OCT 18 2007

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8160 South Highland Drive • Sandy, Utah 84093 [P] 801.943.4144 [F] 801.942.1852

October 17, 2007

Mr. Cheryl Heying
Utah Division of Air Quality
150 North 1950 West
P.O. Box 144820
Salt Lake City, UT 84114-4820

Re: Notice of Intent – Earth Energy Resources, Inc., Mining and Processing Tar Sands – PR Spring Mine

Attn: Tim Blanchard, New Source Manager

On behalf Earth Energy Resources, Inc (Earth Energy), JBR Environmental Consultants is providing this application under the regulatory requirement UAC R307-401-1, Notice of Intent (NOI).

This NOI is being submitted for tar sand mining and processing at the PR Spring Mine in Grand and Uintah Counties Utah. The appropriate permitting forms and emission calculations can be found in the Appendices. Air dispersion modeling documentation is also provided in the Appendices.

To the best of my knowledge, the information supplied in this application is true, accurate, and complete. I believe the application packet contains all of the necessary information to assist in an efficient review by UDAQ; however, if further information is needed, please do not hesitate to contact myself or Erin Hallenberg at 801-943-4144.

Regards,

Denise Kohtala
Environmental Analyst II

Enclosure

cc: Barclay Cuthbert, Earth Energy

Utah Division of Air Quality
New Source Review Section

CK # 101
Paid 1900.00

Date: **October 12, 2007**

Form 1
General Information

N0149-0001

Application for: **X** Initial Approval Order ☐ Approval Order Modification

AN APPROVAL ORDER MUST BE ISSUED BEFORE ANY CONSTRUCTION OR INSTALLATION CAN BEGIN. This is not a stand alone document. Please refer to the Permit Application Instructions for specific details required to complete the application. Please print or type all information requested. All information requested must be completed and submitted before an engineering review can be initiated. If you have any questions, contact the Division of Air Quality at (801) 536-4000 and ask to speak with a New Source Review Engineer. Written inquiries may be addressed to: Division of Air Quality, New Source Review Section, P.O. Box 144820, Salt Lake City, Utah 84114-4820.

Applicable base fee for engineering review and filing fee must be submitted with the application.

General Owner and Facility Information	
1. Company name and address: **Earth Energy Resources, Inc.** **Suite 740, 404 – 6th Avenue SW** **Calgary, Alberta T2P 0R9** Phone No.: **(403) 233-9366** Fax No.: **(403) 668-5097**	2. Company contact for environmental matters: **Tim Wall** **Suite 740, 404 – 6th Avenue SW** **Calgary, Alberta T2P 0R9** Phone No.: **(403) 233-9366** Fax No.: **(403) 668-5097**
3. Facility name and address (if different from above): **Uintah and Grand Counties, Utah** **Sections: T. 15 S., R. 23 E., SLB&M, Uintah County, Sections 35 & 36.** **T. 15.5 S., R. 24 E.,** **SLB&M, Grand County, Sections 31& 32.** Phone no.: **NONE** Fax no.: **NONE**	4. Owners name and address: **Same as 1 above**
5. County where the facility is located in: **Uintah and Grand Counties**	6. Latitude & longitude, and/or UTM coordinates of plant: **4369592 km Northing, 645187 km Easting Zone 12, NAD 27**
7. Directions to plant or Installation (street address and/or directions to site) (include U.S. Coast and Geodetic Survey map if necessary): **30 Northwest of I70 and Highway 6 Junction.**	
8. Identify any current Approval Order(s): AO#_ _Date__ AO#_____Date_____ AO#_____Date_____ AO#_____Date_____	
9. If request for modification, permit # to be modified: Date	
10. Type of business at this facility: **Tar Sand Mining and Processing**	
11. Total company employees greater than 100? ☐ Yes ☒ No	12. Standard Industrial Classification Code **1442 Sand and Gravel Construction**

Approval Order Application
Form 1 (Continued)

13. Application for:
X New construction
☐ Existing equipment operating without permit
☐ Change of permit condition
☐ Modification
☐ Permanent site for Portable Approval Order
☐ Change of location

14. For new construction or modification, enter estimated start date: **11/1/07** Estimated completion date: **11/30/07**

15. For change of permittee, location or condition, enter date of occurrence: **N/A**

16. For existing equipment in operation without prior permit, enter initial operation date: **N/A**

17. Has facility been modified or the capacity increased since November 29, 1969: Yes ☐ No **N/A**

Process Information

18. Site plan of facility **(See Section 3.0)**

19. Flow diagram of entire process to include flow rates and other applicable information **(See Section 3.0)**

20. Detailed written process and equipment description. **(See Section 3.0)**
Description must include:
Process/Equip specific form(s) identified in the instructions
Fuels and their use
Raw materials used
Production rates
Equipment used in process
Operation schedules
(including daily/seasonal variances)
Description of product(s)
Description of changes to process (if applicable)

21. Does this application contain justifiable confidential data? ☐ Yes ☒ No

Emissions Information

22. Complete and attach Form 1d, Emissions Information **(See Section 4.0)**
Include Material Safety Data Sheets for all chemicals or compounds that may be emitted to the atmosphere.

23. Identify on the site plan **(see Section 3.0)** all emissions points, building dimensions, stack parameters, etc.

Air Pollution Control Equipment Information

24. List all air pollution control equipment and include equipment specific forms identified in the instructions. **(See Section 5.0)**

25. List and describe all compliance monitoring devices and/or activities (such as CEM, pressure gages). **N/A**

26. Submit modeling for the project if required. **(See Section 6.0)**

27. Attach your proposal of what air pollution control devices, if any, or operating practices represents Best Available Control Technology. Discuss and evaluate all air pollution control technologies relevant to your situation or process. **(See Section 5.0)**

28. I hereby certify that the information and data submitted in and with this application is completely true, accurate and complete, based on reasonable inquiry made by me and to the best of my knowledge and belief.

Signature: Barclay Cuthbert Title: **Vice President**

29. **Barclay Cuthbert**	30. Telephone Number: **(403) 233-9366**	30. Date: **October 12, 2007**

Earth Energy Resources, Inc.

Notice of Intent to Process Tar Sand from Surface Mining
PR Spring Mine – Tar Sand Ore Mining/Conditioning, Stockpiling & Bitumen Extraction Facility
Grand & Uintah Counties, UT

Submitted on
October 12, 2007

to

Utah Division of Air Quality
150 North 1950 West
Salt Lake City, UT 84114

Prepared by:

jbr environmental consultants, inc.
8160 South Highland Drive
Sandy, UT
(801) 943-4144

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LIST OF APPENDICES

1.0 INTRODUCTION AND OVERVIEW

Earth Energy Resources, Inc. (Earth Energy) is filing this Notice of Intent (NOI) as an initial application for an Approval Order (AO) to operate a mining, sizing, stockpile, and processing facility for a surface tar sand mine at a location on the on the borders of Uintah and Grand Counties, Utah. The PR Spring Mine will be located approximately 35 miles north of Cisco Utah.

With respect to calculated emissions, Earth Energy has included spreadsheets based on processing activities rather than individual pieces of equipment. Process-based emission calculations present the most accurate assessment of overall emissions at the location. Since this is a unique process that involves both mining and conditioning (sizing) of the sandstone ore, emission factors for Western Surface Coal Mine AP-42 Emission Factors, State of Wyoming Approved Emission Factors, and Crushed Stone Processing Emission Factors were used to develop the potential to emit (PTE) estimates from the facility. Any ambient air quality impacts from emissions generated by the equipment at the processing plant are discussed in Section 6.0 – Ambient Air Quality Impact Analysis.

2.0 GENERAL FACILITY INFORMATION

Earth Energy's PR Spring Mine – Tar Sand Sizing & Stockpile Facility will be located on the border of Uintah and Grand counties, Utah. The corresponding Universal Transverse Mercator (UTM) Datum NAD27, Zone 12 coordinates are:

Northing: 4,369,500 meters
Easting: 646,000 meters

A location map of the site, as well as a proposed facility layout, is given in Appendix A.

2.1 UDAQ General Information

The required UDAQ General Information Form is given in Appendix B. The requested Appendix designations have been changed to Section or Subsection designations to be consistent with the format of this NOI.

3.0 PROCESS INFORMATION

The PR Spring Mine will be a tar sand surface mining operation also known as oil sand. The tar sands will be mined with a self-contained mobile surface mining machine which removes and mills the ore prior to conveying it into a haul truck. For the purposes of this NOI the surface miner is being considered the crushing circuit, therefore AP-42 emission factors from 11.19 for sand and gravel processing are being used to estimate the emissions associated with the surface miner. The tar sands will be hauled to the process plant where they will be stockpiled prior to being fed into the crushing circuit. The overburden and interburden material will be placed in disposal sites. A portion of the overburden may be used for reclamation of the surface mined area.

