



**Air Quality Permitting
Statement of Basis**

May 17, 2006

Permit to Construct No. P-060403

**Raft River Energy I LLC
Raft River Geothermal Power Plant – Unit 1
Malta, ID**

Facility ID No. 031-00030

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FINAL

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Acronyms, Units, and Chemical Nomenclatures

acfm	actual cubic feet per minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
AQCR	Air Quality Control Region
CO	carbon monoxide
DEQ	Department of Environmental Quality
EI	emissions inventory
EPA	U.S. Environmental Protection Agency
HAP	Hazardous Air Pollutant
IDAPA	a numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hour
MACT	Maximum Achievable Control Technology
NAAQS	national ambient air quality standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	nitrogen oxides
NSPS	New Source Performance Standards
PM ₁₀	particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	permit to construct
Rules	Rules for the Control of Air Pollution in Idaho
SCL	significant contribution level
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SM	Synthetic Minor
SO ₂	sulfur dioxide
TAP	toxic air pollutant
TDS	total dissolved solids
T/yr	tons per year
µg/m ³	micrograms per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.200, Rules for the Control of Air Pollution in Idaho, for issuing permits to construct.

2. FACILITY DESCRIPTION

This is a geothermal energy (electricity) production plant. Hot water is pumped from the geothermal reservoir located about one mile beneath the ground surface, below both an upper and intermediate aquifer, to the power plant using existing wells that were drilled as part of the former department of energy facility. The hot geothermal fluid will be delivered to the power plant at a temperature of approximately 280 degrees Fahrenheit (°F), where it will flow through heat exchangers that are used to transfer heat to a “working” fluid that has a lower boiling point. For this project the working fluid will be iso-pentane. The heated iso-pentane vaporizes and is sent through two turbines and a single generator to generate power, much like a steam turbine. The vapor discharging from the turbines is then condensed in water-cooled condensers, and pumped back to the pre-heaters and vaporizers for reuse. The working fluid is in a closed loop system, and thus continually cycles through the system. After the heat is extracted from the geothermal fluid, the geothermal fluid is injected back into the geothermal reservoir, forming another closed loop system.

The cooling water for water-cooled condensers is provided by a counter flow cooling tower, with a circulating water flow rate of approximately 48,000 gallons per minute. The cooling tower make-up water source comes from groundwater wells and/or surface water, but brine water (geothermal fluid) may also be used. The cooling tower drift eliminators remove liquid droplets from the cooling tower air flow. They reduce particulate matter emissions.

3. FACILITY / AREA CLASSIFICATION

Raft River Energy I LLC is defined as a minor facility because its potential to emit is less than all major source thresholds. The Standard Industrial Classification (SIC) defining the facility is 4911. The Aerometric Information Retrieval System (AIRS) classification is “B.”

The facility is located within AQCR 63 and UTM zone 12. The facility is located in Cassia County which is designated as attainment or unclassifiable for all criteria pollutants (PM₁₀, CO, NO_x, SO₂, lead, and ozone).

The AIRS information provided in Appendix A defines the classification for each regulated air pollutant at Raft River Energy I LLC, Raft River Geothermal Power Plant - Unit 1. This required information is entered into the EPA AIRS database.

4. APPLICATION SCOPE

This is an initial Permit to Construct (PTC) for a new geothermal energy (electricity) production plant. The plant will be located at 15 Miles South of Malta, Idaho, Township 15 south Range 26 East Sections 22 and 23. The emissions unit from the plant is the cooling tower. There will be fugitive leaks of iso-pentane from the piping components of the plant.

4.1 Application Chronology

February 1, 2006	DEQ received the application.
March 9, 2006	DEQ determined application complete.

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this PTC action.

5.1 Equipment Listing

Cooling Tower

Manufacturer: To be determined
 Type: Induced Draft
 Maximum recirculating rate: 48,000 gallons per minute
 Liquid draft: 0.005%
 Total number of cells: 4 or 6

Stack information of each cooling tower cell

Stack height: 40 feet
 Stack diameter: 15 feet
 Stack flowrate: 1,095,000 acfm per cell
 Stack temperature: 77 °F

Cooling tower dimensions

Height: 25 feet
 Width: 55 feet
 Length: 240 feet

5.2 Emissions Inventory

A detailed emissions inventory (EI) was provided in the PTC application and can be found in Appendix B. The EI has been reviewed by DEQ and appears to accurately reflect emissions from the facility. Table 5.1 provides a summary of the EI.

