Tucson Electric Power Company

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Hand Delivery

September 19, 2017

Mr. Rupesh Patel
Pima County Dept. of Environmental Quality ("PCDEQ)
33 N. Stone Avenue, Suite 700
Tucson, AZ 85701

Subject: Response to PDEQ's letter dated September 8, 2017.

Dear Mr. Rupesh:

TEP hereby submits responses to PDEQ's questions and comments relating to technical review of TEP's permit application. Below are PDEQ's questions and comments, followed by TEP's response to each.

PDEQ Question 1. Provide justification for the assumption that 10% of sulfur dioxide forms sulfuric acid mist (Section 3.1.1).

TEP Response to Question 1: The 10 percent figure is a commonly applied, conservative assumption used to overestimate the SO_2 oxidation rate for natural gas-fired combustion sources equipped with SCR and oxidation catalyst. See, for example, the permitting documents for the combustion turbines at the APS Ocotillo facility in Maricopa County,[1] the RICE at the STEC Red Gate facility in Texas,[2] and the RICE at the MKEC Rubart Station in Kansas.[3] This emission estimate is for purposes of determining whether the RICE Project is subject to PSD review for sulfuric acid mist emissions. Even using the highly conservative 10 percent oxidation figure, the calculated emissions increase is less than one third of the PSD applicability threshold.

PDEQ Question 2. Emission factors from USEPA's *Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources (AP-42)*, Section 3.2-2, Table 3.2-2 were used to calculate particulate matter (PM) emissions in Section 3.1.2 of the application. The emission factor used in the equation shown in Section 3.1.2 applies to filterable fine PM (PM10) and filterable respirable PM (PM2.5). The condensable portion of PM is not included in Section 3.1.2 of the application. Section 5.3 of the application states that all of the filterable and condensable material is

[1] https://yosemite.epa.gov/OA/EAB_WEB_Docket.nsf/Attachments%20By%20ParentFilingId/73B066662563718485257F9D00635FDF/$FILE/Ex.%206_V95007_TSD_2.1.0.0_DRAFT.pdf (last accessed Sept. 9, 2017).
[2] https://webmail.tceq.state.tx.us/gw/webpub/c96dcf3a529598be899b98c3c555697533e52df6/GWDOC/DREF/tnrdom3.dms3apo.ansrp01/483792/Official/webacc/GWContentRoot/TRV%20-%20106544%20South%20Texas%20Electric%20Cooperative%2c%20Inc.%20%28initial%29?action=Document.ViewNative&User.context=c96dcf3a529598be899b98c3c555697533e52df6 (last accessed Sept. 9, 2017).
[3] http://www.kdheks.gov/bar/midkanec/0670173_MKEC_Rubart_PSS_Final_1_28_13.pdf (last accessed Sept. 9, 2017).

believed to be PM2.5. Please provide emission calculations for filterable and condensable PM, including PM2.5 and PM10.

TEP Response to Question 2: Emission calculations for PM2.5 and PM10 are presented separately in Section 3.1.4 of the permit application. Consistent with the definition of "regulated NSR pollutant" at 40 CFR § 52.21(b)(50)(i)(*a*), the PM2.5 and PM10 emission rates presented in those calculations and used throughout the permit application are inclusive of both filterable and condensable fractions. The emission calculations presented in Section 3.1.2 of the permit application are for PM, which is a separately regulated NSR pollutant pursuant to 40 CFR § 52.21(b)(50)(ii). Emissions of this pollutant do not include condensable particulate matter.[4]

PDEQ Question 3. The calculated hourly emissions of PM in Section 3.1.2 of the application are significantly less than the calculated hourly emissions of PM10 and PM2.5 shown in Section 3.1.4 of the application. PM10 and PM2.5 are a subset of total PM, and therefore the hourly PM emissions would be expected to exceed the hourly emissions of PM10 or PM2.5. Please provide an explanation to address this discrepancy and, if necessary, revise Section 3.1.2, Section 3.1.4 and Table 3.4 of the application.

TEP Response to Question 3: See response to question #2.

PDEQ Question 4. Provide the vendor-specified emissions performance information for nitrogen oxide (NOx) referenced in the application Section 3.1.3, Footnote #7.

TEP Response to Question 4: We have requested this information from the engine vendor. TEP will respond upon receiving the requested information.

PDEQ Question 5. Emission rate calculations described in Section 3.1.4 of the application do not include emissions that may occur during shutdown of the RICE. Please provide an explanation of the emissions profile during shutdown and vendor specifications which document the emissions profile explanation.

