Application for Prevention of Significant Deterioration Permit for Greenhouse Gases for Floydada Station
Golden Spread Electric Cooperative, Inc.
Floydada, Texas

Submitted to:

U.S. Environmental Protection Agency, Region 6
Dallas, TX

January 2013

Golden Spread Electric Cooperative, Inc.
A Touchstone Energy Cooperative

TABLE OF CONTENTS

The seal appearing on this document was authorized by Patrick J. Murin, P.E. 67271 on 1/30/2013
P.E. Expiration Date: 12/31/2013

Murin Environmental Inc.
TBPE Registration No. F-7702
Firm Registration Expiration Date: 3/31/2013

1.0 INTRODUCTION AND ADMINISTRATIVE INFORMATION

Golden Spread Electric Cooperative, Inc. (GSEC) is a tax-exempt, consumer-owned public utility, organized in 1984 to provide low cost, reliable electric service for its rural distribution cooperative members. Its 16 member systems serve more than 199,000 retail consumers located in the Oklahoma Panhandle and an area covering 24 percent of Texas including the Panhandle, South Plains and Edwards Plateau Regions.

GSEC owns Mustang Station, a 480 MW, gas-fueled, combined cycle generating plant located near Denver City, Texas, as well as Mustang Station Units 4, 5, and 6, three 168 MW combustion turbine-generators located at the Mustang Station site. In 2011, GSEC added Antelope Station, a 168 MW generating facility made up of 18 quick start engines located near Abernathy, Texas, and Golden Spread Panhandle Wind Ranch, a 78 MW wind facility made up of 34 wind turbines located near Amarillo, Texas. Through its affiliate Fort Concho Gas Storage, Inc., GSEC also owns a gas storage facility near San Angelo, Texas, capable of storing more than two billion cubic feet of natural gas.

Due to concerns about the adequacy of future power reserve margins in West Texas and in other areas in Texas, GSEC is proposing to build a new combustion turbine-generator facility near Floydada, Texas. GSEC expects the new facility, Floydada Station, to provide primarily peaking and intermediate power needs in a highly cyclical operation.

Floydada Station will feature a new GE 7F 5-Series gas turbine in a simple cycle application.[1] The 7F 5-Series turbine is the latest development of GE's F-class turbine technology, which is used in over 1100 gas turbines worldwide. The 7F 5-Series turbine features a 14-stage compressor with super-finish 3-dimensional airfoils for improved efficiency with less long-term degradation. The 3-stage combustion turbine in the 5-Series features a hot gas path with advanced cooling and sealing technologies to improve efficiency and lower lifecycle costs. A new model-based process control system also improves performance efficiency. As a result, the 7F 5-Series turbine achieves an efficiency above 38.7% in a simple-cycle application[2]. The unit can produce up to 202 MW in cold weather conditions, and nominally 190.1 MW in peak summer operation. Compared to other 7F class turbines, the 5-Series turbine also has improvements in start-up and turndown capability, ramp-up rate, and lifecycle costs in peaking, cyclic, and steady-state operation. During normal start-up, the 5-Series turbine will achieve 50% capacity load in 30 minutes, and thereafter operate at design emission limits. During "peaking start-up", a combination of measures allow the unit to achieve 75% load in about 10 minutes, full load operation in about 11.5 minutes, and to operate within design emission limits within 22 minutes. (Peaking start-ups increase the rotor and hot gas maintenance costs relative to normal start-ups.) The turbine is equipped with GE's Dry Low NOx (DLN) 2.6 combustion system to achieve normal emission levels of 9 ppmvd nitrogen oxides (NOx) @15% O_2 and 9 ppmvd carbon monoxide (CO) at operation from 100% load to nominally 50% load.

Exhaust emissions from the turbine comprise the majority of air emissions from the plant site, with smaller emissions from an associated emergency generator engine, the natural gas supply equipment, and electrical equipment.

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[1] These units were previously designated as 7FA.005 series turbines.
[2] This efficiency is equivalent to a heat rate of 8905 BTU (LHV)/kWh of gross power output, and is guaranteed at 98°F ambient temperatures and 18% relative humidity and other specified operating conditions and parameters.

Under the U.S. Environmental Protection Agency's (EPA's) Prevention of Significant Deterioration (PSD) regulations in 40 CFR 52.21, Floydada Station is a major source of greenhouse gas (GHG) emissions because its potential emissions have global warming potential equivalent to more than 100,000 tons per year of emissions of carbon dioxide (CO_2). (The emissions equivalent to CO2 are designated as CO_2-e.) As a new major source of GHG emissions, Floydada Station is required to obtain a pre-construction air quality permit under the PSD rules from the EPA. Floydada Station is also subject to PSD review by the Texas Commission on Environmental Quality (TCEQ) for non-GHG emissions, since it will also be a major source of CO emissions, and emissions of NOx and particulate matter less than 10 microns in diameter and less than 2.5 microns in diameter will exceed their PSD significant emission rates. These non-GHG emissions, and those with emission rates below the respective PSD significant emission rates, are subject to the State of Texas pre-construction authorization requirements, and authorizations for those associated facilities and emissions will be obtained separately from the TCEQ.

Sources and emissions subject to PSD permitting requirements because of their potential to release GHG emissions are only subject to some of the requirements of the PSD rules. The primary requirement of a PSD permit for GHG emissions is to require that the permitted facilities use the Best Available Control Technology (BACT) for controlling GHG emissions. The resulting PSD permit specifies emission levels reflecting the use of BACT, including emissions monitoring and other requirements to ensure that the BACT emission levels are maintained during operations.

Administrative information for the owner and operator of the Floydada Station, and information on the site itself, is provided in the TCEQ Core Data Form which follows this page. Additional information is provided in the TCEQ Form PI-1, which also follows this page. The TCEQ Form PI-1 is a basic element of the TCEQ permit process which will be used to authorize emissions and facilities other than those related to GHG pollutants.

The start of construction of the Floydada Station is projected for end of 2013. Initial operation of the power plant is expected in 1st quarter 2015.

The remaining sections of this permit application are the following: Section 2.0 provides process information and Section 3.0 provides site information for Floydada Station. Section 4.0 summarizes and describes the calculation of GHG emissions from the power plant and supporting equipment. Section 5.0 summarizes the applicability of PSD permit requirements. Section 6.0 analyzes and selects the BACT, including proposed emission limits and monitoring and maintenance requirements to achieve and maintain compliance with the BACT emission limits.

Affiliated with the Federal PSD permit process are requirements to consider the impacts of the proposed power plant on cultural and historical resources in the area, and on biological resources including threatened and endangered species. These impacts will be addressed in studies separate from this PSD permit application.

TCEQ

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (*If other is checked please describe in space provided*)			
☒ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application*)			
☐ Renewal (*Core Data Form should be submitted with the renewal form*)	☐ Other		
2. Attachments	**Describe Any Attachments:** (*ex. Title V Application, Waste Transporter Application, etc.*)		
☒Yes ☐No	Air Quality Permit Application for Floydada Station		
3. Customer Reference Number (***if issued***)	Follow this link to search for CN or RN numbers in Central Registry**	**4. Regulated Entity Reference Number** (***if issued***)	
CN 602663387		**RN 0**	

SECTION II: Customer Information

5. Effective Date for Customer Information Updates (mm/dd/yyyy)	6/30/2012

6. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check only one of the following:*

☐Owner ☐ Operator ☒ Owner & Operator
☐Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐Other: ______

7. General Customer Information

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership
☐Change in Legal Name (Verifiable with the Texas Secretary of State) ☒ No Change**

If "No Change" and Section I is complete, skip to Section III – Regulated Entity Information.

8. Type of Customer:	☒ Corporation	☐ Individual	☐ Sole Proprietorship- D.B.A
☐ City Government	☐ County Government	☐ Federal Government	☐ State Government
☐ Other Government	☐ General Partnership	☐ Limited Partnership	☐ Other:

9. Customer Legal Name (*If an individual, print last name first: ex: Doe, John*)	*If new Customer, enter previous Customer below*	*End Date:*
Golden Spread Electric Cooperative, Inc.		

10. Mailing Address:	P.O. Box 9898							
	City	Amarillo	**State**	TX	**ZIP**	79105	**ZIP + 4**	5898

11. Country Mailing Information (*if outside USA*)	**12. E-Mail Address** (*if applicable*)
	jpippin@gsec.coop

13. Telephone Number	**14. Extension or Code**	**15. Fax Number** (*if applicable*)
(806) 418-3010		(806) 374-2922

16. Federal Tax ID (*9 digits*)	**17. TX State Franchise Tax ID** (*11 digits*)	**18. DUNS Number**(*if applicable*)	**19. TX SOS Filing Number** (*if applicable*)
	17519410603		68655501

20. Number of Employees	**21. Independently Owned and Operated?**
☐ 0-20 ☒ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher	☒ **Yes** ☐ **No**

SECTION III: Regulated Entity Information

22. General Regulated Entity Information (*If 'New Regulated Entity" is selected below this form should be accompanied by a permit application*)

☒ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information ☐ No Change** (*See below*)

****If "NO CHANGE" is checked and Section I is complete, skip to Section IV, Preparer Information.**

23. Regulated Entity Name (*name of the site where the regulated action is taking place*)

Floydada Station

24. Street Address of the Regulated Entity: ***(No P.O. Boxes)***	TBD - Floydada Station is a new grassroots site development						
	City		**State**		**ZIP**		**ZIP + 4**
25. Mailing Address:	Golden Spread Electric Cooperative, Inc.						
	P.O. Box 9898						
	City	Amarillo	**State**	TX	**ZIP**	79105	**ZIP + 4**
26. E-Mail Address:	jpippin@gsec.coop						

27. Telephone Number	**28. Extension or Code**	**29. Fax Number** *(if applicable)*
(806) 418-3010		(806) 374-2922

30. Primary SIC Code (4 digits)	**31. Secondary SIC Code** (4 digits)	**32. Primary NAICS Code** (5 or 6 digits)	**33. Secondary NAICS Code** (5 or 6 digits)
4911		221112	

34. What is the Primary Business of this entity? *(Please do not repeat the SIC or NAICS description.)*

Electrical power production

Questions 34 – 37 address geographic location. Please refer to the instructions for applicability.

35. Description to Physical Location:	Site is directly NE of intersection of County Road 207 & Farm-to-Market Road 786; project area borders FM 786 on south, just east of CR 207; site is ~ 5 miles NNE of Floydada

36. Nearest City	**County**	**State**	**Nearest ZIP Code**
Floydada	Floyd	TX	79235

37. Latitude (N) In Decimal:			**38. Longitude (W) In Decimal:**		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
34	03	24	101	18	56

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form or the updates may not be made. If your Program is not listed, check other and write it in. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Industrial Hazardous Waste	☐ Municipal Solid Waste
☒ New Source Review – Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS	☐ Sludge
TBD				
☐ Stormwater	☒ Title V – Air	☐ Tires	☐ Used Oil	☐ Utilities
	TBD			
☐ Voluntary Cleanup	☐ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:

SECTION IV: Preparer Information

40. Name:	Patrick J. Murin	**41. Title:**	Principal
42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(713) 819-6115		(520) 281-4359	pmurin@murinenv.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 9 and/or as required for the updates to the ID numbers identified in field 39.