The primary operations at this site will be mining, tar sand crushing, and tar processing. Earth Energy also plans to crush some of the overburden for roadbase. A process flow diagram is included in Appendix C. A brief description of the processes at the processing plant is listed below.

Each process train is designed to accommodate 3000-3500 tons of ore per day, producing approximately 2,000 bbl/day of bitumen. The extraction process begins when the mined and conditioned tar sand ore is sent through a crusher/ delumper and reduced to a 2 inch-minus aggregate size. From there, the crushed ore is augered or conveyed to a heated slurry mixer where the cleaning emulsion is introduced and the ore slurried to the consistency of a thick gritty milkshake. The oil sand slurry is then moved by screw conveyor to the slurry tank where primary separation of the bitumen from the sand occurs. The produced sand with residual bitumen is then pumped through a series of separation towers where the last traces of bitumen are removed. All of the liberated bitumen is captured, polished with cyclones and/or centrifuges and then pumped to a storage tank. The cleaning chemical is then removed from the bitumen by distillation and recycled to the front of the process. Produced bitumen is pumped to a product (sales) tank for heated storage prior to transport.

The clean produced sand is de-watered on a shale shaker (or similar device) and the recovered water is pumped to a holding tank for recycle to the front of the process. Additional cleaning agent is added to the re-cycled water to bring it back to full strength. De-watered sand and clay fines are then conveyed to a stockpile for loading and backhaul to the mine pit. At this point, the discharged sand and clay fines contain between 10 and 20% water.

3.1 Sizing Operations

Sizing/Sorting Process – Sizing of the ore is accomplished by a self-propelled/ self-loading surface miner machine (Wirtgen 2200SM). The Wirtgen uses a rotating cutter drum to mine and mill the ore to the desired grain size. Very little fugitive dust is emitted in the milling operation as the rotating drum is water-cooled to maximize the life of the cutting tools. The ore will be loaded into haul trucks by the Wirtgen and delivered to a de-lumper (roller crusher) feed hopper at the processing plant. One or more conveyors transfer the broken up tar sand to the extraction process. Oversize ore chunks and material devoid of bitumen (reject materials) will be sorted with a grizzly and returned to the mine pit with the clean produced sand tailings.

Hauling – Ore material will be transported to the processing plant using conventional (20-50 ton) mine haul trucks.

Overburden and interburden material (ROM) will be removed by conventional mining methods and hauled to overburden dumps in low-lying areas adjacent to the mine pit(s).

3.2 Process Equipment and UDAQ Equipment Forms

With the submittal of this NOI, Earth Energy proposes to permanently operate the equipment shown in Table 3.2-1.

Table 3.2-1 – PR Spring Mine Processing Plant Equipment and Production

Equipment Type	Number at Location	Production	
		Hourly	Annual**
Surface Miner[1]	1	350 tph	1,150,000 tpy
De-lumper[2]	1	150 tph	1,150,000 tpy
250 kW Diesel Generator	1		
500 kW Natural Gas Generator	1		
Process Heaters	1	25 MMBtu/hr	
1,000 bbl Crude Oil Tanks	11		

* tph, tons per hour
** tpy, tons per year

The surface miner extracts, mills, and conveys the ore to haul trucks on a 12 hr/day basis (actual production approx. 10 hrs of 12 hr shift). The de-lumper (dual roller crusher) breaks up the lightly re-consolidated (milled) ore after being transported to the extraction process inlet hopper. The de-lumper will operate on a 24 hr/day basis. It will be fed during the night shift by a wheel loader from ore stockpiled during the day shift.

Earth Energy requests flexibility in hourly operation limitations to 24 hours per day and with that flexibility will not exceed the annual production limits given in Table 3.2-1. This approach is necessary as maximum hourly production is not always possible or sustainable.

The required UDAQ forms for rock crushing equipment, internal combustion engines, and crude oil storage tanks are given in Appendix D.

4.0 EMISSIONS RELATED INFORMATION

Emissions from the tar sand mining, sizing, stockpiling, and extraction operation are calculated on the basis of activities and throughput rather than the size or capacity of equipment. Emission factors for processing and loading/unloading are expressed in terms of pound of pollutant per ton of material processed. Emission factors for stockpile wind erosion are expressed in terms of pound of pollutant per acre (lb/acre). Emission factors for combustion devices are expressed in terms of pound of pollutant per horsepower capacity per hour (lb/hp-hr) of operation.

Short-term emission rates are expressed in terms of pound of pollutant per hour and long-term emission rates are expressed in terms of ton of pollutant per year. The short-term rates are based on maximum hourly production, while long-term rates are based on maximum annual production, as given in Table 3.2-1.

The point source emissions at the facility will be from the internal combustion engines, a process heater and storage tanks; all other particulate emissions are considered fugitive emissions.

The spreadsheets in Appendix E give calculated emissions for each of the following activities:

- Product sizing(milling by surface miner), including controlled de-lumping (crushing) and conveyor transfers or drop points,
- Material removal (topsoil, over/interburden and tar sand),
- Stockpile loading/unloading,
- Stockpile and disturbed area wind erosion,
- Combustion devices internal and external,
- Fugitive emissions from haul road traffic
- Emissions from tanks,
- Emissions from tank to truck load-out.

The subsequent uncontrolled and controlled Potential To Emit (PTE) emissions from all processes are given in Tables 4.0-1 and 4.0-2. The emissions shown are based on mining over a rolling 12-month period and on operating the combustion devices over a rolling 12-month period.

Table 4.0-1 – Total Controlled PTE Emissions

Pollutant	Hourly Emission Rate (lb/hr)	Annual Emission Rate (tpy)
PM	117.96	252.76
PM_{10}	31.03	67.93
$PM_{2.5}$	2.85	5.88
NO_x	9.4	26.08
SO_2	2.10	9.22
CO	5.29	14.99
VOC	21.52	33.27
HAPs	0.11	0.42

Both uncontrolled and controlled emissions were evaluated to determine the status of the source. The uncontrolled emissions from each criteria pollutant are less than 100 tons per year (tpy), and thus the controlled emissions from each criteria pollutant are less than 100 tpy, classifying the source as minor. Uncontrolled annual emissions are based mainly on a throughput limitations as opposed to an hours per year. The uncontrolled emissions from each hazardous air pollutant (HAP) are less than 10 tpy, and the combination of all HAPs is less than 25 tpy, classifying the source as minor for HAPs.

5.0 AIR POLLUTION CONTROL EQUIPMENT INFORMATION

This section contains the required information for pollution control measures used on the types of equipment proposed for permanent installation in this NOI. In most cases, the analysis of Best Available Control Technology (BACT) is a summary of previously completed top-down analyses and/or the result of applying common industrial process knowledge for the type of control technology normally used on a particular piece of equipment.

5.1 Best Available Control Technology (BACT) Analysis

BACT is typically identified by a "top-down" analysis in which engineering feasibility, economic impact(s), environmental impact(s), energy consumption, and cost considerations are applied to each potential technology category. BACT is the technology that emerges from the analysis as the best choice based on all considerations. For purposes of this NOI, a detailed and comprehensive "top-down" presentation is not necessary for the equipment proposed at the PR Spring Mine for two reasons:

1. The equipment is relatively simple and control technology options are limited.
2. Prior analyses and process knowledge have defined BACT categorically and reiteration of the analyses is not necessary.

Consequently, for each type of equipment covered in this NOI, BACT is identified, and the basis for the choice is discussed. These controls will be implemented at the facility for the existing equipment.

Sizing (Primary and Secondary)
Emissions from mining and ore conditioning(sizing) operations are normally controlled by inherent moisture content and/or added moisture from water sprays. Water sprays will be used in the milling(sizing) operation. This type of control constitutes BACT for sizing. The entrained bitumen and connate water (moisture inherent in the material) will adequately control fugitive emissions generated by the sizing of materials. Baghouse technology can be applied; however, typically when baghouses are used on crushers they control emissions from numerous additional emission points (additional crushers, drop points, conveyor transfers, or screens). The economic and cost considerations would demonstrate that the application of baghouse technology to a single crushing circuit is cost prohibitive.

Conveying Operations
Conveyor transfer points are locations at which processed material moves from one conveyor belt to another. Typically the transfer involves a relatively short vertical drop. Since the material on the conveyors is already moist from entrained bitumen and connate water, fugitive dust emissions are minimal and additional controls are not necessary.

For all sources of fugitive emissions in this category and covered in this NOI, entrained bitumen and connate water (inherent moisture) is considered BACT. For reasons already discussed, baghouse technology is not appropriate. Additionally, when the incremental cost is considered,

i.e., the differential cost per ton of pollutant removed between water application and baghouse technology, the cost is unreasonable.

Diesel-fired Generator

BACT for the combustion device is the use of low-sulfur diesel and proper operation and maintenance. This engine also meets EPA Tier II emission levels for diesel engines, which is considered BACT. The application of any add-on technology to control gaseous emissions is cost prohibitive.

