

ATTACHMENT 7

ARCADIS

**Energy Answers International
Proposed Resource Recovery
Facility**

Arecibo, Puerto Rico

**PSD Air Quality Modeling
Protocol**

Prepared for:
Energy Answers International

Prepared by:
ARCADIS
801 Corporate Center Drive
Suite 300
Raleigh, North Carolina 27607
Tel 919.854.1282
Fax 919.854.5448

Our Ref.:
NCENRGY1.0003

Date:
April 2010

ARCADIS

Section 6.6 below, meteorological data from the San Juan meteorological station for years 2005 to 2009 are proposed for use in this air modeling analysis.

Surface and upper air input files for AERMOD will be prepared using the AERMET processor programs. The inputs to AERMET for surface characteristics (surface roughness, Albedo and Bowen ratio) were determined as described above based on land use in the area surrounding the airport anemometer site.

6.6 Meteorological Data Representativeness Evaluation

In order to show that the meteorological data at the San Juan station (located at the airport) is representative of the subject site in Arecibo, ARCADIS performed a spatial and temporal representativeness evaluation.

Geographically, the San Juan airport and the site in Arecibo are less than 50 miles apart and both located northeast of the mountain range. Both locations are on the north ridge in close proximity to the ocean. Spatial representativeness was evaluated by comparing both the surface data at the two locations and the meteorological data for the 1992 to 1993 time frame. Data from PREPA in Cambalache, which is less than 1 mile from the proposed project site, was used to represent onsite meteorological data. The temporal representativeness evaluation was completed by evaluating recent San Juan station data (2005 to 2009).

Spatial Representativeness

To assess spatial representativeness, the land use distribution and estimated values of surface roughness (z_0), Bowen ratio and Albedo for the area surrounding the project site were compared to surface parameters for the area surrounding the San Juan meteorological station. In addition, trends from historical meteorological data were compared between locations.

The surface roughness, albedo, and bowen ratio surface characteristics required by AERMOD were evaluated and are provided in Table 6.1 below.

Table 6.1 Calculated Surface Characteristics <i>(Calculated as dictated by the ADEC Guidance re AERMET Geometric Means)</i>		
Surface Observation Station	PREPA, Cambalache, Arecibo, PR	Luis Munoz Marin International (SJU) Airport, San Juan, PR
Location	Latitude: 18.471553° Longitude: -66.701673°	Latitude: 18.437484° Longitude: -66.002791°
Distance from Subject Site	0.78 miles (1.25 km)	45.92 miles (73.90 km)
Bowen Ratio ^(1,2,3)	0.29	0.45
Surface Roughness ^(1,2,3)	0.09	0.10
Albedo ^(1,2,3)	0.14	0.14

Notes:

- (1.) Summer averages for Bowen Ratio, Albedo, and Surface Roughness were used to calculate the surface characteristics because of the year around mild/arid temperatures in Puerto Rico.
- (2.) Calculations were derived from the ADEC Guidance re AERMET Geometric Means "How to Calculate the Geometric Mean Bowen Ratio and the Inverse-Distance Weighted Geometric Mean Surface Roughness Length in Alaska", Alaska Department of Environmental Conservation, Air Permits Program, Revised June 17, 2009.
- (3.) Default values of Bowen Ratio, Albedo, and Surface Roughness were obtained from the Environmental Protection Agency, *AERSURFACE User Guide*, January 2008., Tables A-1, A-2, and A-3b.

Appendix A Tables A-1 and A-2 contain supporting calculations and a list of identified land use percentages and fraction of total area calculations utilized for the surface calculations. Land use was manually tabulated from satellite photos and other maps. Figures with land use designations for both locations are also included in Appendix A. As shown in Table 6.1, the surface characteristics, including surface roughness, Bowen ratio, and albedo, are consistent for the two locations.

Spatial representativeness was further evaluated by comparing the wind roses and wind speed frequency distributions for the Cambalache (PREPA) data 1992-1993 and San Juan data 1992-1993 contained in Appendix B. (Note that the wind roses display flow vectors – wind traveling to, as opposed to a typical wind rose where the spokes show the direction from which wind is traveling from.) Wind roses and wind speed frequency distributions for 1992 -1993 at both locations are shown to be very consistent. Lastly, a comparison of the temperature trends for the 1992-1993 time period was completed as shown in Appendix C. The trend chart shows that the rolling

average temperature logged at the site in Cambalache is consistent with the San Juan station rolling average temperature data.

Overall, the geography, surface characteristics, wind direction and speed, and temperature trends all show that the meteorological observations recorded at Cambalache (from PREPA) in 1992-1993 are consistent with the meteorological observations at San Juan Airport in 1992-1993.

Temporal Representativeness

For evaluation of temporal representativeness, the wind roses, the wind speed frequency distributions, and the temperature trends were developed and evaluated for 2005 to 2009 for the San Juan station and compared to each other and to the historical 1992-1993 data (see Appendices B and C). As expected, the island does not experience significant seasonal changes and the temperature trend was consistent throughout the years, both historically and recently. The wind roses and wind speed frequency distributions for each year from 2005 to 2009 at San Juan are shown to be very consistent with each other. Interestingly, the wind roses for both the 1992-1993 Cambalache and San Juan locations show winds to the north that are not seen in the recent 5 years of San Juan data. The record shows that there was likely a weather pattern during the 1992-1993 year that was observed and recorded at both the Cambalache and San Juan locations in 1992-1993. This easily identifiable weather pattern was observed at both locations and serves as further evidence supporting the conclusion that the weather characteristics recorded at Cambalache, which is in close proximity to the project site, are indeed consistent with the weather characteristics recorded at the San Juan Airport.

6.7 Background Air Quality

The existing ambient air quality near the proposed facility, based on available air quality monitoring data, indicates that the area is in attainment of the NAAQS. Energy Answers will request a waiver from pre-construction ambient air monitoring prior to submittal of the PSD application if modeling results show that the projected impact of the source is less than the significant monitoring levels as specified in 40 CFR Part 52.21(i).

If modeling results show potential impacts higher than significant concentrations so that background ambient data is required for the analysis, Energy Answers will evaluate existing ambient monitoring data maintained by the USEPA. After modeling is