(See the Core Data Form Instructions for more information on who should sign this form.)

Company:	Golden Spread Electric Cooperative Inc.	**Job Title:**	Senior Asset Manager, Production
Name*(In Print)***:**	Jeff Pippin	**Phone:**	(806) 418-3010
Signature:	[signature]	**Date:**	1/29/13

TCEQ-10400 (09/07)

Texas Commission on Environmental Quality
Form PI-1 General Application for Air Preconstruction Permit and Amendment

Important Note: The agency requires that a Core Data Form be submitted on all incoming applications unless a Regulated Entity and Customer Reference Number have been issued and no core data information has changed. For more information regarding the Core Data Form, call (512) 239-5175 or go to www.tceq.texas.gov/permitting/central_registry/guidance.html.

I. Applicant Information		
A. Company or Other Legal Name: **Golden Spread Electric Cooperative Inc.**		
Texas Secretary of State Charter/Registration Number (if applicable): **SOS Filing No. 68655501**		
B. Company Official Contact Name: **Jeff Pippin**		
Title: **Senior Asset Manager, Production**		
Mailing Address: **P.O. Box 9898**		
City: **Amarillo**	State: **TX**	ZIP Code: **79105-5898**
Telephone No.: **806/418-3010**	Fax No.: **806/374-2922**	E-mail Address: **jpippin@gsec.coop**
C. Technical Contact Name: **Patrick Murin, P.E.**		
Title: **Principal**		
Company Name: **Murin Environmental Inc.**		
Mailing Address**: 979 Via Puebla**		
City: **Rio Rico**	State: **AZ**	ZIP Code: **85648-1918**
Telephone No.: **713/819-6115**	Fax No.: **520/281-4359**	E-mail Address: pmurin@murinenv.com
D. Site Name: **Floydada Station**		
E. Area Name/Type of Facility: **Power Plant/Electrical Power Production**	☒ Permanent ☐ Portable	
F. Principal Company Product or Business: **Electrical Power Production**		
Principal Standard Industrial Classification Code (SIC): **4911**		
Principal North American Industry Classification System (NAICS): **221112**		
G. Projected Start of Construction Date: **12/2013**		
Projected Start of Operation Date: **1st Q/2015**		
H. Facility and Site Location Information (If no street address, provide clear driving directions to the site in writing.): **Site is directly NE of intersection of County Road 207 & Farm-to-Market Road 786; project area borders FM 786 on south, just east of CR 207; site is ~ 5 miles NNE of Floydada**		
Street Address: **N/A – Site is grassroots development**		
City/Town:	County:	ZIP Code: **79235**
Latitude (nearest second): **34°03'24"N**	Longitude (nearest second): **101°18'56"W**	

Texas Commission on Environmental Quality
Form PI-1 General Application for
Air Preconstruction Permit and Amendment

I.	**Applicant Information (continued)**	
I.	Account Identification Number (leave blank if new site or facility):	
J.	Core Data Form.	
Is the Core Data Form (Form 10400) attached? If No, provide customer reference number and regulated entity number (complete K and L).		☒ YES ☐ NO
K.	Customer Reference Number (CN): **CN602663387**	
L.	Regulated Entity Number (RN): **TBD**	
II.	**General Information**	
A.	Is confidential information submitted with this application? If Yes, mark each confidential page confidential in large red letters at the bottom of each page.	☐ YES ☒ NO
B.	Is this application in response to an investigation, notice of violation, or enforcement action? If Yes, attach a copy of any correspondence from the agency and provide the RN in section I.L. above.	☐ YES ☒ NO
C.	Number of New Jobs: 6-8	
D.	Provide the name of the State Senator and State Representative and district numbers for this facility site:	
State Senator: **Senator Robert Duncan**		District No.: **28**
State Representative: **Rep. Phil Stephenson**		District No.: **85**
III.	**Type of Permit Action Requested**	
A.	Mark the appropriate box indicating what type of action is requested. ☒ Initial ☐ Amendment ☐ Revision (30 TAC 116.116(e) ☐ Change of Location ☐ Relocation	
B.	Permit Number (if existing):	
C.	Permit Type: Mark the appropriate box indicating what type of permit is requested. *(check all that apply, skip for change of location)* ☒ Construction ☐ Flexible ☐ Multiple Plant ☐ Nonattainment ☐ Plant-Wide Applicability Limit ☒ Prevention of Significant Deterioration ☐ Hazardous Air Pollutant Major Source ☐ Other:	
D.	Is a permit renewal application being submitted in conjunction with this amendment in accordance with 30 TAC 116.315(c).	☐ YES ☒ NO

III.	**Type of Permit Action Requested *(continued)***		
E.	Is this application for a change of location of previously permitted facilities? If Yes, complete III.E.1 - III.E.4.0		☐ YES ☒ NO
1.	Current Location of Facility (If no street address, provide clear driving directions to the site in writing.):		
Street Address:			
City:	County:	ZIP Code:	
2.	Proposed Location of Facility (If no street address, provide clear driving directions to the site in writing.):		
Street Address:			
City:	County:	ZIP Code:	
3.	Will the proposed facility, site, and plot plan meet all current technical requirements of the permit special conditions? If "NO", attach detailed information.		☐ YES ☐ NO
4.	Is the site where the facility is moving considered a major source of criteria pollutants or HAPs?		☐ YES ☐ NO
F.	Consolidation into this Permit: List any standard permits, exemptions or permits by rule to be consolidated into this permit including those for planned maintenance, startup, and shutdown.		
List: **None**			
G.	Are you permitting planned maintenance, startup, and shutdown emissions? If Yes, attach information on any changes to emissions under this application as specified in VII and VIII.		☒ YES ☐ NO
H.	Federal Operating Permit Requirements (30 TAC Chapter 122 Applicability) Is this facility located at a site required to obtain a federal operating permit? If Yes, list all associated permit number(s), attach pages as needed).		☒ YES ☐ NO ☐ To be determined
Associated Permit No (s.): **An initial FOP application will be submitted**			
1.	Identify the requirements of 30 TAC Chapter 122 that will be triggered if this application is approved.		
☐ FOP Significant Revision	☐ FOP Minor	☐ Application for an FOP Revision	
☐ Operational Flexibility/Off-Permit Notification		☐ Streamlined Revision for GOP	
☒ Initial FOP Application		☐ None	

Texas Commission on Environmental Quality
Form PI-1 General Application for
Air Preconstruction Permit and Amendment

III. **Type of Permit Action Requested *(continued)***		
H. Federal Operating Permit Requirements (30 TAC Chapter 122 Applicability) *(continued)*		
2. Identify the type(s) of FOP(s) issued and/or FOP application(s) submitted/pending for the site. ***(check all that apply)***		
☐ GOP Issued	☐ GOP application/revision application submitted or under APD review	
☐ SOP Issued	☒ SOP application/revision application to be submitted or under APD review	
IV. **Public Notice Applicability**		
A. Is this a new permit application or a change of location application?		☒ YES ☐ NO
B. Is this application for a concrete batch plant? If Yes, complete V.C.1 – V.C.2.		☐ YES ☒ NO
C. Is this an application for a major modification of a PSD, nonattainment, FCAA 112(g) permit, or exceedance of a PAL permit?		☐ YES ☒ NO
D. Is this application for a PSD or major modification of a PSD located within 100 kilometers or less of an affected state or Class I Area?		☐ YES ☒ NO
If Yes, list the affected state(s) and/or Class I Area(s). List:		
E. Is this a state permit amendment application? If Yes, complete IV.E.1. – IV.E.3. **- NO**		
1. Is there any change in character of emissions in this application?		☐ YES ☐ NO
2. Is there a new air contaminant in this application?		☐ YES ☐ NO
3. Do the facilities handle, load, unload, dry, manufacture, or process grain, seed, legumes, or vegetables fibers (agricultural facilities)?		☐ YES ☐ NO
F. List the total annual emission increases associated with the application ***(List all that apply and attach additional sheets as needed):***		
Volatile Organic Compounds (VOC): **31.77 tons/yr**		
Sulfur Dioxide (SO2): **6.23 tons/yr**		
Carbon Monoxide (CO): **260.65 tons/yr**		
Nitrogen Oxides (NOx): **141.74 tons/yr**		
Particulate Matter (PM): **21.29 tons/yr**		
PM 10 microns or less (PM10): **21.29 tons/yr**		
PM 2.5 microns or less (PM2.5): **21.29 tons/yr**		
Lead (Pb): **0**		
Hazardous Air Pollutants (HAPs): **4.56 tons/yr**		
Other speciated air contaminants not listed above: **GHG Pollutants - 539,218 tons/yr**		

Texas Commission on Environmental Quality
Form PI-1 General Application for
Air Preconstruction Permit and Amendment

V. Public Notice Information *(complete if applicable)*		
A. Public Notice Contact Name: **Ron Popejoy**		
Title: **Production Environmental & IS Coordinator**		
Mailing Address: **GSEC - Antelope Station, 1454 CR 315**		
City: **Abernathy**	State: **TX**	ZIP Code: **79311**
B. Name of the Public Place: **Floyd County Memorial Library**		
Physical Address *(No P.O. Boxes)*: **111 South Wall**		
City: **Floydada**	County: **Floyd**	ZIP Code: **79235**
The public place has granted authorization to place the application for public viewing and copying.		☒ YES ☐ NO
The public place has internet access available for the public.		☒ YES ☐ NO
C. Concrete Batch Plants, PSD, and Nonattainment Permits		
1. County Judge Information (For Concrete Batch Plants and PSD and/or Nonattainment Permits) for this facility site.		
The Honorable: **Judge Penny Golightly**		
Mailing Address: **100 Main, Room 105**		
City: **Floydada**	State: **Texas**	ZIP Code: **79235**
2. Is the facility located in a municipality or an extraterritorial jurisdiction of a municipality? ***(For Concrete Batch Plants)***		☐ YES ☐ NO
Presiding Officers Name(s):		
Title:		
Mailing Address:		
City:	State:	ZIP Code:
3. Provide the name, mailing address of the chief executive and Indian Governing Body; and identify the Federal Land Manager(s) for the location where the facility is or will be located.		
Chief Executive:		
Mailing Address:		
City:	State:	ZIP Code:
Name of the Indian Governing Body:		
Mailing Address:		
City:	State:	ZIP Code:

V.	**Public Notice Information *(complete if applicable) (continued)***	
C.	Concrete Batch Plants, PSD, and Nonattainment Permits	
3.	Provide the name, mailing address of the chief executive and Indian Governing Body; and identify the Federal Land Manager(s) for the location where the facility is or will be located. *(continued)*	
Name of the Federal Land Manager(s):		
D.	Bilingual Notice	
Is a bilingual program required by the Texas Education Code in the School District?		☐ YES ☒ NO
Are the children who attend either the elementary school or the middle school closest to your facility eligible to be enrolled in a bilingual program provided by the district?		☐ YES ☒ NO
If Yes, list which languages are required by the bilingual program?		
VI.	**Small Business Classification *(Required)***	
A.	Does this company (including parent companies and subsidiary companies) have fewer than 100 employees or less than $6 million in annual gross receipts?	☒ YES ☐ NO
B.	Is the site a major stationary source for federal air quality permitting?	☒ YES ☐ NO
C.	Are the site emissions of any regulated air pollutant greater than or equal to 50 tpy?	☒ YES ☐ NO
D.	Are the site emissions of all regulated air pollutants combined less than 75 tpy?	☐ YES ☒ NO
VII.	**Technical Information**	
A.	The following information must be submitted with your Form PI-1 ***(this is just a checklist to make sure you have included everything)***	
1.	☒ Current Area Map	
2.	☒ Plot Plan	
3.	☒ Existing Authorizations	
4.	☒ Process Flow Diagram	
5.	☒ Process Description	
6.	☒ Maximum Emissions Data and Calculations	
7.	☒ Air Permit Application Tables	
a.	☒ Table 1(a) (Form 10153) entitled, Emission Point Summary	
b.	☒ Table 2 (Form 10155) entitled, Material Balance	
c.	☒ Other equipment, process or control device tables	
B.	Are any schools located within 3,000 feet of this facility?	☐ YES ☒ NO

VII.	**Technical Information**			
C.	Maximum Operating Schedule:			
Hour(s): 24	Day(s): 7	Week(s): 52	Year(s): up to 8760 hrs	
Seasonal Operation? If Yes, please describe in the space provide below.				☐ YES ☐ NO
Operation will be skewed to the warmer months but operation year-round is possible.				
D.	Have the planned MSS emissions been previously submitted as part of an emissions inventory?			☐ YES ☒ NO
Provide a list of each planned MSS facility or related activity and indicate which years the MSS activities have been included in the emissions inventories. Attach pages as needed.				
E.	Does this application involve any air contaminants for which a disaster review is required?			☐ YES ☒ NO
F.	Does this application include a pollutant of concern on the Air Pollutant Watch List (APWL)?			☐ YES ☒ NO
VIII.	**State Regulatory Requirements** **Applicants must demonstrate compliance with all applicable state regulations to obtain a permit or amendment.** *The application must contain detailed attachments addressing applicability or non applicability; identify state regulations; show how requirements are met; and include compliance demonstrations.*			
A.	Will the emissions from the proposed facility protect public health and welfare, and comply with all rules and regulations of the TCEQ?			☒ YES ☐ NO
B.	Will emissions of significant air contaminants from the facility be measured?			☒ YES ☐ NO
C.	Is the Best Available Control Technology (BACT) demonstration attached?			☒ YES ☐ NO
D.	Will the proposed facilities achieve the performance represented in the permit application as demonstrated through recordkeeping, monitoring, stack testing, or other applicable methods?			☒ YES ☐ NO
IX.	**Federal Regulatory Requirements** **Applicants must demonstrate compliance with all applicable federal regulations to obtain a permit or amendment.** *The application must contain detailed attachments addressing applicability or non applicability; identify federal regulation subparts; show how requirements are met; and include compliance demonstrations.*			
A.	Does Title 40 Code of Federal Regulations Part 60, (40 CFR Part 60) New Source Performance Standard (NSPS) apply to a facility in this application?			☒ YES ☐ NO
B.	Does 40 CFR Part 61, National Emissions Standard for Hazardous Air Pollutants (NESHAP) apply to a facility in this application?			☐ YES ☒ NO

Form PI-1 General Application for
Air Preconstruction Permit and Amendment

IX.	**Federal Regulatory Requirements** **Applicants must demonstrate compliance with all applicable federal regulations to obtain a permit or amendment.** *The application must contain detailed attachments addressing applicability or non applicability; identify federal regulation subparts; show how requirements are met; and include compliance demonstrations.*	
C.	Does 40 CFR Part 63, Maximum Achievable Control Technology (MACT) standard apply to a facility in this application?	☒ YES ☐ NO
D.	Do nonattainment permitting requirements apply to this application?	☐ YES ☒ NO
E.	Do prevention of significant deterioration permitting requirements apply to this application?	☒ YES ☐ NO
F.	Do Hazardous Air Pollutant Major Source [FCAA 112(g)] requirements apply to this application?	☐ YES ☒ NO
G.	Is a Plant-wide Applicability Limit permit being requested?	☐ YES ☒ NO
X.	**Professional Engineer (P.E.) Seal**	
Is the estimated capital cost of the project greater than $2 million dollars?		☒ YES ☐ NO
If Yes, submit the application under the seal of a Texas licensed P.E.		
XI.	**Permit Fee Information**	
Check, Money Order, Transaction Number ,ePay Voucher Number:		Fee Amount: $75,000
Paid online?		☐ YES ☒ NO
Company name on check: Golden Spread Electric Cooperative, Inc.		
Is a copy of the check or money order attached to the original submittal of this application?		☒ YES ☐ NO ☐ N/A
Is a Table 30 (Form 10196) entitled, Estimated Capital Cost and Fee Verification, attached?		☒ YES ☐ NO ☐ N/A

XII. Delinquent Fees and Penalties	
This form will not be processed until all delinquent fees and/or penalties owed to the TCEQ or the Office of the Attorney General on behalf of the TCEQ is paid in accordance with the Delinquent Fee and Penalty Protocol. For more information regarding Delinquent Fees and Penalties, go to the TCEQ Web site at: www.tceq.texas.gov/agency/delin/index.html.	
XIII. Signature	
The signature below confirms that I have knowledge of the facts included in this application and that these facts are true and correct to the best of my knowledge and belief. I further state that to the best of my knowledge and belief, the project for which application is made will not in any way violate any provision of the Texas Water Code (TWC), Chapter 7, Texas Clean Air Act (TCAA), as amended, or any of the air quality rules and regulations of the Texas Commission on Environmental Quality or any local governmental ordinance or resolution enacted pursuant to the TCAA I further state that I understand my signature indicates that this application meets all applicable nonattainment, prevention of significant deterioration, or major source of hazardous air pollutant permitting requirements. The signature further signifies awareness that intentionally or knowingly making or causing to be made false material statements or representations in the application is a criminal offense subject to criminal penalties.	
Name: Jeff Pippin	
Signature: [signature]	*Original Signature Required*
Date: 1/29/13	

2.0 PROCESS DESCRIPTION AND PROCESS FLOW DIAGRAM

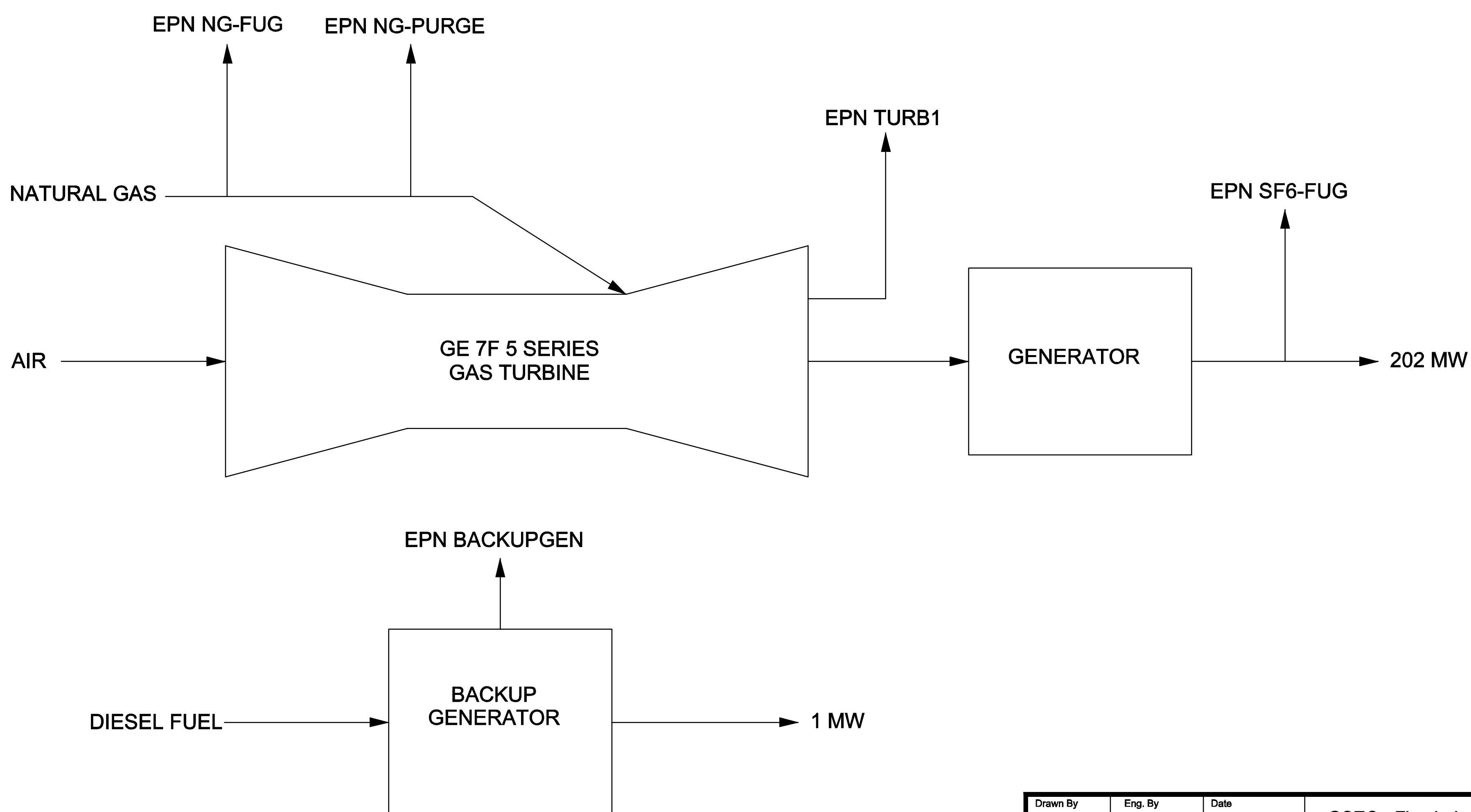
The process flow diagram illustrates the process steps in the proposed Floydada Station.

