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STAFF ANALYSIS OF A PETITION TO AMEND AIR QUALITY CONDITIONS OF CERTIFICATION
TRACY PEAKER PROJECT (TPP) 01-AFC-16C

William Walters

Amendment Request

On February 5, 2003, GWF Energy, LLC (Project Owner) proposed an amendment to the Tracy Peaker Project (TPP) (GWF 2003a). Subsequently, the Project Owner revised this request in June, 2003 as follows (GWF 2003b):

- Decrease the total allowable Particulate Matter 10 microns in diameter or smaller (PM_{10}) emission rates (lb/hr, lb/day, and lb/year) based on compliance source testing, and decrease the resulting amount of PM_{10} emission reduction credits (ERCs) required.
- Eliminate the limitation on the number of annual startup/shutdown events, eliminate the time limit for an individual startup/shutdown event, and add a notation in the conditions that startup/shutdown emissions are to be counted when determining compliance with emission limits.

The PM_{10} amendment request and the startup/shutdown amendment request are separate technical issues and are addressed separately in this analysis. No changes are proposed for any other hourly, daily, or annual permitted emission limits for the TPP. This amendment does not affect the emission units other than the turbines (e.g. emergency equipment) at the TPP.

On June 9, 2003, the San Joaquin Valley Air Pollution Control District (District) issued a revised Authority to Construct for the TPP (District 2003), which included the requested revisions to the PM_{10} hourly, daily, and annual emission limits and offset requirements; and eliminated the limitation on the maximum number of startups/shutdowns per year and the limit on the duration of a startup/shutdown event.

Background

In August 2001, GWF Energy LLC proposed to construct and operate a 169 MW simple cycle power plant to be located southwest of the City of Tracy in San Joaquin County. The Tracy Peaker Project was certified in July 2002 (CEC 2002). The project design includes two natural gas fired General Electric Model PG7121 (EA) combustion turbine generators (CTG) and a diesel fired emergency generator.

The TPP began initial commissioning and source testing operations in Spring 2003.

Laws, Ordinances, Regulations, And Standards

Because the proposed modifications to the air quality conditions do not represent any significant new environmental impacts or changes to design elements subject to local requirements, these modifications will not impact the facility's ability to comply with all applicable LORS.

Analysis

Emissions Analysis

PM_{10} Emissions Amendment

The PM_{10} emissions from the turbines are primarily comprised of solid carbonaceous particles that result from the combustion of natural gas and are separate from the other gaseous criteria pollutants emitted from the turbines (i.e. NO_x, CO, VOC, and SO_x). The requested revisions to the PM_{10} turbine operating emission limits and offset requirements are shown in **Table 1**.

Table 1 – Proposed Changes to the TPP PM_{10} Emission Limits[a]

Parameter	Original Emissions Limit	Proposed Emissions Limit	Emissions Limit Decrease
Hourly Emissions Limit	20.8 lbs/hr	6.6 lbs/hr	14.2 lbs/hr
Daily Emissions Limit	499.2 lbs/day	160 lbs/day	339.2 lbs/day
Annual Emissions Limit	164,800 lbs/year	53,334 lbs/year	111,466 lbs/year

Source: GWF 2003
Note
a. Facility total (two turbines).

A copy of the source test results summary (GWF 2003a) was provided. Staff has reviewed the available emission source test data and provides a comparison of these values with the project owner proposed PM_{10} emission limits in **Table 2**.

Table 2 – TPP Turbine PM_{10} Emissions Comparison

Turbine	Compliance Source Test Data		Proposed Limits	
	Lb/hour	Lb/day	Lb/hour	Lb/day
Turbine 1	1.96[a]	47.0[a]	3.3	80
Turbine 2	1.94[a]	46.6[a]	3.3	80

Source: GWF 2003b.
Note:
a. This data excludes the first of the three test runs for both turbines as the sampling equipment was compromised during those runs, which created unreliable results for those test runs.

