exhibit HRS-5

under 45 dBA, the noise had some tonal components. Low frequency sound may also affect people subjected to the noise. Pulsation may occur when the sound level is 75 to 80 dBC in the 31.5 Hz octave band at residential locations.

Noise in the environment is constantly fluctuating, such as when a car drives by, a dog barks, or a plane passes overhead. Therefore, noise metrics have been developed to quantify fluctuating environmental noise 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 noise 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 noises and is often referred to as the intrusive sound level. The variation between the L_{90}, L_{50}, and L_{10} sound levels can provide an indication of the variability of the acoustical environment. If the acoustical environment is perfectly steady, all values are identical. A large variation between the values indicates the environment experiences highly fluctuating sound levels. For instance, measurements near a roadway with frequent passing vehicles may cause a large variation in the statistical sound levels. This report examines L_{eq} values at nearby residences from the proposed project.

3. Applicable Regulations

Burns & McDonnell reviewed applicable noise regulations for the South Harper Peaking facility located within the city limits of Peculiar, Missouri. There is no noise ordinance for the City of Peculiar. The Federal Highway Administration (FHWA) has established noise impact criteria for different land uses close to highways. Some of the exterior criteria are illustrated below.

Table 3-1

Land Use	Leq (dBA)
Residential	67
Commercial	72

According to the FHWA policy, a noise receiver is considered impacted if the noise level approaches, equals, or exceeds the FHWA's limits listed in Table 3-1.

Exhibit HRS-5

Aquila is proposing a self-imposed facility design limit of no more than 65 dBA Leq at the closest residence. According to the noise projections, and based on design criteria projections, equipment specifications, and measurements of existing sound levels, this limit will be met with all generation units and ancillary equipment running at full capacity.

4. Noise Measurement Methodology

On September 7 and 8, 2004, Burns & McDonnell personnel conducted ambient sound surveys to quantify existing background sound level measurements for three different time periods at various measurement locations around the proposed facility location. Weather conditions which can adversely impact this process were favorable for conducting ambient noise measurements during all measurement periods. 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 morning readings (7 AM to 8 AM) skies were clear to partly cloudy, wind was, on the average, calm to three miles per hour (mph). Temperatures were around 55 degrees Fahrenheit and relative humidity was 73 percent. Afternoon measurements (12 PM to 1 PM) were taken when skies were clear, wind was, on an average, six mph at a temperature of 70 degrees Fahrenheit and relative humidity of 40 percent. During the evening readings (4:30 PM to 5:30 PM) skies were clear, wind was calm to seven mph, the temperature was 76 degrees Fahrenheit and relative humidity was 36 percent.

At each of the three periods when ambient noise was being monitored, sound level measurements were made at four locations around the proposed project site (Figure 4-1). Table 4-1 lists each measurement point and describes each location. The ambient noise monitoring locations were selected because they were accessible, and near sensitive noise receptors.

The nearest residence to the proposed project site is located to the east of the site adjacent to (MP1), approximately 950 feet from the project proposed turbine locations.

Table 4-1:
Noise Monitoring Point Locations

Monitoring Point	Location Description
MP1	Near residence east of the site at the intersection of East 243rd Street and South Harper Road
MP2	North of site near residence at 9812 East 241st Street
MP3	Northwest of site near residence at 9601 East 241st Street
MP4	Southeast of site on South Harper Road near residence

Exhibit HRS-5

Figure 4-1

Exhibit HRS-5

5. Background Noise Levels

Background noise measurements were measured at each of the four locations identified in Table 4-1. Measurements were made in decibels (dB) at 31.5, 63, 125, 250, 500, 1,000, 2,000, 4,000, and 8,000 Hertz (Hz) using a Larson-Davis model 824 sound analyzer. At each monitoring location, sound levels within the referenced frequency bands were measured and logged by the analyzer. Measurements were taken and accumulated until a stable sound level was reached, which usually required about two minutes. The average sound level L_{eq} for each monitoring period is recorded and the contribution of the frequency bands to the total sound level is customarily weighted to approximate the frequency sensitivity of human hearing. Some audible noises were observed during the background noise readings, and these extraneous noises are displayed in Table 5-1, along with the measured noise levels at each point during each measurement period.