Natural Gas-Fired Internal Combustion Engine

BACT for the stationary internal combustion device would be add on controls such as a non-selective catalytic converter as well as the use of natural gas. The unit is controlled to 1.0 g/hp-hr for NOx and CO through the use of add on controls to meet BACT.

6.0 AMBIENT AIR QUALITY IMPACT ANALYSIS

The NOI Guidance provided by UDAQ requires that NOIs for new facilities with emissions above pollutant-specific thresholds in NAAQS attainment areas be accompanied by air quality impact analyses.

6.1 Criteria Air Pollutants

This facility is located in an area of attainment for all criteria pollutants, so applicability of air dispersion modeling of primary pollutants is required for this installation. Table 6.1-1 identifies those primary pollutants, the PTE emissions for the facility, and the modeling thresholds. As indicated in the table, air dispersion modeling of PM_{10} and NOx is required. Since this new source is still in the initial phase, modeling was not completed at this time. As soon as site drawings, equipment configurations, and other site related procedures are finalized, modeling will occur. A modeling protocol will be developed and submitted to UDAQ.

Table 6.1-1– Modeling Thresholds

Pollutant	Facility Emissions PTE (TPY)	Modeling Threshold (TPY)
Point PM_{10}	67.91	15
Non-point PM_{10}	0.01	5

6.2 Hazardous Air Pollutants

The UAC R307-410-4 requires sources to compare proposed HAP emissions to the emissions threshold value (ETV). If the maximum hourly HAP emissions exceed the ETV, the HAP emissions must be modeled.

The hourly emission rates of all HAPs except for formaldehyde and acrolien are below the modeling threshold. These pollutants will be included in the modeling discussed above. Additional detail on this conclusion is given in the emission calculation spreadsheets in Appendix E.

7.0 REQUESTED APPROVAL ORDER CONDITIONS

This section contains proposed language for the Approval Order (AO). The format of the proposed AO is the standard format used by UDAQ for other AOs. Earth Energy anticipates that submitting draft AO language will assist UDAQ and allow for the expeditious issuance of the final AO.

General Conditions:

1. This AO applies to the following company:

   Site Office
   N/A at time of filing.

   Corporate Office
   Earth Energy Resources Inc.
   Suite 740, 404 – 6th Avenue SW
   Calgary, Alberta T2P 0R9
   Phone Number (403) 233-8994
   Fax Number (403) 668-5097

2. All definitions, terms, abbreviations, and references used in this AO conform to those used in the Utah Administrative Code (UAC) Rule 307 (R307), and Title 40 of the Code of Federal Regulations (40 CFR). Unless noted otherwise, references cited in these AO conditions refer to those rules.

3. The limits set forth in this AO shall not be exceeded without prior approval in accordance with R307-401.

4. Modifications to the equipment or processes approved by this AO that could affect the emission covered by this AO must be approved in accordance with R307-401-1.

5. All records referenced in this AO or in applicable NSPS, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or Executive Secretary's representative upon request, and the records shall include the two-year period prior to the date of the request. Records shall be kept for the following minimum periods:

   A. Emission inventories — Five years from the due date of each emission statement or until the next inventory is due, whichever is longer.
   B. All other records — Two years.

6. Earth Energy shall install and operate the tar sand ore processing equipment and shall conduct its operation of the PR Spring Mine in accordance with the terms and conditions of this AO, which as written pursuant to Earth Energy's Notice of Intent submitted to the Division of Air Quality (DAQ) on October 12, 2007.

7. The approved installations shall consist of the following equipment:

Mine & Extraction Equipment

A. One (1) 350 TPH Surface Miner
B. One (1) 150 TPH De-lumper
C. One (1) 250 kW diesel generator
D. One (1) 500 kW natural gas generator
E. Associated conveyors, stackers, etc.
F. Associated loaders, dozers, drills, etc.
G. One (1) 25.0 MMBtu/hr Process heater
H. Eleven (11) 1,000 bbl Crude Oil Tanks

8. Earth Energy shall notify the Executive Secretary in writing when the installation of the equipment listed in Condition #7 has been installed and is operational, as an initial compliance inspection is required. To insure proper credit when notifying the Executive Secretary, send your correspondence to the Executive Secretary, Attention: Compliance Section.

If installation has not been competed within eighteen months from the date of this AO, the Executive Secretary shall be notified in writing on the status of the installation. At that time, the Executive Secretary shall require documentation on the continuous installation of the operation and may revoke the AO in accordance with R307-401-11.

Limitations and Test Procedures

9. Visible emissions from the following emission points shall not exceed the following values:

A. All crushers – 15%
B. All screens – 10%
C. All conveyor transfer points – 10%
D. All diesel engines – 20%
E. Conveyor drop points – 20%
F. All other points – 20%

10. Visible fugitive dust emissions from haul-road traffic and mobile equipment in operational areas shall not exceed 20% opacity. Visible emissions determinations for traffic sources shall use procedures similar to Method 9. The normal requirement for observations to be made at 15-second intervals over a six-minute period, however, shall not apply. Six points, distributed along the length of the haul road or in the operational area, shall be chosen by the Executive Secretary or the Executive Secretary's representative. An opacity reading shall be made at each point when a vehicle passes the selected points. Opacity readings shall be made one-half the vehicle length or greater behind the vehicle and at approximately one-half the height

of the vehicle or greater. The accumulated six readings shall be averaged for the compliance value.

11. The following production limits shall not be exceeded:

    A. 1,150,00,000 tons of processed tar sands material per rolling 12-month period.
    B. 1,150,000 tons of overburden material per rolling 12-month period.
    C. 250 operating hours for the 250 kW diesel generator, per rolling 12-month period. 8,760 operating hours for the 500 kW natural gas generator, per rolling 12-month period
    D. 3,960 operating hours for the mine, per rolling 12-month period.
    E. To determine compliance with a rolling 12-month total, the owner/operating shall calculate a new 12-month total by the twenty-fifth day of each month using data from the previous 12 months. Records of production shall be kept for all periods when the plant is in operation. The records of production shall be kept on a daily basis. Hour of operation and production shall be determined by supervisor monitoring and maintaining of an operations log.

12. All unpaved roads and other unpaved operational areas that are used by mobile equipment shall be water sprayed and / or chemically treated to control fugitive dust. The application of water or chemical treatment shall be used except when the ambient temperature is below freezing (32°). If chemical treatment is used, it shall take place two (2) times a year and watering shall be initiated daily dependant upon observed dust generation. The opacity shall not exceed 20% during all times the areas are in use or unless it is below freezing. Records of water treatment shall be kept for all periods when the plant is in operation. The records shall include the following items:

    A. Date of application
    B. Number of treatments made
    C. Rainfall received, if any
    D. Time of day treatments were made

    Records of treatment shall be made available to the Executive Secretary or Executive Secretary's representative upon request and the records shall include the two-year period prior to the date of the request.

13. The haul roads shall not exceed 14,376 feet combined, and the mine haul truck speed along the haul roads shall not exceed 30 miles per hour. The vehicle speed on the haul roads shall be posted, at minimum, on site at the beginning of each haul road so that it is clearly visible from the haul road.

14. The open or disturbed area shall not exceed limits set forth by the Division of Oil, Gas, and Mining without written consent from the Executive Secretary.

15. Unpaved operational areas shall be watered to minimize generation of fugitive dusts as dry conditions warrant or as determined necessary by the Executive Secretary. The

total disturbed area shall not exceed limits set forth by the Division of Oil, Gas, and Mining without written consent from the Executive Secretary.

Fuels

16. The sulfur content of any diesel fuel burned shall not exceed 0.5 percent by weight. Sulfur content shall be decided by ASTM Method D-4294-89 or approved equivalent. The sulfur content shall be tested if directed by the Executive Secretary.

Federal Limitations and Requirements

17. At all times, including periods of startup, shutdown, and malfunction, owners and operators shall, to the extent practicable, maintain and operate any equipment approved under this AO including associated air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to the Executive Secretary which may include, but is not limited to, monitoring results, opacity observations, review of operating and maintenance procedures, and inspection of the source. All maintenance performed on equipment authorized by this AO shall be recorded.

18. The owner/operator shall comply with R307-150 Series. Inventories, Testing and Monitoring.

19. The owner/operator shall comply with R307-107. General Requirements: Unavoidable Breakdowns.

The Executive Secretary shall be notified in writing if the company is sold or changes its name. Under R307-150-1, the Executive Secretary may require a source to submit an emission inventory for any full or partial year on reasonable notice.

This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including R307.

A copy of the rules, regulations and/or attachments addressed in this AO may be obtained by contacting the Division of Air Quality (DAQ). The Utah Administrative Code R307 rules used by DAQ, the NOI guide, and other air quality documents and forms may also be obtained on the Internet at the following web site: http://www.airquality.utah.gov

The annual emissions estimations below include point source, fugitive emissions, fugitive dust, road dust, etc. and do not include tail pipe emissions, grandfathered emissions, etc. These emissions are for the purpose of determining the applicability of Prevention of Significant Deterioration, non-attainment area, maintenance area, and Title V source requirements of the R307. <u>They are not to be used for determining compliance</u>.