The power production unit at Floydada Station will be a GE 7F 5-Series gas-fired combustion turbine. Supply air will be compressed by the integral 14-stage compressor. Natural gas fuel will be combusted in GE's DLN 2.6 combustion system and the combustion exhaust gases will power the 3-stage expansion turbine. The turbine is air cooled, and an evaporative air cooler is also used for inlet air cooling during summer peak ambient air temperatures.

A diesel-fired generator with a capacity of 1100 ekW will provide emergency power when necessary. This generator will be equivalent to a Cummins 1000DQFAD generator set equipped with a QST30-G5 NR2 engine. The generator will operate in non-emergency operations less than 100 hours per year.

The gas turbine will exhaust through stack Emission Point Number (EPN) TURB1, and the emergency generator will exhaust through stack EPN EMERGEN. These emission sources will release both GHG and non-GHG air pollutants. The GHG pollutant sulfur hexafluoride (SF_6) will be released in low-volume leaks from circuit breakers as EPN SF_6-FUG. Leaks from the natural gas supply equipment (EPN NG-FUG) and periodic maintenance purges of natural gas (EPN NG-PURGE) will release mostly GHG emissions but a small amount of non-GHG emissions. Non-GHG emissions will not be covered in this permit.

PROCESS FLOW DIAGRAM



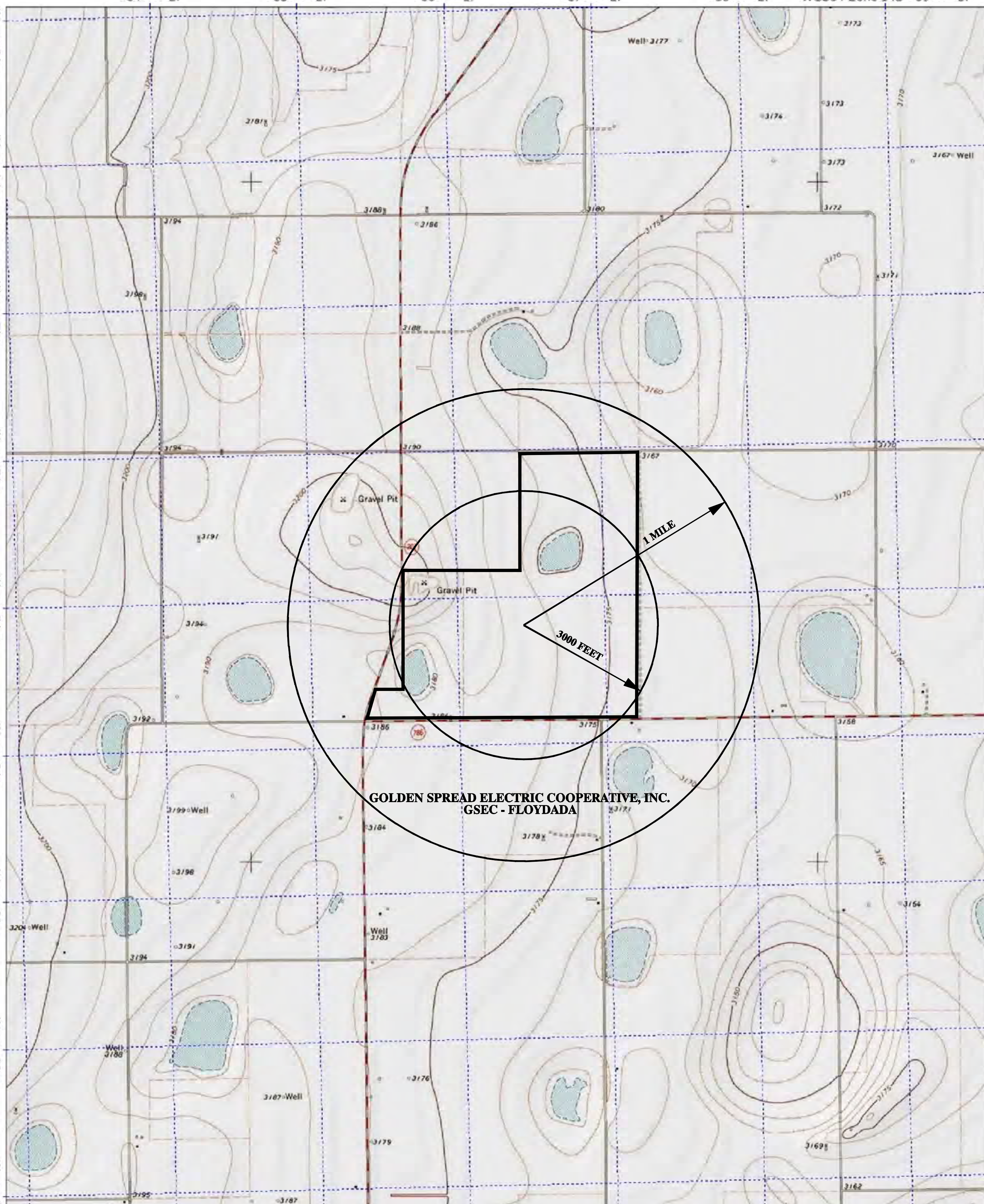
Drawn By	Eng. By	Date		REV
DWW	PJM	12/19/12 - 1/30/13	GSEC - Floydada	3
H:\Clients\MUR4615\GSEC - Floydada\FLOW			Name FLOW	

3.0 SITE INFORMATION

As shown in the Area Map, Floydada Station will be located northeast of the intersection of County Road 207 and Farm-to-Market Road 786, in Floyd County, Texas. The proposed location is approximately 5 miles north northeast of the City of Floydada. The site elevation is approximately 3190 feet.

The preliminary plot plan shows the location of Floydada Station on the GSEC property.

34°03'24" N, 101°18'56" W WGS84 1965 Lockney SE, TX



NATIONAL GEOGRAPHIC

0.0 0.5 1.0 miles
0.0 0.5 1.0 1.5 km

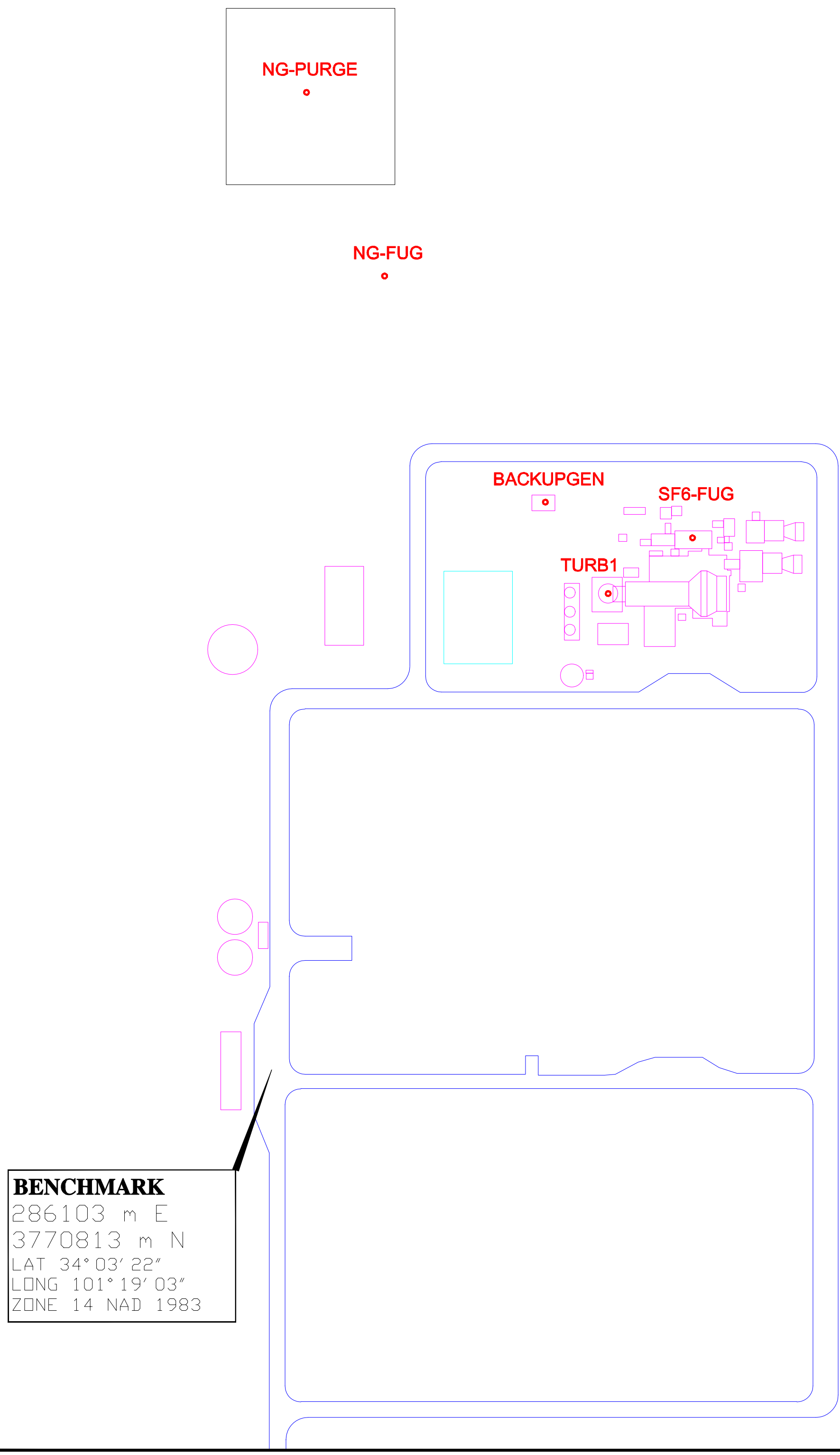
TEXAS

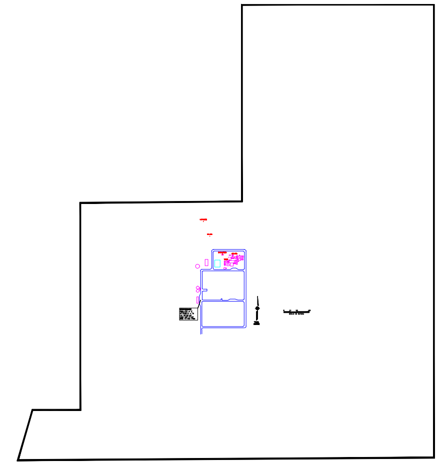
WAID ENVIROMENTAL

MUR4615\GSECD-FLOYDADA\AREAMAP.DWG

TN MN 6½°

12/20/12





VIEW OF PROPERTY LINE

Emission Point Number	Name	Location Easting, Northing (meters)
BACKUPGEN	BACK UP GENERATOR	286189, 3770992
NG-FUG	NG-FUGITIVES	286138, 3771063
NG-PURGE	NG-PURGE	286114, 3771121
SF6-FUG	SF6 FUGITIVE	286235, 3770981
TURB1	TURBINE STACK	286208, 3770963

TRUE NORTH

0 25 50 100
SCALE IN METERS

Drawn By	Eng. By	Date		REV
DWW	PJM	12/20/12 1/8/13	GSEC - Floydada	3

H:\Clients\MUR4615\GSEC - Floydada\FLOYDADAPLOT.DWG

Name FLOYDADAPLOT.DWG

4.0 GHG EMISSIONS

As noted in the Process Description, sources of GHG emissions on the site will include the following:

- The combustion turbine
- An emergency generator
- Natural gas line equipment fugitive releases
- Natural gas maintenance purge releases
- SF_6 leaks from circuit breakers

GHG emissions from these sources are summarized in Table 1. The bases for and calculations of these emissions are further discussed below and in Tables 2 through 6. Floydada Station will not emit two of the six pollutant categories which comprise GHG pollutants, namely hydrofluorocarbons or perfluorocarbons. The plant will emit some amount of each of the remaining four categories of GHG pollutants (CO_2, CH_4, N_2O, and SF_6), but emissions of CO_2 comprise 98.7% of the total annual tons of GHG pollutants as CO_2-e, and 99.97% of the mass emissions of GHG pollutants.