Table 5-1:
Existing Background Sound Pressure Levels, dBA

Measurement Points Locations	Time Period	L_{eq} (dBA)	Extraneous Noises
MP1	Morning	44	Highway 71 traffic noise. Some bird noise
MP2	Morning	44	Dogs barking (minor disturbance)
MP3	Morning	41	Highway 71 traffic noise
MP4	Morning	42	Some highway traffic noise
MP1	Afternoon	55	Insect noise
MP2	Afternoon	51	Insect and bird noise
MP3	Afternoon	49	Insect and bird noise, some traffic noise
MP4	Afternoon	50	Highway 71 traffic noise and some bird noise
MP1	Evening	54	Insect noise
MP2	Evening	54	Insect noise and rustling leaves
MP3	Evening	51	Insect noise, distant circular saw and backhoe sounds, distant people sounds and music
MP4	Evening	56	Insect and bird noise

The ambient A-weighted sound levels varied from a low of 41 dBA at MP3 to a high of 56 dBA at MP4. The variation in sound level appeared to be related to the amount of insect and bird noise. During the morning readings, insect noise was not present. Insects were very loud during the afternoon and evening readings. Overall, the measured ambient noise levels are not uncommon for a rural area.

Exhibit HRS-5

6. Operational Noise Levels

Siemens-Westinghouse provided noise data for individual components of a 501D5A combustion turbine (Table 6-1). Total sound power at a distance of 3 feet is estimated to be 122 dBA.

Table 6-1:
Siemens-Westinghouse Sound Power Levels
at Octave Band Frequencies for One 501D5A Combustion Turbine Components, dBA

SOUND POWER LEVEL SOURCE	Octave Band Frequency (Hz)										
	ft.	31.5	63	125	250	500	1000	2000	4000	8000	dBA
CT Exhaust Expansion Joint	3	122	125	122	117	107	104	109	109	101	116
CT Exhaust Stack Exit - Includes Directivity & Silencer	3	139	124	114	97	88	96	107	107	105	112
CT Exhaust Stack Walls	3	137	128	122	109	101	101	97	97	92	110
Turbine Enclosure Walls	3	113	109	100	85	74	75	76	76	63	88
Turbine Enclosure Vents	3	114	114	107	93	83	78	86	86	85	96
Open Air-cooled Generator	3	113	112	127	114	97	98	99	99	102	113
Inlet Duct Walls	3	118	115	112	97	100	110	103	103	101	112
Inlet Filter With Evaporative Cooler - Includes Silencer	3	135	131	115	95	84	99	100	109	107	111
Mechanical Package (Total wall & vents)	3	99	99	117	99	108	95	88	88	83	104
Rotor Air Cooler (1 x 100% fin fan)	3	113	123	117	108	101	93	87	87	83	105
Lube Oil Cooler (2 x 50% fin-fan)	3	125	113	120	113	106	99	91	91	86	109
Fuel Gas System	3	131	127	124	115	108	111	105	105	108	116
Total Unit		143	135	131	122	113	115	113	113	113	122

Using industry-accepted noise modeling software (CadNa program), the expected project noise levels at the sensitive receptors were calculated. The CadNa program takes into account each piece of noise-emitting equipment on the project site and predicts noise levels in circular contours of equal sound pressure. Attenuation was included for sound propagation over vegetation, barriers, and shielding.

Sound pressure levels were predicted at each of the nearest receptors to the proposed site. Each noise-emitting piece of equipment and each sensitive noise receptor were located in the CadNa program at appropriate distances as determined from United States Geological Survey maps and proposed site layout maps.