Table 5.1 EMISSIONS ESTIMATES

Cooling Tower	PM ₁₀	
	lb/hr	T/yr
Using Groundwater, or surface water as cooling tower make-up water	4.8	21.0
Using brine water (i.e. geothermal fluid) as cooling tower make-up water	6.0	26.3

The VOC fugitive emissions from the piping components that transfer iso-pentane were estimated in the application. They are about 11 tons per year.

5.3 Modeling

The facility has demonstrated compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard. The facility's PM₁₀ ambient impact is less than the respective significant contribution level (SCL). Therefore, no full impact modeling analysis was required in accordance with State of Idaho Air Quality Modeling Guideline. The detailed modeling analysis is included in Appendix C. A summary of the modeling analysis is presented in Table 5.2.

Table 5.2 IMPACT ANALYSIS RESULTS FOR PM₁₀

Pollutant	Averaging Period	Facility Ambient Impact (µg/m ³)	SCL (µg/m ³)	Percent of SCL
PM ₁₀	24-hour	1.59	5	32%
	Annual	0.32	1	32%

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this PTC.

IDAPA 58.01.01.201 Permit to Construct Required

The facility's proposed project does not meet PTC exemption criteria contained in Sections 220 through 223 of the Rules. Therefore, a PTC is required.

IDAPA 58.01.01.203.02 NAAQS

"No permit to construct shall be granted for a new or modified stationary source unless the applicant shows to the satisfaction of the Department all of the following:02. NAAQS...."

The facility has demonstrated compliance, to DEQ's satisfaction, that this project will not cause or significantly contribute to a violation of any ambient air quality standards of PM₁₀. The facility's PM₁₀ ambient impact is less than the respective SCL. The summary of the modeling analysis is in Table 5.2. Detailed modeling analysis is included in Appendix B.

IDAPA 58.01.01.625 Visible Emissions

This regulation states that any point of emission shall not have a discharge of any air pollutant for a period aggregating more than three minutes in any 60-minute period of greater than 20% opacity.

The stack of each cooling tower cell at this facility is subject to this regulation. However, the possibility of the exceedance is very small. Therefore, no specific monitoring is required.

40 CFR 61 and 63 National Emission Standards for Hazardous Air Pollutants & MACT

This facility is not subject to NESHAP or MACT.

Non Applicability Determination

40 CFR 60 Subpart Kb New Source Performance Standards

The iso-pentane storage pressure vessel is not subject to 40 CFR 60 Subpart Kb, because the subpart does not apply to pressure vessels designed to operate at 204.9Kpa (29.71 psia) and without emissions to the atmosphere (40 CFR 60.110b(d)(2)). The iso-pentane storage pressure vessel is rated at over 100 psig (approximately 114 psia). The vapor pressure of pentane is less than 10 psig, even at summer ambient temperatures; therefore, the emission from the storage unit will be essentially zero except for some vapor loss due to filling.

IDAPA 58.01.01.203.03 Toxic Air Pollutants (TAP)

Iso-pentane is not a listed TAP in IDAPA 58.01.01.585 and 586, neither a listed EPA HAP. Therefore, a TAP analysis for this permit is not required.

5.5 Permit Conditions Review

5.5.1 Permit Condition 1.1 states the purpose of this permit action.

5.5.2 Permit Condition 2.1 provides the process description.

- 5.5.3 Permit Condition 2.2 states that emissions from the cooling tower are uncontrolled.
- 5.5.4 Permit Condition 2.3 lists the maximum PM₁₀ emissions rates from the cooling tower based on design parameters.
- 5.5.5 Permit Condition 2.4 lists the opacity limit.
- 2.5.6 Permit Condition 2.5 lists the maximum total dissolved solids (TDS) in the recirculation water. It was calculated based on design parameters in the application.
- 2.5.7 Permit Condition 2.6 requires the permittee to keep the record of TDS on site. As long as the permittee operates the cooling tower as it is designed, the facility meets the opacity limit and PM₁₀ NAAQS. Therefore, no specific monitoring is required.