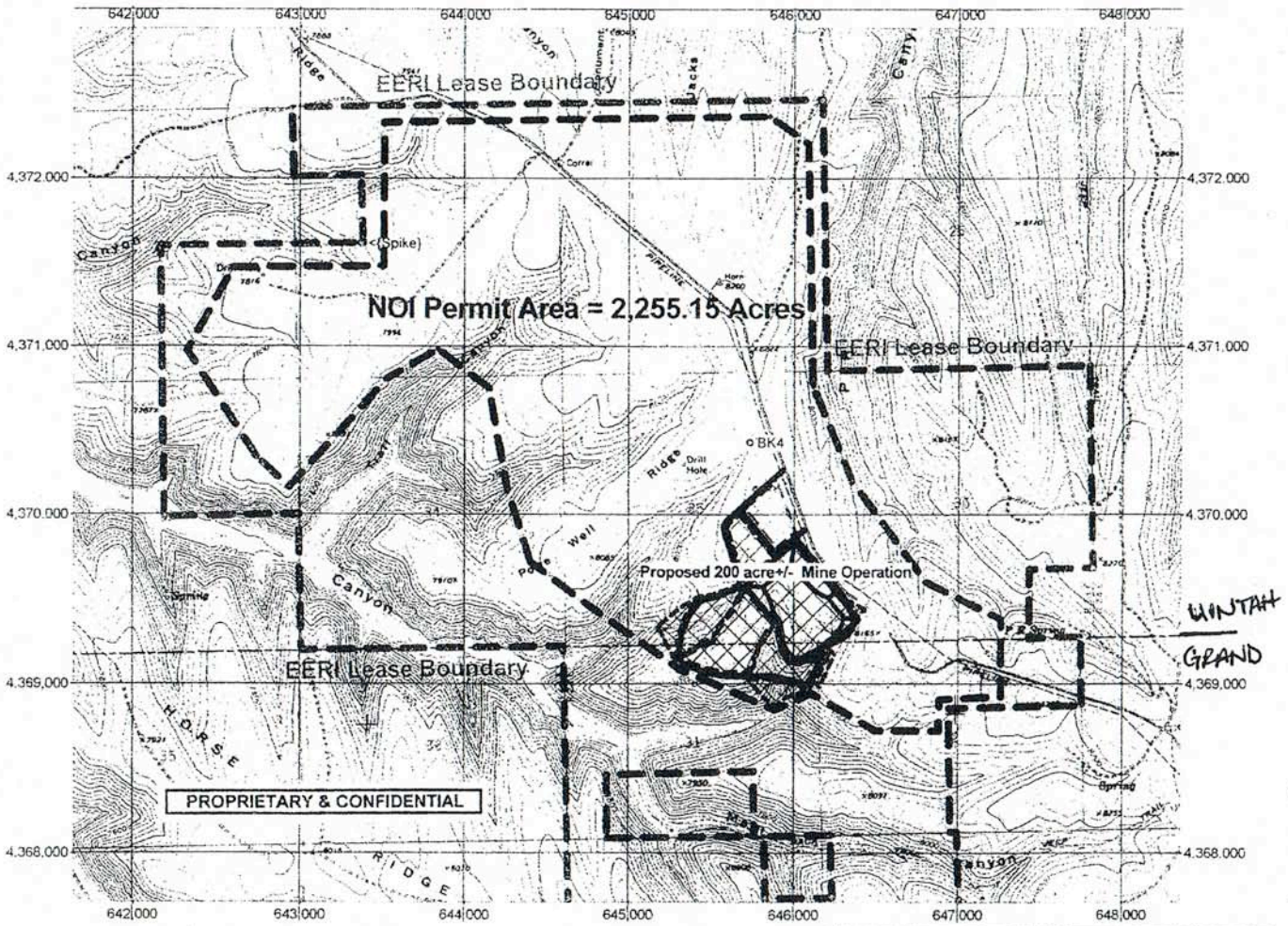
The controlled PTE emissions for this source, Earth Energy's PR Spring Mine, are currently calculated at the following values:

	Pollutant	Tons/yr
A.	PM_{10}	67.93
B.	SO_2	9.22
C.	NO_x	26.08
D.	CO	14.99
E.	VOC	33.27
F.	HAPs	0.42

APPENDIX A

Location Maps
Proposed Facility Layout

NOIPermitArea



0 ¼ ½ 1 Mile

0 1000 2000 3000 5000 Feet

0 0.5 1 Kilometer

1927 North American Datum: UTM grid zone 12
Generated by BigTopo7 (www.igage.com)
Map compiled from USGS Quads: P R Spring, UT

'NOIPermitArea.tf5' Scale: 1" = 0.395Mi 635Mt 2,083Ft, 1 Mi = 2.534", 1 cm = 250Mt

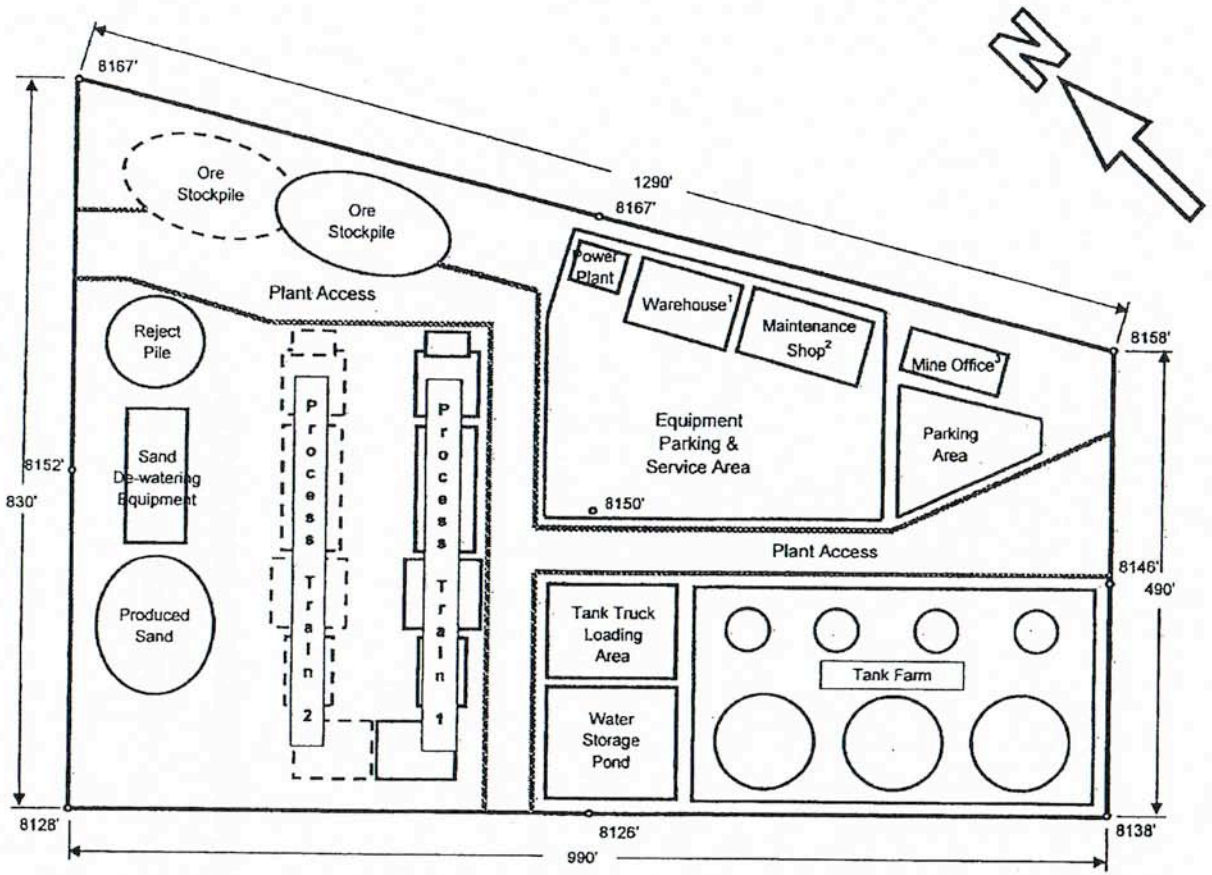
Earth Energy Resources Inc.

