Formosa Plastics

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April 29, 2013

Mr. David Garcia
Acting Director, Multimedia
Planning and Permitting Division
U.S. EPA Region 6, 6PD
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

RE: EPA Request for Information
Greenhouse Gas Permit Application
Formosa Plastics Corporation, Texas
2012 Expansion Project: Two Gas Turbines
Point Comfort, Calhoun County, Texas

Dear Mr. Garcia:

This letter is in response to your letter dated April 9, 2013, requesting supplemental information related to FPC TX's Greenhouse Gas (GHG) permit application for two combined cycle gas turbines (Turbines). The attachment to this letter provides the supplemental information you have requested.

Also, as it relates to the Biological Assessment and Cultural Resources Reports, FPC TX has performed a preliminary biological assessment analysis. FPC TX continues to work on finalizing the reports as required for EPA to issue a final GHG permit. The Biological Assessment and Cultural Resources Reports will be forthcoming in a few weeks.

Should you have any questions regarding this application, please contact myself at tammyl@fdde.fpcusa.com, or 302-836-2241 or Ms. Karen Olson of Zephyr Environmental Corporation, at kolson@zephyrenv.com or 512-879-6618.

Sincerely,

Tammy G Lasater

Tammy G. Lasater

Enclosure

Attachment

The following is provided in response to the information request in EPA letter dated April 9, 2013. Each request for information is repeated below in bold italics followed by FPC TX response and supplemental information. To clarify the responses when responses are required for multiple sub-questions contained in EPA question, those sub-questions have been organized into the bullets below and responded to individually.

Before addressing the specific request for information, FPC TX provides the following general comment for EPA to consider in conjunction with the specific responses provided to the specific requests for information in EPA's letter dated April 9, 2013.

FPC TX General Comment:

The proposed facilities are two combined cycle (CC) gas turbines. There are many individual design and operational elements which contribute to the overall energy efficiency of CC turbines. The interrelationship and interdependence of each of these elements and their effect(s) are important in relation to the aggregate energy efficiency of the CC unit. However, the complexity of the design and operational elements' interrelationship does not allow each element to be considered individually and quantified with confidence as a separate item. This is the reason that on page 28 and 32 of the FPC TX November 30, 2012 application, respectively, FPC TX specifically states that:

> *"The following discussion lists those design elements and operating and maintenance practices that have been considered and selected to maximize energy efficiency. These individual elements are not being individually considered as BACT control options, rather overall unit energy-efficient design and operation is considered the BACT option. The individual elements' effects on overall unit energy efficiency are reflected in the proposed holistic energy efficiency-based BACT limit in Step 5. "*

> *" Since the proposed energy efficiency design options, described in Step 1 above, are not independent features but are interdependent and represent an integrated energy efficiency strategy, FPC TX is proposing a BACT limit for each combined cycle unit which takes into consideration the operation, variability and interaction of all these energy efficient features in combination. A holistic BACT limit which accounts for the ultimate performance of the entire unit was chosen, rather than individual independent subsystem performance. Otherwise, monitoring and maintaining energy efficiency would be un-necessarily complex because the interdependent nature of operating parameters means that one parameter cannot necessarily be controlled independently without affecting the other operating parameters."*

1. ***Please provide supplemental data that includes the efficiency and loading curve of the proposed turbine proposed for this project that supports describing the unit as "efficient turbine design". (this information may be represented graphically in load/efficiency curves). Also, please provide any benchmark data that compares this turbine to similarly designed combustion turbines that have been recently permitted by air permitting authorities nationwide.***

   FPC TX Response:

   As explained in the general comment above, it is not appropriate to assess efficiency of the turbine alone for the reasons above and those listed below. Therefore, FPC TX's response to this request for information is provided in the context of combined cycle operation of similar turbines. :

   - The proposal is to operate the proposed equipment in combined cycle (CC) mode,
   - Combined cycle mode is inherently much more efficient than a turbine operating in simple cycle mode, as acknowledged by EPA in the following Statements of Bases for issued GHG permits:
     - Calpine Corporation, Deer Park Energy Center (DPEC), LLC; permit no. PSD-TX-979-GHG,
     - Channel Energy Center (CEC), LLC; permit no. PSD-TX-955-GHG, and
     - La Paloma Energy Center, LLC; permit no. PSD-TX-1288-GHG.

