PINAL POWER, LLC
30 MEGAWATT BIOMASS ENERGY PROJECT

38743 West Cowtown Road
Maricopa, Arizona 85238

Air Quality Impact Assessment for New Source Review for Operational Emissions

Prepared By:

Scientific Resources Associated
1328 Kaimalino Lane
San Diego, CA 92109

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APPENDICES

1.0 INTRODUCTION

This Air Quality Impact Analysis (AQIA) was prepared in support of Pinal Power, LLC's application for Authority to Construct and Title V Operating Permit to the Pinal County Air Quality Control District (PCAQCD). This AQIA is not required for permitting, but has been prepared as a voluntary evaluation to demonstrate that emissions of regulated criteria air pollutants from the proposed biomass power plant will not cause or contribute to a violation of an ambient air quality standard. This AQIA was performed following the regulatory requirements developed by the U.S. EPA.

Pinal Power, LLC, an Arizona limited liability corporation, is proposing to construct, own and operate a 30 MW (net) biomass power project in Pinal County, Arizona. The project has access to and is contracting for sufficient municipal green waste, agricultural wood waste, Guayule and other feedstock generated in the local area to fuel the project though its projected 30-year lifetime. The Project will be located in Pinal County, Arizona, inside the Mariposa City limits in an area zoned Industrial bounded by Cowtown Road as shown on Attachment A. The site consists of approximately 45.3 acres and the current address of the site is 38743 West Cowtown Road. The site is owned by the Project owners, Pinal Power LLC.

The Pinal Power Project will be a wood-waste biomass energy plant producing 30+ megawatts (MW) of electrical output. It will be fueled primarily by municipal green waste and agricultural wood waste derived from agricultural operations in the area within 30 miles of the plant. The project will consume approximately 260 thousand bone dry tons (BDT) of wood waste annually. The plant will include an automated fuel feed system, boiler feed water treatment, combustor and boiler, steam turbine, condenser, multicone dust collector, ESP, and evaporative cooling tower. It will be interconnected to the grid via a 69kV transmission line terminating at an APS transmission line approximately 13 miles from the project. The net electrical output will be sold under a long-term power purchase agreement.

Modeling was conducted in accordance with U.S. EPA modeling guidance, for the pollutants and averaging intervals shown in Table 1-1. The pollutants include carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM_{10}), and nitrogen dioxide (NO_2). In addition, As commissioning emissions represent the maximum emissions for these pollutants, and are the only emissions that exceed the Rule 20.3 AQIA trigger levels, modeling was conducted for commissioning emissions only.

Table 1-1
Air Dispersion Model Averaging Periods and Compliance Criteria

Pollutants	Period	Federal Ambient Air Quality Standard ($\mu g/m^3$)
Carbon Monoxide (CO)	8-Hr	40,000
	1-Hr	10,000
Nitrogen Dioxide (NO_2)	Annual	100
	1-Hr	188
Sulfur Dioxide (SO_2)	3-Hr	1300
	24-Hr	365
	Annual	80
Particulate Matter (PM_{10})	24-Hr	150

2.0 EMISSION SOURCE PARAMETERS

This section of the report describes the facility-specific data used in the air dispersion model. Facility-specific data includes emission rates, stack parameters, and source locations.

The only point source modeled for the AQIA is the McBurney Biomass Boiler. Emission rates in lb/day and g/sec are provided in Table 2-1. For conservative purposes, annual emissions were modeled as though the facility could operate for 8760 hours per year. This provides a worst-case analysis of potential annual impacts. Emissions were assumed to operate at their maximum hourly emission rates at all times.

Table 2-1
Boiler Emission Rates

Pollutant	McBurney Biomass Boiler	
	Lbs/day	g/sec
CO	1,350.72	7.09
NO_x	1,350.72	7.09
SO_2	561.10	2.95
PM_{10}	192.96	1.013

In addition to emission rates, emission source data required by the model includes stack location, stack height, stack diameter, exhaust velocity, exhaust temperature, and stack discharge angle. Emission source data are provided in Table 2-2. Downwash of the plume due to structures on the site was included.