4.1 Gas Turbine

GHG emissions from the combustion turbine comprise CO_2, CH_4, and N_2O. Emissions of CO_2 and CH_4 during normal operations are those estimated from turbine manufacturer data. Emissions of N_2O are estimated from the EPA's *Compilation of Air Pollutant Emission Factors* (AP-42, 5th Edition) and the maximum fuel usage rates. GHG emissions of CO_2 and N_2O during startup and shutdown operations were conservatively estimated to be the same as those in normal operations. CH_4 emissions during startup and shutdown operations were estimated from turbine manufacturer data. Actual GHG emissions in these operations will be less, based on the lower firing rate of natural gas. Table 2 provides the emission calculation bases and example calculations.

4.2 Emergency Generator

GHG emissions from the emergency generator are based on the vendor maximum fuel usage rates and vendor emission factors, excepting that emission factors from AP-42 were used for emissions of CO_2. Table 3 provides emission calculation bases and example calculations.

4.3 Natural Gas Line Fugitives and Maintenance Purges

Natural gas line fugitive emissions are determined from the number of pipeline components such as control and relief valves, flanges, and sampling connections, and emission factors in 40 CFR 98 Table W-1A. The speciation of the fugitive releases uses data on the maximum composition of GHG components in the natural gas supply. Table 4 provides the emission calculation bases and example calculations.

The number and extent of maintenance purges are estimated from two maintenance purges per quarter for the gas turbine fuel line. The amount of natural gas lost in each purge is conservatively estimated as 1000 acf/purge at 475 psig. Again, the speciation of the natural gas emissions is based on the maximum composition of GHG components in the natural gas supply. Table 5 provides the emission calculation bases and example calculations.

4.4 SF_6 Leaks from Circuit Breakers

Leaks of SF_6 are based on the amount of SF_6 in circuit breakers at the power plant and a standard leak rate of 0.5% per year, which corresponds to the use of modern design circuit breakers and a comprehensive leak monitoring program. Table 6 provides the emission calculation bases and example calculations.

	Turbine 1			Emergency Gen		NG-Purge		NG-Fugitives		SF_6 Fug	TOTAL	
	Normal, lb/hr	SSM, lb/hr	Total, tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	tons/yr	tons/yr	PSD Significant Increase Levels, tons/yr
CO_2	232,749	232,749	532,007	1,728	86.42	26.2	0.105	0.018	0.079		532,093	N/A
CH_4	12.00	153.00	124.97	0.1	0.01	1364	5.46	0.95	4.16		134.60	N/A
N_2O	5.82	5.82	13.3								13.3	N/A
SF_6										0.0073	0.0073	N/A
GHG	232,767	232,908	532,145	1,729	86.43	1,390	5.57	0.97	4.24	0.0073	532,241	100,000
CO_2-e	234,806	237,767	538,754	1,731	87	28,670	114.77	20.0	87.44	174.47	539,218	100,000

Bases for Calculations	
- Total Annual Operating Hours, Normal Maximum Operation	4000
- Total Number of 30-min Startups Per Year	635
- Maximum Duration of Startup (to 50% load), min	30
- Maximum Annual Startup Hours	317.5
- Total Number of Shutdowns Per Year	635
- Maximum Duration of Shutdown (from 50% load), min	24
- Normal Operating Hours, % of Total	87.5%
- Startup, Shutdown, or Maintenance (SSM) Hours, % of Total	12.5%
- Maximum Annual Shutdown Hours	254
- Basis of Turbine Emission Rates	Vendor data except as noted
- Maximum Turbine Firing Duty, MM Btu/hr (HHV)	1941

Maximum Emission Rates

	Turbine 1					
	Normal, lb/hr	Startup, lbs/start-up	Startup, lbs/hr (incl. normal operation)	Shutdown, lbs/shutdown	Shutdown, lbs/hr (incl. normal operation)	Annual, tons/yr
CO_2	232,749	N/A	232,749	N/A	232,749	532,007
CH_4	12	147	153	171	178.2	124.97
N_2O	5.82	N/A	5.82	N/A	5.82	13.3
CO_2-e	234,806	N/A	237,767	N/A	238,296	538,754

Example Calculation of Annual Emissions

Annual CH_4 Emissions from Turbine 1:

[(4000 hours X 12 lb/hr) + (635 startups X 147 lbs/startup) + (635 shutdowns X 178.2 lbs/shutdown)] X (1 ton / 2000 lbs) = 124.97 tons/yr

Tabulation of HAPs and N_2O Emission Factors from AP-42, Tables 3.1-2a and 3.1-3

HAPs (Total)	0.00103 lbs/MM Btu
N_2O	0.003 lbs/MM Btu

Tabulation of GHG Warming Potential Equivalency Factors (40 CFR Part 98 Subpart A, Table A-1)

CO_2	1 kg CO_2-e/kg CO_2
CH_4	21 kg CO_2-e/kg CH_4
N_2O	310 kg CO_2-e/kg N_2O

Calculation of Normal CO_2-e Hourly Emissions

(232,749 lb CO2/hr) X (1lb CO2-e/lb CO2) + (12 lbs CH4/hr) X (21 lb CO2-e/lb CH4) + (5.82 lbs N2O/hr) X (310 lb CO2-e/lb N2O) = 234,806 lbs CO_2-e/hr

Note: AP-42 is the U.S. EPA's *Compilation of Air Pollutant Emission Factors*, 5th Edition.

Gas-Fired Generator - Cummins QST30-G5 NR2

Maximum Gross Generator Output , kW	1111
Maximum Fuel Consumption, gal/hr	72.2
Maximum Fuel Consumption (calculated), MM Btu/hr[1]	10.108
Maximum Brake Horsepower, bhp	1490
Annual Hours of Non-Emergency Operation	100

Criteria and GHG Pollutants [2]	CH_4	CO_2	CO_2-e
Emission Factor, g/bhp-hr	0.03	526.18	N/A
Emission Factor, lbs/MM Btu (AP-42 Table 3.4-3,4)	N/A	N/A	N/A
Hourly emissions, lbs/hr	0.1	1728.4	1731
Annual emissions, tons/yr	0.01	86.42	87

Tabulation of GHG Warming Potential Equivalency Factors (40 CFR Part 98 Subpart A, Table A-1)	
CO_2	1 kg CO_2-e/kg CO_2
CH_4	21 kg CO_2-e/kg CH_4

Example Calculation of GHG_e Hourly Emissions

(1,728 lb CO2/hr) X (1lb CO2-e/lb CO2) + (0.1 lbs CH4/hr) X (21 lb CO2-e/lb CH4) = 1,731 lbs CO_2-e/hr

Example Calculation of Hourly Emissions

Vendor Data: (1490 bhp) X (526.176 g CO2/bhp-hr) X (1 lb/453.6 g) = 1728.4 lbs CO_2/hr

Example Calculation of Annual Emissions

(1728.4 lbs CO2/hr) X (100 hours/yr) X (1 ton/2000 lbs) = 86.42 tons CO_2/yr

[1]Based on 140,000 BTU (HHV)/gal.

[2]Based on Vendor Emission Data Sheet, and Tier 2 Limits.

Emission Bases and Calculations

Emission Source Characteristics	
- No. of Gas Valves:	120
- No. of Gas Flanges:	300
- No. of Gas Relief Valves:	8
- No. of Sampling Connections:	18
Emission Factor, scf/hr/component	
- Gas Valve:	0.123
- Gas Flange:	0.017
- Gas Relief Valve:	0.196
- Gas Sampling Connection*:	0.123
*Used factor for gas valves since no factor is provided in Table W-1A of 40 CFR 98.	
Source of Emission Factors:	Table W-1A of 40 CFR 98
Annual Hours of Operation:	8760
Maximum Component Compositon, % Vol	
- CH_4:	94.906
- CO_2:	0.665
Molecular Weights	
- CH_4:	16.04
- CO_2:	44.01
Calculated Fugitive Release, scf/hr = ∑ (no. of components) X (emission factor, scf/hr/component) = 23.642 scf/hr	
GHG Equivalency Factors, lb CO_2-e/lb:	
- CH_4:	21
- CO_2:	1

Calculated Emission Rates

	lbs/hr	tons/yr
CH_4	0.95	4.16
CO_2	0.018	0.079
CO_2-e	19.968	87.44

Example Calculation of Hourly Emissions (CH_4):

(23.642 scf/hr) * (94.906 scf CH4/100 scf gas) X (1-lb-mol/379 scf) X (16.04 lbs CH4/lb-mol) =
0.95 lbs CH_4/hr

Example Calculation of Annual Emissions (CH4)

(0.95 lbs/hr) X (8760 hrs/yr) X (1 ton/2000 lbs) = 4.16 tons CH_4/yr

Example Calculation of CO_2-e Hourly Emissions

(0.018 lb CO2/hr) X (1lb CO2-e/lb CO2) + (0.95 lbs CH4/hr) X (21 lb CO2-e/lb CH4) =
19.97 lbs CO_2-e/hr

Emission Bases and Calculations

Fuel Gas Volume Lost in Purge, acf/purge:	1000
Maximum Fuel Gas Pressire, psig:	475
Minimum Fuel Gas Temperature, °F:	50
Maximum Purges per Hour:	1
Maximum Purges, per year:	8
Calculated Volume per Purge, scf/purge:	33967
Calculated Lb-Moles per Purge, lb-mol/purge:	89.6
Calculated Lb-Moles per Year, lb-mols/year:	716.8

	Gas Comp., % vol	Molecular Weight	lbs/hr, lbs/purge	tons/yr	CO_2-e Factor, ton/ton*	CO_2-e, lbs/hr	CO_2-e, tons/yr
Nitrogen	5.206	28.01	130.7	0.523	N/A	N/A	N/A
Carbon Dioxide	0.665	44.01	26.2	0.105	1	26.2	0.105
Methane	94.906	16.04	1364	5.46	21	28644	114.66
Ethane	7.007	30.07	188.8	0.76	N/A	N/A	N/A
Propane	1.063	44.09	42	0.168	N/A	N/A	N/A
i-Butane	0.111	58.12	5.8	0.023	N/A	N/A	N/A
n-Butane	0.218	58.12	11.4	0.046	N/A	N/A	N/A
i-Pentane	0.049	72.15	3.2	0.013	N/A	N/A	N/A
n-Pentane	0.05	72.15	3.2	0.013	N/A	N/A	N/A
Hexane	0.04	86.17	3.1	0.012	N/A	N/A	N/A
Heptanes+	0	100.19	0	0	N/A	N/A	N/A
VOC	1.531		68.7	0.275	N/A	N/A	N/A
Total						28670	114.77

Note: Highest values from representative sampling used for each gas component, so total composition exceed 100%.
*GHG Warming Potential Equivalency Factor from 40 CFR Part 98, Subpart A, Table A-1.

