

**CALIFORNIA ENERGY COMMISSION**

1516 NINTH STREET  
SACRAMENTO, CA 95814-5112

**DATE:** June 24, 2003  
**TO:** Interested Parties  
**FROM:** Lance Shaw, Compliance Project Manager  
**SUBJECT: Henrietta Peaker Project (01-AFC-18C)  
Staff Analysis of Proposed Modifications To Air Quality Conditions  
of Certification**

On February 6, 2003, the California Energy Commission (Energy Commission) received a request from GWF Energy LLC (GWF), to amend the Energy Commission Decision for the Henrietta Peaker Project.

The Henrietta Peaker Project is a nominal 91.4 MW natural gas-fired power plant that began commercial operation in March, 2003. The facility is located west of Lemoore, in an unincorporated part of Kings County, CA. It is within the boundaries of the San Joaquin Valley Air Pollution Control District (District).

The proposed modifications will allow GWF to reduce PM10 emission limits, and subsequently, to lower the amount of PM10 emission reduction credits that GWF is required to surrender to the District to mitigate the project's PM10 emission impacts. The proposed modifications will also clarify and simplify the methodology for tracking and reporting emissions during startups and shutdowns and eliminate the restriction on the number of startups and shutdowns.

These modifications have been approved by the District and a revised Authority to Construct was issued on January 2, 2003.

Energy Commission staff reviewed the proposed petition and assessed the impacts of this proposal on environmental quality, public health and safety. Staff proposes revisions to existing conditions of certification for air quality (AQ-17, AQ-18, AQ-20, AQ-21, AQ-22, AQ-23, AQ-30, AQ-59 and AQ-62). It is the Energy Commission staff's opinion that, with the implementation of revised conditions, the project will remain in compliance with applicable laws, ordinances, regulations, and standards and that the proposed modifications will not result in a significant adverse direct or cumulative impact to the environment (Title 20, California Code of Regulations, Section 1769).

The air quality staff analysis is attached for your information and review. Energy Commission staff intends to recommend approval of the petition at the July 23, 2003 Business Meeting of the Energy Commission. If you have comments on this proposed project change, please submit them to me at the address above prior to July 23, 2003. If you have any questions, please call me at (916) 653-1227 or e-mail at [lshaw@energy.state.ca.us](mailto:lshaw@energy.state.ca.us)

Attachment

# **REQUEST TO AMEND THE HENRIETTA PEAKER PROJECT (HPP) 01-AFC-18 Amendment Request 1**

On February 5, 2003, GWF Energy, LLC (Project Owner) proposed an amendment to the Henrietta Peaker Project (HPP) (GWF 2003). This amendment request seeks to do the following:

- Decrease the total allowable Particulate Matter 10 microns in diameter or smaller (PM<sub>10</sub>) emission rates (lb/hr, lb/day, and lb/year) based on compliance source testing; and decrease the total PM<sub>10</sub> emission reduction credits (ERCs) required to offset the reduced PM<sub>10</sub> emission rates.
- Revise the startup/shutdown emission limits from a lb/hr basis to a lb/event reporting basis; and eliminate the limitation on the number of annual startup/shutdown events.

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

On January 2, 2003 the San Joaquin Valley Air Pollution Control District (District) issued a revised Permit to Operate for the HPP (District 2003), which included the requested changes to the HPP startup/shutdown emission limits, PM<sub>10</sub> hourly, daily, and annual emission limits, and eliminated the limitation on the maximum number of startups/shutdowns per year.

## *Background*

In August 2001, GWF Energy LLC proposed to construct and operate a 91.4 MW simple cycle power plant to be located west of the City of Lemoore, in Kings County. The Henrietta Peaker was certified in March 2002 (CEC 2002). The project design includes two natural gas fired General Electric LM6000 PC Sprint combustion turbine generators (CTG) and a diesel fired emergency generator.

The HPP began operations during the summer of 2002.

## *Laws, Ordinances, Regulations, And Standards*

The California State Health and Safety Code, section 41700, requires that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health, or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.”

## Emissions Analysis

### PM<sub>10</sub> Emissions Amendment

The PM<sub>10</sub> 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<sub>x</sub>, CO, VOC, and SO<sub>x</sub>). The requested revisions to the PM<sub>10</sub> turbine operating emission limits and offset requirements are shown in **Table 1**.