- The proposed CC turbines are located at an industrial process unit which is a uniquely different service from Electric Utility power generation as explained below:
  - Since the FPC TX Utilities plant does not exclusively provide electricity to the grid, the plant's total electrical and steam generation is primarily established by the variable demand of the FPC TX operating plants at the FPC TX Point Comfort complex. Therefore, the CC units at the Utility plant have to be managed to meet the electrical and steam energy demands of the FPC TX operating plants.
  - Multiple smaller models result in higher overall efficiency of the industrial process unit power generation system because it provides optimum capacity:
    - to manage the system to meet plant operation's needs when one unit is out of service for maintenance because it provides multiple backup capacity
    - to optimize the number of units operating at higher loads (which corresponds to higher efficiencies) to generate the electricity and steam needed by the plant operations at any one time.

- The permit application (pages 34 and 35) provided heat rate benchmark information for similar combined cycle units that were available at the time of the application. As explained in the application heat rate is a direct indicator of combined cycle unit efficiency.

- One additional GHG BACT entry was found for similar units (combined cycle turbines) at industrial process sources based on a current search of EPA's RACT/BACT/LAER Clearinghouse: the Westlake Vinyls Co., LP entry for permit no. PSD-LA-754 issued on December 6, 2011. The GHG BACT for this permit simply lists "good combustion practices" as BACT. FPC TX's proposed BACT for the combined cycle units includes implementation of energy efficient design and operating elements as well as a numeric BACT limit as proposed in Section 6.2.4 of the permit application.

  A recent review of EPA's Region 6 permitting website was performed to benchmark the proposed units against industrial process CC turbines. FPC TX identified three applicants proposing to construct combined cycle turbines at industrial process sources: Air Liquide Large Industries US (Air Liquide), NRG Development Company (NRG) and Copano Processing LP (Copano).

  FPC TX has already provided a detailed comparison of its proposed units to those proposed by Air Liquide on page 35 of the permit application. At this time, no additional information relating to the units proposed by Air Liquide has been posted to the website.

  The NRG permit application is proposing to construct a new utility plant to be co-located with a new polymer plant. The proposed utility plant's capacity is designed to provide steam and electricity to the single low pressure polymer plant. The proposed NRG utility plant will include a combined cycle turbine unit and various other steam producing units (e.g., boilers). The project differs from FPC TX's utility plant expansion in that: the proposed site is a greenfield plant with no existing utility infrastructure and the energy demands are expected to be relatively constant since the unit is only providing energy to one industrial process unit.

  The Copano permit application also requests construction of new combined cycle turbine units at a new gas processing plant. Similar to the NRG units, Copano's combined cycle units are being specifically designed to provide energy to a single plant with relatively constant energy demands.

  In contrast, FPC TX's proposed project is to expand the existing utility plant's generation capacity to support the 2012 Expansion Project, which includes a new LDPE plant and new Olefins 3 and PDH unit at the existing FPC TX site which includes more than one dozen other process units. Therefore, as explained in detail in response to question no. 7 (below), more information regarding FPC TX's selection of turbine model and the pertinent design considerations that are unique to this project (utility plant expansion at an existing industrial source) is provided.

Even so, FPC TX has provided a copy of GE's Performance Curve (attached) for the 7EA turbine showing the relationship of heat rate ratio to turbine load.

2. On page 28 of the permit application, it states that for burner maintenance "there are three basic maintenance levels: combustion inspections, hot gas path inspections, and major overhauls." Please provide supplemental details about each maintenance level such as what is involved, frequency of each level of maintenance, monitoring, and recordkeeping requirements.

<u>FPC TX Response</u>: The following summarizes what is involved for burner and turbine maintenance in combustion inspections, hot gas path inspections and major overhauls:

- Combustion inspections require a disassembly shutdown. During this shutdown inspection is performed on fuel nozzles, liners, transition pieces, crossfire tubes and retainers, sparkplug assemblies, flame detectors and combustor sleeves. Inspections are performed to identify wear, erosion, corrosion, hot spots, cracks, plugging, clearance limits, and to replace consumable and normal wear and tear items such as seals, nuts, bolts, gaskets.

- Hot gas path inspections require that the top half of the turbine shell be removed and involve examination of parts exposed to high temperatures for the hot gases discharged from the combustion process. This includes detailed inspection of turbine nozzles, stator shrouds, turbine buckets, bushings, compressor blades, diffusers, and turbine shell and bushings for wear and tear, cracks, loose and missing parts, plugging, and corrosion.

- Major overhauls involve inspection of all of the major components of the gas turbine and includes elements of the combustion and hot gas path inspections, in addition to completely opening the entire turbine assembly for access to inspect the rotors, compressor blades, bearing assemblies, casing, compressor inlet and flow-path, actuators, gearing, nozzles, diaphragms, buckets for wear and tear, cracks, loose and missing parts, plugging, and corrosion.

Figure 1 illustrates the different scope of the three maintenance efforts.

