Hilcorp Alaska, LLC

Post Office Box 244027
Anchorage, AK 99524-4027

3800 Centerpoint Drive
Suite 1400
Anchorage, AK 99503

Phone: 907/777-8300
Fax: 907/777-8301

December 4, 2023

Application Intake
Alaska Department of Environmental Conservation
Air Permits Program
555 Cordova Street
Anchorage, AK 99501

Subject: Hilcorp Alaska, LLC – Application for an Owner Requested Limit
Ivan River Unit

Dear Application Intake,

Hilcorp Alaska, LLC (Hilcorp) submits the enclosed application for an Owner Requested Limit (ORL) for the Ivan River Unit in accordance with 18 AAC 50.225. The ORL will authorize the installation of an additional gas-fired compressor engine while avoiding the requirement for a Title I minor permit under 18 AAC 50.502(c)(3). Note that the gas-fired compressor engine is currently operating at Ivan River Unit as a non-road engine in accordance with the requirements of 40 CFR 1068.30.

Hilcorp is providing a one-time administrative fee of $2,444 to establish the ORL per 18 AAC 50.400(f)(1)(A).

Please contact Natalia Lau at (907) 777-8304 or natalia.lau@hilcorp.com with any questions or concerns.

Based on the information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete.

Sincerely,

Chris Kanyer
Asset Team Lead
Hilcorp Alaska, LLC

Enclosure

Cc: AlaskaAirCompliance
Jeanette Brena (Boreal)

Hilcorp Alaska, LLC

Ivan River Unit

Application for an Owner Requested Limit

Prepared for:

Hilcorp Alaska, LLC

November 2023

BOREAL

Ivan River Unit

Application for an Owner Requested Limit

Prepared for:

Hilcorp Alaska, LLC

3800 Centerpoint Dr., Suite 1400
Anchorage, AK 99503

Prepared by:

Boreal Environmental Services

4300 B Street, Suite 510
Anchorage, AK 99503

Owner Requested Limit Application Elements

Requirement	Regulatory Citation	Application Section
Completed Stationary Source ID Form	18 AAC 50.225(b)(1)	SSID Form
List of all emissions units at the stationary source	18 AAC 50.225(b)(2)	Attachment A
Calculations of the stationary source's actual emissions and PTE air pollutants	18 AAC 50.225(b)(3)	Attachment A
Descriptions of each proposed limit, including for each air pollutant a calculation of the effect the limit will have on the stationary source's PTE and allowable emissions	18 AAC 50.225(b)(4)	Attachment A and Attachment C
Descriptions of a verifiable method to attain and maintain each limit, including monitoring and recordkeeping requirements	18 AAC 50.225(b)(5)	Attachment C
Citation to each requirement that the person seeks to avoid, including an explanation of why the requirement would apply in the absence of the limit and how the limit allows the person to avoid the requirement	18 AAC 50.225(b)(6)	Attachment A and Attachment C
A statement that the owner or operator of the stationary source will be able to comply with each limit	18 AAC 50.225(b)(8)	Attachment C
Signed, certification statement	18 AAC 50.225(b)(9)	SSID Form

OWNER REQUESTED LIMIT IDENTIFICATION FORM

Alaska Department of Environmental Conservation **Owner Requested Limit Application**	**ADEC USE ONLY** Receiving Date: ADEC Control #: ORL :

STATIONARY SOURCE IDENTIFICATION FORM

Section 1 Stationary Source Information

Stationary Source Name: Ivan River Unit			
Project Name (if different):	Stationary Source Contact: Natalia Lau		
Source Physical Address: Western Side of Cook Inlet, AK	City:	State:	Zip:
	Telephone: (907) 777-8304		
	E-Mail Address: Natalia.Lau@hilcorp.com		
UTM Coordinates or Latitude/Longitude:	Northing:	Easting:	Zone:
	Latitude: 61° 16' 43.9" N	Longitude: 150° 52' 45.9" W	

Section 2 Legal Owner

Name: Hilcorp Alaska, LLC		
Mailing Address: 3800 Centerpoint Dr. Suite 1400		
City: Anchorage	State: AK	Zip: 99503
Telephone #: (907) 777-8300		
E-Mail Address:		

Section 3 Operator *(if different from owner)*

Name: *Same as Owner*		
Mailing Address:		
City:	State:	Zip:
Telephone #:		
E-Mail Address:		

Section 4 Designated Agent *(for service of process)*

Name: CT Corporation		
Mailing Address: 9630 Glacier Highway, Ste. 202		
City: Juneau	State: AK	Zip: 99801
Physical Address:		
City:	State:	Zip:
Telephone #:		
E-Mail Address:		

Section 5 Billing Contact Person *(if different from owner)*

Name: Hilcorp Alaska, LLC Accounts Payable		
Mailing Address: P.O. Box 61529		
City: Houston	State: TX	Zip: 77208
Telephone #:		
E-Mail Address:		

Section 6 Application Contact

Name: Natalia Lau			
Mailing Address: 3800 Centerpoint Dr. Suite 1400	City: Anchorage	State: AK	Zip: 99503
	Telephone: (907) 777-8304		
	E-Mail Address: Natalia.Lau@hilcorp.com		

OWNER REQUESTED LIMIT IDENTIFICATION FORM

Section 7 Certification

This certification applies to the Air Quality Control Owner Requested Limit Application for the Ivan River Unit
(Stationary Source Name)
submitted to the department on: *(refer to date below).*

Type of Application
☒ Initial Application
☐ Change to Initial Application

The application is **NOT** complete unless the certification of truth, accuracy, and completeness on this form bears the **signature of a responsible official** of the firm making the application. (18 AAC 50.205)

CERTIFICATION OF TRUTH, ACCURACY, AND COMPLETENESS

"Based on information and belief formed after reasonable inquiry, I certify that the statements and information in and attached to this document are true, accurate, and complete."

Signature: Chris Kanyer	Date: 12/4/2023
Printed Name: Chris Kanyer	Title: Asset Team Lead

Section 13 Attachments

☒ Attachments Included. List attachments:

Attachment A – Emissions Unit Inventory and Potential to Emit Calculations
Attachment B – Supporting Information
Attachment C – Owner Requested Limit Application Requirements

Attachment A

Emissions Unit Inventory and Potential to Emit Calculations

Table A-1a. Air Quality Permit Applicability Summary with Owner Requested Limit
Hilcorp Alaska, LLC - Ivan River Unit

Pollutant	Existing Stationary Source Potential Emissions	Proposed Stationary Source Potential Emissions	Change in Potential Emissions	PSD Permit Thresholds[1]	PSD Permit Required?	Minor Air Quality Permitting Thresholds[2]	Minor Permit Required?	Title V Air Quality Permitting Thresholds[3]	Title V Permit Required?
NO_X	46.05 tpy	37.78 tpy	-8.27 tpy	250 tpy	No	10 tpy	No	100 tpy	No
CO	74.25 tpy	33.67 tpy	-40.58 tpy	250 tpy	No	----[4]	----	100 tpy	No
PM	0.71 tpy	0.79 tpy	0.08 tpy	250 tpy	No	----	----	100 tpy	No
PM_{10}	0.71 tpy	0.79 tpy	0.08 tpy	250 tpy	No	10 tpy	No	100 tpy	No
$PM_{2.5}$	0.71 tpy	0.79 tpy	0.08 tpy	250 tpy	No	10 tpy	No	100 tpy	No
VOC	1.73 tpy	2.17 tpy	0.44 tpy	250 tpy	No	----	----	100 tpy	No
SO_2	2.70 tpy	2.87 tpy	0.17 tpy	250 tpy	No	10 tpy	No	100 tpy	No

Table A-1b. Air Quality Permit Applicability Summary without Owner Requested Limit
Hilcorp Alaska, LLC - Ivan River Unit

Pollutant	Existing Stationary Source Potential Emissions	Proposed Stationary Source Potential Emissions	Change in Potential Emissions	PSD Permit Thresholds[1]	PSD Permit Required?	Minor Air Quality Permitting Thresholds[2]	Minor Permit Required?	Title V Air Quality Permitting Thresholds[3]	Title V Permit Required?
NO_X	46.05 tpy	64.13 tpy	18.07 tpy	250 tpy	No	10 tpy	**Yes**	100 tpy	No
CO	74.25 tpy	75.90 tpy	1.65 tpy	250 tpy	No	----[4]	----	100 tpy	No
PM	0.71 tpy	0.79 tpy	0.08 tpy	250 tpy	No	----	----	100 tpy	No
PM_{10}	0.71 tpy	0.79 tpy	0.08 tpy	250 tpy	No	10 tpy	No	100 tpy	No
$PM_{2.5}$	0.71 tpy	0.79 tpy	0.08 tpy	250 tpy	No	10 tpy	No	100 tpy	No
VOC	1.73 tpy	2.17 tpy	0.44 tpy	250 tpy	No	----	----	100 tpy	No
SO_2	2.70 tpy	2.87 tpy	0.17 tpy	250 tpy	No	10 tpy	No	100 tpy	No

Notes:

[1] PSD air quality permitting thresholds per 40 CFR 52.21(b)(i)(b) and 18 AAC 50.306.