PR Spring Oil Sand Mine

Plan of NOI Permit Area

Map Scale: 1:25,000

Rev.1 - Date: March 9/07 Drawn by: TJW



NOTES:

1) "Sprung type" structure on concrete pad
2) "Sprung type" structure on gravel pad
3) "Atco type" modular office (2-3 unit) on gravel pad
4) All process equipment skid-mounted c/w sill plates
5) Spot Elevations: ft. ASL (from BigTopo)
6) Area of Plant Site: ~15 acres

Earth Energy Resources

PR Spring Plant Site - Plot Plan

Preliminary Equipment Layout - Rev.3

Drawing Not to Scale

Drawn by: TJW **Date: Mar 7, 2007**

APPENDIX B

UDAQ Form 1 – General Information

Utah Division of Air Quality
New Source Review Section

Date: **October 12, 2007**

Form 1
General Information

Application for: **X** Initial Approval Order ☐ Approval Order Modification

AN APPROVAL ORDER MUST BE ISSUED BEFORE ANY CONSTRUCTION OR INSTALLATION CAN BEGIN. This is not a stand alone document. Please refer to the Permit Application Instructions for specific details required to complete the application. Please print or type all information requested. All information requested must be completed and submitted before an engineering review can be initiated. If you have any questions, contact the Division of Air Quality at (801) 536-4000 and ask to speak with a New Source Review Engineer. Written inquiries may be addressed to: Division of Air Quality, New Source Review Section, P.O. Box 144820, Salt Lake City, Utah 84114-4820.

Applicable base fee for engineering review and filing fee must be submitted with the application.

General Owner and Facility Information

1. Company name and address:
Earth Energy Resources, Inc.
Suite 740, 404 – 6th Avenue SW
Calgary, Alberta T2P 0R9

Phone No.: **(403) 233-9366**
Fax No.: **(403) 668-5097**

2. Company contact for environmental matters:
Tim Wall
Suite 740, 404 – 6th Avenue SW
Calgary, Alberta T2P 0R9

Phone No.: **(403) 233-9366**
Fax No.: **(403) 668-5097**

3. Facility name and address (if different from above):
Uintah and Grand Counties, Utah
Sections: T. 15 S., R. 23 E., SLB&M, Uintah County, Sections 35 & 36.
T. 15.5 S., R. 24 E., SLB&M, Grand County, Sections 31& 32.

Phone no.: **NONE**
Fax no.: **NONE**

4. Owners name and address:

Same as 1 above

5. County where the facility is located in:
Uintah and Grand Counties

6. Latitude & longitude, and/or UTM coordinates of plant:
4369592 km Northing, 645187 km Easting Zone 12, NAD 27

7. Directions to plant or Installation (street address and/or directions to site) (include U.S. Coast and Geodetic Survey map if necessary): **30 Northwest of I70 and Highway 6 Junction.**

8. Identify any current Approval Order(s):
AO#_ _Date__ AO#_____Date_____
AO#_____Date_____ AO#_____Date_____

9. If request for modification, permit # to be modified: Date

10. Type of business at this facility: **Tar Sand Mining and Processing**

11. Total company employees greater than 100?
☐ Yes Ξ No

12. Standard Industrial Classification Code
1442 Sand and Gravel Construction

Approval Order Application
Form 1 (Continued)

13. Application for:
X New construction
☐ Existing equipment operating without permit
☐ Change of permit condition
☐ Modification
☐ Permanent site for Portable Approval Order
☐ Change of location

14. For new construction or modification, enter estimated start date: **11/1/07** Estimated completion date: **11/30/07**

15. For change of permittee, location or condition, enter date of occurrence: **N/A**

16. For existing equipment in operation without prior permit, enter initial operation date: **N/A**

17. Has facility been modified or the capacity increased since November 29, 1969: Yes ☐ No **N/A**

Process Information

18. Site plan of facility **(See Section 3.0)**

19. Flow diagram of entire process to include flow rates and other applicable information **(See Section 3.0)**

20. Detailed written process and equipment description. **(See Section 3.0)**
Description must include:
Process/Equip specific form(s) identified in the instructions
Fuels and their use
Raw materials used
Production rates
Equipment used in process
Operation schedules
(including daily/seasonal variances)
Description of product(s)
Description of changes to process (if applicable)

21. Does this application contain justifiable confidential data? ☐ Yes Ξ No

Emissions Information

22. Complete and attach Form 1d, Emissions Information **(See Section 4.0)**
Include Material Safety Data Sheets for all chemicals or compounds that may be emitted to the atmosphere.

23. Identify on the site plan **(see Section 3.0)** all emissions points, building dimensions, stack parameters, etc.

Air Pollution Control Equipment Information

24. List all air pollution control equipment and include equipment specific forms identified in the instructions. **(See Section 5.0)**

25. List and describe all compliance monitoring devices and/or activities (such as CEM, pressure gages).
N/A

26. Submit modeling for the project if required. **(See Section 6.0)**

27. Attach your proposal of what air pollution control devices, if any, or operating practices represents Best Available Control Technology. Discuss and evaluate all air pollution control technologies relevant to your situation or process. **(See Section 5.0)**

28. I hereby certify that the information and data submitted in and with this application is completely true, accurate and complete, based on reasonable inquiry made by me and to the best of my knowledge and belief.

Signature: Barclay Cuthbert Title: **Vice President**

29. **Barclay Cuthbert**	30. Telephone Number: **(403) 233-9366**	30. Date: **October 12, 2007**

APPENDIX C

UDAQ Permitting Forms

Utah Division of Air Quality
New Source Review Section

Date: **October 12, 2007**
Company: **Earth Energy Resources, Inc.**
Site: **PR Spring Mine**

Form 15
Rock Crushing and Screening

Equipment Information

1. Check the appropriate crushing operations used in your process:

Type of Unit **Surface Miner / De-lumper**
Manufacturer **Wertgin / TBD**
Model **Surface Miner / Screen**
Date Manufactured **TBD/ TBD**
✗ Primary Crushing type ☐ Cone ✗ Jaw ☐ Ball
☐ Secondary Crushing type ☐ Cone ☐ Jaw ☐ Ball
☐ Tertiary Crushing type ☐ Cone ☐ Jaw ☐ Ball
Screen Manufacturer **TBD**
Model and Date Manufactured **TBD**
Screen type and size (triple, double, or single deck)
TBD

2. Dust sources will be controlled as follows:

	No Control	Pre Soaked	Water Spray	Bag house	Other (explain)
☐ Feed hopper	☐	☐	☐	☐	✗
☐ All belt transfer points	☐	☐	☐	☐	✗
☐ Inlet to all crushers	☐	☐	☐	☐	✗
☐ Exit of all crushers	☐	☐	☐	☐	✗
☐ All shaker screens	☐	☐	☐	☐	✗

OTHER – Inherent moisture with added moisture by water sprays as needed.

3. Water Sprays

Total Water Rate to nozzles (gal/min):	Nozzle pressure (psi):	Quantity of nozzles at each spray bar location:
NA	**NA**	**NA**

4. Maximum Plant Production Rate and Operating Hours:

1,155,000 tons/yr **350** tons/hr
3960 hrs/yr **16** hrs/day

5. Water sprays used on stockpiles?
✗ Yes ☐ No

Stockpile size: **5.0 acres**

6. Number of conveyor belt transfer and drop points:
Approximately 5 or less

Utah Division of Air Quality
New Source Review Section

Date: **October 12, 2007**
Company: **Earth Energy Resources, Inc.**
Site/Source: **PR Spring Mine**

Form 11
Internal Combustion Engines

Equipment Information

1. Manufacturer: **TBD**
   Model no.: **250 kW**

2. Operating time of Emission Source:

average	maximum
10 Hours/day	**12** Hours/day
6 Days/week	**6** Days/week
45 Weeks/year	**52** Weeks/year

3. Manufacturer's rated output at baseload, ISO ___ hp or **250** Kw
   Proposed site operating range ____ hp or **250** Kw

Gas Firing – Not Applicable

4. Are you operating site equipment on pipeline quality natural gas: ☐ Yes ☐ No

5. Are you on an interruptible gas supply:
   ☐ Yes ☐ No
   If "yes", specify alternate fuel:
   _____

6. Annual consumption of fuel:
   _____ MMSCF/Year

7. Maximum firing rate:
   _____ BTU/hr

8. Average firing rate:
   _____ BTU/hr

Oil Firing

9. Type of oil:
   Grade number ☐ 1 ✗ 2 ☐ 4 ☐ 5 ☐ 6 Other specify _____

10. Annual consumption: **4775** gallons

11. Heat content: **19590** BTU/lb

12. Sulfur content: **<0.5%** by weight

13. Ash content: **Trace** % by weight

14. Average firing rate: **19.1** gal/hr

15. Maximum firing rate: **20.0** gal/hr

16. Direction of firing: ✗ horizontal ☐ tangential ☐ other: (specify)

Operation

17. Application:
- ✗ Electric generation
- _____ Base load _____ Peaking
- ☐ Emergency Generator
- ☐ Driving pump/compressor
- ☐ Exhaust heat recovery
- ☐ Other (specify) _____

18. Cycle
- ✗ Simple cycle
- ☐ Regenerative cycle
- ☐ Cogeneration
- ☐ Combined cycle

Emissions Data

19. Manufacturer's Emissions in grams per hour (grams/hp-hr): **4.8** NO_X **2.6** CO **Unavailable** VOC **Unavailable** Formaldehyde. **Note: (NOx & CO Tier II factors)**

20. Attach manufacturer's information showing emissions of NO_x, CO, VOC, SO_x, CH_2O and PM_{10} for each proposed fuel at engine loads and site ambient temperatures representative of the range of proposed operation. The information must be sufficient to determine maximum hourly and annual emission rates. Annual emissions may be based on a conservatively low approximation of site annual average temperature. Provide emissions in pounds per hour and except for PM_{10}, parts per million by volume (ppmv) at actual conditions and corrected to dry, 15% oxygen conditions.