**Table 1 – Proposed Changes to the HPP PM<sub>10</sub> Emission Limits<sup>a</sup>**

Parameter	Original Turbine Emissions Limit	Proposed Turbine Emissions Limit	Emissions Limit Decrease
Hourly Emissions Limit	6.6 lbs/hr	4.0 lbs/hr	2.6 lbs/hr
Daily Emissions Limit	158.4 lbs/day	96.0 lbs/day	62.4 lbs/day
Annual Emissions Limit	52,800 lbs/year	32,000 lbs/year	20,800 lbs/year

Source: GWF 2003

Note(s)

a. Two turbine facility totals.

A copy of the Source Test Report 2002 Emission Compliance Tests and CEMS Certification (Avogadro 2002a) was submitted with the amendment request. Staff has reviewed the available emission source test data and provides a comparison of these values with the project owner proposed PM<sub>10</sub> emission limits in **Table 2**.

**Table 2 – HPP Turbine PM<sub>10</sub> Emissions Comparison**

Turbine	Compliance Source Test Data		Proposed Limits	
	Lb/hour	Lb/day	Lb/hour	Lb/day
Turbine 1 <sup>a</sup>	0.938	22.50	2.0	48.0
Turbine 1 <sup>b</sup>	0.426	10.23	2.0	48.0
Turbine 2 <sup>a</sup>	1.207	28.96	2.0	48.0
Turbine 2 <sup>b</sup>	0.564	13.54	2.0	48.0

Source: Avogadro 2002a, Avogadro 2002b.

Note(s): ND-No Data

a. Compliance testing performed July-August 2002 at 100% load conditions (Avogadro 2002a).

b. Compliance testing performed in June 2002 (Avogadro 2002b).

The data provided in **Table 2** indicates that the revised PM<sub>10</sub> emission rate assumption used by the project owner appears to be conservative based on the available compliance source test data. Staff believes that proposed hourly, daily, and annual emission limits for PM<sub>10</sub>, which are higher than the source test result values, are both conservative and reasonable.

## Startup/Shutdown Amendment

The startup or shutdown of a turbine can result in NO<sub>x</sub>, CO, and VOC emissions that are temporarily higher than the maximum emissions that occur during normal turbine operating modes. PM<sub>10</sub> and SO<sub>2</sub> emissions are not elevated during startup/shutdown conditions. Therefore, any amendments to the startup/shutdown conditions can only effect the NO<sub>x</sub>, CO, and VOC emissions. The requested revisions to the startup/shutdown emissions basis (from lb/hr to lb/event) and the available startup/shutdown source test data are shown in **Table 3**.

**Table 3 – Proposed Changes to the HPP Turbine Startup/Shutdown Basis**

Parameter	Pollutant	Original Emissions Limit	Proposed Emissions Limit
Startup and Shutdown Emission Limits (both Turbines)	NO <sub>x</sub>	15.4 lb/hr	15.4 lb/event <sup>a</sup>
	CO	15.4 lb/hr	15.4 lb/event <sup>a</sup>
	VOC	1.4 lb/hr	1.4 lb/event <sup>a</sup>
Maximum Number of Startups/Shutdowns (per Turbine)	NO <sub>x</sub> CO VOC	300 startups and shutdowns <sup>a</sup>	No limit

Source: GWF 2003. Avogadro 2002a, Avogadro 2002b.

Note(s):

a. Individual events are less than one hour in duration, and it is possible to have more than one startup/shutdown event per turbine per hour. Therefore, changing the emissions limit from a lb/hr basis to a lb/event basis effectively increases the hourly NO<sub>x</sub>, CO and VOC emission limits during hours with one or more startup/shutdown events.

According to the project owner, changing the limit to a “per event” basis would avoid the need to apply the startup/shutdown limits to two clock hours when a startup or shutdown begin at the end of a clock hour, and would clarify the measurement and enforceability of the limits (GWF 2003). Additionally, the project owner has indicated that for the determination of maximum hourly operating emissions, the total number of startup and/or shutdown events could be no higher than four (i.e. two startup/shutdown cycles) per turbine per hour (Wheeler 2003). Using this revised emission limit basis and the number of potential startup/shutdown events per hour, the facility wide maximum hourly turbine emissions for NO<sub>x</sub>, CO and VOC would be four times higher than those currently listed in Condition AQ-17 (61.6 lbs/hr of NO<sub>x</sub>, 61.6 lbs/hour of CO and 5.6 lbs/hr of VOC).