[2] Minor air quality permitting thresholds for an existing stationary source under 18 AAC 50.502(c)(3).

[3] Title V air quality operating permit thresholds per 40 CFR 71 and 18 AAC 50.326.

[4] Not applicable.

Table A-2. Stationary Source Emission Unit Inventory
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Make/Model	Fuel Type	Rating/Size	Maximum Operation
Existing Emission Units					
2	Tank Bldg Flameco Burner	Sivalls Glycol Reboiler B Train	Fuel Gas	0.25 MMBtu/hr	8,760 hr/yr
3	Sivalls Gas Heater	Sivalls Glycol Heat String	Fuel Gas	4 MMBtu/hr	8,760 hr/yr
4	Sivalls Gas Heater	Sivalls Gas Heater	Fuel Gas	4 MMBtu/hr	8,760 hr/yr
5	Sivalls Glycol Reboiler	Sivalls Glycol Reboiler A Train	Fuel Gas	0.25 MMBtu/hr	8,760 hr/yr
6[1]	Dresser Compressor Drive	Caterpillar 3406B	Fuel Gas	215 hp	8,760 hr/yr
7	Turbine Generator (Primary)	Capstone 65 Microturbine	Fuel Gas	65 kW	8,760 hr/yr
8[1]	Ariel Booster Compressor Drive	Caterpillar 3406TA	Fuel Gas	325 hp	8,760 hr/yr
9	Tank Bldg Catalytic Heater	Catadyne Heater	Fuel Gas	0.023 MMBtu/hr	8,760 hr/yr
10	Scrubber Bldg Catalytic Heater	Catadyne Heater	Fuel Gas	0.023 MMBtu/hr	8,760 hr/yr
11	Scrubber Bldg Catalytic Heater	Catadyne Heater	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
12	Line Heater Bldg Bruest Heater	Bruest Heater	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
13	Dresser Stage Compressor Bldg Catalytic Heater	Bruest Heater	Fuel Gas	0.028 MMBtu/hr	8,760 hr/yr
14	Dresser Stage Compressor Bldg Catalytic Heater	Bruest Heater	Fuel Gas	0.028 MMBtu/hr	8,760 hr/yr
15	Booster Compressor Bldg Catalytic Heater	Catadyne Heater	Fuel Gas	0.012 MMBtu/hr	8,760 hr/yr
16	Booster Compressor Bldg Catalytic Heater	Catadyne Heater	Fuel Gas	0.012 MMBtu/hr	8,760 hr/yr
17	Booster Compressor Bldg Catalytic Heater	Catadyne Heater	Fuel Gas	0.012 MMBtu/hr	8,760 hr/yr
18	Well House 14-31 Catalytic Heater	Bruest Heater	Fuel Gas	0.028 MMBtu/hr	8,760 hr/yr
20	Gas-fired Catalytic Heater	Catalytic Heater	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
21	Well House 13-31 Catalytic Heater	Catalytic Heater	Fuel Gas	0.028 MMBtu/hr	8,760 hr/yr
24	Turbine Generator	Capstone 65 Microturbine	Fuel Gas	65 kW	8,760 hr/yr
25	Catalytic Heater No. 1	Catalytic Heater No. 1	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
26	Catalytic Heater No. 2	Catalytic Heater No. 2	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
27	Catalytic Heater No. 3	Catalytic Heater No. 3	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
28	Catalytic Heater No. 4	Catalytic Heater No. 4	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
29	Catalytic Heater No. 5	Catalytic Heater No. 5	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
30	Catalytic Heater No. 6	Catalytic Heater No. 6	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
31	Catalytic Heater No. 7	Catalytic Heater No. 7	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
32	Catalytic Heater No. 8	Catalytic Heater No. 8	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
33	Catalytic Heater No. 9	Catalytic Heater No. 9	Fuel Gas	0.05 MMBtu/hr	8,760 hr/yr
34	A and B Train Dehydrators	N/A	N/A	N/A	8,760 hr/yr
New/Modified Emission Units					
6[1]	Dresser Compressor Drive w/ Three-Way Catalyst	Caterpillar 3406B	Fuel Gas	215 hp	8,760 hr/yr
8[1]	Ariel Booster Compressor Drive w/ Three-Way Catalyst	Caterpillar 3406TA	Fuel Gas	325 hp	8,760 hr/yr
35[2]	Compressor Drive	Caterpillar G3304 NA	Fuel Gas	95 hp	8,760 hr/yr

Notes:

[1] EU IDs 6 and 8 currently operate with a three-way catalyst that reduce emissions of NO_X, CO, and VOC. This ORL requests that the catalysts be legally enforceable for purposes of potential to emit.

[2] EU ID 35 will be moved from Beluga River Unit.

Table A-3. Oxides of Nitrogen (NO_X) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Rating/Size	Maximum Operation	Emission Factor	Reference	Potential NO_X Emissions[1]
Existing Emission Units						
2	Tank Bldg Flameco Burner	0.25 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.10 tpy
3	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	100 lb/MMscf	AP-42 Table 1.4-1	1.72 tpy
4	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	100 lb/MMscf	AP-42 Table 1.4-1	1.72 tpy
5	Sivalls Glycol Reboiler	0.25 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.10 tpy
6	Dresser Compressor Drive	215 hp	8,760 hr/yr	2.21 lb/MMBtu	AP-42 Table 3.2-3	16.65 tpy
7	Turbine Generator (Primary)	65 kW	8,760 hr/yr	0.000491 lb/kW-hr	Vendor Data	0.14 tpy
8	Ariel Booster Compressor Drive	325 hp	8,760 hr/yr	2.21 lb/MMBtu	AP-42 Table 3.2-3	25.17 tpy
9	Tank Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
10	Scrubber Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
11	Scrubber Bldg Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
12	Line Heater Bldg Bruest Heater	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
13	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
14	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
15	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
16	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
17	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
18	Well House 14-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
20	Gas-fired Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
21	Well House 13-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
24	Turbine Generator	65 kW	8,760 hr/yr	0.000491 lb/kW-hr	Vendor Data	0.14 tpy
25	Catalytic Heater No. 1	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
26	Catalytic Heater No. 2	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
27	Catalytic Heater No. 3	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
28	Catalytic Heater No. 4	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
29	Catalytic Heater No. 5	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
30	Catalytic Heater No. 6	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
31	Catalytic Heater No. 7	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
32	Catalytic Heater No. 8	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
33	Catalytic Heater No. 9	0.05 MMBtu/hr	8,760 hr/yr	94 lb/MMscf	AP-42 Table 1.4-1	0.02 tpy
34	A and B Train Dehydrators	N/A	8,760 hr/yr	N/A	N/A	0.00 tpy
New/Modified Emission Units						
6	Dresser Compressor Drive w/ Three-Way Catalyst	215 hp	8,760 hr/yr	0.82 lb/MMBtu	AP-42 Table 3.2-3[2]	6.16 tpy
8	Ariel Booster Compressor Drive w/ Three-Way Catalyst	325 hp	8,760 hr/yr	0.82 lb/MMBtu	AP-42 Table 3.2-3[2]	9.31 tpy
35	Compressor Drive	95 hp	8,760 hr/yr	19.7 g/hp-hr	Vendor Data[3]	18.07 tpy
					Existing Total	**46.05 tpy**
					Proposed Total without ORL	**64.13 tpy**
					Proposed Total with ORL	**37.78 tpy**

Notes:

[1] Parameters and Conversions:

Fuel Gas Heat Content: 1,020 Btu/scf

Gas-fired Engine Heat Rate: 8,000 Btu/hp-hr

[2] Three-way catalyst reduces emissions of NO_X by 90 to 99 percent, CO by 95 to 99 percent, and VOC by 80 to 90 percent. Worst-case emissions for NO_X assume 63 percent reduction, an emission factor equivalent to 3 g/hp-hr.