Method of Emission Control: NO ADDITIONAL CONTROL

☐ Lean premix combustors ☐ Oxidation catalyst ☐ Water injection ☐ Other (specify)_____

☐ Other low-NO_x combustor ☐ SCR catalyst ☐ Steam injection

Additional Information

21. On separate sheets provide the following:

A. Details regarding principle of operation of emission controls. If add-on equipment is used, provide make and model and manufacturer's information. Example details include: controller input variables and operational algorithms for water or ammonia injection systems, combustion mode versus engine load for variable mode combustors, etc. **NOT APPLICABLE**

B. Exhaust parameter information on attached form. **ATTACHED**

C. All calculations used for the annual emission estimates must be submitted with this form to be deemed complete. **SECTION 4.0**

D. All formaldehyde emissions must be modeled as per Utah Administrative Code R307-410-4 using SCREEN 3. **SECTION 6.0**

E. If this form is filled out for a new source, forms 1 and 2 must be submitted also.

INTERNAL COMBUSTION ENGINE
FORM 11 (continued)
EMISSION SOURCES

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this form.

AIR CONTAMINANT DATA							EMISSION POINT DISCHARGE PARAMETERS							
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM			AIR CONTAMINANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (6)			STACK SOURCES (7)				
										HEIGHT ABOVE GROUND (FT)	HEIGHT ABOVE STRUCT. (FT)	EXIT DATA		
NUMBER	NAME	COMPONENT OR AIR CONTAMINANT NAME (2)		CONC. (%V) (3)	LB/HR (4)	TONS/YR (5)	ZONE	EAST (METERS)	NORTH (METERS)			DIA. (FT)	VELO. (FPS)	TEMP. (^{O}F)
1	GENSET1	PM_{10}			0.11	0.014	12	646000	4369500	13		0.5	184	995°F
		NO_X			3.55	0.443	12	646000	4369500	13		0.5	184	995°F
		SO_2			0.0001	0.017	12	646000	4369500	13		0.5	184	995°F
		CO			1.922	0.24	12	646000	4369500	13		0.5	184	995°F
		VOC			0.001	0.0015	12	646000	4369500	13		0.5	184	995°F
		CH_20			0.003	0.0001	12	646000	4369500	13		0.5	184	995°F

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL is approximately 5,000 feet.
UTAH AIR CONSERVATION BOARD STANDARD CONDITIONS ARE 68^{O} F AND 14.7 PSIA.

General Instructions for this form.

1. Identify each emission; point with a unique number for this plant site on plot plan, previous permits and emission inventory questionnaire. Limit emission point number to 8 character spaces. For each emission point use as many lines as necessary to list air contaminant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, ugitive, etc. Abbreviations are OK.
2. Typical component names are: air, H_2Q nitrogen, oxygen, CO_2, CO, NO_x, SO_x, hexane, particulate matter (PM_{10}), etc. Abbreviations are OK.
3. Concentration data is required for all gaseous components. Showconcentration in volume percent oftotal gas stream.
4. Pounds per hour. (#/hr) is maximum emission rate expected by applicant.
5. Tons per year (T/Y) is annual maximum emission rate expected by applicant, which takes into account process operating schedule.
6. As a minimum applicant must furnish a facility plot plan drawn to scale showing a plant benchmark, latitude and longitude correct to the nearest second for the benchmark, and all emission points dimensioned with respect to the benchmark. Please showemission point UTM coordinates if known.
7. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Showlength and width for a rectangular stack. Indicate ifhorizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures ifstructure is within three "stack heights above ground" of stack.

Utah Division of Air Quality
New Source Review Section

Date: **October 12, 2007**
Company: **Earth Energy Resources, Inc.**
Site/Source: **PR Spring Mine**

Form 11
Internal Combustion Engines

Equipment Information	
1. Manufacturer: **TBD** Model no.: **500 kW**	2. Operating time of Emission Source: average: **10** Hours/day, **6** Days/week, **45** Weeks/year maximum: **12** Hours/day, **6** Days/week, **52** Weeks/year
3. Manufacturer's rated output at baseload, ISO ____ hp or **500** Kw Proposed site operating range ____ hp or **500** Kw	
Gas Firing – Not Applicable	
4. Are you operating site equipment on pipeline quality natural gas: □ Yes □ No	
5. Are you on an interruptible gas supply: □ Yes □ No If "yes", specify alternate fuel: _____	6. Annual consumption of fuel: _____ MMSCF/Year
7. Maximum firing rate: _____ BTU/hr	8. Average firing rate: _____ BTU/hr
Oil Firing	
9. Type of oil: Grade number □ 1 ✗ 2 □ 4 □ 5 □ 6 Other specify _____	
10. Annual consumption: **44.3** MMSCF	11. Heat content: **1000** BTU/SCF
12. Sulfur content: **<0.0%** by weight	13. Ash content: **0**% by weight
14. Average firing rate: **7520** BTU/hp-hr	15. Maximum firing rate: **7526** BTU/hp-hr
16. Direction of firing: ✗ horizontal □ tangential □ other: (specify)	

Operation

17. Application:
- ✗ Electric generation
- _____ Base load _____ Peaking
- □ Emergency Generator
- □ Driving pump/compressor
- □ Exhaust heat recovery
- □ Other (specify) _____

18. Cycle
- ✗ Simple cycle
- □ Regenerative cycle
- □ Cogeneration
- □ Combined cycle

Emissions Data

19. Manufacturer's Emissions in grams per hour (grams/hp-hr): 1.0 NO_X 1.0 CO 0.03 VOC 0.0205 Formaldehyde.

20. Attach manufacturer's information showing emissions of NO_x, CO, VOC, SO_x, CH_2O and PM_{10} for each proposed fuel at engine loads and site ambient temperatures representative of the range of proposed operation. The information must be sufficient to determine maximum hourly and annual emission rates. Annual emissions may be based on a conservatively low approximation of site annual average temperature. Provide emissions in pounds per hour and except for PM_{10}, parts per million by volume (ppmv) at actual conditions and corrected to dry, 15% oxygen conditions.

Method of Emission Control: NO ADDITIONAL CONTROL

□ Lean premix combustors □ Oxidation catalyst □ Water injection □ Other (specify)_____

□ Other low-NO_x combustor □ SCR catalyst □ Steam injection

Additional Information

21. On separate sheets provide the following:

A. Details regarding principle of operation of emission controls. If add-on equipment is used, provide make and model and manufacturer's information. Example details include: controller input variables and operational algorithms for water or ammonia injection systems, combustion mode versus engine load for variable mode combustors, etc. **NOT APPLICABLE**

B. Exhaust parameter information on attached form. **ATTACHED**

C. All calculations used for the annual emission estimates must be submitted with this form to be deemed complete. **SECTION 4.0**

D. All formaldehyde emissions must be modeled as per Utah Administrative Code R307-410-4 using SCREEN 3. **SECTION 6.0**

E. If this form is filled out for a new source, forms 1 and 2 must be submitted also.

INTERNAL COMBUSTION ENGINE
FORM 11 (continued)
EMISSION SOURCES

Review of applications and issuance of permits will be expedited by supplying all necessary information requested on this form.

AIR CONTAMINANT DATA							EMISSION POINT DISCHARGE PARAMETERS							
EMISSION POINT (1)		CHEMICAL COMPOSITION OF TOTAL STREAM			AIR CONTAMINANT EMISSION RATE		UTM COORDINATES OF EMISSION PT. (6)			STACK SOURCES (7)				
										HEIGHT ABOVE GROUND (FT)	HEIGHT ABOVE STRUCT. (FT)	EXIT DATA		
NUMBER	NAME	COMPONENT OR AIR CONTAMINANT NAME (2)		CONC. (%V) (3)	LB/HR (4)	TONS/YR (5)	ZONE	EAST (METERS)	NORTH (METERS)			DIA. (FT)	VELO. (FPS)	TEMP. (^{O}F)
1	GENSET1	PM_{10}			0.003	0.001	12	646000	4369500	13		0.5	295	826°F
		NO_X			3.53	14.68	12	646000	4369500	13		0.5	295	826°F
		SO_2			0.002	0.009	12	646000	4369500	13		0.5	295	826°F
		CO			3.53	14.68	12	646000	4369500	13		0.5	295	826°F
		VOC			0.099	0.435	12	646000	4369500	13		0.5	295	826°F
		CH_20			0.069	0.301	12	646000	4369500	13		0.5	295	826°F

GROUND ELEVATION OF FACILITY ABOVE MEAN SEA LEVEL is approximately 5,000 feet.
UTAH AIR CONSERVATION BOARD STANDARD CONDITIONS ARE 68^{O} F AND 14.7 PSIA.