Table 2-2
Modeled Release Parameters

Parameter	Boiler
UTM East, m (NAD 83, UTM Zone 12)	408172.91
UTM North, m (NAD 83, UTM Zone 12)	3653318
Source Base Elevation, m	370
Stack Height, m	36.576
Stack Diameter, m	2.44
Stack Exit Velocity, m/s	14.87
Stack Exit Temperature, K	436
Orientation	Vertical

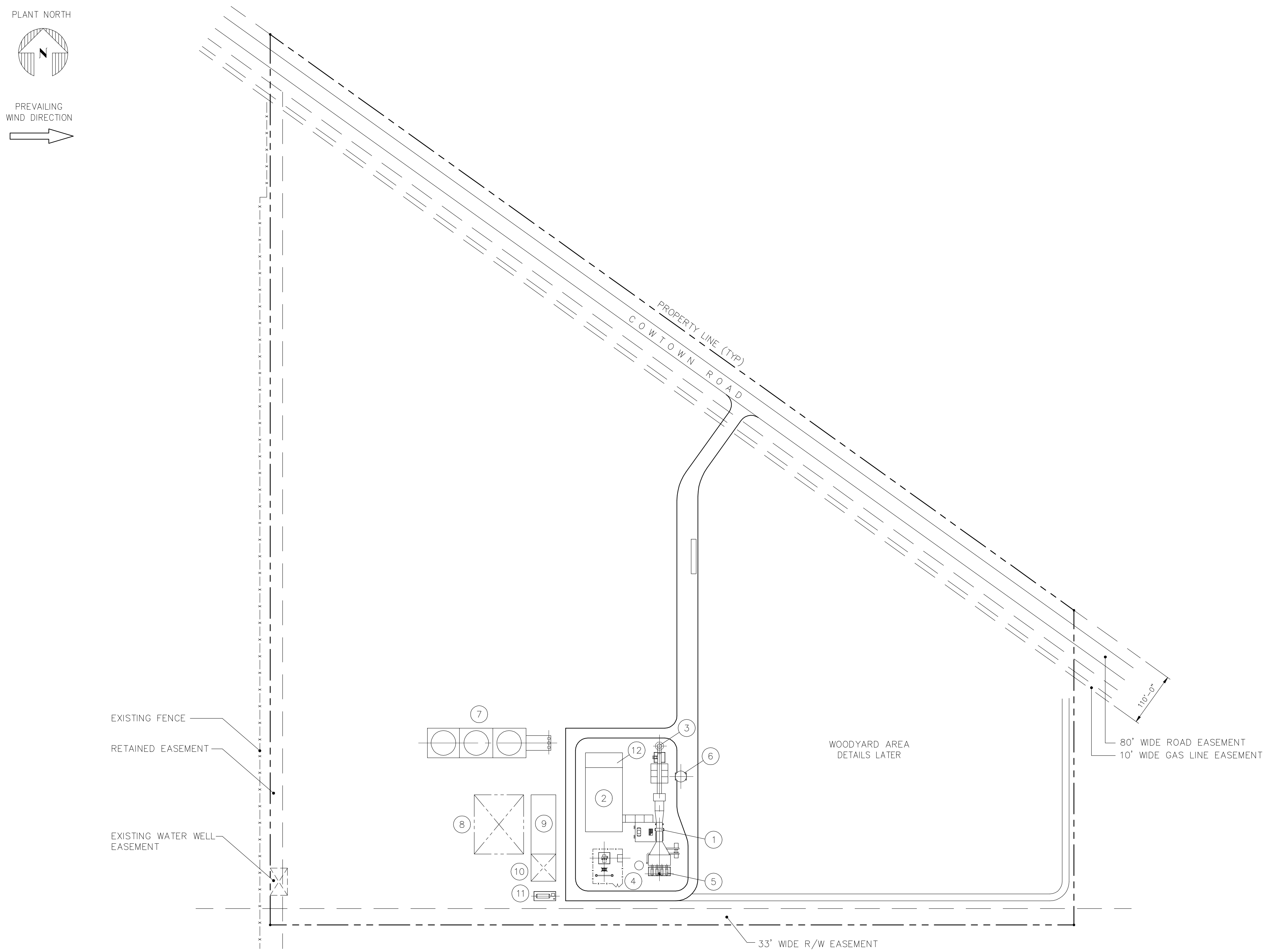
[1]UTM Coordinates in meters, NAD83

Downwash of the plume due to structures on the site was included. The main structures on the site include the steam turbine building, the flue gas control structures (SCR, ESP, and oxidation catalyst housing), the boiler housing, the tower building, the cooling tower, and the ash collection system. Downwash structures are shown in Table 2-3.