[3] See attached compressor drive vendor data.

Table A-4. Carbon Monoxide (CO) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Rating/Size	Maximum Operation	Emission Factor	Reference	Potential CO Emissions[1]
Existing Emission Units						
2	Tank Bldg Flameco Burner	0.25 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.04 tpy
3	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	84 lb/MMscf	AP-42 Table 1.4-1	1.44 tpy
4	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	84 lb/MMscf	AP-42 Table 1.4-1	1.44 tpy
5	Sivalls Glycol Reboiler	0.25 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.04 tpy
6	Dresser Compressor Drive	215 hp	8,760 hr/yr	3.72 lb/MMBtu	AP-42 Table 3.2-3	28.02 tpy
7	Turbine Generator (Primary)	65 kW	8,760 hr/yr	0.001330 lb/kW-hr	Vendor Data	0.38 tpy
8	Ariel Booster Compressor Drive	325 hp	8,760 hr/yr	3.72 lb/MMBtu	AP-42 Table 3.2-3	42.36 tpy
9	Tank Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.004 tpy
10	Scrubber Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.004 tpy
11	Scrubber Bldg Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
12	Line Heater Bldg Bruest Heater	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
13	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
14	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
15	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.002 tpy
16	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.002 tpy
17	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.002 tpy
18	Well House 14-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
20	Gas-fired Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
21	Well House 13-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.005 tpy
24	Turbine Generator	65 kW	8,760 hr/yr	0.001330 lb/kW-hr	Vendor Data	0.38 tpy
25	Catalytic Heater No. 1	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
26	Catalytic Heater No. 2	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
27	Catalytic Heater No. 3	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
28	Catalytic Heater No. 4	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
29	Catalytic Heater No. 5	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
30	Catalytic Heater No. 6	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
31	Catalytic Heater No. 7	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
32	Catalytic Heater No. 8	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
33	Catalytic Heater No. 9	0.05 MMBtu/hr	8,760 hr/yr	40 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
34	A and B Train Dehydrators	N/A	8,760 hr/yr	N/A	N/A	0.00 tpy
New/Modified Emission Units						
6	Dresser Compressor Drive w/ Three-Way Catalyst	215 hp	8,760 hr/yr	1.49 lb/MMBtu	AP-42 Table 3.2-3[2]	11.21 tpy
8	Ariel Booster Compressor Drive w/ Three-Way Catalyst	325 hp	8,760 hr/yr	1.49 lb/MMBtu	AP-42 Table 3.2-3[2]	16.95 tpy
35	Compressor Drive	95 hp	8,760 hr/yr	1.8 g/hp-hr	Vendor Data[3]	1.65 tpy
					Existing Total	**74.25 tpy**
					Proposed Total without ORL	**75.90 tpy**
					Proposed Total with ORL	**33.67 tpy**

Notes:

[1] Parameters and Conversions:

Fuel Gas Heat Content: 1,020 Btu/scf

Gas-fired Engine Heat Rate: 8,000 Btu/hp-hr

[2] Three-way catalyst reduces emissions of NO_X by 90 to 99 percent, CO by 95 to 99 percent, and VOC by 80 to 90 percent. Worst-case emissions for CO assume 60 percent reduction. Note that permitting is not triggered for CO even when a zero percent reduction is assumed.

[3] See attached compressor drive vendor data.

Table A-5. Particulate Matter ($PM/PM_{10}/PM_{2.5}$) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Rating/Size	Maximum Operation	Emission Factor	Reference	Potential PM Emissions[1]
Existing Emission Units						
2	Tank Bldg Flameco Burner	0.25 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.01 tpy
3	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.13 tpy
4	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.13 tpy
5	Sivalls Glycol Reboiler	0.25 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.01 tpy
6	Dresser Compressor Drive	215 hp	8,760 hr/yr	0.01941 lb/MMBtu	AP-42 Table 3.2-2	0.15 tpy
7	Turbine Generator (Primary)	65 kW	8,760 hr/yr	0.0066 lb/MMBtu	AP-42, Table 3.1-2a	0.02 tpy
8	Ariel Booster Compressor Drive	325 hp	8,760 hr/yr	0.01941 lb/MMBtu	AP-42 Table 3.2-2	0.22 tpy
9	Tank Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.001 tpy
10	Scrubber Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.001 tpy
11	Scrubber Bldg Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
12	Line Heater Bldg Bruest Heater	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
13	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.001 tpy
14	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.001 tpy
15	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.0004 tpy
16	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.0004 tpy
17	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.0004 tpy
18	Well House 14-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.001 tpy
20	Gas-fired Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
21	Well House 13-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.001 tpy
24	Turbine Generator	65 kW	8,760 hr/yr	0.0066 lb/MMBtu	AP-42, Table 3.1-2a	0.02 tpy
25	Catalytic Heater No. 1	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
26	Catalytic Heater No. 2	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
27	Catalytic Heater No. 3	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
28	Catalytic Heater No. 4	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
29	Catalytic Heater No. 5	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
30	Catalytic Heater No. 6	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
31	Catalytic Heater No. 7	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
32	Catalytic Heater No. 8	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
33	Catalytic Heater No. 9	0.05 MMBtu/hr	8,760 hr/yr	7.6 lb/MMscf	AP-42 Table 1.4-2	0.002 tpy
34	A and B Train Dehydrators	N/A	8,760 hr/yr	N/A	N/A	0.00 tpy
New/Modified Emission Units						
6	Dresser Compressor Drive w/ Three-Way Catalyst	215 hp	8,760 hr/yr	0.01941 lb/MMBtu	AP-42 Table 3.2-2	0.15 tpy
8	Ariel Booster Compressor Drive w/ Three-Way Catalyst	325 hp	8,760 hr/yr	0.01941 lb/MMBtu	AP-42 Table 3.2-2	0.22 tpy
35	Compressor Drive	95 hp	8,760 hr/yr	0.01941 lb/MMBtu	AP-42 Table 3.2-3	0.08 tpy

Existing Total	**0.71 tpy**
Proposed Total without ORL	**0.79 tpy**
Proposed Total with ORL	**0.79 tpy**

Notes:

[1] Parameters and Conversions:

Fuel Gas Heat Content:	1,020 Btu/scf
Gas-fired Engine Heat Rate:	8,000 Btu/hp-hr
Turbine Heat Rate:	10,000 Btu/kW-hr
EU ID 35 Heat Rate:	10,073 Btu/hp-hr (Vendor Data)