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

**Table 4 – HPP Turbine Startup/Shutdown Emissions Comparison**

Pollutant	Turbine	Source Test Results		Proposed Limit (lb/event)
		Startup (lb/event)	Shutdown (lb/event)	
NO <sub>x</sub>	Turbine 1 <sup>a</sup>	ND	ND	15.4
	Turbine 1 <sup>b</sup>	3.695	3.824	
	Turbine 2 <sup>a</sup>	2.549	0.634	
	Turbine 2 <sup>b</sup>	2.058	4.201	
CO	Turbine 1 <sup>a</sup>	ND	ND	15.4
	Turbine 1 <sup>b</sup>	0.330	0.075	
	Turbine 2 <sup>a</sup>	0.195	0.120	
	Turbine 2 <sup>b</sup>	0.452	0.046	
VOC	Turbine 1 <sup>a</sup>	ND	ND	1.4
	Turbine 1 <sup>b</sup>	ND	ND	
	Turbine 2 <sup>a</sup>	0.194	0.083	
	Turbine 2 <sup>b</sup>	ND	ND	

Source: Avogadro 2002a, Avogadro 2002b.

Note(s): ND-No Data

a. Compliance testing performed July-August 2002 at 100% load conditions (Avogadro 2002a).

b. Compliance testing performed in June 2002 (Avogadro 2002b).

The data provided in **Table 4** indicates that the startup/shutdown event emissions limits being requested are very conservative. However, the startup/shutdown event emissions may increase over time as the turbines age, and the current startup/shutdown NO<sub>x</sub> emissions limit could be exceeded if more than 4 startup/shutdown events total (2 per turbine) would occur in any given hour. Therefore, staff is willing to accept that the requested per event emission limits may be reasonable over the life of the project.

The project owner is also requesting that the limit of 300 startups/shutdowns be removed. This will allow the project owner the operating flexibility that may be necessary for this peaking power plant. The project owner is not requesting to increase maximum daily and annual emission limits. Additionally, the project owner is requesting that Condition AQ-21 be modified to explicitly state that startup/shutdown emissions be included in the measurement of annual emissions.

## ***Impact Analysis***

### **PM<sub>10</sub> Emissions Amendment**

The project owner has requested that the emissions limits for PM<sub>10</sub> 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<sub>10</sub> emissions impacts, as shown in the staff assessment (CEC 2001), would be reduced. Therefore, staff does not believe that this amendment request would result in significant project impacts.

### Startup/Shutdown Amendment

The requested changes to the startup/shutdown emission levels from lb/hr to lb/event will only impact the worst-case short-term NO<sub>2</sub> modeling results. The commissioning emissions modeling analysis performed for project licensing used higher hourly emissions for CO than the emissions now being proposed for startup/shutdown (88 lbs/hour vs. 61.6 lbs/hour) and showed no project impacts (CEC 2001). Also, the maximum daily and annual emission limits, which include startup/shutdown emissions, will remain unchanged, so the annual NO<sub>x</sub> modeling results will not change. Staff's estimate of the worst-case 1-hour NO<sub>x</sub> startup emission impact is provided in **Table 5**.

**Table 5 – Worst-Case Startup Modeling Results**

Pollutant	Averaging Period	Project Impact (µg/m <sup>3</sup> ) <sup>a</sup>	Background (µg/m <sup>3</sup> )	Total Impact (µg/m <sup>3</sup> )	Limiting Standard (µg/m <sup>3</sup> )	Type of Standard	Percent of Standard
NO <sub>2</sub>	1-Hour	32.3	165	197	470	CAAQS	42

Background Source: CEC 2001

a. The project impact is based on an emissions ratio (61.6 lbs/hour worst case startup/shutdown emissions divided by 52 lbs/hour worst case modeled commissioning emissions) of the commissioning emissions modeling analysis results, which assumed a stack temperature and velocity of 594°F and 14.76 m/s, respectively. (The normal operating stack temperatures and velocity are approximately 800°F and 40 m/s)

**Table 5** shows that the requested revision to the startup emissions does not have the potential to cause new exceedances of ambient air quality standards. Therefore, staff does not believe that this amendment request would result in a potentially significant project impact.

