DOCKETED

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ATMOSPHERIC DYNAMICS, INC
Meteorological & Air Quality Modeling

February 25, 2016

Mr. Chris Anderson
Antelope Valley Air Quality Management District
43301 Division Street, Suite 206
Lancaster, CA 93535

Re: MDAQMD Rule 1406 PERC Data Collection Protocol for the Palmdale Energy Project

Dear Mr. Anderson:

Included with this cover letter is the Paved Emissions Reduction Credit (PERC) Data Collection Protocol for the Palmdale Energy Project (PEP). Palmdale Energy, LLC is proposing to provide PM10 emission reduction credits (ERCs) in the form of road paving per Mojave Desert Air Quality Management District (MDAQMD) Rule 1406. The purpose of this protocol is to provide the AVAQMD with sufficient information to identify the sources of Paving Emissions Reduction Credits (PERCs) in order to voluntarily pave a series of unpaved public roads in order to generate PM10 emission credits. This protocol will outline the methods for data collection and analysis in order to perform the calculations as specified in MDAQMD Rule 1406. Once the data has been collected and analyzed, an application for PERCs will be submitted to the AVAQMD which will contain all information as required by MDAQMD Rule 1402 (B)(1)(b).

We look forward to working with you. If you have any questions, please do not hesitate to call me at (831) 620-0481. Thank you for your attention in this matter.

Sincerely,
Atmospheric Dynamics, Inc.

Gregory S. Darvin
Senior Meteorologist

cc:
Tom Cameron, Palmdale Energy, LLC

Attachment

MDAQMD Rule 1406

Paving Emissions Reduction Credits Protocol

Palmdale Energy Project

Palmdale, California

Submitted to

Antelope Valley Air Quality Management District

Submitted by

Palmdale Energy, LLC

Prepared by

Atmospheric Dynamics, Inc.

ATMOSPHERIC DYNAMICS, INC
Meteorological & Air Quality Modeling

February 2016

INTRODUCTION AND PROJECT DESCRIPTION

Palmdale Energy, LLC proposes to construct, own, and operate the Palmdale Energy Project (PEP or Project). The PEP will consist of a natural gas-fired combined-cycle design to be developed on an approximately 50-acre site in the northern portions of the City of Palmdale (City). The combined-cycle equipment will utilize two (2) Siemens SCC6-5000F natural gas-fired combustion turbine generators (CTG), two heat recovery steam generators (HRSG) with supplemental duct firing, one (1) steam turbine generator (STG), one (1) auxiliary boiler, and support equipment.

The Project is designed to provide flexible capacity within the CAISO and will have a nominal electrical output of 660 megawatts (MW). Commercial operation is planned for the summer of 2019. The design and location of the proposed PEP would serve to complement electrical generation needs for flexible resource support.

The project will require a AVAQMD Regulation XIII New Source Review (NSR) permit, as specified under Rules 1300-1320. Currently, the AVAQMD air basin is federal and State attainment/unclassified for NO_2, SO_2, PM2.5, and CO. The area is in attainment for the federal PM10 standards, but nonattainment for the 8-hour ozone (O_3) standard. It is also State non-attainment for PM10 and O_3 standards. Based on the project emissions, the new facility will be a major new stationary source per AVAQMD New Source Review (NSR) Regulation XIII.

AVAQMD Regulation XIII, NSR Rule 1302, provides the requirements at which emission levels the offset calculations must be done and thresholds over which emissions must be offset. It also defines which pollutants must be offset, what ratios must be used, and the criteria of what can be used as an emission reduction credit (ERC). If a project meets the requirements of these rules, then the mitigation (i.e., ERC) can be considered to be completely effective since the program has been developed to ensure eventual attainment of the AAQS.

The purpose of this protocol is to provide the AVAQMD with sufficient information to identify the sources of Paving Emissions Reduction Credits (PERCs) in order to voluntarily pave a series of unpaved public roads in order to generate PM10 emission credits. This protocol will outline the methods for data collection and analysis in order to perform the calculations as specified in the Mojave Desert Air Quality Management District (MDAQMD) Rule 1406.

Once the data has been collected and analyzed, an application for PERCs will be submitted to the AVAQMD which will contain all information as required by AVAQMD Rule 1309.