6. PERMIT FEES

Raft River Energy I LLC submitted a \$1,000 PTC application fee on February 1, 2006, in accordance with IDAPA 58.01.01.224. The total emissions of Raft River Energy I LLC is between 10 to 100 tons range. In accordance with IDAPA 58.01.01.225, the PTC processing fee is \$5,000. DEQ received the \$5,000 processing fee on May 10, 2006.

7. PERMIT REVIEW

7.1 Regional Office Review of Draft Permit

An electronic copy of the draft permit was e-mailed to DEQ's Twin Falls Regional Office for review and comment on April 18, 2006.

7.2 Facility Review of Draft Permit

The facility was issued the draft permit for review and comment on April 25, 2006. The comments were addressed in the permit.

7.3 Public Comment

An opportunity for public comment period on the PTC application was provided from March 16, 2006, to April 17, 2006, in accordance with IDAPA 58.01.01.209.01.c. During this time, there were no comments on the application and no requests for a public comment period on DEQ's proposed action.

8. RECOMMENDATION

Based on review of application materials, and all applicable state and federal rules and regulations, staff recommend that Raft River Energy I LLC be issued a final PTC No. P-060403 for the geothermal energy production (i.e. electricity production) plant. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

SYC/bf Permit No. P-060403

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Appendix A

AIRS Information

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AIRS/AFS^a FACILITY-WIDE CLASSIFICATION^b DATA ENTRY FORM

Facility Name: Raft River Energy I LLC
Facility Location: 15 miles south of Malta
AIRS Number: 031-00030

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO ₂	---						---	U
NO _x	---						---	U
CO	---						---	U
PM ₁₀	B						B	U
PT (Particulate)	B						B	
VOC	B						B	U
THAP (Total HAPs)	NA							
			APPLICABLE SUBPART					

^a Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

^b AIRS/AFS Classification Codes:

- A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.
- SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.
- B = Actual and potential emissions below all applicable major source thresholds.
- C = Class is unknown.
- ND = Major source thresholds are not defined (e.g., radionuclides).

Appendix B

Emissions Inventory

P-060403

**RAFT RIVER ENERGY 1 LLC
RAFT RIVER GEOTHERMAL POWER PLANT - UNIT 1**

COOLING TOWER EMISSION ESTIMATES

Clean Water		
Recirculation Rate:	48000 gal/min	
TDS Concentration:	4000 ppm	(800ppm in recirculating water)*(5 recirculation cycles)
Liquid Drift ^a :	0.005 %	
<hr/>		
Water Mass Flow Rate:	(48000 gal/min)(60 min/hr)(8.33 lb/gal)	23990400 lb/hr of water
Cooling Tower Drift:	(23990400 lb/hr)(0.00005) =	1199.52 lb/hr of drift
PM ₁₀ Emissions:	(4000 ppm)(1199.52 lb/hr)/10 ⁶ =	4.80 lb/hr 21.82 T/yr
		(8760 hrs of operation per year)

Dirty Water		
Recirculation Rate:	48000 gal/min	
TDS Concentration:	5000 ppm	(1000ppm in recirculating water)*(5 recirculation cycles)
Liquid Drift ^a :	0.005 %	
<hr/>		
Water Mass Flow Rate:	(48000 gal/min)(60 min/hr)(8.33 lb/gal)	23990400 lb/hr of water
Cooling Tower Drift:	(23990400 lb/hr)(0.00005) =	1199.52 lb/hr of drift
PM ₁₀ Emissions:	(5000 ppm)(1199.52 lb/hr)/10 ⁶ =	6.00 lb/hr 26.27 T/yr
		(8760 hrs of operation per year)

^a Manufacturer's information

Appendix C

Modeling Review

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**RAFT RIVER ENERGY 1 LLC
RAFT RIVER GEOTHERMAL POWER PLANT - UNIT 1
Cooling Tower Modeling Results**

DATA/ASSUMPTIONS

Stack Parameters	
Height	40 ft
Diameter	15 ft
Flow Rate (per cell)	1,095,000 ACFM
Temperature	293 K
Building Parameters	
Height	25 ft
Width	55 ft
Length	240 ft
Max annual operating hours:	8760 hr/yr
Max. 1-hr Ambient Impact:	0.0611 ug/m ³
Distance to ambient air	750 ft

The modeling conservatively assumes that all the emissions come out of one cell.
The modeling conservatively assumes that the exhaust temperature is ambient.