### Mitigation

#### PM<sub>10</sub> Emissions Amendment

The Project Owner is requesting that these new lower PM<sub>10</sub> emission limits be used to reduce the offset burden for the HPP. The project owner's requested revisions to the offset requirements are shown in **Table 6**.

**Table 6 – Proposed Changes to the HPP PM<sub>10</sub> Emission Offset Requirements<sup>a</sup>**

	Original Offsets	Proposed Offsets
District Offset Requirement (AQ-2)	23,600 lbs/year	2,800 lbs/year
Staff Offset Requirement (AQ-C3)	29,200 lbs/year	29,200 lbs/year
Total Offsets	52,800 lbs/year	32,000 lbs/year

Source: GWF 2003

Note(s):

a. Two turbine facility totals.

A comparison of the annual PM<sub>10</sub> emission limits presented earlier in **Table 1** and the PM<sub>10</sub> emission offset requirements presented in **Table 6** 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<sub>10</sub> offsets required by the District may be reduced to 2,800 lbs/year, or 700 lbs/quarter. The project owner has already provided 29,200 lb/year of PM<sub>10</sub> offsets, as they proposed, to fully offset the project and comply with Condition of Certification AQ-C3. This requested change results in a new offset requirement of 32,000 lbs/year of PM<sub>10</sub> emissions, reducing the original estimated offset total of 52,800 lbs/year by 20,800 lbs/year. The project owner is using an interpollutant offset trade of SO<sub>2</sub> for PM<sub>10</sub> at an offset ratio of 1.9:1.0 (1.9 lbs of SO<sub>2</sub> ERCs per lb of PM<sub>10</sub> offset). This means that the total amount of SO<sub>2</sub> ERCs required to offset the PM<sub>10</sub> emissions will drop from 100,320 lbs/year (52,800 x 1.9) to 60,800 lbs/year (32,000 x 1.9). The project's PM<sub>10</sub> emissions will remain fully mitigated.

### **Startup/Shutdown Amendment**

The requested amendment to the startup/shutdown emissions basis (per event rather than per hour) and elimination of the maximum number of startup events have not caused a request for additional annual emissions of NO<sub>x</sub>, CO, or VOC. Therefore, the requested startup/shutdown amendment does not require any revisions to the existing offset mitigation package.

### ***Conclusions and Recommendations***

#### **PM<sub>10</sub> Emissions Amendment**

The owner of the Henrietta Peaker Project, GWF Energy LLC, is proposing to lower the PM<sub>10</sub> emission limits and reduce the total PM<sub>10</sub> emission reduction credits required accordingly. The available source test data supports the proposal to lower the PM<sub>10</sub> emission estimates for the plant. The emissions reductions will result in a small improvement in local PM<sub>10</sub> impacts from the plant, and the corresponding emission offset reduction will result in no net change to the projects PM<sub>10</sub> mitigation. Therefore, staff conditionally agrees with the owner's PM<sub>10</sub> emissions amendment proposal, with the necessary revisions to the Conditions of Certification.

#### **Startup/Shutdown Amendment**

Revisions to the startup/shutdown emission limits from lb/hr to lb/event increases the worst-case short-term emission potential for NO<sub>x</sub>, CO, or VOC by a factor of four. However, 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<sub>x</sub>, CO, or VOC emissions will not cause exceedances of ambient air quality standards. Therefore, staff conditionally 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-2	Revises quarterly District offset requirements for PM <sub>10</sub> based on the reduced emission limits.
AQ-17	Revises startup/shutdown emissions basis from lb/hour to lb/event.
AQ-18	Deletes the limitation on the number of startup/shutdown events per year. Adds a limitation on the number of startup/shutdown events in one hour.
AQ-19	Revises the maximum per turbine hourly PM <sub>10</sub> emission limit from 3.3 lbs/hr to 2.0 lbs/hour.
AQ-20	Revises the maximum daily per turbine PM <sub>10</sub> emissions limit from 79.2 lbs/day to 48.0 lbs/day.
AQ-21	Revises the definition of maximum annual emissions to include startup and shutdown emissions, and revises the annual per turbine PM <sub>10</sub> emission limit from 26,400 lbs/year to 16,000 lb/year.