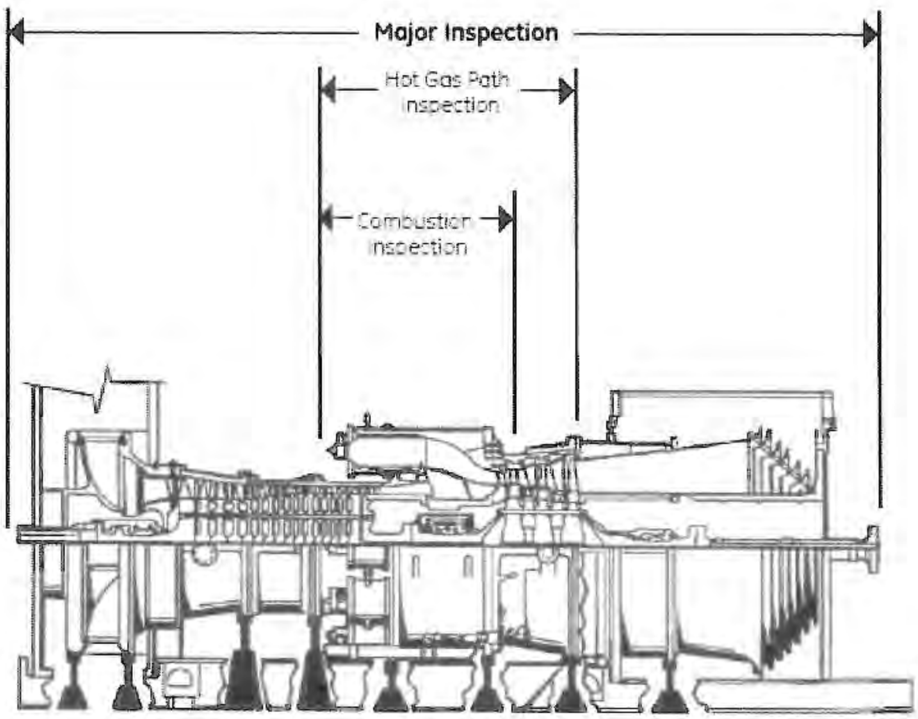

FIGURE 1 – Major Inspection Work Scope[1]

These inspections are generally scheduled based on hours of operation and number of starts and stops on a cycle of the three type of inspections based on the number of run hours (approximately every 12,000 run hours) as follows:

Run time Cycle	Inspection Cycle
The first 12,000 hours	Combustion
Another 12,000 hours	Hot Gas Path
Another 12,000 hours	Combustion
Another 12,000 hours	Major Overhaul

After the Major Overhaul the inspection cycle begins again starting with the Combustion Inspection. Additional maintenance may be required if high vibrations or exhaust temperatures are detected.

Inspections are performed by a third party company performing the field service work. For recordkeeping, the third party company is required to submit a report detailing the

[1] From page 31, Figure 42 of GE Energy document GER-3620L.1, *Heavy-Duty Gas Turbine Operating and Maintenance Considerations*

alignment of the equipment, condition of changed, retained, and replaced parts, and abnormal conditions addressed during the inspection and field service.

3. ***On page 29 of the permit application, it states that "GE Model 7EA combustion turbines have sophisticated instrumentation and controls to automatically control the operation of the combustion turbine ....the control system monitors the operation of the unit and modulates the fuel flow and turbine operation to achieve optimal high-efficiency, low-emissions performance under for full load and part load conditions." Please provide more information pertaining to the automation of the combustion turbine operation that will ensure optimal fuel combustion. Please provide supplemental information that discusses details of what operating parameters will be monitored and how will it be used to determine that the turbines are operating at optimal efficiency and fuel combustion is occurring including temperature and pressure. How will proper air/fuel ratios assured? What type of analyzers will be utilized? Will these analyzers provide continuous monitoring? Will there be manual overrides and alarms to alert on-site personnel to operating abnormalities? What is the company's proposed monitoring strategy (e.g. CEMs)?***

FPC TX Response: To clarify the response to the multiple questions that were contained in EPA question above, they have been organized into the bullets below.

- ***Please provide more information pertaining to the automation of the combustion turbine operation that will ensure optimal fuel combustion. Please provide supplemental information that discusses details of what operating parameters will be monitored and how will it be used to determine that the turbines are operating at optimal efficiency and fuel combustion is occurring including temperature and pressure.***

  FPC TX Response: The GE control system provides optimal fuel combustion by continuously controlling turbine fuel flow, fuel division between the primary and secondary stages of the Dry Low Nox Burner (DLN) combustor and compressor inlet-guide-vane position based on measurements of temperature, speed and compressor discharge pressure.