Calculation Formulae:

Calculated Volume per Purge [=] (acf/purge) X [(475 + 14.7) psia / 14.7 psia] X [(60 + 460) deg R / (50 + 460) deg R]
Calculated Lb-Moles per Purge [=] (scf/purge) X (1 lb-mole /379 scf)
Calculated Lb-Moles per Year [=] (lb-moles/purge) X (purges/year)
Calculated Lbs/Day or Hour [=] (lb-moles/purge) X (purges/day or hour) X (% Vol / 100 %) X (MW lbs / lb-mole)
Calculated Tons/Year [=] (lbs/day, hour, or purge) X (purges/year) X (1 ton / 2000 lbs)

Emission Bases and Calculations

No. of Circuit Breakers:	8
Amount of SF_6 in each Circuit Breaker, lbs:	365
Estimated annual leak rate, wt. %:	0.5
Estimated annual SF6 emissions = (8 breakers) X (365 lbs/breaker) X (0.5 % lost/yr) X (1 ton/2000 lbs) = 0.0073 tons SF_6/yr	
GHG Equivalency Factor, ton CO_2-e/ton SF_6:	23900
Estimated annual CO_2-e emissions = (0.0073 tons SF6/yr) X (23900 tons CO2-e/ton SF6) = 174.47 tons CO_2-e/yr	

5.0 PSD APPLICABILITY SUMMARY

As shown in Table 1, Floydada Station will emit 532,241 tons/yr of GHG pollutants and 539,218 tons/yr of CO_2-e. Because these emissions exceed the GHG major source definition of 100,000 tons/yr, Floydada Station is required to obtain a pre-construction air quality permit under the PSD rules from the EPA. Floydada Station is also subject to PSD review by the Texas Commission on Environmental Quality (TCEQ) for non-GHG emissions, since, as shown in Table 1F, it will also be a major source of CO emissions, and emissions of NOx and particulate matter less than 10 microns in diameter and less than 2.5 microns in diameter will exceed their PSD significant emission rates. These non-GHG emissions, and those with emission rates below the respective PSD significant emission rates, are subject to the State of Texas pre-construction authorization requirements, and authorizations for those associated facilities and emissions will be obtained separately from the TCEQ.

Sources and emissions subject to PSD permitting requirements because of their potential to release GHG emissions are subject only to some of the requirements of the PSD rules. The primary requirement of a PSD permit for GHG emissions is to require that the permitted facilities use the Best Available Control Technology (BACT) for controlling GHG emissions. The resulting PSD permit specifies emission levels reflecting the use of BACT, including emissions monitoring and other requirements to ensure that the BACT emission levels are maintained during operations. An analysis of and rationale for BACT for the GHG sources at the Floydada Station are provided in Section 6.0.

Floydada Station is not subject to other PSD permit requirements. It is not subject to an analysis of ambient air impacts because there are no National Ambient Air Quality Standards or PSD Ambient Air Increments for GHG emissions. It is not subject to preconstruction ambient air monitoring because of the nature of GHG emissions and their potential global impact; there is no benefit for the gathering of local ambient air monitoring data on GHG pollutants. EPA's permitting guidance for GHG also indicates there is no need to conduct analyses of additional impacts on Class I areas, soils and vegetation because quantifying the impacts attributable to a single source is not feasible with current climate change models.[4]

[4] U.S. EPA, PSD and Title V Permitting Guidance for Greenhouse Gases, EPA-457/B-11-001, March 2011.

TCEQ

TABLE 1F
AIR QUALITY APPLICATION SUPPLEMENT

Permit No.: **TBD**	Application Submittal Date: **January, 2013**
Company: **Golden Spread Electric Cooperative, Inc.**	
RN: **TBD**	Facility Location: **Plant site is NW of intersection of County Road 207 and Farm to Market Road 786, about 5 miles NNE of Floydada, Texas**
City: **Floydada**	County: **Floyd**
Permit Unit I.D.: **Floydada Station**	Permit Name: **Floydada Station**
Permit Activity: ☒ New Source ☐ Modification	

Complete for all Pollutants with a Project Emission Increase.	**POLLUTANTS**							
	Ozone							
	VOC	**NO_x**	**CO**	**PM_{10}**	**$PM_{2.5}$**	**NO_X**	**SO_2**	**CO_2-e**
Nonattainment?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
PSD?	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**
Existing site PTE (tpy)?	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Proposed project emission increases[1]?	31.77	141.74	260.65	21.29	21.29	141.74	6.23	539,218
Is the existing site a major source?	**No**	**No**	**No**	**No**	**No**	**No**	**No**	**No**
If not, is the project a major source by itself?	**No**	**No**	**Yes**	**No**	**No**	**No**	**No**	**Yes**
If site is major source, is project increase significant? **N/A**								
If netting required, estimated start of construction: **N/A since a new grassroots plant is proposed**								
5 years prior to start of construction **N/A**								contemporaneous
Estimated start of operation **N/A**								period
Net contemporaneous change, including proposed project (tpy)	31.77	141.74	260.65	21.29	21.29	141.74	6.23	539,218
Major NSR Applicable?	**No**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**No**	**Yes**

[signature]	Senior Asset Manager, Production	1/25/13
Signature	*Title*	*Date*

[1] Sum of proposed emissions minus baseline emissions, increases only.

The representations made above and on the accompanying tables are true and correct to the best of my knowledge.

TCEQ - 10154 (Revised 04/12) Table 1F
These forms are for use by facilities subject to air quality permit requirements and may be revised periodically. (APDG 5912v2)

6.0 BEST AVAILABLE CONTROL TECHNOLOGY (BACT)

EPA's PSD rules require that any emissions emitted above the significant increase level, and thus subject to the PSD permitting process, be subject to the BACT analysis. Title 40 CFR 52.21(b)(12) reads in part:

> *Best available control technology* means an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under [this] Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR parts 60 and 61.

BACT is established in a top-down analysis where the most effective control technology is selected if it is technically feasible and has "reasonable" energy, environmental, and economic/cost impacts. As described in EPA's PSD and Title V Permitting Guidance for Greenhouse Gases (EPA, 2011) the steps to be followed in establishing BACT are the following:

1) Identify all available control technologies
2) Eliminate technically infeasible options
3) Rank remaining control technologies
4) Evaluate most effective controls and document results
5) Select the BACT

These steps are used below to evaluate and select BACT for Floydada Station.

6.1 Gas Turbine

6.1.1 Step 1 - Identify all available control technologies.

There are two fundamental control technology options for the gas turbine. The first is carbon capture and storage (CCS). CCS is an add-on technology that captures GHG emissions resulting from natural gas combustion before they enter the atmosphere. In this instance the captured CO_2 would be compressed and transported via pipeline to a site where the CO_2 could either be stored or used (for example, for enhanced oil recovery). The second option is the baseline option of using an efficient gas turbine technology and maintaining and operating each turbine train component properly.

6.1.2 Step 2 - Eliminate technically infeasible options.

According to EPA GHG Permitting Guidance document a technology is technically feasible if it (1) has been demonstrated and operated successfully on the same type of source under review or, (2) is available and applicable to the type of source under review.[5] In the United States, there are presently <u>no</u> existing demonstrations of CCS systems used in the removal of CO_2 from natural-gas turbines, from turbines fired with other fuels, or from gas-fired, liquid-fired, or solid-fired boilers and furnaces.[6] One project, the

[5] Ibid, page 33.
[6] Search of EPA's RACT/BACT/LAER Clearinghouse, EPA Clean Air Technology Center, 10/8/2012, and literature survey.

Kemper County Integrated Gasification Combined Cycle Project, is under construction in Mississippi.[7] This project features the removal of CO_2 from a syngas produced from coal gasification; the syngas is then used in a conventional combined cycle power unit. A similar demonstration project, the Texas Clean Energy IGC project, has been planned for Penwell, Texas but construction has not begun.[8] Both of these projects will use technology in a pre-combustion application similar to gas processing conducted in petroleum refineries and natural gas treatment facilities, and do not demonstrate CCS on post-combustion equipment exhausts. Combustion exhausts are at low pressure while gasifier streams are at medium to high pressure: the low pressure in turbine exhausts limits the availability, viability, and practicability of technologies for the removal of CO_2 since some technologies are viable only at medium or high pressure. In addition, the concentration of CO_2 in combustion exhausts is much lower than in gasifier streams. Overall, the lack of utilization of the CO_2 capture/compression/transport/storage as BACT reflects the emerging nature of the CCS technology and the fact that it is not deployed even in demonstration projects on combustion sources.

Just two years ago, the President's Interagency Task Force on Carbon Capture and Storage 2010 report found,

> Current technologies …are not ready for widespread implementation primarily because they have not been demonstrated at the scale necessary to establish confidence for power plant application. Since the CO_2 capture capacities used in current industrial processes are generally much smaller than the capacity required for the purposes of GHG emissions at a typical power plant, there is considerable uncertainty associated with capacities at volumes necessary for commercial deployment.[9]

CCS systems comprise three key systems: capture, transport and storage.