TEP Response to Question 5. Emission rate calculations presented in Section 3.1.4 of the permit application do, in fact, include emissions which will occur during shutdown of the RICE. Emissions of these pollutants during shutdown events are not greater than the emission rates proposed as BACT during normal operations. We have requested additional information from the engine vendor. TEP will if necessary expand on this answer upon receiving the requested information.

PDEQ Question 6. Section 2.2 of the application describes the startup period and states that startup lasts for 2 minutes in the case of a "hot" startup and 4 minutes for a "warm" startup. Please provide the details of how a "hot" startup and a "warm" startup are defined. Also, provide an explanation of

[4] *See*, for example, 77 *Fed. Reg.* 65107 (Oct. 25, 2012).

the basis for the 30-minute startup period included in the emission calculations in Section 3.1.4 of the application.

TEP Response to Question 6: We have requested this information from the engine vendor. TEP will respond upon receiving the requested information.

PDEQ Question 7. The carbon dioxide (CO2) emission factor from Table C-1 of 40 CFR 98 for natural gas is listed at 53.06 kilograms (kg) CO2 per million British thermal units (MMBtu). The emission factor in Table 3-1 (Section 3.1.5) is 53.02 kg CO2 per MMBtu. Please provide revised emission calculations with the corrected CO2 emission factor.

TEP Response to Question 7: The updated tables, reflecting the codified emission factor as revised by U.S. EPA effective Jan. 1, 2014, are as follows.

Table 3-1. GHG PTE for Each RICE

	40 CFR 98 kg/MMBtu	mass lb/hr (per engine)	mass tpy (per engine)
CO_2	53.06	1.81E+04	7.92E+04
CH_4	1.0E-03	3.41E-01	1.49E+00
N_2O	1.0E-04	3.41E-02	1.49E-01
mass total GHG		1.81E+04	7.92E+04

	mass lb/hr (per engine)	40 CFR 98 GWP	CO_2e lb/hr (per engine)	CO_2e tpy (per engine)
CO_2	18,073	1	1.81E+04	7.92E+04
CH_4	3.4E-01	25	8.52E+00	3.73E+01
N_2O	3.4E-02	298	1.02E+01	4.45E+01
CO_2e total GHG			1.81E+04	7.92E+04

PDEQ Question 8. Greenhouse gas (GHG) emission estimates for natural gas leaks are based on the number of each type of component included in the natural gas piping system (Section 3.1.6, Table 3-2 of the permit application). Provide a basis for the number of each type of component.

TEP Response to Question 8: The component count estimates provided in Table 3-2 in the permit application are based on preliminary design information for the RICE project and are believed to be generally consistent with component count estimates used for similar projects.

TEP also emphasizes that the estimated GHG emissions from leaks in natural gas piping components are not critical to determining applicability of, or compliance with, any PDEQ or federal regulations. GHG is a regulated NSR pollutant only for purposes of establishing BACT, and it is well established that BACT for this type of emissions unit is a work practice requirement; the GHG emissions estimate is not pertinent to the determination of BACT or to any other analysis required as part of the PSD review.

PDEQ Question 9. According to Section 3.1.6 of the application, GHG emissions from natural gas leaks were calculated using average emission factors for natural gas piping components for petroleum refineries. Please re-compute emissions using the emission factors provided in 40 CFR 98, Table W-1A.

TEP Response to Question 9: The GHG emissions estimate presented in Table 3-2 in the permit application are, as noted in footnote 9 in the permit application, based on emission factors taken from U.S. EPA's *Protocol for Equipment Leak Emission Estimates* report.[5] TEP considers this to be an appropriate methodology for estimating emissions from leaking components in natural gas piping, as the *Protocol* document is geared toward estimating emissions from leaking components in piping at industrial facilities. Emissions calculated using the "Western U.S." emission factors in Table W-1A of part 98 would be lower by 93%. Furthermore, the emission estimation methodology in 40 CFR part 98, subpart W, is not appropriate for this purpose, as the subpart W factors are based on data that are neither newer nor more representative of piping at an industrial facility. Specifically, the factors in Table W-1A are based on data from a 1992 study for underground pipelines in the natural gas distribution segment.[6]

In addition, GHG is a regulated NSR pollutant only for purposes of establishing BACT, and it is well established that BACT for this type of emissions unit is a work practice requirement; the GHG emissions estimate is not pertinent to the determination of BACT or to any other analysis required as part of the PSD review.