The data provided in **Table 2** indicate that the revised PM_{10} emission rate limits proposed by the project owner appear to be conservative based on the available compliance source test data. Staff believes that the proposed hourly, daily, and annual emission limits for PM_{10}, which are conservatively higher than the source test result values, are reasonable.

Startup/Shutdown Amendment

The startup or shutdown of a turbine can result in NO_x and CO emissions that are temporarily higher than the maximum emissions that occur during normal turbine operation. PM_{10}, VOC and sulfur dioxide (SO_2) emissions are not expected to be elevated during startup/shutdown for the project's GE 7E turbines. Therefore, any amendments to the startup/shutdown conditions can only effect the NO_x and CO emissions. The requested revisions to the startup/shutdown emissions basis are shown in **Table 3**.

Table 3 – Proposed Changes to the TPP Turbine Startup/Shutdown Limits

Parameter	Pollutant	Original Limit	Proposed Limit
Startup and Shutdown Emission Limits (both Turbines)	NO_x	26 lb/hr	52 lb/hr
	CO	42 lb/hr	84 lb/hr
Maximum Number of Startups/Shutdowns (per Turbine)	NO_x CO	250 startups and shutdowns	No limit

Source: GWF 2003a/District 2003.

It should be noted that the project owner originally provided the startup/shutdown emissions estimate in their AFC based on per startup or shutdown event (13 lbs NO_x and 21 lbs CO per event per turbine), and that a total of two events could occur in a single hour per turbine (Wheeler 2003). Therefore, the project owner's original startup/shutdown emission basis conforms to the revised emission basis and this change, in essence, reflects a correction to the language of the existing condition.

Using the revised emission limit basis, the facility wide maximum hourly turbine emissions during startup for NO_x and CO could be interpreted to be two times higher than those currently listed in Condition AQ-17 (26 lbs/hr of NO_x, 42 lbs/hour of CO for both turbines); however, this is not actually the case as the condition does not exclude non-startup operating emissions in the same hour as a startup, so the total emissions during a startup hour assuming 20 minutes per start would be as high as that listed in Condition AQ-20.

Staff has reviewed the available startup/shutdown emission source test data submitted by the project owner (GWF 2003b) and provides a comparison of these values with the project owner proposed startup/shutdown event emission limits in **Table 4**.

Table 4 – TPP Turbine Startup/Shutdown Emissions Comparison

		Source Test Results		
Pollutant	Turbine	Startup (lb/hr)	Shutdown (lb/hr)	Proposed Limit (lb/hr)
NO_x	Turbine 2	10.2	9.4	26
CO	Turbine 2	1.6	1.6	42

Source: GWF 2003b

The data provided in **Table 4** indicates that the startup/shutdown emissions limits being requested are conservative for NO_x and very conservative for CO. However, the startup/shutdown event emissions may increase over time as the turbines age, or may vary more than what was found during the limited number of startups/shutdowns emission tests.

Therefore, staff has determined that the requested emission limits are reasonable over the life of the project.

The project owner is also requesting that the limit of 250 startups/shutdowns per turbine per year be removed and that the time limit per startup/shutdown event be removed. This will allow the project owner the operating flexibility that may be necessary for this peaking power plant. Additionally, the project owner is requesting that Conditions AQ-21, 22 and 23 be modified to explicitly state that startup/shutdown emissions are included in the daily, quarterly, and annual emission totals.

Impact Analysis

PM_{10} Emissions Amendment

The project owner has requested that the emissions limits for PM_{10} be lowered and that offset requirements be lowered accordingly. This request does not change the emission impacts for other criteria pollutants either solely or cumulatively. The maximum project related operational PM_{10} emissions impacts, as shown in the staff assessment (CEC 2001), would be reduced. Therefore, staff has determined that the proposed modifications will not result in significant project impacts.