The conditions of certification to be revised are shown below. Revisions are shown in redline/strikeout. Staff edits to condition **AQ-18** include correcting the condition number referenced and defining the maximum number of hourly startup/shutdown events. *(It should be noted that the Districts offset condition (AQ-2) shows the NO<sub>x</sub> offset requirement as the quantity of ERCs required at an offset ratio of 1.5:1 and shows the PM<sub>10</sub> offset requirement as the baseline offset quantity prior to the application of appropriate offset ratios.)*

**AQ-2** Upon implementation of C-3929-1-0 and C-3929-2-0, emission offsets shall be provided to offset emissions increases in the following amounts: PM<sub>10</sub> - Q1: ~~8500~~700 lb, Q2: : ~~8500~~700 lb, Q3: : ~~8500~~700 lb, and Q4: : ~~8500~~700 lb and NO<sub>x</sub> (as NO<sub>2</sub>) - Q1: 29,055 lb, Q2: 30,210 lb, Q3: 30,210 lb, and Q4: 29,055 lb. Offsets shall be provided at the appropriate offset ratio specified in Rule 2201. SO<sub>x</sub> offsets provided to offset PM<sub>10</sub> increases shall be at a ratio of 1.4:1 at the appropriate distance ratio. [District Rule 2201]

**Verification:** The project owner/operator shall submit copies of ERCs surrendered to the SJVAPCD in the amounts shown above to the CPM prior to initiation of project construction.

**AQ-17** During startup or shutdown of any gas turbine engine, combined emissions from the two gas turbine engines (C-3929-1 and C-3929-2) shall not exceed the following: NO<sub>x</sub> (as NO<sub>2</sub>) - 15.4 lb, CO - 15.4 lb, and VOC - 1.4 ~~in any one hour~~ lb per event . [California Environmental Quality Act]

**Verification:** The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-31**.

**AQ-18** A ~~S~~startup event is defined as the period beginning with turbine initial firing until the unit meets the lb/hr and ppmvd emission limits in Condition **AQ-**



**2419.** 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. Startup and shutdown of gas turbine engine shall not exceed a time period of one hour per occurrence. The number of startups and shutdowns shall not exceed 4 events per hour (i.e. two startup/shutdown cycles). ~~Startup and shutdown events shall not exceed 300 occurrences per calendar year.~~[District Rule 2201]

**Verification:** The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition AQ-31.

**AQ-19** Emission rates from this unit, except during startup and shutdown events, shall not exceed any of the following: NO<sub>x</sub> (as NO<sub>2</sub>) – 6.21 lb/hr and 3.6 ppmvd @ 15% O<sub>2</sub>; VOC (as methane) – 1.17 lb/hr and 2.0 ppmvd @ 15% O<sub>2</sub>; CO – 6.25 lb/hr and 6.0 ppmvd @ 15% O<sub>2</sub>; PM<sub>10</sub> - ~~3.3~~2.0 lb/hr; or SO<sub>x</sub> (as SO<sub>2</sub>) - 0.33 lb/hr. All emission concentration limits are three-hour rolling averages. [District Rules 2201, 4001, and 4703]

**Verification:** The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-31**.

**AQ-20** Maximum daily emissions from this unit shall not exceed any of the following: NO<sub>x</sub> (as NO<sub>2</sub>) –150.5 lb/day; VOC – 28.1 lb/day; CO – 151.5 lb/day; PM<sub>10</sub> - ~~79.2~~48.0 lb/day; and SO<sub>x</sub> (as SO<sub>2</sub>) - 7.9 lb/day. [District Rule 2201]

**Verification:** The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-31**.

**AQ-21** Maximum annual emissions from this unit, including startup and shutdown emissions, shall not exceed any of the following: NO<sub>x</sub> (as NO<sub>2</sub>) – 49,510 lb/year; VOC – 2,844 lb/year; CO – 21,830 lb/year; PM<sub>10</sub> – ~~26,400~~16,000 lb/year; and SO<sub>x</sub> (as SO<sub>2</sub>) – 2,640 lb/year. [District Rule 2201]

**Verification:** The project owner/operator shall provide records of compliance as part of the quarterly reports of Condition **AQ-31**.