Predicted sound levels at each of the monitoring points were determined by logarithmically adding together the measured background noise levels and the noise levels predicted by the model for each sensitive noise receptor. Total noise levels predicted for each sensitive noise receptor (measuring point) range from 62 dBA at MP1 to 58 dBA at MP3 (Table 6-2). These sound levels are generally related to the proximity of the monitoring point to the project site. The largest increase in sound level would be at MP1, the closest residence to the site, which would increase from 51 dBA to 62 dBA.

Exhibit HRS-5

Figure 6-1

Exhibit HRS-5

7. Impacts to Sensitive Noise Receptors

The sensitive noise receptors closest to the proposed Aquila site are four residences. No schools, hospitals or other community facilities are located within one mile of the site.

8. Equipment and Procedures to Mitigate the Effects of Noise Emissions During Construction and Operation

The following procedures could be used to mitigate sound during construction and operation of the project.

Construction – The construction of the proposed project will be similar to that of any other medium-to large-scale construction project and will generally employ the same types of construction equipment engaged at other construction sites. Pile driving, typically one of the noisiest construction activities, may not be required. Overall site construction work is expected to take about 8 months, during which a number of different construction phases will be completed. Each phase will employ a different mix of equipment and will have different noise emissions.

Operation – Building materials can be selected for their sound attenuating properties. Standard silencing features of stacks and their sound attenuating properties could be considered when specific equipment is selected. The use of acoustic/weather enclosures around major outdoor equipment would help to mitigate the overall sound from the site.