<u>Capture</u>

The CO_2 capture system uses one of several absorption processes to absorb CO_2 from the combustion exhaust gas into a liquid such as monoethanolamine. The absorbed CO_2 is then released by changing the temperature and/or pressure of the absorbing liquid. The enriched CO_2 stream must then be compressed for transport to storage or an end-use. The absorption and compression processes increase the internal energy use for the power plant by 10-40%.[10]

<u>Transport</u>

The availability of transportation to move the captured CO_2 presents a second critical issue to the technical viability of the CCS option.

CO_2 pipelines in the Permian Basin are shown in the figure below. There are presently no existing pipelines that could transport the CO_2 stream from the Floydada Station to a storage facility or an enhanced oil recovery ("EOR") field. The closest existing CO_2 pipeline – the Anton-Irish Pipeline - is located about sixty miles (97 km) west, and slightly southwest of the proposed Floydada Station. The

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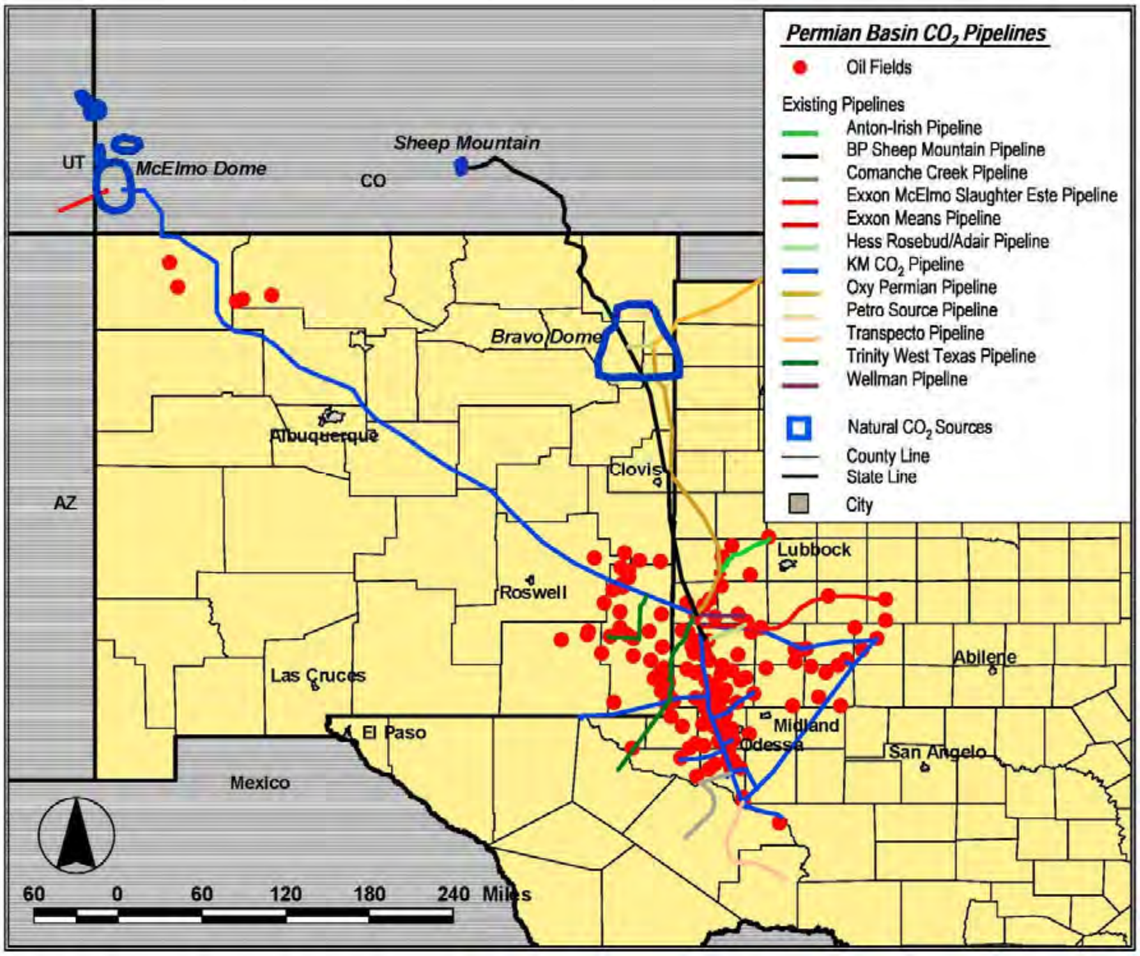
[7] Whether Mississippi Power can recover the costs of building the Kemper facility is currently pending before the Sixth Chancery Court District of Mississippi.
[8] According to the Penwell project website, as of September 14, 2012 construction of this project had not begun. http://www.texascleanenergyproject.com/news-room/
[9] *<u>Report of the Interagency Task Force on Carbon Capture and Storage</u>*, August 2010.
[10] Intergovernmental Panel on Climate Change, Special Report on Carbon Dioxide Capture and Storage, (Bert Metz et al. eds., 2005)



CO_2 Pipelines in the Permian Basin[11]

Anton-Irish Pipeline is privately owned by Oxy Permian and the line's capacity is dedicated to Oxy's operations.[12] Because this is a private line, GSEC cannot demand access to the line and even if Oxy were amenable to GSEC using its line, whether the pipeline or the site it delivers to have any available capacity is unknown to GSEC. In addition the Anton-Irish line may not be suitable for the transportation of anthropogenic CO_2. In its 2012 report The Global CCS Institute noted:

> [T]here are significant differences between the US experience with CO_2 EOR pipelines (mainly dealing with naturally occurring CO_2), and the expertise needed to design transport systems for anthropogenic CO_2. The composition of CO_2 that is captured from power plants, for instance, will influence the hydraulics calculations that are needed to design these pipelines. Impurities or by-products such as nitrogen, argon, methane, and hydrogen lower the density of a CO_2 stream, resulting in a higher pressure drop…Moreover, combinations of impurities (e.g. from different sources) could together

[11] Advanced Resources International, Basin-Oriented Strategies for CO2 EOR: Permian Basin, prepared for U.S. Department of Energy, February 2006.
[12] A Policy, Legal and Regulatory Evaluation of the Feasibility of a National Pipeline Infrastructure for the Transport and Storage of Carbon Dioxide, page 38 (September 2010).

> raise the critical pressure more than that from one component in isolation. The characteristics of CO_2 with impurities are therefore vitally important to know in order to properly engineer a CO_2 transport system. Detailed thermodynamics of CO_2 with impurities has been modeled, but the available models need to be **further** validated.[13]

Aside from the costs related to the building of a new CO_2 line, there are other adverse factors. Private right of way would need to be obtained from likely hundreds of landowners. The sensitivity of and impact on wildlife of such a pipeline would need to considered along with the time delays inherent in obtaining all of the required permits and approvals from State and possibly Federal agencies.

Storage

Finally, the availability of a geologic storage site for the storage of the captured CO2 or for use in EOR operations presents many technical challenges. After a search of publicly available information, GSEC was unable to find any geologic sites in the immediate vicinity of Floydada Station that are viable for large-scale, long-term CO_2 storage. Even if there were a storage site with available capacity, any geologic site to be used for CO_2 injection and storage would need to be extensively characterized and studied which would take several years and would cost several million dollars.[14] The viability of a potential storage site depends on the trapping mechanisms and capacity of the geological formations, and the risks for environmental effects on subsurface and surface waters resulting from pipeline and storage facility leaks. In addition the quality of the CO_2 produced from the Floydada Station would impact the suite of storage options available to it. While EOR sites exist in the Permian Basin, the Floydada Station is approximately 60 miles away from the nearest pipeline terminus and the transportation challenges noted above would apply. In addition, whether the captured CO_2 would be suitable for injection as part of an EOR operation is unknown.

Because of the lack of demonstration of CCS on gas turbine power plants, and other power plant applications, lack of commercial deployment, lack of a transport pipeline, and uncertainties on the possible use of the CO_2 for EOR or for storage in geologic storage sites, CCS is not considered to be a technically viable option.

Gas turbo machinery such as that proposed for use at Floydada Station are readily commercially available and demonstrated in practice, and are considered to be technically viable. Floydada Station has a low heat rate (conversely, a high energy efficiency) due to the use of advanced gas turbine technology. By minimizing fuel usage, these techniques also minimize the release of GHG. This is discussed further below.

6.1.3 Step 3 - Rank remaining control technologies.

CCS technology has the potential to remove between 85 to 90% of the CO_2 from the turbine train exhaust, and this potential capability gives it the first rank for control effectiveness. The baseline option to use efficient gas turbine technology does not reduce CO_2 further than by the innate efficiency of the gas turbine production technology.

[13] Global CCS Institute, The Global Status of CCS: 2012, Canberra Australia, 123-124 (emphasis added).
[12] Ibid. at 129.

6.1.4 Step 4 - Evaluate the most effective controls and document results.

Post-combustion capture of CO_2 could potentially remove 90%, or 485,296 tons per year of CO_2-e from the turbine exhaust.

Costs for CCS applied to natural gas-fired gas turbines, primarily in combined cycle applications, have been widely examined in studies conducted by the U.S. Department of Energy, the Interagency Task Force on Carbon Capture and Storage, the Electric Power Research Institute, and others. Results of the most recent of these have been presented in the "The Cost of Carbon Capture and Storage for Natural Gas Combined Cycle Power Plants"[15] along with additional estimates generated from Carnegie Mellon University's Integrated Environmental Control Model. These cost estimates can be readily extrapolated to the Floydada turbine exhaust because the exhausts from both simple-cycle turbines and combined cycle power plants have similar characteristics, including similar levels of impurities and carbon dioxide (3-5% by volume). One difference is the scale of the production facility. The studied combined cycle power plants have all featured two F Class gas turbines with a total power output approximately 2.5 times that of Floydada Station. This difference in scale results in a higher capital cost per unit of power produced or carbon dioxide removed for the Floydada turbine. While GSEC has considered that effect in the calculation of capital cost below, we have not escalated the annualized costs to consider the higher relative capital cost for a CCS system used with a single simple cycle turbine. The annualized costs for a CCS facility can thus be expected to be even higher than the estimates provided below. Costs are presented in 2011 dollars.

Cost Component	CCS Cost for Floydada Station
Total Capital Cost	\$196 million
Total Annualized Cost	\$29-50 million
Cost Effectiveness	\$61-104/ton CO_2 removed

The capital costs include the CO_2 absorption train, CO_2 compression train, CO_2 pipeline costs, and costs for the injection of CO_2 into storage sites or EOR sites. The total annualized costs included annualized capital costs and all fixed and variable operating and maintenance costs. These costs can be expected to reasonably represent the minimum costs of CCS for the Floydada Station. The cost of CCS would increase the cost of electricity produced at the plant by \$0.03-0.05/kWh. Included in these costs are the cost of the higher energy demands at the plant due to the use of CCS, with an expected increase in energy usage (or a reduction in the net power from the plant) of about 15%. The costs estimates were developed with data from the paper cited above and from the Global CCS Institute's 2012 Status Report.[16]

CCS may also have adverse environmental impacts on subsurface and surface water qualities, but like many aspects of CCS, the extent of these and other environmental effects is uncertain.