PM10 and PM10 Precursor (SO_x) Offsets

The District is attainment for the federal PM10 standard. Therefore, there is no regulatory requirement, that the applicant is aware of, that requires the adoption of a PM10 plan, road paving rule, or any other preparatory regulatory action prior to responding to an ERC application for emission reductions resulting from the paving of an existing unpaved road. For the same reason, USEPA approval is not required for any District action involving PM10 credits (1305(B)(3)(d)). Furthermore, the District is attainment for both the federal and state PM2.5 standards, and therefore the PEP is not required to offset its PM2.5 emissions pursuant to the

District rules. Based on Rule 1302 and the California Environmental Quality Act (CEQA), the project will need to generate the following ERCs listed in Table 1.

Table 1 PM10 and SO_2 Offsets

OFFSETS/MITIGATION PROPOSED FOR PEP Emission Reduction Credits - TPY			
	PM_{10}		**SO_2**
AVAQMD Offset Trigger Thresholds	15		25
Facility PTE[1]	81.01		11.39
AVAQMD Offset Ratio	1:1		1:1
Total Offsets Required	81.01		11.39*

[1] Values derived from Section 4.1 of the AVAQMD Application Package
* While rule 1302 does not require SO_2 ERCs, SO_2 contributes to PM10 and will be mitigated under CEQA.

The PEP will propose to pave certain roads located within the air basin in order to generate PM10 PERCs, which will mitigate emissions of PM10 and SO_x and satisfy the State air quality requirements and CEQA. Thus, the total PM10 mitigation package would be for 81.01 tons per year of PM10 and 11.39 tons per year of SO_2, for a total PERC quantity of 92.4. In the current permit application package submitted to the AVAQMD and the CEC, ten (10) existing unpaved road segments were identified, totaling approximately 22 miles as listed in Table 2. From these ten (10) initial road segments, a subset of four (4) were selected for potential paving activities and are listed in Table 3. If additional roadway segments are needed, then additional roads from Table 2 will be assessed.

Table 2 Initial Road Segments

Street Segment	From	To	Jurisdiction	Street Type	Segment Length (Mi.)	ROW Req.	Segment Footprint (Acre)
Ave. B	90th Street W	30th Street W	L.A. County	County Road	Approx. 6.0	40 Ft.	29.1
Ave. S-2	96th Street E	106th Street E	L.A. County	County Road	Approx. 1.0	40 Ft.	4.85
110th Street E	Ave. L	Columbia Way /Avenue M	City of Palmdale	Secondary Arterial	Approx. 1.0	92 Ft.	11.15
40th Street W	Ave. N	Ave N-8	L.A. County	County Road	Approx. 0.5	40 Ft.	1.94
Ave. Q	90th Street E	110th Street E	City of Palmdale	Secondary Arterial	Approx. 2.0	92 Ft.	22.3
Ave. S-6	96th Street E	106th Street E	L.A. County	County Road	Approx. 1.0	40 Ft.	4.85
Ave. T-10	87th Street E	96th Street E	L.A. County	County Road	Approx. 1.0	40 Ft.	4.85

Ave. N-8	Bolz Ranch Road	30th Street W	City of Palmdale	Local Interior St.	Approx. 1.5	60 Ft.	10.91
Ave. G	90th Street E	120th Street E	L.A. County	County Road	Approx. 3.0	40 Ft.	9.70
Carson Mesa Road	El Sastre	Vincent View Road	L.A. County	County Road.	Approx. 1.85	40 Ft.	8.24

Completion of the road paving activities will be prior to the commencement of start of construction to the project. Road paving activities will not coincide with facility construction.

PM10 Source Characterization

Particulate emissions occur whenever vehicles travel on unpaved roads. 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.

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. The emissions depend on correction parameters that characterize the condition of a particular road and 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 *um* 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.