Exhibit HRS-5

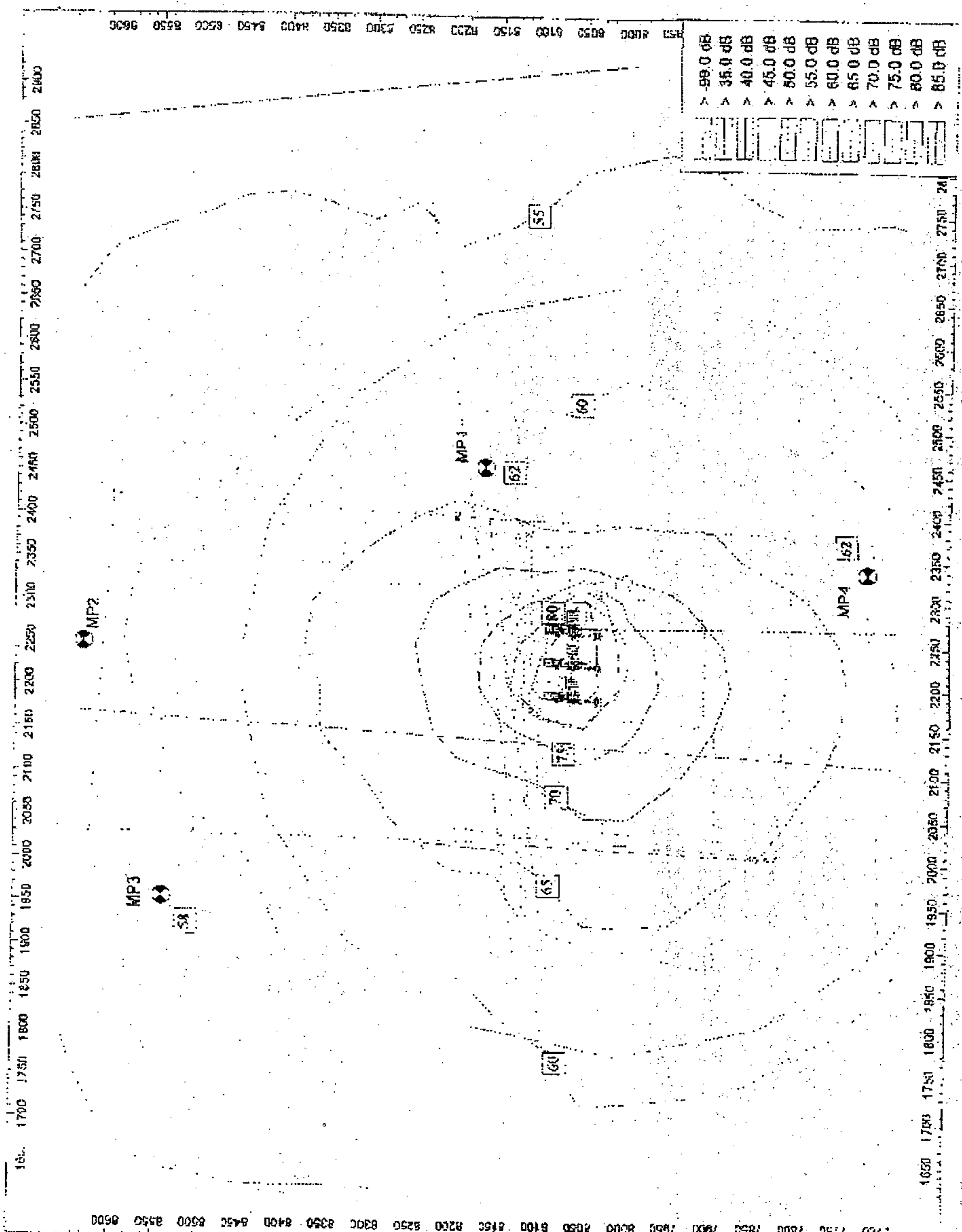

Exhibit HRS-5

Noise Compliance Test

Aquila
South Harper Peaking Facility
Cass County, Missouri

Aquila

August 2005

Exhibit HRS-6
Page 1 of 3

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.

Exhibit HRS-6

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	56.0	75.7	Insect noise
Receptor No.1	Unit 1, 2, and 3 operating	56.3	76.9	Insect noise, backup beeping