Table A-6. Volatile Organic Compounds (VOC) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Rating/Size	Maximum Operation	Emission Factor	Reference	Potential VOC Emissions[1]
Existing Emission Units						
2	Tank Bldg Flameco Burner	0.25 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
3	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.09 tpy
4	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.09 tpy
5	Sivalls Glycol Reboiler	0.25 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.01 tpy
6	Dresser Compressor Drive	215 hp	8,760 hr/yr	0.0296 lb/MMBtu	AP-42 Table 3.2-3	0.22 tpy
7	Turbine Generator (Primary)	65 kW	8,760 hr/yr	0.000171 lb/kW-hr	Vendor Data	0.05 tpy
8	Ariel Booster Compressor Drive	325 hp	8,760 hr/yr	0.0296 lb/MMBtu	AP-42 Table 3.2-3	0.34 tpy
9	Tank Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
10	Scrubber Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
11	Scrubber Bldg Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
12	Line Heater Bldg Bruest Heater	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
13	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
14	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
15	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.0003 tpy
16	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.0003 tpy
17	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.0003 tpy
18	Well House 14-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
20	Gas-fired Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
21	Well House 13-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
24	Turbine Generator	65 kW	8,760 hr/yr	0.000171 lb/kW-hr	Vendor Data	0.05 tpy
25	Catalytic Heater No. 1	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
26	Catalytic Heater No. 2	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
27	Catalytic Heater No. 3	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
28	Catalytic Heater No. 4	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
29	Catalytic Heater No. 5	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
30	Catalytic Heater No. 6	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
31	Catalytic Heater No. 7	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
32	Catalytic Heater No. 8	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
33	Catalytic Heater No. 9	0.05 MMBtu/hr	8,760 hr/yr	5.5 lb/MMscf	AP-42 Table 1.4-1	0.001 tpy
34	A and B Train Dehydrators	N/A	8,760 hr/yr	N/A	GRI-GLYCalc 4.0[2]	0.85 tpy
New/Modified Emission Units						
6	Dresser Compressor Drive w/ Three-Way Catalyst	215 hp	8,760 hr/yr	0.0118 lb/MMBtu	AP-42 Table 3.2-3[3]	0.09 tpy
8	Ariel Booster Compressor Drive w/ Three-Way Catalyst	325 hp	8,760 hr/yr	0.0118 lb/MMBtu	AP-42 Table 3.2-3[3]	0.13 tpy
35	Compressor Drive	95 hp	8,760 hr/yr	0.5 g/hp-hr	Vendor Data[2]	0.44 tpy
					Existing Total	**1.73 tpy**
					Proposed Total without ORL	**2.17 tpy**
					Proposed Total with ORL	**1.84 tpy**

Notes:

[1] Parameters and Conversions:

Fuel Gas Heat Content: 1,020 Btu/scf

Gas-fired Engine Heat Rate: 8,000 Btu/hp-hr

[2] See attached compressor drive vendor data and GRI-GLYCalc reports.

[2] Three-way catalyst reduces emissions of NO_X by 90 to 99 percent, CO by 95 to 99 percent, and VOC by 80 to 90 percent. Worst-case emissions for VOC assume 60 percent reduction. Note that permitting is not triggered for VOC even when a zero percent reduction is assumed.

Table A-7. Sulfur Dioxide (SO_2) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Rating/Size	Maximum Operation	Emission Factor[1]	Reference	Potential SO_2 Emissions[2]
Existing Emission Units						
2	Tank Bldg Flameco Burner	0.25 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.05 tpy
3	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.72 tpy
4	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.72 tpy
5	Sivalls Glycol Reboiler	0.25 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.05 tpy
6	Dresser Compressor Drive	215 hp	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.31 tpy
7	Turbine Generator (Primary)	65 kW	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.12 tpy
8	Ariel Booster Compressor Drive	325 hp	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.47 tpy
9	Tank Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.004 tpy
10	Scrubber Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.004 tpy
11	Scrubber Bldg Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
12	Line Heater Bldg Bruest Heater	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
13	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
14	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
15	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.002 tpy
16	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.002 tpy
17	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.002 tpy
18	Well House 14-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
20	Gas-fired Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
21	Well House 13-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
24	Turbine Generator	65 kW	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.12 tpy
25	Catalytic Heater No. 1	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
26	Catalytic Heater No. 2	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
27	Catalytic Heater No. 3	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
28	Catalytic Heater No. 4	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
29	Catalytic Heater No. 5	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
30	Catalytic Heater No. 6	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
31	Catalytic Heater No. 7	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
32	Catalytic Heater No. 8	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
33	Catalytic Heater No. 9	0.05 MMBtu/hr	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.01 tpy
34	A and B Train Dehydrators	N/A	8,760 hr/yr	N/A	N/A	0.00 tpy
New/Modified Emission Units						
6	Dresser Compressor Drive w/ Three-Way Catalyst	215 hp	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.31 tpy
8	Ariel Booster Compressor Drive w/ Three-Way Catalyst	325 hp	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.47 tpy
35	Compressor Drive	95 hp	8,760 hr/yr	250 ppm H_2S	Mass Balance	0.17 tpy
					Existing Total	**2.70 tpy**
					Proposed Total without ORL	**2.87 tpy**
					Proposed Total with ORL	**2.87 tpy**

Notes:

[1] A sulfur concentration of 250 ppm is used as a conservative estimate for Ivan River Unit fuel gas.

[2] Parameters and Conversions:

Fuel Gas Heat Content:	1,020 Btu/scf
Gas-fired Engine Heat Rate:	8,000 Btu/hp-hr
Turbine Heat Rate:	10,000 Btu/kW-hr
EU ID 35 Heat Rate:	10,073 Btu/hp-hr (Vendor Data)

Table A-8. Greenhouse Gas (GHG) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

EU ID	Description	Rating/Size	Maximum Operation	Emission Factor	Reference	Potential CO_2e Emissions[1]
Existing Emission Units						
2	Tank Bldg Flameco Burner	0.25 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	128.22 tpy
3	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	2,051.54 tpy
4	Sivalls Gas Heater	4.0 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	2,051.54 tpy
5	Sivalls Glycol Reboiler	0.25 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	128.22 tpy
6	Dresser Compressor Drive	215 hp	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	882.16 tpy
7	Turbine Generator (Primary)	65 kW	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	333.37 tpy
8	Ariel Booster Compressor Drive	325 hp	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	1,333.50 tpy
9	Tank Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	11.54 tpy
10	Scrubber Bldg Catalytic Heater	0.023 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	11.54 tpy
11	Scrubber Bldg Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
12	Line Heater Bldg Bruest Heater	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
13	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	14.36 tpy
14	Dresser Stage Compressor Bldg Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	14.36 tpy
15	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	6.15 tpy
16	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	6.15 tpy
17	Booster Compressor Bldg Catalytic Heater	0.012 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	6.15 tpy
18	Well House 14-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	14.36 tpy
20	Gas-fired Catalytic Heater	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
21	Well House 13-31 Catalytic Heater	0.028 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	14.36 tpy
24	Turbine Generator	65 kW	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	333.37 tpy
25	Catalytic Heater No. 1	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
26	Catalytic Heater No. 2	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
27	Catalytic Heater No. 3	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
28	Catalytic Heater No. 4	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
29	Catalytic Heater No. 5	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
30	Catalytic Heater No. 6	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
31	Catalytic Heater No. 7	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
32	Catalytic Heater No. 8	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
33	Catalytic Heater No. 9	0.05 MMBtu/hr	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	25.64 tpy
34	A and B Train Dehydrators	N/A	8,760 hr/yr	N/A	GRI-GLYCalc 4.0[2]	2,700.15 tpy
New/Modified Emission Units						
6	Dresser Compressor Drive w/ Three-Way Catalyst	215 hp	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	882.16 tpy
8	Ariel Booster Compressor Drive w/ Three-Way Catalyst	325 hp	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	1,333.50 tpy
35	Compressor Drive	95 hp	8,760 hr/yr	53.11 kg/MMBtu	40 CFR 98 Table C-1 & C-2	490.80 tpy

Existing Total	**10,348.80 tpy**
Proposed Total without ORL	**10,839.60 tpy**
Proposed Total with ORL	**10,839.60 tpy**

Notes:

[1] Parameters and Conversions:

Gas-fired Engine Heat Rate:	8,000 Btu/hp-hr
Turbine Heat Rate:	10,000 Btu/kW-hr
EU ID 35 Heat Rate:	10,073 Btu/hp-hr (Vendor Data)

[2] See attached GRI-GLYCalc reports.