Finally, it is worth noting that anthropogenic CO_2 used and trapped within an EOR reservoir may not serve the goal of reducing overall GHG emissions. The objective of using CO_2 in EOR operations is to

[15] E.S. Rubin and Haibo Zhai (Carnegie Mellon University), "The Cost of Carbon Capture and Storage for Natural Gas Combined Cycle Power Plants", Environmental Science and Technology, 2012, **46**, 3076-3084.
[16] Global CCS Institute, The Global Status of CCS: 2012, Canberra Australia, 145.

produce oil which will be combusted and emit GHG gasses. Consequently, the net result of a CCS system that is used for EOR could ultimately result in zero GHG savings.[17]

The base case option of the advanced F class turbine system will not entail the CCS costs or energy impacts.

6.1.5 Step 5 - Select the BACT.

Economic, energy, and environmental impacts all argue against the selection of CCS as BACT. The higher annual costs, and the resulting impact on the costs of produced electricity, would in fact result in the cancellation of the Floydada Station project, if CCS were required as BACT. CCS is also not considered technically viable. BACT for GHG emissions is the use of the efficient gas turbine technology proposed for the Floydada Station, with the turbine facility operated and maintained properly according to the manufacturer recommendations.

6.2 Emergency Generator

The natural-gas fired emergency generator will normally operate less than 100 hours per year in non-emergency operations. GHG from the Emergency Generator will amount to 87 tons/yr of CO_2-e emissions, and 86.42 tons/yr of GHG emissions on a mass basis.

6.2.1 Identify all available control technologies.

There are two options for control of GHG emissions from the emergency generator. The first is to implement the add-on CCS option. The second is to maintain and operate the emergency generator properly, according to manufacturer recommendations and good combustion practice.

6.2.2 Eliminate technically infeasible options.

The use of CCS is not technically feasible for the emergency generator due to the generator's infrequent but critical operating requirements for quick response, short-duration operation; the operating period for the generator would usually end before the CCS absorption unit has reached normal operation. Except for its periodic testing, the emergency generator is intended to operate only for emergency situations when grid power may not be available, when its entire electrical output is required for the emergency situation. No CCS systems have been demonstrated for use on emergency generators.

Maintaining and operating the generator properly is technically viable, as demonstrated by widespread use of these units.

[17] Global CCS Institute, The Global Status of CCS: 2012, Canberra Australia, 153.

6.2.3 Rank remaining control technologies.

The only option is the base option to maintain and operate the generator properly, according to manufacturer recommendations and good combustion practice.

6.2.4 Evaluate the most effective controls and document the results.

GHG emission estimates for the emergency generator reflect the base option to maintain and operate the generator properly. There are no cost impacts for this option. Energy usage for the generator is comparable to that of a simple cycle gas turbine. There are no adverse environmental effects from the limited operation of the generator.

6.2.5 Select the BACT.

BACT is to maintain and operate the generator properly according to manufacturer recommendations, and to operate at the minimal schedule proposed in the permit application.

6.3 Natural Gas Line Fugitives and Maintenance Purges

Fugitive emissions from the natural gas supply lines amount to 87.44 tons/yr of CO_2-e emissions, and 4.24 tons/yr of GHG emissions on a mass basis. Quarterly maintenance purges from the natural gas supply have been conservatively estimated to comprise 114.77 tons/yr of CO_2-e emissions, and 5.57 tons/yr of GHG emissions on a mass basis.

6.3.1 Identify all available control technologies.

Piping fugitive leaks can be controlled by three basic approaches:

1) Use of leak-less and/or seal-less equipment,
2) Use of a leak detection and repair program using either periodic leak inspection by instrument or remote sensing of leaks by infrared camera,
3) Use of audio/visual/olfactory (AVO) observations of leaks in periodic walkthroughs as part of normal operations. (This method of control results in the base emissions of fugitive leaks.)

Maintenance purges of gas lines can be controlled by either flaring the emissions to reduce the CO_2-e emissions or by minimizing the number of purges.

6.3.2 Eliminate technically infeasible options.

Leak-less piping equipment has been used in the chemical process industry when toxic or hazardous materials are used. They have not been used in natural gas supply lines, and operating/maintenance problems with their operation would require line shutdowns to effect repairs. Because of the safety risk and increased GHG emissions of line shutdowns to repair leak-less equipment, and because the natural gas fuel lines do not contain toxic or hazardous materials, the use of leak-less piping components is infeasible and impracticable. The other options to control fugitive leaks are technically feasible.

Both options to control maintenance purges are technically feasible. Quarterly use of a portable flare does entail higher safety risks.

6.3.3 Rank remaining control technologies.

Both instrument detection of leaks and remote sensing of leaks have been determined to be equivalent control methods by EPA.[18] These methods are ranked as most effective, with an estimated effectiveness of 75-95%. AVO methods are less effective since their observations are not conducted at specified intervals. However, because of the presence of natural gas odorants and the high pressure of the natural gas, AVO is moderately effective. We have not attributed a control efficiency to the AVO monitoring by periodic walk-around inspections because this technique is very likely included with the emission factor used to estimate GHG emissions.

For maintenance purges, flaring would reduce CH_4 and other hydrocarbon emissions by 98% but CO_2-e emissions would be reduced only by 81% since the combustion of the hydrocarbon emissions would result in the formation of CO_2 emissions.

6.3.4 Evaluate the most effective controls and document results.

Leak monitoring quarterly using instrument monitoring would cost approximately $1,500 per quarter or $6,000 annually. Leak monitoring using camera/remote sensing would cost approximately $4,000 per quarter or $16,000 annually. Leak repair costs are estimated to be approximately $5,000 per year. Costs for instrumental or remote monitoring of leaks, and their repair, would thus cost $11,000 to $21,000 annually. For an overall reduction of 85% of the CO_2-e emissions from equipment leaks, this would result in a cost effectiveness of $150-280/ton CO_2-e. Periodic AVO monitoring, as a base option, would have no costs other than those included in normal plant operation and maintenance expense. None of these options have significant adverse environmental or energy impacts.

Rental and operation of a portable flare once per quarter for the maintenance purge would cost approximately $3,500 per quarter or $14,000 annually. For an 81% overall reduction in CO_2-e emissions, this would result in a cost effectiveness of $150/ton CO_2-e. Neither this option nor the base option of minimizing the number of maintenance purges has any significant adverse energy or environmental impacts. Natural gas losses in both cases are the same.

6.3.5 Select the BACT.

Due to the high cost of instrument monitoring or remote monitoring of leaks, with a cost effectiveness of $152-280/ton CO_2-e, neither of these options are BACT for fugitive leaks from the natural gas supply system. BACT is the periodic AVO observation of piping equipment.

Due to the high cost of flaring, with a cost effectiveness of $150/ton CO_2-e, flaring is not BACT for maintenance line purges. BACT is the base option of minimizing the number of purges to 8 per year.

6.4 SF_6 Leaks from Circuit Breakers

SF_6 leaks from circuit breakers will amount to 174.47 tons/yr of CO_2-e emissions, and 0.0073 tons/yr of GHG emissions on a mass basis.

[18] 73 FR 78199-78219, December 22, 2008.

6.4.1 Identify all available control technologies.

There are two technology options. The first is to replace SF_6 with an alternate dielectric material or alternative type of circuit breaker. The second is to use comprehensive leak detection with modern SF_6 circuit breaker technology.

6.4.2 Eliminate technically infeasible options.

Although the development of alternative dielectric materials and types of circuit breakers is underway, no alternative or option has been found to be superior to SF_6 based circuit breakers for high voltage applications. SF_6 provides better electrical insulation, and quenches electric arcs more effectively. Circuit-breakers using SF_6 as the insulating and quenching medium are smaller, safer, and have longer useable lifetimes than alternatives. As such, the use of alternate dielectric materials or types of circuit breaker is not technically feasible.

The use of leak detection and modern SF_6 circuit breaker technology is feasible.

6.4.3 Rank remaining control technologies.

The use of modern circuit breaker technology and comprehensive leak detection methods will allow Floydada Station to achieve a leak rate of 0.5%/year.

6.4.4 Evaluate the most effective controls and document results.

The use of modern circuit breaker technology and comprehensive leak detection methods will not cause any significant adverse economic, environmental, or energy effects.

6.4.5 Select the BACT.

Use of modern circuit breaker technology and a comprehensive leak detection and disposition program constitutes BACT. The comprehensive program will involve inventory and use tracking, leak detection by hand-held halogen detectors, and low-gas density alarms. It will also include a recycling program so that SF_6 is evacuated into portable cylinders rather than vented to atmosphere.

6.5 Proposed Emission and Production Limits, Monitoring, and Maintenance Requirements

Table 7 shows the emission and production limits, monitoring, and maintenance requirements proposed to support BACT.

Emission Source	Emission and Production Limits	Monitoring Requirements	Maintenance Requirements
Gas turbine	• 538,754 tons/yr CO_2-e • 237,767 lbs/h CO_2-e • 923,443 MWh (gross)/yr • 1217 lbs CO_2-e/MWh (gross) @ max. load • 1514 lbs CO_2-e/MWh (gross) @ any load from 50% to 100% load	• Determine hourly and annual GHG emissions using 40 CFR 98.43 • Determine and record annual GHG emissions on a rolling 12-month basis • Determine and record lbs CO_2/MWh (gross) as a rolling 30-day average • Record gross electricity output in MWh/yr on a rolling 12-month basis	• Operate and maintain all equipment according to manufacturer recommendations
Emergency generator	• 87 tons/yr CO_2-e	• Determine annual GHG emissions using 40 CFR 98.33 on a calendar year basis	• Operate and maintain all equipment according to manufacturer recommendations
Natural Gas Piping Fugitive Leaks	• 87.4 tons/yr CO_2-e	• Record leak observations reporting by operating and maintenance staff	• Operate and maintain all equipment according to manufacturer recommendations
Natural Gas Maintenance Purges	• 115 tons/yr CO_2-e	• Record purge volumes and determine annual GHG emissions on a calendar year basis	• Operate and maintain all equipment according to manufacturer recommendations
SF_6 Fugitive Leaks	• 174 tons/yr CO_2-e	• Use inventory records to determine SF_6 and CO_2-e emissions on a calendar year basis • Monitor for leaks using halogen detector on a monthly basis	• Implement a recycling program so that SF_6 is evacuated into portable cylinders rather than vented to atmosphere. • Operate and maintain all equipment according to manufacturer recommendations

Table 7. Proposed Emission and Production Limits, Monitoring, and Maintenance Requirements