Exhibit HRS-6

Residential Noise Assessment Study

Aquila
South Harper Peaking Facility
Cass County, Missouri

Aquila

August 2005

Exhibit HRS-7
Pg. 1 of 2

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

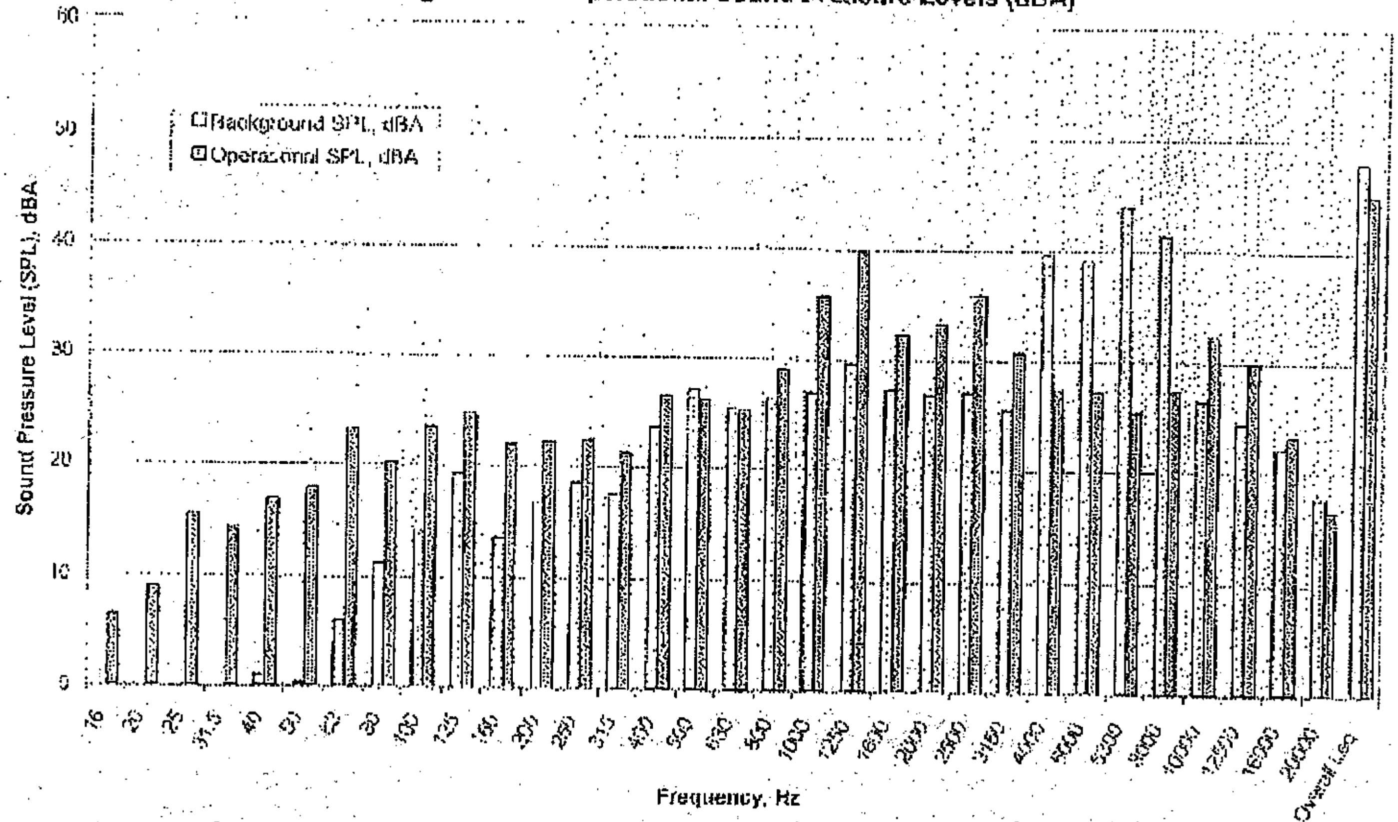

Exhibit HRS-7

Aquila Networks - Missouri
Peaking Facility Site Selection

COMPREHENSIVE SITE EVALUATION
SUMMARY TABLE

SCHEDULE CR-2

Rank	Site Name	Location in Missouri (City, Township, Range, Section, Elevation, Description)	Area for Development	Access to Electric Transmission	Access to Natural Gas Supply	Access to Potable Water	Access to Sanitary Sewer	Air Permit Comments	Fatal Flaw
			Δ Acquisition Cost [1]	Δ Improvement Cost [2]	Δ Improvement Cost [3]				Σ Δ Cost
1.	South Harper, Cass County	Southwest of Peculiar, T.45N-R.32W, Sec. 32, El. 981 Feet. Three miles south of Peculiar on the west of the intersection of 243rd St. and Harper Rd.	74 acres @ $13,000/acres = $1,000,000	1) MPS 69-kV line north-south along west of property. 2) Two miles north of KCPL dual 161-kV lines. 3) Five miles south of MPS 345 kV line. 4) New 345 kV transformer and substation addition for $2.5 million.	1) Adjacent to Southern Star CGP compressor station. 2) Two Southern Star gas transmission lines transect property east-west. 3) Panhandle Eastern gas transmission lines two miles south of property.	8-inch line along Harper Rd., PWSD No. 7	Sanitary Sewer located three miles north, inside Peculiar city limits	Significantly distant from future ozone non-attainment area. Air permit easily obtained.	No Fatal Flaw. County zoning issue negated by planned Peculiar annexation. Stated support of City of Peculiar, West Peculiar Fire District, Public Water Supply District No. 7, and Ray-Pec School District. Chapter 100 financing proposed.
			+ $400K	+ $5 Million for extension, + $2.5 Million for 345 kV sub.	$0 - gas supply on site.				+$7.5 Million with shortest schedule impact and Chapter 100 financing.
2.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]	[illegible]				[illegible]
3.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			$0	$0	[illegible]				[illegible]
4.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]	$0				[illegible]
5.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]	[illegible]				[illegible]
6.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			[illegible]	[illegible]	[illegible]				[illegible]
7.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
			$0	$0					[illegible]