Table 2-3
Structures Included in Downwash Analysis

Structure	Length, m	Width, m	Height, m
Steam Turbine Building	39.36	23.04	10.67
Boiler Housing	21.12	21.12	34.63
Control System Housing	18.24	9.60	25.91
Tower Building	30.72	10.40	10.67
Cooling Tower	60.48	17.97	10.67
Ash Handling System	23.03	9.60	19.20

Figure 2-1 presents a plot plan of the facility showing the location of the stack and structures, as well as the facility boundary.



LIST OF MAJOR COMPONENTS

1. BOILER
2. TURBINE BUILDING
3. STACK
4. GSU & SWITCHYARD
5. FUEL METERING/FEEDER SYSTEM
6. ASH SILO
7. COOLING TOWER
8. AREA RESERVED FOR WATER TANKS
9. WATER TREATMENT / MAINTENANCE BUILDING
10. AREA RESERVED FOR CHEMICAL STORAGE
11. AMMONIA TANK
12. ADMINISTRATION & CONTROL ROOM AREA

NOTES:

1. EXISTING SITE ARRANGEMENT & PROPERTY LINES BASED ON PRELIMINARY DATA & SHALL BE VERIFIED WITH SURVEY.

GRAPHIC SCALE

NO.	DATE	BY	REVISIONS
A	–	KAB	PRELIMINARY

NO.	DATE	BY	REVISIONS

SCALE	AS NOTED	DATE	
DRWN	KAB		4/12/11
CHK'D	–		–
ENG'R	–		–
APP'D			

Spectrum Energy, Inc.

IRVINE, CALIFORNIA — CHARLOTTE, NORTH CAROLINA

PINAL BIOMASS POWER FACILITY
SITE PLAN

MARICOPA COUNTY — ARIZONA

CONTRACT NO. | FILE NAME PB1_M-SP-101-1 | DWG NO. PB1-SP-101-1 | SHT. 1 OF 1 | A

3.0 AIR DISPERSION MODEL PARAMETERS

This section of the report describes the air dispersion model that was used and key assumptions for developing the air dispersion model input files. Air dispersion model input and output files are attached in Appendix A.

3.1 Air Dispersion Model

Air dispersion modeling was completed using the AERMOD Version 09292. AERMOD is the U.S. EPA's approved regulatory air dispersion model. Inputs to AERMOD include emission source and receptor geographic locations, terrain heights, stack parameters, pollutant emission rates, and meteorological data.

3.2 Modeling Assumptions

AERMOD allows the user to select various model options to represent the site. Conservative assumptions were selected where appropriate to provide an evaluation of maximum potential impacts and demonstrate that the project would not result in an exceedance of an air quality standard. The model options used within AERMOD are summarized in Table 3-1.

Table 3-1
AERMOD Model Options

Parameter	Option
Urban Area	No Urban Area (rural area assumed)
Stack Tip Downwash	On
Elevated Terrain	Terrain and Hill Heights Considered
Plume Depletion	Off
Calms Processing	On
Missing Data Processing	On
Exponential Decay	Off

Selected options are shown on the input and output files in Appendix A.

3.3 Meteorological Data

Surface meteorological data were obtained from the National Weather Service for the Casa Grande Airport, at which data suitable for use in the AERMOD model were collected. The data were processed based on the most recent U.S. EPA guidance for processing of data using AERMET, accounting for the Bowen ratio and albedo for the area, and using surface roughness and elevation for the site based on recommendations from the Arizona Department of

Environmental Quality. Upper air data from the Tucson meteorological monitoring station were used to process the data. Meteorological data for the period from 2007 through 2009 were used in the modeling analysis.

3.4 Receptor Grid

A receptor grid using Cartesian coordinates based on Universal Transverse Mercator (UTM) coordinates was established using the following approach. The facility boundary was defined using 50-meter spacing along the property line. Grids were placed starting at the facility boundary, as follows: a 50-meter grid from the facility to a distance of 250 meters; a 100-meter grid from 250 meters out to 1000 meters from the facility boundary; and a 250-meter grid from 1000 meters to 2500 meters from the facility boundary.