- ***How will proper air/fuel ratios assured?***

  FPC TX Response: Proper air/fuel ratios are assured through the use of DLN burners which require controlled fuel distribution to primary and secondary stages of the DLN combustor which assures proper air to fuel ratios. See Figure 2 for a diagram of the

DLN gas fuel system. The fuel division is accomplished by a calibrated splitter value to move to a set position based on the calculated combustion reference temperature as illustrated by Figure 3

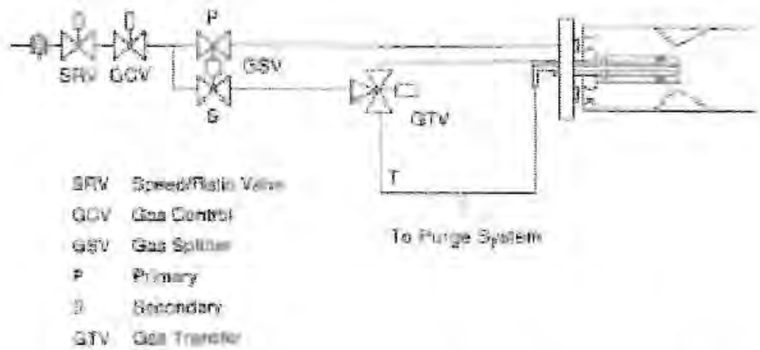

FIGURE 2 – Typical DLN-1 Fuel Gas Split Schedule[2]

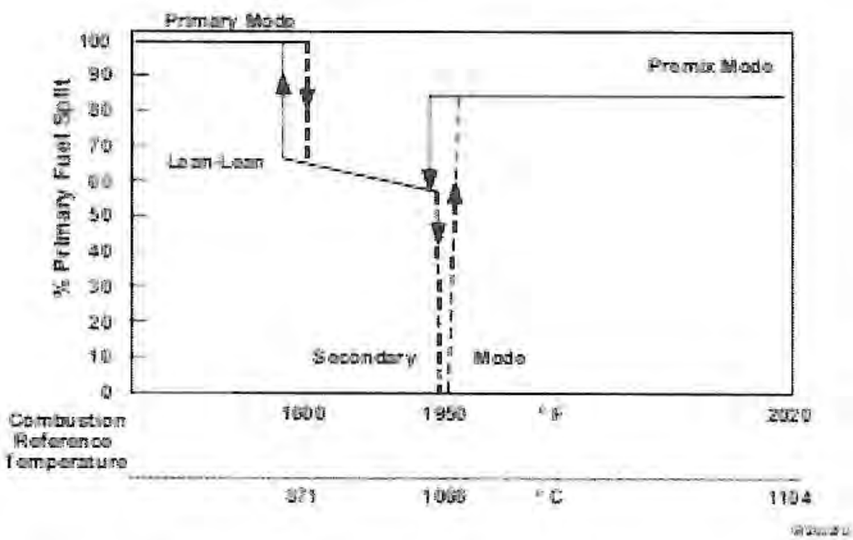

FIGURE 3 – Typical DLN-1 Fuel Gas Split Schedule[3]

[2] From page 6, Figure 8 of GE Power Systems document GER-3586G, *Dry Low NO_X Combustion Systems for GE Heavy-Duty Gas Turbines*

[3] From page 6, Figure 7 of GE Power Systems document GER-3586G, *Dry Low NO_X Combustion Systems for GE Heavy-Duty Gas Turbines*

- ***Will there be manual overrides and alarms to alert on-site personnel to operating abnormalities?***

  FPC TX Response: The control system will alert on-site personnel of issues with combustion or DLN operation mode status.

- ***What is the company's proposed monitoring strategy (e.g. CEMs)?***

  FPC TX Response: Consistent with page 45 of the permit application, FPC TX continues to propose the following as the GHG monitoring approach:

  > *"FPC TX proposes to monitor CO_2 emissions by monitoring the quantity of fuels combusted in the turbines and heat recovery steam generators and performing periodic fuel sampling as required by the applicable provisions of 40 CFR 98 Subpart C as discussed in Section 4. FPC TX expects that this approach will allow for monitoring of GHG emissions in a manner consistent with existing plant operating procedures and the GHG monitoring and reporting requirements applicable to both existing sources and those proposed with this application."*

4. ***On page 29 of the permit application, it states that by firing hydrogen or tail gas (primarily methane and hydrogen) in the HRSG duct burners, FPC TX will be recovering heating value from these process streams that are normally vented or flared, thereby reducing GHG emissions from flaring. Please provide supplemental technical data and supporting calculations that quantifies this reduction in GHG emissions.***

   FPC TX Response: If these fuel gas streams are not burned in the duct burners they would have to be burned in the flare while natural gas would need to be imported to fuel the duct burners.