PM10 Emission Calculation Equation

The form of the MDAQMD PM10 emission calculation, which is based on Equation 1 in AP-42 (Chapter 13.2.2 Unpaved Roads) is of the form for vehicles traveling on publicly accessible roads dominated by light duty vehicles:

Equation 1

$$\mathrm{E}_u = \frac{K\left(\frac{s}{12}\right)^a\left(\frac{S}{30}\right)^d}{\left(\frac{M}{0.5}\right)^c}$$

where:

E_u = the unpaved road PM10 emission factor with units of pounds per vehicle mile traveled
k = empirical constant (1.8 for PM10) for units of lbs per VMT
s = the surface material silt content in percent (default value of 6.2 for gravel roads and 11.0 for non-gravel roads)
a = empirical constant (1 for PM10)
S = the mean vehicle speed with units of miles per hour (default value 20 mph for all unpaved roads)
d = empirical constant (0.5 for PM10)
M = surface material moisture content in percent (default value 1)
c = empirical constant (0.2 for PM10)

Due to rainfall or other precipitation, the above equation can be adjusted to reflect average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation:

$$E_{ext} = E[\frac{365 - P}{365}]$$

where:

E_{ext} = annual size specific emission factor extrapolated for natural mitigation, lb/VMT
E = emission factor from Equation 1
P = number of days in a year with at least 0.01 inches of precipitation

Equation 2 (from USEPA AP-42 §13.2.1) shall be used to estimate the quantity of PM10 emissions from re-suspension of loose material on a road surface due to vehicle travel on a dry paved Roadway Segment after paving:

Equation 2: $$E_p = k(sL)^{0.91}(W)^{1.02}$$

where:

E_p = the paved road PM_{10} emission factor with units pounds per vehicle mile traveled
k = empirical constant (0.0022 for PM_{10}) for units of lbs per VMT
sL = the road surface silt loading with units of grams per square meter (a default value equal to 2.4 for all paved roads)
W = average weight of vehicles traveling the road with units of tons (a default value equal to 3.0 for all unpaved roads)

The equations above shall be used to determine the PM10 emission factor (in terms of pounds per VMT) for each roadway segment in an unpaved and paved condition. Where allowed, non-default values shall be used to calculate PM10 emission factors as discussed below and will be obtained in accordance with Section (F) of the Rule.

The annual quantity of PM10 emissions emitted from each Roadway Segment shall be calculated by multiplying the PM10 emission factor by the annual VMT for each Roadway Segment as determined pursuant to subsection (C)(2) of the Rule. The PM10 emission reductions associated with paving an unpaved roadway segment will be calculated as the difference, in tons per year, between the emissions from the road in the unpaved condition and the emissions from the road in the paved condition. In accordance with MDAQMD Rule 1406, vehicle exhaust, brake wear and tire wear emissions will be ignored for purposes of this calculation.

PERC Source Generation Plan

The following subsections provide information which will be obtained and measured in order to quantify emissions of PERCs. While the AVAQMD provides for default values for vehicle speeds, silt content and surface material moister content, site specific conditions at each of the proposed roadway segments will be measured and quantified in accordance with Section F of the MDAQMD Rule 1406.

Determination of Vehicle Miles Traveled

Table 3 shows the proposed sub-set of road segments that are identified for determination of vehicle miles traveled (VMT). The VMT will be calculated using at least seven (7) consecutive measurement periods for each roadway segment as follows:

- Each measurement period (traffic count) shall measure vehicular traffic over a minimum of 24 hours.
    - For averaging within a traffic count, vehicular traffic shall be considered zero (0) for each hour not monitored continuously during any given 24-hour period.
- Traffic counts shall be conducted on non-holiday weekdays and weekends.
- Separate traffic counts will be made for each segment. A segment is identified as a length of road between cross streets. The counts will be made near the center point of each road segment.
- The VMT for each roadway segment shall be calculated by multiplying the time weighted average of seven (7) separate traffic counts for that roadway segment by the roadway segment's length in miles to the nearest 0.1 of a mile.

Table 3 Proposed Roadways with Specific Road Segments

Roadway	From	To	Jurisdiction	Street Type	Total Roadway Length (Miles)	ROW Req.	Roadway Area (Acre)	Distance From PEP (Miles)	Number of Segments for each Traffic Count
Ave S-6	96th Street E	110th Street E	City of Palmdale	County Road	Approx. 0.95	40 ft.	4.61	10.5	5
Ave T-10	87th Street E	96th Street E	City of Palmdale	County Road	Approx. 1 .0	40 ft.	4.85	10.8	5
Ave S-2	96th Street E	106th Street E	LA County	County Road	Approx. 1 .0	40 ft.	4.85	10.25	5
40th Street. W	Ave N	Ave N-6	LA County	County Road	1.43	40 ft.	9.41	5.5	9

Figures 1 through 3 presents the locations, total roadway lengths and individual segments for each of the proposed roads identified in Table 3.