General Instructions for this form.

1. Identify each emission; point with a unique number for this plant site on plot plan, previous permits and emission inventory questionnaire. Limit emission point number to 8 character spaces. For each emission point use as many lines as necessary to list air contaminant data. Typical emission point names are: heater, vent, boiler, tank, reactor, separator, baghouse, ufgitive, etc. Abbreviations are OK.
2. Typical component names are: air, H_2O, nitrogen, oxygen, CO_2, CO, NO_x, SO_x, hexane, particulate matter (PM_{10}), etc. Abbreviations are OK.
3. Concentration data is required for all gaseous components. Showconcentration in volume percent oftotal gas stream.
4. Pounds per hour. (#/hr) is maximum emission rate expected by applicant.
5. Tons per year (T/Y) is annual maximum emission rate expected by applicant, which takes into account process operating schedule.
6. As a minimum applicant must furnish a facility plot plan drawn to scale showing a plant benchmark, latitude and longitude correct to the nearest second for the benchmark, and all emission points dimensioned with respect to the benchmark. Please showemission point UTM coordinates if known.
7. Supply additional information as follows if appropriate:
   (a) Stack exit configuration other than a round vertical stack. Showlength and width for a rectangular stack. Indicate ifhorizontal discharge with a note.
   (b) Stack's height above supporting or adjacent structures ifstructure is within three "stack heights above ground" of stack.

APPENDIX D

Emission Calculation Spreadsheets

EMISSIONS SUMMARY

Source		PM		PM_{10}		$PM_{2.5}$		NO_x		SO_2		CO		VOC		Total HAPs	
		lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Secondary Crushing - Controlled	Fugitive	0.63	1.76	0.26	0.71	0.01	0.04										
Screening - Controlled	Fugitive	0.54	2.08	0.33	1.27												
Conveyors	Fugitive	0.17	0.26	0.06	0.09												
Material Removal (Overburden)	Fugitive	1.01	1.99	0.30	0.60												
Stockpile Load-Unload (Overburden)	Fugitive	0.91	1.82	0.43	0.86	0.07	0.13										
Stockpile Load-Unload (Ore)	Fugitive	0.23	3.51	0.11	1.66	0.02	0.25										
Exposed Area Wind Erosion	Fugitive	6.20	27.17	1.86	8.15												
Diesel Generators	Non-Fugitive	0.11	0.01	0.11	0.01			3.55	0.44	0.00	0.02	1.92	0.24	0.00	0.00	0.01	0.00
Natural Gas Generator	Non-Fugitive	0.00	0.00	0.00	0.00			3.35	14.68	0.00	0.01	3.35	14.68	0.10	0.43	0.09	0.41
Haul Roads	Fugitive	105.32	208.54	26.84	53.15	2.68	5.31										
Tar Sand Loader Haul Roads	Fugitive	2.84	5.61	0.72	1.43	0.07	0.14										
External Combustion Emissions	Non-Fugitive							2.50	10.95	2.10	9.20	0.02	0.07	0.19	0.83		
Tank Emissions	Non-Fugitive													0.94	4.11		
Tank to Truck Loading Emissions	Non-Fugitive													20.29	27.90		
Totals	**Fugitive**	**117.84**	**252.75**	**30.91**	**67.91**	**2.85**	**5.88**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
	Non-Fugitive	**0.11**	**0.01**	**0.11**	**0.01**	**0.00**	**0.00**	**9.40**	**26.08**	**2.10**	**9.22**	**5.29**	**14.99**	**21.52**	**33.27**	**0.11**	**0.42**
Total		117.96	252.76	31.03	67.93	2.85	5.88	9.40	26.08	2.10	9.22	5.29	14.99	21.52	33.27	0.11	0.42

PROCESS EMISSIONS

Ore

Process[4]	Throughput		PM_{10} Emission Factor	PM Emission Factor	$PM_{2.5}$ Emission Factor	PM Emissions		PM_{10} Emissions		$PM_{2.5}$ Emissions	
	tph	tpy				lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Fines Crushing - Controlled[1]	150	1,155,000	0.0012 lb/ton	0.003 lb/ton	0.00007 lb/ton	0.45	1.73	0.18	0.69	0.01	0.04
Fines Screening - Contolled	150	1,155,000	0.0022 lb/ton	0.0036 lb/ton		0.54	2.08	0.33	1.27	0.00	0.00
Conveyor Transfers[1,2]	150	1,155,000	0.00014 lb/ton/point	0.000046 lb/ton/point		0.06	0.24	0.02	0.08		

[1] Moisture content assumed to be 4%; above the moisture content for controlled crushing in the Emission Factor Reference provided.

[2] Assumption is that a total of 5 drop points are in use at the plant.

[3] AP-42 footnotes indicate no data available for primary/secondary crushing, but emission factors for PM_{10} for tertiary crushers can be used as an upper limit for primary/secondary crushing.

Overburden for Road base (One Time Event)

Process	Throughput		PM_{10} Emission Factor	PM Emission Factor	PM Emissions		PM_{10} Emissions		E-Factor Reference
	tph	tpy			lb/hr	tpy	lb/hr	tpy	
Secondary Crushing - Controlled[1]	150	49,345	0.00054 lb/ton	0.0012 lb/ton	0.18	0.03	0.08	0.01	AP-42, 5th Edition, Table 11.19.2-2[3]
Conveyor Transfers[1,2]	150	49,345	0.00014 lb/ton/point	0.000046 lb/ton/point	0.11	0.02	0.03	0.01	AP-42, 5th Edition, Table 11.19.2-2

[1] Moisture content assumed to be 4%; above the moisture content for controlled crushing in the Emission Factor Reference provided.

[2] Assumption is that a total of 5 drop points are in use at the plant.

[3] AP-42 footnotes indicate no data available for primary/secondary crushing, but emission factors for PM_{10} for tertiary crushers can be used as an upper limit for primary/secondary crushing.

[4] Crushing conveying unit is a Werkin Miner that removes and mills ore and conveys the milled material into a truck for hauling, the screen is a delumper to loosen the milled material after it has been hauled to the hopper for processing. As per conversations with Tim Blanchard and Tim DeJulius with the UDAQ it was suggested that fines crushing and screening emission factors could be used for this process.

E-Factor Reference
AP-42, 5th Edition, Table 11.19.2-2[3]
AP-42, 5th Edition, Table 11.19.2-2
AP-42, 5th Edition, Table 11.19.2-2

Earth Energy Resources **PR Springs Mine NOI**

Top Soil Removal

	Controlled Emissions			Uncontrolled Emissions		
Pollutant	Gram/sec	Lbs/hr	Tons/yr	Gram/sec	Lbs/hr	Tons/yr
Total Particulate	0.15	1.23	0.23	0.31	2.45	0.46
PM10	0.05	0.37	0.07	0.09	0.74	0.14

Throughput Rates		
Hourly	184.94	tons
Annual	68,796	tons

NOTE: 50% control

State of Wyoming Approved Emission factors
for fugitive dust emission sources from surface mining

TSP=((0.02 lb/ton*Tons/yr((365-P)/365))*0.75)/2000 WYO
PM10= TSP *0.3 WYO

Where

M=	Material moisture content	10	Natural moisture percent
S=	Material silt content	4.8	Silt Content (AP-42 Table 13.2.2-2)
P=	number of days in a year with at least 0.01 inches of precip	42	Days
A=	annual hours of operations	372	hours based on topsoil being removed 12 hours a day for 31 days.

Topsoil removal will take place during the first month of operation and will be a one-time occurrence as such the emission from the topsoil removal are only being accounted for in the first year of operation.