   To quantify the reduction in emissions, FPC TX is providing the attached emission calculations (Tables 1 & 2) showing the difference between the GHG emissions associated with the two fuel firing scenarios. Scenario One is burning the OL tail gas in the flare and burning imported natural gas in the duct burners. Scenario Two is burning OL tail gas in the duct burners. Note that the hydrogen fuel gas stream is not shown in this analysis as it contains no carbon and as such its combustion does not result in GHG emissions.

5. ***On page 29 of the permit application, it states that the HRSG are heat exchangers designed to capture as much thermal energy as possible from the combustion turbine exhaust gases. If available, please provide any supplemental benchmark data that compares the design of the proposed HRSG to existing or similar sources in the industry. How will heat transfer efficiency be ascertained? What will be monitored and recorded to demonstrate compliance? Also, it is stated that to minimize fouling of the tube surfaces in the HRSG, the filtration of the inlet air to the turbines is performed, and by reducing the fouling, the efficiency is maintained. What operating parameters will be monitored to ensure equipment is operating by design?***

If available, please provide any supplemental benchmark data that compares the design of the proposed HRSG to existing or similar sources in the industry.

<u>FPC TX Response</u>: As stated in the application and in the general comment above, it is not appropriate to evaluate the HRSG portion of the combined cycle unit apart from the overall unit efficiency since the turbine and HRSG operation are integrally related and their efficiency is interdependent. Previous companies that FPC TX has contracted for design of HRSG's are no longer in business, so HRSG specific benchmark data is not available for other models of HRSGs that FPC TX has evaluated for previous combined cycle projects. That being said, FPC TX has provided benchmark data for the CC unit (turbine and HRSG, in aggregate) in response to question 1.

Ongoing HRSG performance will be monitored by comparing actual steam generation to the manufacturer design value.

- ***How will heat transfer efficiency be ascertained?***

<u>FPC TX Response</u>: After construction, manufacturer guarantee is verified using an ASME test method to quantify HRSG performance (heat transfer rates, heat transfer efficiency). Also, as described in response to question 2 above, during turnarounds visual inspections are performed on sections of the HRSG. These inspections would identify signs of fouling and baffling (disrupted exhaust gas flow – under tubes instead of over).

Please see response to questions below for the description of method of monitoring efficiency and implementation of best practices for minimizing fouling, filtration of inlet air provided below

- ***What will be monitored and recorded to demonstrate compliance?***

  FPC TX Response: Again, as discussed in the general comment above the HRSG's design heat transfer efficiency is not intended to be relied upon independently from all the other efficiency elements of the CC unit. Therefore, FPC TX proposes to monitor as described on pages 35 and 45 of the permit application. The data from this monitoring will be used to demonstrate compliance with the proposed CC unit heat rate limits which are a direct metric of the CC unit's aggregate efficiency (i.e., all the energy efficiency design elements associated with heat transfer efficiency).

- ***Also, it is stated that to minimize fouling of the tube surfaces in the HRSG, the filtration of the inlet air to the turbines is performed, and by reducing the fouling, the efficiency is maintained. What operating parameters will be monitored to ensure equipment is operating ~~by~~ [as] design[ed]?***

  FPC TX Response: In addition to the inspections, described in response to question no. 2 above, FPC TX filters the inlet air to prevent additional particles entering the CC turbine equipment and creating potential fouling. There are two stages of gas turbine combustion air filtration (pre-filtration and primary filtration). The pre-filters help minimize fouling of the more expense primary filters. Pre-filters are changed approximately every 2 years. The primary air filters are scheduled to be replaced approximately every 6 to 8 years and as indicated by the differential pressure across the air filters.

6. ***On page 31 of the permit application, it is stated that efficiency of the turbines is increased by superheating the fuel prior to combustion. The proposed BACT analysis on page 32 states that pre-heating will be utilized. Please provide any supplemental data that discusses improved percent increase of operating efficiency for the proposed combustion turbine compared to combustion turbines that do not utilize fuel pre-heating. How will heat transfer efficiency to the fuel be ascertained and assured for the fuel pre-heater?***

FPC TX Response: Fuel preheating is expected to result in increased operating efficiency because the amount of preheat is directly proportional to a reduction in required fuel fired (MMBtu) to raise the temperature of the fuel for combustion.

The increase in efficiency associated with fuel preheating is not expected to be exceptionally large (relative to unit's overall heat rate) and is identified as only one of many design elements which contribute to the overall CC unit energy efficiency. The actual amount of pre-heat is dynamic depending on the fuel gas delivery pressure and composition. See Figure 4 which provides an illustration of a representative relationship between superheat requirements and gas supply pressure.