Table A-9. Hazardous Air Pollutant (HAPs) Emissions Summary
Hilcorp Alaska, LLC - Ivan River Unit

Hazardous Air Pollutant	Potential HAP Emissions (tpy)					
	NG Boilers and Heaters	NG Turbines	NG 4SRB RICE Existing	NG 4SRB RICE Proposed	Dehydrators[1]	Total[2,3]
1,1,2,2-Tetrachloroethane	-----	-----	4.79E-04	5.85E-04	-----	1.06E-03
1,1,2-Trichloroethane	-----	-----	2.90E-04	3.54E-04	-----	6.43E-04
1,3-Butadiene	-----	1.22E-06	1.25E-02	1.53E-02	-----	2.79E-02
1,3-Dichloropropene	-----	-----	2.40E-04	2.94E-04	-----	5.34E-04
1,4-Dichlorobenzene	4.79E-05	-----	-----	-----	-----	4.79E-05
2,2,4-Trimethylpentane	-----	-----	5.28E-02	6.45E-02	-----	1.17E-01
Acetaldehyde	-----	1.14E-04	4.98E-02	6.08E-02	-----	1.11E-01
Acrolein	-----	1.82E-05	2.99E-02	3.65E-02	-----	6.64E-02
Arsenic Compounds	7.98E-06	-----	-----	-----	-----	7.98E-06
Benzene	8.38E-05	3.42E-05	3.35E-04	4.09E-04	-----	8.62E-04
Beryllium Compounds	4.79E-07	-----	-----	-----	-----	4.79E-07
Biphenyl	-----	-----	2.44E-04	2.98E-04	-----	5.42E-04
Cadmium Compounds	4.39E-05	-----	-----	-----	-----	4.39E-05
Carbon Tetrachloride	-----	-----	2.59E-04	3.17E-04	-----	5.76E-04
Chlorobenzene	-----	-----	4.69E-04	5.73E-04	-----	1.04E-03
Chloroform	-----	-----	4.03E-04	4.92E-04	-----	8.95E-04
Chromium Compounds	5.59E-05	-----	-----	-----	-----	5.59E-05
Cobalt Compounds	3.35E-06	-----	-----	-----	-----	3.35E-06
Ethyl Benzene	-----	9.11E-05	3.88E-01	4.74E-01	-----	8.62E-01
Ethylene Dibromide	-----	-----	5.79E-02	7.07E-02	-----	1.29E-01
Formaldehyde	2.99E-03	2.02E-03	7.80E-04	9.52E-04	-----	6.75E-03
Lead Compounds	2.00E-05	-----	-----	-----	-----	2.00E-05
Manganese Compounds	1.52E-05	-----	-----	-----	-----	1.52E-05
Mercury Compounds	1.04E-05	-----	-----	-----	-----	1.04E-05
Methanol	-----	-----	1.84E-03	2.24E-03	-----	4.08E-03
Methylene Chloride	-----	-----	2.67E-03	3.26E-03	-----	5.93E-03
Naphthalene	2.43E-05	3.70E-06	2.25E-04	2.75E-04	-----	5.28E-04
n-Hexane	7.18E-02	-----	1.06E-02	1.29E-02	5.39E-01	6.34E-01
Nickel Compounds	8.38E-05	-----	-----	-----	-----	8.38E-05
Phenol	-----	-----	1.36E-04	1.66E-04	-----	3.02E-04
Polycyclic Organic Matter	3.52E-06	6.26E-06	3.69E-03	4.51E-03	-----	8.21E-03
Propylene Oxide	-----	8.26E-05	-----	-----	-----	8.26E-05
Selenium Compounds	9.58E-07	-----	-----	-----	-----	9.58E-07
Styrene	-----	-----	-----	-----	-----	0.00E+00
Toluene	1.36E-04	1.30E-04	-----	-----	-----	2.66E-04
Xylenes	-----	6.40E-05	-----	-----	-----	6.40E-05
Existing Total	**0.075**	**0.003**	**0.613**	**0.000**	**0.539**	**1.230**
Proposed Total	**0.075**	**0.003**	**0.000**	**0.749**	**0.539**	**1.366**

Notes:

[1] Hexanes from GRI-GLYCalc 4.0, see attached reports.

[2] Emissions from all units are potential emissions based on full time operation.

[3] See individual emissions unit category emissions calculations for details on methodology and assumptions (Tables A-10 through A-12).

Table A-10. Hazardous Air Pollutants (HAPs) - Gas-Fired Boilers and Heaters
Hilcorp Alaska, LLC - Ivan River Unit

Section 112 Hazardous Air Pollutants		Source Category Emission Calculations	
CAS No.	**Chemical Name**	**Emission Factor[1]**	**Potential HAP Emissions[2]**
106467	1,4-Dichlorobenzene	1.20E-03 lb/MMscf	4.79E-05 tpy
N/A	Arsenic Compounds	2.00E-04 lb/MMscf	7.98E-06 tpy
71432	Benzene	2.10E-03 lb/MMscf	8.38E-05 tpy
N/A	Beryllium Compounds	1.20E-05 lb/MMscf	4.79E-07 tpy
N/A	Cadmium Compounds	1.10E-03 lb/MMscf	4.39E-05 tpy
N/A	Chromium Compounds	1.40E-03 lb/MMscf	5.59E-05 tpy
N/A	Cobalt Compounds	8.40E-05 lb/MMscf	3.35E-06 tpy
5000	Formaldehyde	7.50E-02 lb/MMscf	2.99E-03 tpy
N/A	Lead Compounds	5.00E-04 lb/MMscf	2.00E-05 tpy
N/A	Manganese Compounds	3.80E-04 lb/MMscf	1.52E-05 tpy
N/A	Mercury Compounds	2.60E-04 lb/MMscf	1.04E-05 tpy
91203	Naphthalene	6.10E-04 lb/MMscf	2.43E-05 tpy
110543	n-Hexane	1.80E+00 lb/MMscf	7.18E-02 tpy
N/A	Nickel Compounds	2.10E-03 lb/MMscf	8.38E-05 tpy
N/A	Polycyclic Organic Matter	8.82E-05 lb/MMscf	3.52E-06 tpy
N/A	Selenium Compounds	2.40E-05 lb/MMscf	9.58E-07 tpy
108883	Toluene	3.40E-03 lb/MMscf	1.36E-04 tpy
Notes:		**Existing Total**	**0.075 tpy**

[1] Reference: AP-42, Tables 1.4-3, 1.4-4.

[2] Total fuel rate based on maximum full-time operation.

EU ID	Description	Heat Rate
2	Tank Bldg Flameco Burner	2.15 MMscf/yr
3 & 4	Sivalls Gas Heaters (2)	68.71 MMscf/yr
5	Sivalls Glycol Reboiler	2.15 MMscf/yr
9	Tank Bldg Catalytic Heater	0.19 MMscf/yr
10	Scrubber Bldg Catalytic Heater	0.19 MMscf/yr
11	Scrubber Bldg Catalytic Heater	0.43 MMscf/yr
12	Line Heater Bldg Bruest Heater	0.43 MMscf/yr
13 & 14	Dresser Stage Compressor Bldg Catalytic Heaters (2)	0.48 MMscf/yr
15 - 17	Booster Compressor Bldg Catalytic Heaters (3)	0.31 MMscf/yr
18	Well House 14-31 Catalytic Heater	0.24 MMscf/yr
20	Gas-fired Catalytic Heater	0.43 MMscf/yr
21	Well House 13-31 Catalytic Heater	0.24 MMscf/yr
25 - 33	Catalytic Heaters No. 1 through 9	3.86 MMscf/yr
	Existing Total Potential Fuel Rate:	**79.81 MMscf/yr**

Table A-11. Hazardous Air Pollutants (HAPs) - Gas-Fired Turbines
Hilcorp Alaska, LLC - Ivan River Unit

Section 112 Hazardous Air Pollutants		Source Category Emission Calculations	
CAS No.	Chemical Name	Emission Factor[1]	Potential HAP Emissions[2]
106990	1,3-Butadiene	4.30E-07 lb/MMBtu	1.22E-06 tpy
75070	Acetaldehyde	4.00E-05 lb/MMBtu	1.14E-04 tpy
1077028	Acrolein	6.40E-06 lb/MMBtu	1.82E-05 tpy
71432	Benzene	1.20E-05 lb/MMBtu	3.42E-05 tpy
100414	Ethyl Benzene	3.20E-05 lb/MMBtu	9.11E-05 tpy
5000	Formaldehyde	7.10E-04 lb/MMBtu	2.02E-03 tpy
91203	Naphthalene	1.30E-06 lb/MMBtu	3.70E-06 tpy
N/A	Polycyclic Organic Matter	2.20E-06 lb/MMBtu	6.26E-06 tpy
75569	Propylene Oxide	2.90E-05 lb/MMBtu	8.26E-05 tpy
108883	Toluene	1.30E-04 lb/MMBtu	3.70E-04 tpy
1330207	Xylenes (isomers and mixture)	6.40E-05 lb/MMBtu	1.82E-04 tpy
		Existing Total	**0.003 tpy**

Notes:

[1] Reference: AP-42, Table 3.1-3.