4.0 RESULTS

The initial approach to conducting modeling was to evaluate whether the impacts would be above the significant impact levels (SILs) for any pollutant. The SILs are set forth in the U.S. U.S. EPA's Prevention of Significant Deterioration regulations and, while not applicable to the Pinal Power Biomass Project, provide a means of assessing whether further evaluation is warranted.

In the event that further evaluation is warranted, background concentrations were obtained from monitoring stations located in Pinal County.

Table 4-1 summarizes the results of the modeling for criteria pollutants. .

Table 4-1
Summary of Maximum Predicted Impacts

Pollutants	Period	Model Result $\mu g/m^3$	SIL $\mu g/m^3$
Carbon Monoxide (CO)	8-Hr	30.50	500
	1-Hr	48.09	2,000
Nitrogen Dioxide (NO_2)	Annual	1.39[1]	1
	1-Hr	36.07[1]	N/A
Sulfur Dioxide (SO_2)	3-Hr	15.35	25
	24-Hr	10.50	5
	Annual	0.771	1
Particulate Matter ($PM_{10}/PM_{2.5}$)	24-Hr	3.60	5

[1] Adjusted for ozone-limiting using the U.S. EPA's default conversion factor of 0.75.

As shown in Table 4-1, impacts for CO, 3-hour and annual SO_2, and $PM_{10}/PM_{2.5}$ are below the SILs, and no further evaluation is warranted for these pollutants. Further evaluation was conducted for NO_2 and SO_2 impacts.

Background data for SO_2 were obtained from Pinal County Air Pollution Control District and the Maricopa County Air Pollution Control District for monitoring sites in Pinal and Maricopa Counties. Background data for SO_2 were obtained from the San Manuel monitoring station, which is the only location in the county that measures SO_2.

Background data for NO_2 are not available in Pinal County. Data were obtained from the Maricopa County Air Quality Department, which measures NO_2 at five sites within Maricopa County. Because the majority of the sites are located in areas that are more developed than the Pinal Power site, NO_2 data from the Buckeye monitoring station was considered to be the most representative of the site. The U.S. EPA has not issued guidance for evaluating impacts for 1-hour NO_2 concentrations to date. This analysis represents a screening analysis based on evaluating the maximum impact plus second high value in comparison with the 1-hour NAAQS, taking into account the effect of ozone limiting, which restricts the amount of NO that would be converted to NO_2. It should also be noted that the highest impacts are located on the facility boundary, where NO to NO_2 conversion would be minimal.

The highest annual NO_2 background level from the period 2007 through 2009 was used to represent ambient background for the AQIA. The second-highest NO_2 background level for the period 2007 through 2009 was used for 1-hour background because the standard is based on a 98th percentile value rather than on the highest measured value. A summary of the selected background ambient air quality data for NO_2 and SO_2 is presented in Table 4-3.

Table 4-3
Ambient Background Concentrations

Pollutant	Period	Concentration ppm	Concentration μg/m^3
NO_2	1 hour[1]	0.057	107.02
	Annual	0.0111	20.84
SO_2	1 hour	0.015	39.22
	3 hour	0.015	39.22
	24 hour	0.007	18.30
	Annual	0.002	5.23

[1]Because the standard is based on a 98th percentile average over a 3-year period, or is equivalent to the 4th highest measured value, the second high was used to represent background 1-hour concentration.

Table 4-4 presents an evaluation of the results of the analysis with background concentrations added, in comparison with the NAAQS for NO_2 and SO_2.

Table 4-4
Modeling Results Ambient Background Concentrations

Pollutant	Period	Impact, μg/m^3	Background Concentration, μg/m^3	Impact plus Background Concentration, μg/m^3	NAAQS
NO_2[1]	1-Hour	36.07[1]	107.02	143.09	188
	Annual	1.39[1]	20.84	22.23	100
SO_2	1-Hour	19.98	39.22	59.20	196
	3-Hour	15.35	39.22	54.57	1,300
	24-Hour	10.50	18.30	28.80	365
	Annual	0.771	5.23	6.00	80

Source: www.epa.gov/air/data/monvals.html.
[1] Adjusted for ozone-limiting using the USEPA's default conversion factor of 0.75.

Electronic copies of input and output files are provided as Appendix A (available via electronic files).

APPENDIX A. AIR DISPERSION MODEL INPUT AND OUTPUT FILES
(Available via Electronic Files)