FPC TX will monitor the temperature of fuel supplied to the turbine to ensure the fuel meets the minimum temperature requirements prior to entering the turbine. The amount of preheat is directly correlated to the temperature of the fuel leaving the fuel gas heat exchanger.

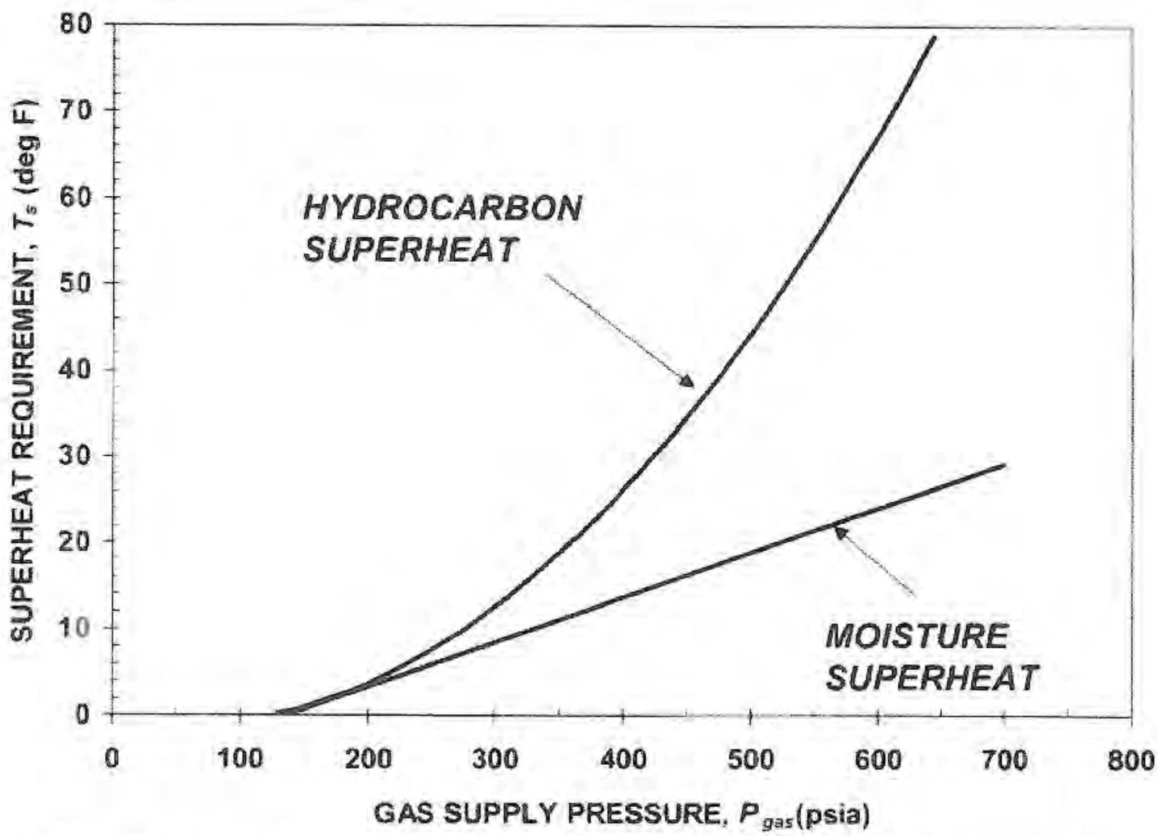

FIGURE 4 – Hydrocarbon and Moisture Superheat Requirements[4]

7. ***On page 32 of the permit application, for the combustion turbine the proposed BACT is the efficient turbine design, but the analysis does not appear to compare the selected turbine model to other available combustion turbines. Since efficient turbine designs can vary among turbines, please provide supplemental data to the BACT analysis that explains if other turbines were evaluated for this project and why***

[4] From page 13, Figure 1 of GEI 4104G, *Specification for Fuel Gases for Combustion in Heavy-Duty Gas Turbines*

they were eliminated. If a more efficient design was evaluated and eliminated, please explain why. Also, please provide supplemental data that explains why the turbines selected are the most efficient for this source.