Exhibit HRS-8

Aquila Networks - Missouri
Peaking Facility Site Selection

COMPREHENSIVE SITE EVALUATION
SUMMARY TABLE

SCHEDULE CR-2

Rank	Site Name	Location in Missouri (City, Township, Range, Section, Elevation, Description)	Area for Development $ Acquisition Cost (1)	Access to Electric Transmission $ Improvement Cost (2)	Access to Natural Gas Supply $ Improvement Cost (3)	Access to Potable Water	Access to Sanitary Sewer	Air Permit Comments	Fatal Flaw $ Cost
1.	[illegible]	[illegible]	[illegible]	[illegible] $0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4.	[illegible]	[illegible]	[illegible] $0	[illegible] ~$1 Million	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
11	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible] $0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

(1) Acquisition Costs uses an estimated value for land inside "City Limits" to be $120K/acre and land outside "City Limits" to be $15K/acre for discussion purpose only and are based on an approximate site value, approximate costs for Richards-Gebaur land are from the Economic Development Corporation of Kansas City, Missouri and do not reflect actual cost of land; actual costs for land will vary.

(2) Differential Improvement Costs for Access to Electric Column do not reflect total actual costs. Differential costs are meant to compare the items of a design that differ from the recommended site, e.g. distance to electrical interconnect. Number assumes site requires substation and that new or reconductored line costs $1.0 Million/mile.

(3) Differential Improvement Costs for Access to Natural Gas do not reflect total actual costs. Differential costs are meant to compare the items of a design that differ from the recommended site, e.g. distance to gas supply. Number assumes new gas line costs $1.0 Million/mile and for large pipe runs through town an arbitrary factor of 1.67 was used to account for added costs of extra wall thickness, road borings, creek crossings, and r.o.w. or easement acquisition.

Exhibit HRS-8

Summary of Model Results for MO PSC Staff and OPC Representatives

Copy of presentation Table Page 13

January 27, 2004 vs. July 9, 2004 Rankings*

January 27, 2004	Five-Year NPV Difference
A. Five 501D5A CT's + Market	($12 M)
B. Three 501D5A CT's ("CBEC") + Exelon 10 HR + Market	Preferred
C. CBEC + SPS/Xcel Sys Part + Market	~ $7 M
D. MEPPH Cycling PPA + Market	+ $12 M
E. Exelon 10 HR + SPS/Xcel + Market	+ $21 M

July 9, 2004	Ten-Year NPV Difference
A. Five 501D5A CT's + Market	($4 M)
B. CBEC + 150 MW SPS/Xcel + 78 MW Eight-Year & 100 MW Three-Year Extension NPPD ("NPPD") + Market	***Preferred***
C. CBEC + NPPD + 200 MW Three-Year MEPPH + Market	+ $14 M
D. CBEC + NPPD + 200 MW Five-Year MEPPH + Market	+ $18 M
E. CBEC + 250 MW Five-Year MEPPH + Market	+ $28 M

* All scenarios include 200 MW of baseload capacity additions in 2010 and 2021 and timely deployment of 501D5A CT's for future load growth

Schedule JGB-2

Exhibit HRS-9

HRS

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EDUCATIONAL EXPERIENCE:

University of Missouri - B.S. Electrical Engineering - 1976

PROFESSIONAL REGISTRATION

Professional Engineer – Missouri, and current NCEES Council Record

WORK EXPERIENCE:

12/04 to present – self-employed

03/03 to 11/04 – Project Manager, Mid America Consultants

05/00 to 02/03 - Project Manager, Sargent & Lundy, LLC

03/98 to 04/00 - Branch Manager, GE Automation Services

03/86 to 02/98 - Vice President, Sega Inc.