PDEQ Question 10. Circuit breaker sulfur hexafluoride (SF6) emissions were conservatively estimated using an assumed leak rate of 0.5 percent per year (Section 3.1.7 of the application). Please provide justification for the assumed leak rate.

TEP Response to Question 10: The assumed leak rate of 0.5 percent per year is based on the equipment design standard that is proposed as BACT (Section 5.7) for this emissions unit. This emission estimation methodology is conservative in that it reflects an assumption that each circuit breaker will leak continuously at a rate equal to the design maximum emission rate.

TEP also emphasizes the GHG emission estimate is not critical to determining applicability of, or compliance with, any PDEQ or federal regulations. GHG is a regulated NSR pollutant only for purposes of establishing BACT, and it is well established that BACT for this type of emissions unit is

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[5] *Protocol for Equipment Leak Emission Estimates* (EPA-453/R-95-017), Nov. 1995, U.S. EPA.

[6] *See*, "Greenhouse Gas Emissions Reporting from the Petroleum and Natural Gas Industry – Background Technical Support Document" (available at https://www.regulations.gov/document?D=EPA-HQ-OAR-2009-0923-3610) (last accessed Sept. 9, 2017) at p. 132, explaining that the scf/hr/service factors are calculated from the scf/mile/yr factor from "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007." *See*, also, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2007" (available at https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2007) (last accessed Sept. 9, 2017), at Annex 3, Section 3.4, explaining that the scf/mile/yr factors are based on the national total emissions for the distribution segment of the natural gas industry as estimated in "Methane Emissions from the Natural Gas Industry." *See*, also, "Methane Emissions from the Natural Gas Industry, Vol. 9: Underground Pipelines" (EPA-600/R-96-080i), June 1996 (available at https://www.epa.gov/sites/production/files/2016-08/documents/9_underground.pdf) (last accessed Sept. 9, 2017), at p. 1, explaining that the objective of the study summarized in the report was "to quantify the methane emissions from the gas industry for the 1992 base year" and further explaining that the emissions estimate for the distribution segment is specific to underground pipelines

an equipment design standard; the GHG emissions estimate is not pertinent to the determination of BACT or to any other analysis required as part of the PSD review.

PDEQ Question 11. The total GHG emission rates (mass and CO2 equivalent) presented in Section 3.1.8, Table 3-4 of the application are not equal to the sum of the emission rates presented in Tables 3-1, 3-2, and 3-3. Please revise Table 3-4.

TEP Response to Question 11: The figures presented in Table 3-4 in the permit application were, in fact, equal to the sum of the values presented in Tables 3-1 through 3-3; any apparent discrepancy was due to rounding. However, revision of Table 3-4 is necessary due to the use of the updated CO_2 emission factor in the response to question #7 above. The following revision to Table 3-4 reflects more appropriate rounding of the GHG emission rates.

Table 3-4. Total Annual PTE for PSD Pollutants from RICE Project

Pollutant	tpy
SO_2	14.2
sulfuric acid mist	2.2
PM	0.5
PM10/PM2.5	114.1
CO	299.6
VOC	227.8
NO_X	179.0
GHG (mass)	7.92E+05
GHG (CO_2e)	7.93E+05

PDEQ Question 12. Appendix B of the application indicates that the NOx emission rate is 179 tons per year, per engine. According to Sections 3.1.8 and 4.5.3 of the application, the voluntarily accepted NOx limit is 179 tons per year for all 10 RICE, not per engine. Please revise the calculations and documentation in the application to accurately reflect annual NOx emissions on a per-engine basis as well as total emissions for all RICE.

TEP Response to Question 12: The calculations and documentation of per-engine emissions listed in the permit application are correct as presented. As explained in Section 3.1.3 of the permit application, the unrestricted potential to emit of each RICE exceeds the voluntarily proposed emission cap of 179.0 tons per year. No engine-specific limits more stringent than this emission cap are proposed. However, to improve clarity, TEP will add a note to the cited table on Appendix B, page B-2, to read as follows.

PSD pollutant for which PTE is calculated using NSPS limit and emission cap:
mechanical output capacity (hp): 26,820

	NSPS g/hp-hr	lb/hr (per engine)	tpy (per engine)
NOx	1.0E+00	5.91E+01	1.79E+02 *

* - Unrestricted PTE of each engine, without considering effects of SCR, would be 259 tpy. The emission cap, by limiting total emissions from all ten engines to 179 tpy, also will prohibit emissions from any one engine in excess of 179 tpy.