FPC TX Response: FPC TX chose to use 7EAs for the following reasons:

- The 7EA has equivalent efficiency as other similar alternatives (see answer to question no. 1),
- Since the FPC TX Utilities plant does not provide electricity to the grid, the total electrical generation has to be managed to meet and not exceed the varying demands of the more than one dozen FPC TX operating plants at the Point Comfort Complex. The 7EA electric generation capacity provides the operational flexibility necessary to optimize the number of units operating at higher loads (which corresponds to higher efficiencies) to generate the instantaneous electricity and steam demands of the FPC TX Point Comfort Complex.
- Use of multiple smaller model turbines provide system reliability, since during single unit outage (e.g., service, maintenance) there would still be adequate capacity to manage the system to meet the Complex's energy demands.
- The six existing turbines at the plant are all GE 7EAs. As such, FPC TX has twenty years' experience operating and maintaining this model turbine and its associated monitoring equipment. Since the same model is proposed for the two new CC Turbines, this operating experience will result in more effective and reliable performance results for the new turbines because of more efficient and effective maintenance since there are :
    - Established consistent maintenance practices for all turbines,
    - The proposed CC unit HRSG design is unique to FPC TX (designed internally) of which FPC TX has very specialized design, operation and maintenance experience
    - Interchangeability of parts for all turbines provides quicker maintenance and higher on-stream time at efficient operation
    - Existing GE turbine control system ("Mark VIE") is uniform across all existing turbines and is compatible with GE 7EA units. Similar sized turbines from other turbine manufacturers would require a separate control system.
- Comparable turbines designs from other manufacturers were not available at the specified 85 MW output (per turbine) required for this project.

8. On page 41 of the permit application, FPC TX proposes to use weekly AVO monitoring. Please provide supplemental data that discusses the details of what this program will involve. What is the proposed compliance strategy including recordkeeping, schedule, and the protocol for equipment repairs? Is there a TCEQ

LDAR method that would be preferred to use? Please provide supplemental data that includes the basis for utilizing this preferred method versus other potential methods.

FPC TX Response: The fugitive emission sources in this plant will be in fuel gas and natural gas service. FPC TX is proposing:

- To implement an Audio Visual and Olfactory (AVO) monitoring program for equipment in natural gas and fuel gas service.
  - To perform the AVO monitoring on a weekly basis
  - To maintains a written log of weekly inspections identifying the operating area inspected, the date inspected, the fuel gas and natural gas equipment inspected (valves, lines, flanges, etc), whether any leaks were identified by visual, audible or olfactory inspections, and corrective actions/repairs taken
- For leaks identified, immediately of detection of the leak, plant personnel will take the following action:
  - Tag the leaking equipment
  - Commence repair or replacement of the leaking component
- AVO is a more appropriate monitoring method for fuel gas and natural gas components in this plant as explained in the permit application and below:
  - Monitoring can be done more frequent monitoring so leaks can be detected more quickly than with the TCEQ 28 series of Method 21 based LDAR program
  - The total estimated GHG fugitive emissions from this plant are small (<0.002% of total mass and <0.05% of the total CO2e)

Existing Utility Plant Steam Turbine Conversion Rates
Formosa Plastic Corporation, Texas
2012 Expansion Project: Gas Turbines
August 2013

Steam Turbine Conversion Rates, Existing Utility Plant Steam Turbines				
steam turbine no:	1	2	3	Total (all turbines)
Total Steam Input (klb/hr)	700	660	770	2,130
Total Output (MW)	30	66	55	151
Average Conversion Rate (klbs/MW):				14.11