[2] Total heat rate based on maximum full-time operation.

EU ID	Description	Heat Rate
7	Turbine Generator (Primary)	5,694 MMBtu/yr
24	Turbine Generator	5,694 MMBtu/yr
	Existing Total Potential Heat Rate:	**11,388 MMBtu/yr**

Table A-12. Hazardous Air Pollutants (HAPs) - Gas-Fired 4-Stroke Rich Burn Engines
Hilcorp Alaska, LLC - Ivan River Unit

Section 112 Hazardous Air Pollutants		Source Category Emission Calculations		
CAS No.	Chemical Name	Emission Factor[1,2]	Existing Potential HAP Emissions[3]	Proposed Potential HAP Emissions[3]
79345	1,1,2,2-Tetrachloroethane	2.53E-05 lb/MMBtu	4.79E-04 tpy	5.85E-04 tpy
79016	1,1,2-Trichloroethane	1.53E-05 lb/MMBtu	2.90E-04 tpy	3.54E-04 tpy
106990	1,3-Butadiene	6.63E-04 lb/MMBtu	1.25E-02 tpy	1.53E-02 tpy
542756	1,3-Dichloropropene	1.27E-05 lb/MMBtu	2.40E-04 tpy	2.94E-04 tpy
75070	Acetaldehyde	2.79E-03 lb/MMBtu	5.28E-02 tpy	6.45E-02 tpy
107028	Acrolein	2.63E-03 lb/MMBtu	4.98E-02 tpy	6.08E-02 tpy
71432	Benzene	1.58E-03 lb/MMBtu	2.99E-02 tpy	3.65E-02 tpy
56235	Carbon Tetrachloride	1.77E-05 lb/MMBtu	3.35E-04 tpy	4.09E-04 tpy
108907	Chlorobenzene	1.29E-05 lb/MMBtu	2.44E-04 tpy	2.98E-04 tpy
67663	Chloroform	1.37E-05 lb/MMBtu	2.59E-04 tpy	3.17E-04 tpy
100414	Ethyl Benzene	2.48E-05 lb/MMBtu	4.69E-04 tpy	5.73E-04 tpy
106934	Ethylene Dibromide	2.13E-05 lb/MMBtu	4.03E-04 tpy	4.92E-04 tpy
5000	Formaldehyde	2.05E-02 lb/MMBtu	3.88E-01 tpy	4.74E-01 tpy
67561	Methanol	3.06E-03 lb/MMBtu	5.79E-02 tpy	7.07E-02 tpy
74873	Methylene Chloride	4.12E-05 lb/MMBtu	7.80E-04 tpy	9.52E-04 tpy
91203	Naphthalene	9.71E-05 lb/MMBtu	1.84E-03 tpy	2.24E-03 tpy
N/A	Polycyclic Organic Matter	1.41E-04 lb/MMBtu	2.67E-03 tpy	3.26E-03 tpy
100425	Styrene	1.19E-05 lb/MMBtu	2.25E-04 tpy	2.75E-04 tpy
108883	Toluene	5.58E-04 lb/MMBtu	1.06E-02 tpy	1.29E-02 tpy
75014	Vinyl Chloride	7.18E-06 lb/MMBtu	1.36E-04 tpy	1.66E-04 tpy
1330207	Xylenes (isomers and mixture)	1.95E-04 lb/MMBtu	3.69E-03 tpy	4.51E-03 tpy
Notes:		**Total**	**0.613 tpy**	**0.749 tpy**

[1] Reference: AP-42, Table 3.2-3.

[2] AP-42, Table 3.2-3 is unclear if the value for PAH includes Naphthalene; emission factor for PAH is included and listed under Polycyclic Organic Matter.

[3] Total heat rate based on maximum full-time operation.

EU ID	Description	Heat Rate
6	Dresser Compressor Drive	15,067 MMBtu/yr
8	Ariel Booster Compressor Drive	22,776 MMBtu/yr
	Existing Total Potential Heat Rate:	**37,843 MMBtu/yr**
35	Compressor Drive	8,383 MMBtu/yr
	Proposed Total Potential Heat Rate:	**46,226 MMBtu/yr**

Attachment B

Supporting Information

A Train Dehydrator

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Ivan River Potential Emissions - Train A
File Name: C:\Users\Alana Riste\OneDrive - BES, Inc\Desktop\Hilcorp\Ivan River Train A.ddf
Date: October 31, 2023

DESCRIPTION:

Description: Model for Potential Emissions - Train A

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	22.5541	541.298	98.7868
Ethane	0.1733	4.159	0.7591
Propane	0.0672	1.613	0.2943
Other Hexanes	0.1158	2.780	0.5073
Total Emissions	22.9104	549.850	100.3475
Total Hydrocarbon Emissions	22.9104	549.850	100.3475
Total VOC Emissions	0.1830	4.392	0.8016

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25	
Calculated Dry Gas Dew Point:	0.55	lbs. H2O/MMSCF
Temperature:	50.0	deg. F
Pressure:	800.0	psig
Dry Gas Flow Rate:	30.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0221	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	13.73	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	54.63	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	3.99%	96.01%
Carbon Dioxide	99.13%	0.87%
Nitrogen	99.95%	0.05%
Methane	99.96%	0.04%
Ethane	99.84%	0.16%

Propane	99.70%	0.30%
Other Hexanes	98.68%	1.32%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	91.10%	8.90%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Other Hexanes	1.00%	99.00%

STREAM REPORTS:

WET GAS STREAM

Temperature: 50.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.89e-002	1.72e+001
Carbon Dioxide	5.85e-001	8.49e+002
Nitrogen	3.24e-001	2.99e+002
Methane	9.89e+001	5.23e+004
Ethane	1.07e-001	1.06e+002
Propane	1.54e-002	2.24e+001
Other Hexanes	3.10e-003	8.81e+000
Total Components	100.00	5.36e+004

DRY GAS STREAM

Temperature: 50.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.25e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.16e-003	6.86e-001
Carbon Dioxide	5.81e-001	8.42e+002
Nitrogen	3.24e-001	2.99e+002
Methane	9.90e+001	5.23e+004
Ethane	1.07e-001	1.06e+002
Propane	1.54e-002	2.23e+001
Other Hexanes	3.06e-003	8.69e+000

Total Components	100.00	5.36e+004

LEAN GLYCOL STREAM

Temperature: 50.00 deg. F
Flow Rate: 1.50e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.80e+001	8.27e+003
Water	2.00e+000	1.69e+002
Carbon Dioxide	8.79e-012	7.42e-010
Nitrogen	1.71e-013	1.44e-011
Methane	8.98e-018	7.58e-016
Ethane	9.69e-010	8.18e-008
Propane	3.24e-011	2.74e-009
Other Hexanes	1.39e-005	1.17e-003
Total Components	100.00	8.44e+003

RICH GLYCOL STREAM

Temperature: 50.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.51e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.75e+001	8.27e+003
Water	2.18e+000	1.85e+002
Carbon Dioxide	8.75e-002	7.43e+000
Nitrogen	1.71e-003	1.45e-001
Methane	2.66e-001	2.26e+001
Ethane	2.04e-003	1.73e-001
Propane	7.92e-004	6.72e-002
Other Hexanes	1.38e-003	1.17e-001
Total Components	100.00	8.49e+003

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 9.50e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	3.66e+001	1.65e+001
Carbon Dioxide	6.74e+000	7.43e+000
Nitrogen	2.07e-001	1.45e-001
Methane	5.62e+001	2.26e+001
Ethane	2.30e-001	1.73e-001
Propane	6.08e-002	6.72e-002
Other Hexanes	5.37e-002	1.16e-001
Total Components	100.00	4.70e+001