PDEQ Question 13. The hazardous air pollutants (HAPs) presented in Table 3-5 (Section 3.2) of the application do not include all of the chemicals designated as HAPs in Section 3.2-2, Table 3.2-2 of USEPA's *Compilation of Air Pollutant Emission Factors, AP-42*. For example, naphthalene is a listed HAP in AP-42 but is not included in Table 3-5. Please provide emission calculations for all HAPs listed in Table 3.2-2 of AP-42. It is acceptable to exclude HAPs for which AP-42 provides an emission factor that is less than a specified value as the resulting emission rate for those pollutants is assumed to be negligible. Please also provide the total combined HAP emission rate for each RICE unit and for all proposed RICE units.

TEP Response to Question 13: Table 3-5 in the permit application includes naphthalene, and it generally includes each pollutant which both i) is a hazardous air pollutant listed in or pursuant to 42 U.S.C. § 7412(b) and ii) is listed in Table 3.2-2 of AP-42 with an emission factor that is not identified therein as a "less than" value (i.e., an emission factor based on the method detection limit). Please note that several compounds listed in Table 3.2-2 of AP-42 and identified with footnote "k" are not, in fact, listed hazardous air pollutants. These compounds are constituents of a single listed hazardous air pollutant, "polycyclic organic matter." TEP elected not to present an emission estimate for polycyclic organic matter because there is no published emission factor for this pollutant; summing the listed emission factors for individual constituents of this pollutant would be misleading, as it is unknown whether other constituents not listed in Table 3.2-2 of AP-42 may also be present.

PDEQ Question 14. It is assumed that Units 1 and 2 described in the application in Section 4.5.3.1 of the application are the same as Units I1 and I2 in Attachment 2 of the current permit. Please confirm.

TEP Response to Question 14: TEP confirms PDEQ assumption.

PDEQ Question 15. The net nitrogen oxide (NOx) emission increase provided in Section 4.5.3.3 of the application is based on the NOx emission decrease from shut down of Units I1 and I2 described in Section 4.5.3.1 of the application. According to Section 4.5.3.1, the average NOx emission rate for the time between January 2013 and December 2014, is 69.8 tons NOx per year from Unit I1 and 69.9 tons NOx per year from Unit I2. These values result in a total creditable NOx emission decrease of 139.7 tons per year. A review of USEPA Air Markets Program data referenced in Section 4.5.3.1 includes different NOx emission rates for Unit I1 and Unit I2 from those emission rates obtained from a query of the USEPA Air Markets Program database for calendar years 2013 and 2014. Please review the 2013/2014 NOx emission rates for Units I1 and I2 in Section 4.5.3.1 and provide updated information if necessary.

TEP Response to Question 15: The data presented in the permit application were inadvertently based on TEP's internal emissions calculations rather than data from U.S. EPA's Air Markets Program database. Revised text from sections 4.5.3.1 and 4.5.3.3 of the permit application, with revised values based on U.S. EPA data as shown in red font, is as follows:

- As provided by 40 CFR § 52.21(b)(3)(i)(b) and (b)(3)(vi)(a), the creditable amount of the emissions decrease from the proposed shutdown is the amount by which the baseline actual emissions exceeds the new level of actual emissions. Pursuant to 40 CFR § 52.21(b)(48)(i),

TEP has selected the 24-month period from January 2013 through December 2014, inclusive, as the baseline period. This baseline period is permissible because it occurs entirely within the five-year period immediately preceding when TEP will begin actual construction of the project. The average actual NO_X emissions rates during this period, based on U.S. EPA Air Markets Program Data, are 69.7 tpy from Unit 1 (75.7 tons in 2013 and 63.6 tons in 2014) and 69.7 tpy from Unit 2 (63.2 tons in 2013 and 76.3 tons in 2014). The new level of actual emissions will be zero. The creditable amount of the emissions decrease is 139.4 tpy.

NO_X increase from RICE project	179.0
NO_X decrease from shutdown of Units 1-2	139.4
Net NO_X increase	39.6
Significant level	40
Increase significant?	No

If you have any question concerning this letter, please feel free to contact Charles Komadina at (520) 918-8316 or me at (520)745-3388.

Sincerely,

Conrad Spencer,
Director, Sundt Modernization Project

cc: R. Grimaldi, PCDEQ
E. Bakken, TEP
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