Startup/Shutdown Amendment

The requested changes to the startup/shutdown emission limits from both turbines to per turbine do not affect the worst-case short-term NO_2 or CO modeling results. The commissioning emissions modeling analysis performed for project licensing used higher hourly emissions for NO_x and CO than the emissions now being proposed for startup/shutdown (130 lbs/hour vs. 52 lbs/hour for NO_x and 216 lbs/hour vs. 84 lbs/hour for CO) and showed no significant project impacts (CEC 2001). Also, the maximum daily and annual emission limits, which include startup/shutdown emissions, will remain unchanged, so the annual NO_x modeling results will not change. Therefore, staff has determined that the proposed modifications will not result in significant environmental impacts.

Mitigation

PM_{10} Emissions Amendment

The Project Owner is requesting that the lower PM_{10} emission limits be used to reduce the offset burden for the TPP. The project owner's requested revisions to the offset requirements are shown in **Table 5**.

Table 5 – Proposed Changes to the TPP PM_{10} Emission Offset Requirements[a]

	Original Offsets	Proposed Offsets
District Offset Requirement (AQ-62)	135,600 lbs/year	24,136 lbs/year
Staff Offset Requirement (AQ-C4)	29,200 lbs/year	29,200 lbs/year
Total Offsets	164,800 lbs/year	53,336 lbs/year

Source: GWF 2003b/District 2003
Note(s):
a. Facility totals (two turbines).

A comparison of the annual PM_{10} emission limits presented earlier in **Table 1** and the PM_{10} emission offset requirements presented in **Table 5** shows that the emission offsets are being reduced in the same amount as the annual emission limit reduction.

As a result of the reduced annual emission limit, the PM_{10} offsets required by the District may be reduced to 24,136 lbs/year, or 6,034 lbs/quarter. The project owner has already provided 29,200 lb/year of PM_{10} offsets, as they proposed, to comply with Condition of Certification AQ-C4. This requested change results in a new total (District + CEC) offset requirement of 53,336 lbs/year of PM_{10} emissions, reducing the original estimated offset total of 164,800 lbs/year by 111,464 lbs/year. The project owner has provided the PM_{10} offsets for the project using both PM_{10} ERCs at a ratio of 1.2:1.0 and 1.5:1.0 and an interpollutant offset trade of SO_2 for PM_{10} at an offset ratio of 2.5:1.0 (2.5 lbs of SO_2 ERCs per lb of PM_{10} offset) (CEC 2001). The applicant has surrendered PM_{10} ERC Certificates N-282-4, N-306-4, and N-307-4, which have been formally retired by the District, to comply with the requirements of Condition of Certification AQ-C4, and they will use a small amount of ERC Certificate N-350-5 (formerly Certificate N-130-5), using a 2.5:1 SO_2 to PM_{10} offset ratio, to cover the rest of the PM_{10} offset burden (Wheeler 2003). These two ERC Certificates are from emission reductions that occurred within San Joaquin County. The project owner will recover the other PM_{10} and SO_2 ERCs previously identified for the PM_{10} offset package (CEC 2001, p. 5-46 AIR QUALITY Table 25).

Startup/Shutdown Amendment
Revisions to the startup/shutdown hourly emission limits, and deletion of the maximum number of startup events and the time limit per startup/shutdown event have not caused a request to modify the quarterly or annual emission limits. Therefore, the requested modifications to the startup/shutdown emission and event limits do not require any revisions to the existing offset mitigation package.

Conclusions and Recommendations

PM_{10} Emissions Amendment
The owner of the Tracy Peaker Project, GWF Energy LLC, is proposing to lower the PM_{10} emission limits and reduce the total PM_{10} emission reduction credits required accordingly. The available source test data supports the proposal to lower the PM_{10} emission estimates for the plant. The emission offset reduction will result in no net change to the projects PM_{10} mitigation. Therefore, staff agrees with the owner's PM_{10} emissions amendment proposal, with the necessary revisions to the Conditions of Certification.