Ambient Impact Analysis Clean Water							
Pollutant	Emissions (lb/yr)	Emissions (T/yr)	Max 24-hr Impact (ug/m ³)	Max Annual Impact (ug/m ³)	24-hr SCL (ug/m ³)	Annual SCL (ug/m ³)	Above SCL?
Particulate Matter (PM ₁₀)	4.80	21.0	1.27	0.28	5	1	N

Ambient Impact Analysis Brine Water							
Pollutant	Emissions (lb/yr)	Emissions (T/yr)	Max 24-hr Impact (ug/m ³)	Max Annual Impact (ug/m ³)	24-hr SCL (ug/m ³)	Annual SCL (ug/m ³)	Above SCL?
Particulate Matter (PM ₁₀)	6.00	26.3	1.59	0.32	5	1	N

SCL = Significant Contribution Level

11/30/05
13:26:40

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

RAFT RIVER ENERGY 1 LLC COOLING TOWER PM10

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT
EMISSION RATE (G/S) = .126000
STACK HEIGHT (M) = 12.1920
STK INSIDE DIAM (M) = 4.5720
STK EXIT VELOCITY (M/S) = 31.4779
STK GAS EXIT TEMP (K) = 293.0000
AMBIENT AIR TEMP (K) = 293.0000
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION = RURAL
BUILDING HEIGHT (M) = 7.6200
MIN HORIZ BLDG DIM (M) = 16.7600
MAX HORIZ BLDG DIM (M) = 73.1520

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

STACK EXIT VELOCITY WAS CALCULATED FROM
VOLUME FLOW RATE = 1095000.0 (ACFM)

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = 5178.015 M**4/S**2.

*** FULL METEOROLOGY ***

*** SCREEN AUTOMATED DISTANCES ***

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	.8364E-08	6	1.0	1.1	10000.0	89.27	12.89	12.89	NO
100.	.2386E-01	5	1.0	1.1	10000.0	97.93	25.25	24.75	NO
200.	.9561E-01	3	10.0	10.2	3200.0	54.52	26.37	18.28	NO
300.	.3209	3	10.0	10.2	3200.0	54.52	36.36	23.65	NO
400.	.5123	4	20.0	20.6	6400.0	33.15	30.06	16.40	NO
500.	.6268	4	20.0	20.6	6400.0	33.15	36.64	19.25	NO
600.	.6608	4	20.0	20.6	6400.0	33.15	43.13	22.04	NO
700.	.6478	4	20.0	20.6	6400.0	33.15	49.55	24.77	NO
800.	.6119	4	20.0	20.6	6400.0	33.15	55.89	27.44	NO
900.	.5742	4	15.0	15.5	4800.0	40.13	62.40	30.53	NO
1000.	.5479	4	15.0	15.5	4800.0	40.13	68.59	33.07	NO

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:
612. .6611 4 20.0 20.6 6400.0 33.15 43.97 22.40 NO

DWASH= MEANS NO CALC MADE (CONC = 0.0)
DWASH=NO MEANS NO BUILDING DOWNWASH USED

DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

 *** REGULATORY (Default) ***
 PERFORMING CAVITY CALCULATIONS
 WITH ORIGINAL SCREEN CAVITY MODEL
 (BRODE, 1988)

*** CAVITY CALCULATION - 1 ***	*** CAVITY CALCULATION - 2 ***
CONC (UG/M**3) = .0000	CONC (UG/M**3) = .0000
CRIT WS @10M (M/S) = 99.99	CRIT WS @10M (M/S) = 99.99
CRIT WS @ HS (M/S) = 99.99	CRIT WS @ HS (M/S) = 99.99
DILUTION WS (M/S) = 99.99	DILUTION WS (M/S) = 99.99
CAVITY HT (M) = 8.32	CAVITY HT (M) = 7.62
CAVITY LENGTH (M) = 37.65	CAVITY LENGTH (M) = 18.92
ALONGWIND DIM (M) = 16.76	ALONGWIND DIM (M) = 73.15

CAVITY CONC NOT CALCULATED FOR CRIT WS > 20.0 M/S. CONC SET = 0.0

 END OF CAVITY CALCULATIONS

 *** SUMMARY OF SCREEN MODEL RESULTS ***

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
-----	-----	-----	-----
SIMPLE TERRAIN	.6611	612.	0.

 ** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