11/79 to 02/86 - Senior Electrical Engineer, Burns & McDonnell

06/73 to 10/79 - Electrical Engineer, Black & Veatch

Exhibit HRS-10

SPECIFIC INDUSTRY EXPERIENCE:

Electric Power Projects

Experience ranges from 120-volt commercial power systems to 750 MW electric utility power plants. Specialties include:

Electrical System Protection – Engineer protective relay systems for central station power plants, cogeneration power plants, heavy industrial plants, university distribution systems, and commercial buildings. In the last decade, replaced numerous legacy electromechanical and solid-state discrete relays with modern microprocessor based multifunction protective relays for generators, large transformers, motors, and distribution feeders. An ongoing multifunction relay upgrade project includes redundant 262-MW unit protection, 4 large oil-filled transformers, eighteen 4-kV motors, 4 transmission system breakers, and nineteen 4.16-kV distribution breakers.

Electrical System Planning – Perform load allocation, power flow, voltage regulation, installation feasibility, and short circuit studies. Complete planning and detailed design of facilities have ranged from less than 1 MW to over 150 MW load. Designed electrical interconnection of major co-generation facilities with supplying utilities, ranging from 6 MWe to 180 MWe in capacity, with interconnection voltages ranging from 4.16-kV to 230-kV.

Emergency Power Systems – Design emergency, standby, and uninterruptible power systems using reciprocating engines, turbines, and static electronics. Facilities have included up to five emergency generators, with open transitions for testing and restoration, closed transitions for testing and restoration, and parallel operation for testing.

Construction Observation and Testing – Resolve technical issues during construction and perform testing of completed electric power systems. Troubleshoot power system anomalies such as power quality problems, and errant equipment operation.

Control Projects

From 1987 through 2005, engineered a number of control upgrade projects and new plant control systems in both the electric utility and industrial process sectors. Those projects ranged from 100 hard-wired I/O to 5500 hard-wired I/O, including the following representative projects:

Exhibit HRS-10

Phased DCS Installation - Project manager, construction manager, and startup coordinator for a decade-long series of projects at a 262-MW pulverized-coal-fired unit converting late 70's control system technologies to modern microprocessor-based systems. Subsystems included turbine, electrical auxiliaries, scrubber, baghouse, coal handling and ash handling.

Complete DCS Installations - Project engineer, construction manager, and/or startup coordinator for two 650-MW coal-fired control system replacement projects, each with 5,500-plus hard-wired inputs and outputs. The subsystems included boiler control, boiler safeguard, burner management, flame scanning (one unit), turbine control (one unit), turbine water induction protection (one unit), motor control, electrical auxiliary power control (one unit), data acquisition, alarms, and sequence of event monitoring.

PLC Installations - Project manager for numerous conversions from obsolete hardware to programmable logic controllers. Processes controlled included coal handling (six power stations, 10 units), flue gas particulate removal (two baghouses), flue gas de-sulphurization (two scrubbers), fiberglass pipe insulation manufacturing (7 lines), demineralization, condensate polishing, and emergency power transfers.

PROFESSIONAL DEVELOPMENT:

In 2004, entered MBA degree program with technology management emphasis (MBA/TM) at University of Phoenix on-line. Eighteen credit hours earned through June 2005.

Since 1987, completed technical courses and taught technical courses to fulfill professional development requirements for self and teams. Courses included non-linear load evaluation, power system analysis, power plant design, project management, and computer networking.

From 1990 through 1997, completed various annual and semi-annual Design Professionals Insurance Corporation training courses. These courses covered risk and liability in services proposals, contract negotiation, project management, and construction management.

Exhibit HRS-10