B Train Dehydrator

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Ivan River Potential Emissions
File Name: C:\Users\Alana Riste\OneDrive - BES, Inc\Desktop\Hilcorp\Dehys\Ivan River Lewis River\Ivan River.ddf
Date: April 04, 2023

DESCRIPTION:

Description: Model for Potential Emissions - Train B

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	1.7873	42.895	7.8283
Ethane	0.0127	0.305	0.0556
Propane	0.0049	0.118	0.0214
Other Hexanes	0.0072	0.172	0.0314
Total Emissions	1.8121	43.489	7.9368
Total Hydrocarbon Emissions	1.8121	43.489	7.9368
Total VOC Emissions	0.0121	0.289	0.0528

EQUIPMENT REPORTS:

ABSORBER

Calculated Absorber Stages:	2.57	
Specified Dry Gas Dew Point:	1.14	lbs. H2O/MMSCF
Temperature:	70.0	deg. F
Pressure:	800.0	psig
Dry Gas Flow Rate:	20.0000	MMSCF/day
Glycol Losses with Dry Gas:	0.0411	lb/hr
Wet Gas Water Content:	Saturated	
Calculated Wet Gas Water Content:	27.15	lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio:	3.41	gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	4.20%	95.80%
Carbon Dioxide	99.91%	0.09%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.98%	0.02%
Propane	99.97%	0.03%
Other Hexanes	99.88%	0.12%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	39.03%	60.97%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Other Hexanes	1.00%	99.00%

STREAM REPORTS:

WET GAS STREAM

Temperature: 70.00 deg. F
Pressure: 814.70 psia
Flow Rate: 8.34e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	5.72e-002	2.26e+001
Carbon Dioxide	5.85e-001	5.66e+002
Nitrogen	3.24e-001	1.99e+002
Methane	9.89e+001	3.49e+004
Ethane	1.07e-001	7.07e+001
Propane	1.54e-002	1.49e+001
Other Hexanes	3.10e-003	5.87e+000
Total Components	100.00	3.57e+004

DRY GAS STREAM

Temperature: 70.00 deg. F
Pressure: 814.70 psia
Flow Rate: 8.33e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.40e-003	9.50e-001
Carbon Dioxide	5.85e-001	5.66e+002
Nitrogen	3.24e-001	1.99e+002
Methane	9.90e+001	3.49e+004
Ethane	1.07e-001	7.07e+001
Propane	1.54e-002	1.49e+001
Other Hexanes	3.10e-003	5.86e+000
Total Components	100.00	3.57e+004

LEAN GLYCOL STREAM

Temperature: 70.00 deg. F
Flow Rate: 1.23e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.80e+001	6.80e+002
Water	2.00e+000	1.39e+001
Carbon Dioxide	7.34e-012	5.09e-011
Nitrogen	1.60e-013	1.11e-012
Methane	8.65e-018	6.00e-017
Ethane	8.63e-010	5.99e-009
Propane	2.87e-011	1.99e-010
Other Hexanes	1.04e-005	7.24e-005
Total Components	100.00	6.94e+002

RICH GLYCOL STREAM

Temperature: 70.00 deg. F
Pressure: 814.70 psia
Flow Rate: 1.28e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.47e+001	6.80e+002
Water	4.95e+000	3.56e+001
Carbon Dioxide	7.10e-002	5.10e-001
Nitrogen	1.55e-003	1.11e-002
Methane	2.49e-001	1.79e+000
Ethane	1.77e-003	1.27e-002
Propane	6.82e-004	4.90e-003
Other Hexanes	1.01e-003	7.24e-003
Total Components	100.00	7.18e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 5.04e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.07e+001	2.17e+001
Carbon Dioxide	8.72e-001	5.10e-001
Nitrogen	2.99e-002	1.11e-002
Methane	8.39e+000	1.79e+000
Ethane	3.18e-002	1.27e-002
Propane	8.36e-003	4.90e-003
Other Hexanes	6.26e-003	7.16e-003
Total Components	100.00	2.40e+001

G3304 NA GAS ENGINE TECHNICAL DATA

CATERPILLAR®

ENGINE SPEED:	1800	FUEL:	NAT GAS
COMPRESSION RATIO:	10.5:1	FUEL SYSTEM:	LPG IMPCO
AFTERCOOLER (°F):	N/A	MIN. FUEL PRESS. (psig):	1.5
JACKET WATER (°F):	210	MIN. METHANE NUMBER:	80
COOLING SYSTEM:	COMBINED	MAX. RATED ALTITUDE (ft):	500
IGNITION SYSTEM:	MAG	AT AMBIENT TEMP (°F):	77
EXHAUST MANIFOLD:	WET	NOx EMISSION LEVEL:	STD
COMBUSTION:	STD		

RATING AND EFFICIENCY	NOTES	LOAD	100%	75%	50%
LHV OF FUEL		btu/scf	920	920	920
ENGINE POWER		bhp	95	71	48
ENGINE EFFICIENCY	(1)	%	33.3	32.1	25.3
THERMAL EFFICIENCY	(5)	%	54.6	55.3	61.8
TOTAL EFFICIENCY	(6)	%	87.9	87.4	87.1

ENGINE DATA					
FUEL CONSUMPTION	(1)	btu/bhp-hr	7640	7917	10073
AIR FLOW	(WET)	lb/hr	666	533	414
AIR FLOW	(WET)	scfm	145	116	90
INLET MAN. PRESS.		in. Hg (abs)	27.5	23.5	19.4
INLET MAN. TEMP.	(10)	°F	100	100	131
TIMING	(11)	°BTDC	30	30	30
EXHAUST STACK TEMP.		°F	1045	1004	988
EXHAUST FLOW (@STACK TEMP)	(WET)	cfm	461	351	276
EXHAUST FLOW	(WET)	lb/hr	702	561	438

EMISSIONS					
NOx (as NO2)	(9)	g/bhp-hr	15.8	16.8	19.7
CO	(9)	g/bhp-hr	1.6	1.7	1.8
THC	(9)	g/bhp-hr	2.4	2.4	3.2
NMHC	(9)	g/bhp-hr	0.36	0.36	0.48
EXHAUST O2 (DRY)		%	3.1	2.9	1.7
LAMBDA			1.17	1.18	1.10

HEAT BALANCE DATA					
LHV INPUT	(1)	btu/min	12097	9401	7974
HEAT REJ. TO JACKET	(2) (7)	btu/min	4344	3502	3634
HEAT REJ. TO ATMOSPHERE	(4)	btu/min	484	376	319
HEAT REJ. TO EXH. (LHV to 77°F)	(2)	btu/min	3106	2369	1826
HEAT REJ. TO EXH. (LHV to 350°F)	(2)	btu/min	2259	1693	1295

CONDITIONS AND DEFINITIONS

ENGINE RATING OBTAINED AND PRESENTED IN ACCORDANCE WITH ISO 3046/1 (STD. REF. CONDITIONS OF 25°C, 100 KPA). NO OVERLOAD PERMITTED AT RATING SHOWN. CONSULT ALTITUDE CURVES FOR APPLICATIONS ABOVE MAXIMUM RATED ALTITUDE AND/OR TEMPERATURE.

1) FUEL CONSUMPTION TOLERANCE ACCORDING TO ISO 3046/1. TOLERANCE IS +5% OF FULL LOAD DATA.
2) HEAT REJECTION TO JACKET AND EXHAUST TOLERANCE IS ±8% OF FULL LOAD DATA.
3) HEAT REJECTION TO A/C TOLERANCE IS ±8% OF FULL LOAD DATA.
4) HEAT REJECTION TO ATMOSPHERE TOLERANCE IS ±25% OF FULL LOAD DATA.
5) THERMAL EFFICIENCY: JACKET WATER +EXH. HEAT TO 350°F
6) TOTAL EFFICIENCY: ENGINE EFF. + THERMAL EFF. TOLERANCE IS +/- 10% OF FULL LOAD DATA
7) TOTAL JW HEAT: JACKET HEAT + OIL COOLER HEAT (HEAT RATE BASED ON TREATED WATER)
8) TOTAL A/C HEAT: A/C HEAT x A/C HEAT REJ. FACTOR (HEAT RATE BASED ON TREATED WATER)
9) EMISSION DATA SHOWN ARE NOT TO EXCEED VALUES. PUBLISHED PART LOAD DATA MAY REQUIRE ENGINE ADJUSTMENT.
10) MEASURED BETWEEN AFTERCOOLER OUTLET AND PLENUM ENTRY.
11) TIMING INDICATED IS FOR USE WITH A MINIMUM FUEL METHANE NUMBER SPECIFIED. CONSULT THE APPROPRIATE FUEL USAGE GUIDE FOR TIMING AT OTHER METHANE NUMBERS.