Silt Content Analyses

The roadway segment surface material silt content will be determined by using collection and analysis methodologies as specified in Appendices C.1 and C.2 of USEPA AP-42 "Compilation of Air Pollutant Emission Factors" – Fifth Edition. Specifically, Appendix C.1 summarizes the procedures for sampling while Appendix C.2 provides for the laboratory procedures to analyze the data collected in accordance with C.1.

Sampling Analysis Frequency

The overall objective in an unpaved road sampling program is to inventory the mass of particulate matter (PM) emissions from the roads. This is typically done by:

1. Collecting "representative" samples of the loose surface material from the road;
2. Analyzing the samples to determine silt fractions and moisture content; and
3. Using the results in equation (1) of AP-42, Section 13.2.2, Unpaved Roads, together with traffic data (e. g., number of vehicles traveling the road each day).

Based on the overall study area and that the average length of roadway to be sampled will be less than three (3) miles in length, we would propose that the sampling frequency of silt/moisture content be taken at 0.5 mile intervals (or portion thereof) for each major road segment. Major road segment is defined here as the length of road between intersections with other either paved or unpaved roads. Thus, for a road segment that is 0.6 miles in length, two (2) samples will be taken.

If a longer road is identified for analysis, in that it is longer than three (3) miles in length, then the composite sampling method will be used, as identified in Appendix C.1. Here, a minimum of

three incremental samples will be taken with the first sample at the first 0.5-mile segment with additional increments taken from each remaining 0.5-mile length of road up to a maximum length of three (3) miles.

Sample Collection Method

Following the procedures in Appendix C.1, the following collection method will be used to obtain samples of roadway material:

1. Using string or other suitable markers, mark a 0.3 meters (m) (1 foot [ft]) wide portion across the road. The collection area will not be marked with a chalk line or in any other method likely to introduce fine material into the sample.
2. With a whisk broom and dustpan, remove the loose surface material from the hard road base. The base will not be abraded during sweeping. Sweeping will be performed slowly so that fine surface material is not injected into the air. The material will be collected only from the portion of the road over which the wheels and vehicles routinely travel (i.e., not from berms or any "mounds" along the road centerline).
3. The swept material will be periodically deposited into a clean, labeled container of suitable size, such as a metal or plastic 19 liter (L) (5 gallon [gal]) bucket, having a sealable polyethylene liner. Increment samples may be mixed within this container.
4. Record the required information on the sample collection sheet as provided in Appendix C.1 in figure C.1-2.

Sample Sizes

For unpaved roads that are uncontrolled and don't use chemical stabilizers, a sample of 10 to 50 pounds will be taken and split into smaller samples for analysis, following the procedures in Appendix C.2. For unpaved roads that do utilize some type of chemical stabilizer, a minimum of one (1) pound of material will be collected, in accordance with Appendix C.1.

Submittal to AVAQMD

The final application submittal package will contain all the information required by MDAQMD Rule 1402 (B)(1)(b). This will include:

1. The name, address and telephone number of a responsible official for the applicant (the responsible official will be the addressee of all official correspondence regarding the application and PERCs;
2. The name and telephone number of a contact person for inquiries regarding the application and PERCs, if different than the responsible official;
3. Information identifying the particular new or modified facility or emissions unit requiring PM10 offsets pursuant to District Regulation XIII – *New Source Review*.
4. Information sufficient to identify the source of the proposed PERCs, and the PM10 Attainment Status Designation;

5. Information sufficient to allow the calculations specified in this rule to be performed;
6. A statement from the applicant that the unpaved road(s) will be paved according to state or local government paving standards, as applicable;
7. A letter or agreement from the appropriate state or local government stating that each Roadway Segment:
    a) Has been inspected;
    b) Has been described as being either gravel- or non-gravel surfaced;
    c) Will be adopted into the state or local transportation network, if not already part of the network; and,
    d) Will be maintained.
8. A statement from the applicant indicating that any necessary environmental review for the paving of each Roadway Segment required pursuant to the California Environmental Quality Act (CEQA) has been performed. Applicant shall provide a copy of such CEQA review upon District request.
9. Fees in accordance with District requirements.