Startup/Shutdown Amendment

Revision of the startup/shutdown hourly emission limits from a both turbine basis to a per turbine basis corrects the condition to reflect the project owner's original startup/shutdown emission proposal. Additionally, the maximum daily and annual emission limits will remain unchanged, so that the elimination of limitation on the maximum number of startup/shutdown events does not cause any daily or annual emissions impacts, and the increase in the maximum hourly NO_x and CO startup/shutdown emission limits will not cause exceedances of ambient air quality standards. The elimination of the limitation on the

maximum number of startup/shutdown events and the elimination of the time limits per startup/shutdown do not cause any changes to the maximum hourly, daily, or annual emissions limits, and the addition of text clarifying that the startup/shutdown emissions are included in the accounting for all emission limitations does not change any emission limits or impacts. Therefore, staff agrees with the owner's startup/shutdown amendment proposal, with the necessary revisions to the Conditions of Certification.

Conditions of Certification

The purpose for each change is as follows:

Condition	Purpose for Change
AQ-17	Revises/corrects the startup/shutdown emissions basis to a per turbine basis.
AQ-18	Deletes the limitation on the time frame for a startup/shutdown and the number of startup/shutdown events allowed per year.
AQ-20	Reduces the maximum per turbine hourly PM_{10} emission limit from 10.4 lbs/hr to 3.3 lbs/hour.
AQ-21	Reduces the maximum daily per turbine PM_{10} emissions limit from 249.6 lbs/day to 80 lbs/day. Adds implicit statement that startup/shutdown emissions are included in the daily emission limits.
AQ-22	Revises the quarterly combined turbine PM_{10} emission limit from 41,200 lbs/year to 13,333 lb/quarter. Adds implicit statement that startup/shutdown emissions are included in the annual emission limits.
AQ-23	Revises the annual combined turbine PM_{10} emission limit from 164,800 lbs/year to 53,334 lb/quarter. Adds implicit statement that startup/shutdown emissions are included in the quarterly emission limits.
AQ-30	Corrects condition by deleting reference to PM_{10}. PM_{10} source test requirements are provided in AQ-29.
AQ-58	Minor correction to the condition proposed by the District.
AQ-62	Reduces the District's PM_{10} offset requirement from 33,900 to 6,034 lbs/quarter to reflect the emission limit reductions provided in revised conditions AQ-22 and AQ-23. This does not change the additional CEC offset requirement provided in AQ-C4.

The conditions of certification to be revised are shown below. Revisions are shown in redline/strikeout. (*It should be noted that the Districts made additional minor modifications/corrections to the conditions that are provided below.)*

AQ-17 During a startup and a shutdown of a gas turbine engine, the emissions from the gas turbine engine shall not exceed the following: NO_x (as NO_2): 26 pounds in any one hour and CO: 42 pounds in any one hour. [California Environmental Quality Act]

Verification: The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-40**.

AQ-18 A startup event is defined as the period beginning with turbine initial firing until the unit meets the lb/hr and ppmvd emission limits in AQ-20. A shutdown event is defined as the period beginning with initiation of turbine shutdown sequence and ending with cessation of firing of the gas turbine engine. [District Rule 2201]

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Deleted: Startup of the CTG shall not exceed a time period of 20 minutes each per occurrence. Shutdown of the CTG shall not exceed a time period of 30 minutes each per occurrence. Startup and shutdown events shall not exceed 250 occurrences per calendar year.

Verification: The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-40**.

AQ-20 Emissions from this unit, except during startup and shutdown events, shall not exceed any of the following: NO_x (as NO_2) – 26.45 lb/hr and 5.0 ppmvd @ 15% O_2; VOC (as methane) – 2.42 lb/hr and 2.0 ppmvd @ 15% O_2; CO – 26.57 lb/hr and 6.0 ppmvd @ 15% O_2; PM_{10} – 3.3 lb/hr; and SO_x (as SO_2) - 0.78 lb/hr. All emission concentration limits are three-hour rolling averages. [District Rules 2201, 4001, and 4703]

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Verification: The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-40**.