FUEL USAGE GUIDE

DERATE FACTOR/ENGINE TIMING vs METHANE NUMBER

<30	30	35	40	45	50	55	60	65	70	75	80 to 100
0	1.0/15	1.0/16	1.0/17	1.0/20	1.0/21	1.0/22	1.0/23	1.0/25	1.0/26	1.0/27	1.0/30

ALTITUDE DERATION FACTORS

		0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
A	130	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.69	0.66	0.64	0.61	0.59
M	120	0.94	0.91	0.88	0.84	0.81	0.78	0.76	0.73	0.70	0.67	0.65	0.62	0.60
B	110	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.69	0.66	0.63	0.61
I	100	0.98	0.94	0.91	0.88	0.84	0.81	0.78	0.75	0.73	0.70	0.67	0.65	0.62
E	90	0.99	0.96	0.92	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66	0.63
N	80	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67	0.64
T	70	1.00	0.99	0.96	0.92	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68	0.66
	60	1.00	1.00	0.98	0.94	0.91	0.87	0.84	0.81	0.78	0.75	0.72	0.70	0.67
(°F)	50	1.00	1.00	1.00	0.96	0.93	0.89	0.86	0.83	0.80	0.77	0.74	0.71	0.68

ALTITUDE (FEET ABOVE SEA LEVEL)

FUEL USAGE GUIDE:

This table shows the derate factor required for a given fuel and what engine timing to use. Note that deration occurs as the methane number decreases. Methane number is a scale to measure ignition and burning characteristics of various fuels. Representative values are shown below.

Methane	100
Ethane	44
Propane	34
n-Butane	10
Hydrogen	0

Most dry pipeline natural gas has a methane number of 67 or above. The gas quality should be analyzed to determine the percentage of each constituent and then determine the methane number. Consult the dealer or factory for assistance.

ALTITUDE DERATION FACTORS:

This table shows the deration required for various ambient temperatures and altitudes. Use this information to help determine actual engine power for your site.

ACTUAL ENGINE RATING:

It is important to note that the Altitude/Temperature deration and the Fuel Usage Guide deration are not cumulative, i.e., they are not to be added together. The same is true for the Low Energy Fuel deration (reference the Caterpillar Methane Number Program) and the Fuel Usage Guide deration. However, the Altitude/Temperature deration and Low Energy Fuel deration are cumulative; and they must be added together in the method shown below. To determine the actual power available, take the lowest rating between 1) and 2).

1) (Altitude/Temperature Deration) + (Low Energy Fuel Deration)
2) Fuel Usage Guide Deration

Note: For NA's always add the Low Energy Fuel deration to the Altitude/Temperature deration. For TA engines only add the Low Energy Fuel deration to the Altitude/Temperature deration whenever the Altitude/Temperature deration is less than 1.0 (100%). This will give the actual rating for the engine at the conditions specified.

AFTERCOOLER HEAT REJECTION FACTORS:

Aftercooler heat rejection is given for standard conditions of 77°F and 500 ft altitude. To maintain a constant inlet air manifold temperature, as the ambient air temperature goes up, so must the heat rejection. As altitude increases, the turbocharger must work harder to overcome the lower atmospheric pressure. This increases the amount of heat that must be removed from the inlet air by the aftercooler. Use the aftercooler heat rejection factor to adjust for ambient and altitude conditions. Multiply this factor by the standard aftercooler heat rejection. Failure to properly account for these factors could result in detonation and cause the engine to shut down or fail.

Attachment C

Owner Requested Limit Application Requirements

Attachment C
Owner Requested Limit

Ivan River Unit is a small gas production pad located on the west side of the Cook Inlet. The current inventory consists of 25 boilers and heaters, two microturbines, two gas-fired compressor engines, and one dehydrator. Ivan River Unit currently operates without an air quality control permit because potential emissions are below permitting thresholds.

Hilcorp Alaska, LLC (Hilcorp) is currently planning to add one gas-fired compressor, referred to as Emissions Unit (EU) ID 35, to Ivan River Unit. To avoid the requirement for a Title I minor permit for nitrogen oxides (NO_X) under 18 AAC 50.502(c)(3), Hilcorp is requesting this Owner Requested Limit (ORL). The ORL will offset NO_X increases from EU ID 35 with NO_X decreases from existing EU IDs 6 and 8 which currently operate with non-selective catalytic reduction (i.e., a three-way catalyst). Since the controls will now be federally enforceable via this ORL, the units' potential emissions can be restricted.

An application for an ORL must include the information required in 18 AAC 50.225(b). The information required under 18 AAC 50.225(b) is addressed below.

18 AAC 50.225(b)(1)

Per 18 AAC 50.225(b)(1), a completed stationary source ID form is provided with this application.

18 AAC 50.225(b)(2)

Per 18 AAC 50.225(b)(2), a list of all EUs at the stationary source is provided in Attachment A of this application.

18 AAC 50.225(b)(3)

Per 18 AAC 50.225(b)(3), the calculated potential to emit air pollutants for the stationary source is provided in Attachment A of this application. The facility is an existing stationary source, and the change in potential to emit for the project was used as the basis for calculations.

18 AAC 50.225(b)(4)

Per 18 AAC 50.225(b)(4), a description of each proposed limit is provided in the section below. For each air pollutant, a calculation of the effect the limit will have on the stationary source's potential to emit and the allowable emissions are provided in Attachment A.

18 AAC 50.225(b)(5)

Per 18 AAC 50.225(b)(5), a description of a verifiable method to attain and maintain each limit, including monitoring and recordkeeping requirements is provided below and is proposed as a condition of the ORL.

1. **Owner Requested Limit to Avoid a Title I Minor Permit.** To avoid the requirement to obtain a Title I minor permit under 18 AAC 50.502(c)(3), limit the project emissions of NO_X to less than 10 tons per year as follows:

    1.1. Operate EU IDs 6 and 8 with non-selective catalytic reduction (i.e., a three-way catalyst).

    1.2. Maintain the catalyst inlet temperature greater than or equal to 750 °F and less than or equal to 1250 °F. Monitor and record as follows:

        a. Collect the catalyst inlet temperature data at least once every 15 minutes, reduce data to 4-hour rolling averages; and maintain the 4-hour rolling averages within the range of greater than or equal to 750 °F and less than or equal to 1250 °F; or

        b. Install equipment to automatically shut down the engine if the catalyst inlet temperature exceeds 1250 °F.

    1.3. Include in the annual operating report instances where the catalyst inlet temperature operated outside the range of Condition 1.2a during the reporting period unless equipment was installed to automatically shut down as indicated in Condition 1.2b.

    1.4. Report as an excess emission or permit deviation each instance EU IDs 6 and 8 operated without non-selective catalytic reduction.

18 AAC 50.225(b)(6)

Per 18 AAC 50.225(b)(6), a citation to each requirement that the person seeks to avoid, including an explanation of why the requirement would apply in the absence of the limits and how the limits allow the person to avoid the requirement is provided below.

The proposed ORL will ensure that the change in potential to emit for the project does not exceed the 10 tons per year threshold to obtain a Title I minor permit under 18 AAC 50.502(c)(3) for NO_X emissions.

18 AAC 50.225(b)(8)

Per 18 AAC 50.225(b)(8), Hilcorp will comply with the proposed limits.

18 AAC 50.225(b)(9)

Per 18 AAC 50.225(b)(9), a certification, bearing the signature of the person requesting the limits, is provided in Section 7 of the stationary source ID form.