Figure 1

West Ave N-8 from 45th St W to Tournament Dr

Figure 2

East Ave's S-2 & S-6 from 96th St E to 106th St E

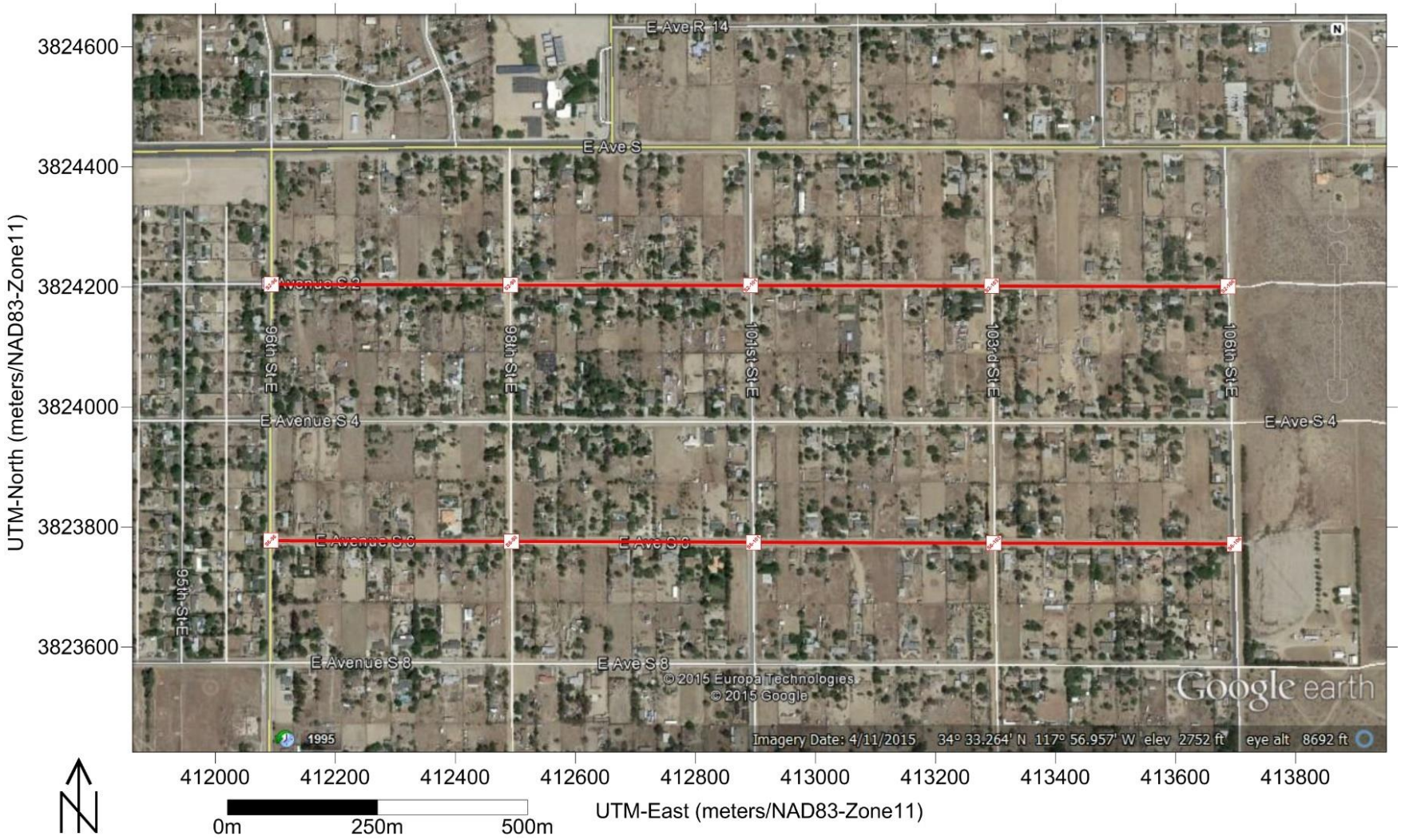

Figure 3

East Ave T-10 from 87th St E to 96th St E