AQ-21 Emissions from this unit, including emissions from startup events and shutdown events, shall not exceed any of the following: NO_x (as NO_2) –493.3 lb/day; VOC – 42.4 lb/day; CO – 235.7 lb/day; PM_{10} – 80 lb/day; and SO_x (as SO_2) – 18.7 lb/day. [District Rule 2201]

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Verification: The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-40**.

AQ-22 Combined quarterly emissions from N-4597-1 and N4597-2, including emissions from startup events and shutdown events, shall be calculated for each calendar quarter and shall not exceed any of the following: NO_x (as NO_2) – Q1: 76,704 lb, Q2: 76,704 lb, Q3: 76,756 lb, Q4: 76,756 lb; VOC – Q1: 6,676 lb, Q2: 6,676 lb, Q3: 6,680 lb, Q4: 6,680 lb; and PM_{10} – Q1: 13,333 lb, Q2: 13,333 lb, Q3: 13,333 lb, Q4: 13,333 lb. [District Rule 2201]

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Verification: The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-40**.

AQ-23 Combined annual emissions from N-4597-1 and N-4597-2, including emissions from startup events and shutdown events, calculated on a twelve consecutive month rolling basis shall not exceed any of the following: NO_x (as NO_2) – 306,920 lb/year; VOC – 26,712 lb/year; and PM_{10} – 53,334 lb/year. [District Rule 2201]

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Verification: The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-40**.

AQ-30 Source testing of startup NOx, CO, and VOC mass emission rates shall be conducted for one of the gas turbine engines (N-4597-1 or N-4597-2) upon initial operation and at least once every seven years thereafter by District witnessed in-situ sampling of exhaust gases by a qualified independent source test firm. CEM relative accuracy shall be determined during startup source testing in accordance with District approved protocol. [District Rule 1081]

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Verification: The results and field data collected during source tests shall be submitted to the CPM and the District within 60 days of testing. Testing shall be conducted within 60 days of initial operation of one CTG and at least once every seven years.

AQ-58 The owner shall submit an application for a Permit to Operate to comply with Rule 2520 - Federally Mandated Operating Permits prior to the implementation of the Authority to Construct to a Permit to Operate. [District Rule 2520]

Verification: The project owner/operator shall file their application with the District prior to implementing this Authority to Construct.

AQ-62 Offsets shall be provided in the amount that will mitigate the increase in NOx emissions of 71,730 pounds per calendar quarter, the increase in VOC emissions of 1,678 pounds per calendar quarter, and the increase in PM10 emissions of 6,034 pounds per calendar quarter. [District Rule 2201]

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Verification: The project owner/operator shall submit to the District written documentation that all necessary offsets have been acquired, or that binding contracts to secure such offsets have been entered into, at least 30 days prior to commencement of construction.

REFERENCES

California Energy Commission (CEC) 2001. Tracy Peaker Project Staff Assessment, December, 2001.

California Energy Commission (CEC) 2002. Commission Decision – Tracy Peaker Project, July, 2002.

GWF Energy LLC (GWF) 2003a. Applicant's Petition for Minor Amendment to Tracy Peaker Project (01-AFC-16). Tracy Peaker Project, February 2003.

GWF Energy LLC (GWF) 2003b. Applicant source test summary data from the Avogadro Group transmitted by Mark Kehoe, GWF, to William Walters, Aspen. June 2003.

San Joaquin Valley Air Pollution Control District (District) 2003. Revised Authority to Construct for the Tracy Peaker Project. June 9, 2003.

Wheeler 2003. Record of conversation between Doug Wheeler GWF, David Stein URS and William Walters, Aspen. March 14 & 18, and June 11, 2003.