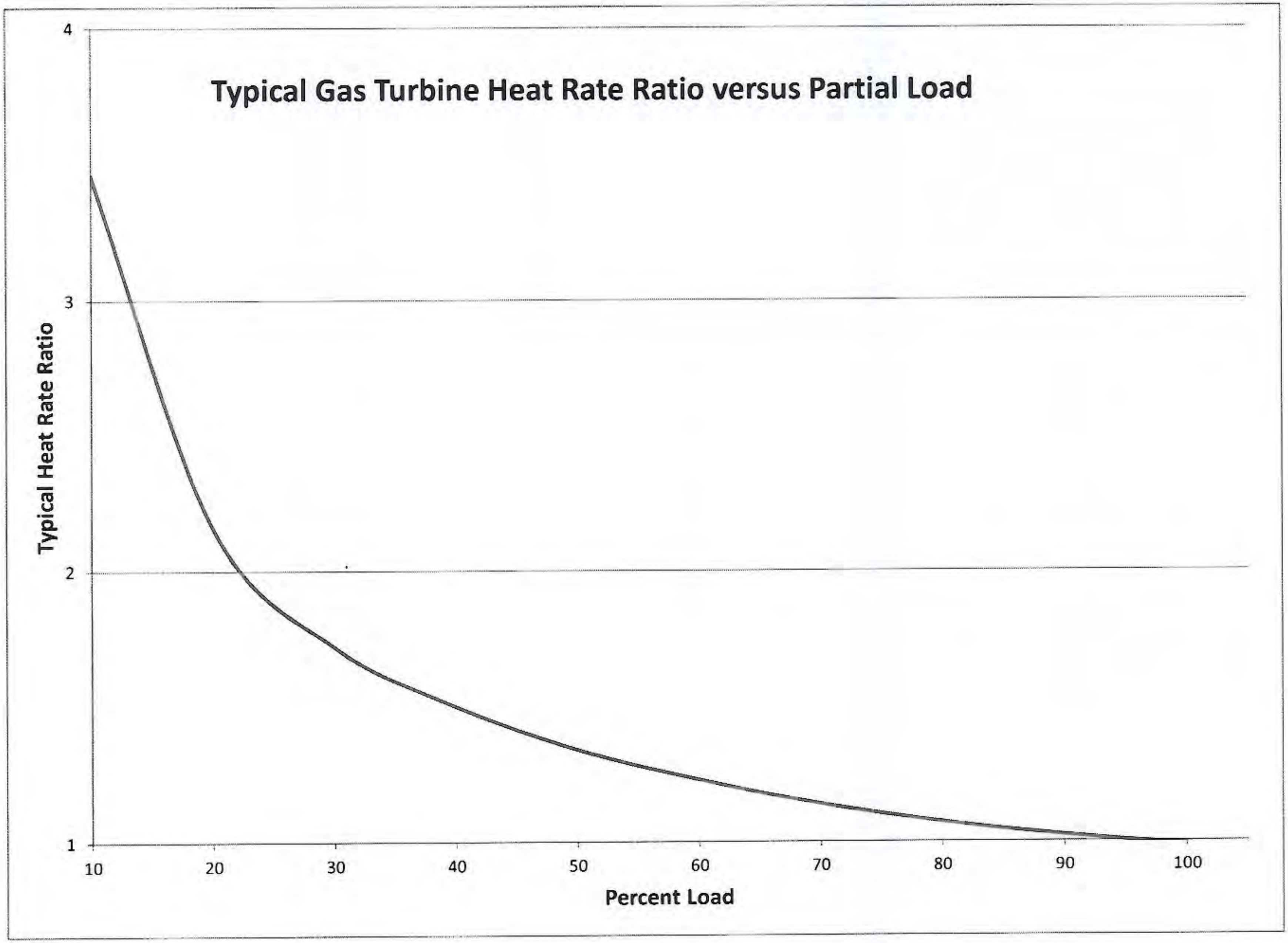
Typical Gas Turbine Heat Rate Ratio versus Partial Load
Typical Heat Rate Ratio
4
3
2
1
10
20
30
40
50
60
70
80
90
100
Percent Load

Table 1 - for Response to Question 4
GHG Emission Calculations - Flaring of OL Tail Gas
Formosa Plastic Corporation, Texas
2012 Expansion Project: Gas Turbines
April 2013

Flare Gas Data:

Variable	OL Tail Gas Stream	Units	Reference
Carbon Content (Annual Avg)	0.68	kg C/kg	design specification
Molecular Weight (Annual Avg)	9.8	kg/kgmol	design specification

GHG Emissions from Flares:

Source Type	Annual Avg Flare Gas Flow Rate (scf/yr)	Pollutant	GHG Mass Emissions[2] (metric ton/yr)	Global Warming Potential[3]	CO_2e (metric ton/yr)	CO_2e (tpy)
Flare burning OL Tail Gas	3.36E+09	CO_2	94,175	1	94,175	103,828
		CH_4	284.26	21	5,970	6,581
		N_2O	0.94	310	291.94	321.87
			94,460		**100,437**	**110,731**

Notes:

1. *CH_4 and N_2O GHG factors based on Table C-2 of 40 CFR 98 Mandatory Greenhouse Gas Reporting.*
2. *CO_2 emissions based on 40 CFR Part 98, Subpart Y, Equation Y-1a.*
3. *Global Warming Potential factors based on Table A-1 of 40 CFR 98 Mandatory Greenhouse Gas Reporting.*

Table 2 - for Response to Question 4
GHG Emission Reductions for OL Tail Gas Firing in Duct Burners
Formosa Plastic Corporation, Texas
2012 Expansion Project: Gas Turbines
April 2013

Scenario	Sources	CO_2e (metric ton/yr)	CO_2e (tpy)
1	Duct Burners firing natural gas [1]	111,579	123,015
	OL Tail Gas Combustion in Flare [2]	100,437	110,731
	Scenario Total GHG Emissions:	**212,015**	**233,747**
2	Duct Burners firing OL tail Gas [3]	**96,206**	**106,068**

	CO_2e (metric ton/yr)	CO_2e (tpy)
GHG Emission Reductions: Scenario 2 vs Scenario 1	**115,809**	**127,679**

Notes:
[1] See GHG permit application, Table A-3 for detailed calculation of NG combustion in duct burners.
[2] See Table 1 of this attachment for OL tail gas flaring GHG emission calculations.
[3] See GHG permit application, Table A-4 for detailed calculation of OL tail gas in duct burners.