Earth Energy Resources

Overburden Removal

PR Spings Mine NOI

	Controlled Emissions			Uncontrolled Emissions		
Pollutant	Gram/sec	Lbs/hr	Tons/yr	Gram/sec	Lbs/hr	Tons/yr
Total Particulate	0.13	1.01	1.99	0.25	2.01	3.98
PM10	0.04	0.30	0.60	0.08	0.60	1.19

Throughput Rates		
Hourly	150.00	tons
Annual	600,000	tons

NOTE: 50% control

State of Wyoming Approved Emission factors
for fugitive dust emission sources from surface mining

TSP=((0.02 lb/ton*Tons/yr((365-P)/365))*0.75)/2000 WYO
PM10= TSP *0.3 WYO

Where

M=	Material moisture content	4 Natural moisture percent
S=	Material silt content	4.8 Silt Content (AP-42 Table 13.2.2-2)
P=	number of days in a year with at least 0.01 inches of precip	42 Days
A=	annual hours of operations	3960 hours
		0.5 Control Efficiency

OVERBURDEN FRONT END LOADING/STOCKPILE DISTURBANCE EMISSIONS

Drop Point Emissions	Emissions		
Pollutant	Gram/sec	Lbs/hr	Tons/yr
Total Particulate	0.11	0.91	1.82
PM10	0.05	0.43	0.86
PM2.5	0.01	0.07	0.13

Throughput Rates		
Hourly	150	tons
Annual	600,000	tons

PM=(k)*(0.0032)*((U/5)^1.3)/((M/2)^1.4) 13.2.4-4 Equation (1)
PM10=(k')*(0.0032)*((U/5)^1.3)/((M/2)^1.4) 13.2.4-4 Equation (1)
PM2.5=(k)*(0.0032)*((U/5)^1.3)/((M/2)^1.4) 13.2.4-4 Equation (1)

Where

k=	Particle size multiplier for TSP	0.74	Page 13.2.4-4
k'=	Particle size multiplier for PM10	0.35	Page 13.2.4-4
k"	Particle size multiplier for PM2.5	0.053	Page 13.2.4-4
U=	Mean wind speed	7.5	DAQ Default (Average of Uintah & Grand Counties)
M=	Material moisture content	4	Natural moisture
n=	Number of drop points	4	Two dozers, two loaders

PM= 0.00152 lbs/ton
PM10= 0.000719 lbs/ton
PM2.5= 0.000109 lbs/ton

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Section 13 Miscellaneous Sources
13.2 Fugitive Dust Sources, 11/2006 Revision
13.2.4 Aggregate Handling and Storage Piles, 11/2006 Revision

ORE FRONT END LOADING/STOCKPILE DISTURBANCE EMISSIONS

Drop Point Emissions	Emissions		
Pollutant	Gram/sec	Lbs/hr	Tons/yr
Total Particulate	0.03	0.23	3.51
PM10	0.01	0.11	1.66
PM2.5	0.00	0.02	0.25

Throughput Rates		
Hourly	150	tons
Annual	1,155,000	tons

PM=(k)*(0.0032)*((U/5)^1.3)/((M/2)^1.4) 13.2.4-4 Equation (1)
PM10=(k')*(0.0032)*((U/5)^1.3)/((M/2)^1.4) 13.2.4-4 Equation (1)
PM2.5=(k)*(0.0032)*((U/5)^1.3)/((M/2)^1.4) 13.2.4-4 Equation (1)

Where

k=	Particle size multiplier for TSP	0.74	Page 13.2.4-4
k'=	Particle size multiplier for PM10	0.35	Page 13.2.4-4
k"	Particle size multiplier for PM2.5	0.053	Page 13.2.4-4
U=	Mean wind speed	7.5	DAQ Default (Average of Uintah & Grand Counties)
M=	Material moisture content	4	Natural moisture
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13.2.4 Aggregate Handling and Storage Piles, 11/2006 Revision

EXPOSED AREA WIND EROSION

Area: 143 acres

Control Efficiency 50%
TSP= 0.38 Ton/acre/yr Table 11-9-4
PM10= TSP x 0.3 0.114
Usage 365 Days/yr

Pollutant	Controlled emissions		
	Grams/sec	Lbs/hr	Tons/yr
Total Particulate	0.782	6.203	27.17
PM10	0.234	1.861	8.15

Pollutant	Uncontrolled emissions		
	Grams/sec	Lbs/hr	Tons/yr
Total Particulate	1.563	12.406	54.34
PM10	0.469	3.722	16.30

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Section 11 Mineral Products Industry
Chapter 11.9 - Western Surface Coal Mining

Earth Energy Resources **PR Springs Mine NOI**

UNPAVED HAUL ROADS

Unpaved Haul Roads	50% Controlled			Uncontrolled		
Pollutant	Gram/sec	Lbs/hr	Tons/yr	Gram/sec	Lbs/hr	Tons/yr
Total Particulate	13.28	105.32	208.54	26.56	210.64	417.07
PM_{10}	3.39	26.84	53.15	6.77	53.69	106.30
$PM_{2.5}$	0.34	2.68	5.31	0.68	5.37	10.63

PM=	(k((s/12)^0.7)((W/3)^0.45)*((365-P)/365)	Pounds per VMT
PM_{10}=	(k'((s/12)^0.9)((W/3)^0.45)*((365-P)/365)	Pounds per VMT
$PM_{2.5}$=	(k2((s/12)^0.9)((W/3)^0.45)*((365-P)/365)	Pounds per VMT

WHERE

k=	particle size factor 30 um from Table 13.2.2-2	4.9
k'=	particle size factor <10 um from Table 13.2.2-2	1.5
k2=	particle size factor <2.5 um from Table 13.2.2-2	0.15
s=	silt content default mean value page 13.2.2-2	4.8
W=	Mean vehicle weight (tons)	25
P=	number of days in a year with at least 0.01 inches of precip	42 Average of two WRCC Stations (1 in Grand ; 1 in Uinta County)

PM=	5.928108873	Lbs/VMT	(lbs per vehicle mile traveled)
PM_{10}=	1.510856956	Lbs/VMT	(lbs per vehicle mile traveled)
$PM_{2.5}$=	0.151085696	Lbs/VMT	(lbs per vehicle mile traveled)

VMT/YEAR=	140710	
Length of road roundtrip(ft)	12700	
Miles/Trip	2.4	Miles
Trips/year	58500	
Control Efficiency for roads	0.5	

HOURS OF OPERATION

Hours per day	12
Days per week	Varied
Weeks per year	Varied
Hours per year	3960

Materials and Trucks

Ore & Overburnden[1]

	TPY
Material (tons/year)	1,755,000
Empty Weight (tons)	10
Loaded Weight (tons)	40
Mean Vehicle Weight	25
Trips/year	58500
% of Total Trucks	100%

Materials and Trucks

Ore & Overburnden[1]

	TPH
Trips/hr	15
Road Length (ft)	12700
Miles/Trip	2.4
VMT/HOUR	35.53

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Section 13 Miscellaneous Sources, 11/2006 Revision
13.2 Fugitive Dust Sources
13.2.2 Unpaved Roads

UNPAVED HAUL ROADS

Unpaved Haul Roads	50% Controlled			Uncontrolled		
Pollutant	Gram/sec	Lbs/hr	Tons/yr	Gram/sec	Lbs/hr	Tons/yr
Total Particulate	0.36	2.84	5.61	0.72	5.67	11.23
PM_{10}	0.09	0.72	1.43	0.18	1.45	2.86
$PM_{2.5}$	0.01	0.07	0.14	0.02	0.14	0.29

PM=	(k((s/12)^0.7)((W/3)^0.45)*((365-P)/365)	Pounds per VMT
PM_{10}=	(k'((s/12)^0.9)((W/3)^0.45)*((365-P)/365)	Pounds per VMT
$PM_{2.5}$=	(k2((s/12)^0.9)((W/3)^0.45)*((365-P)/365)	Pounds per VMT

WHERE

k=	particle size factor 30 um from Table 13.2.2-2	4.9	
k'=	particle size factor <10 um from Table 13.2.2-2	1.5	
k2=	particle size factor <2.5 um from Table 13.2.2-2	0.15	
s=	silt content default mean value page 13.2.2-2	4.8	
W=	Mean vehicle weight (tons)	25	
P=	number of days in a year with at least 0.01 inches of precip	42	Average of two WRCC Stations (1 in Grand ;1 in Uinta County)

PM=	5.9281089	Lbs/VMT	(lbs per vehicle mile traveled)
PM_{10}=	1.510857	Lbs/VMT	(lbs per vehicle mile traveled)
$PM_{2.5}$=	0.1510857	Lbs/VMT	(lbs per vehicle mile traveled)

VMT/YEAR=	3788	
Length of road (ft)	1000	
Miles/Trip	0.2	Miles
Trips/year	20000	
Control Efficiency for roads	0.5	

HOURS OF OPERATION

Hours per day	12	
Days per week	Varied	
Weeks per year	Varied	
Hours per year	3960	

Materials and Trucks

	Ore[1] TPY
Material (tons/year)	600,000
Empty Weight (tons)	10
Loaded Weight (tons)	40
Mean Vehicle Weight	25
Trips/year	20000
% of Total Trucks	100%

Materials and Trucks

	Ore[1] TPH
Trips/hr	5
Road Length (ft)	1000
Miles/Trip	0.2
VMT/HOUR	0.96

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Section 13 Miscellaneous Sources, 11/2006 Revision
13.2 Fugitive Dust Sources
13.2.2 Unpaved Roads

DIESEL GENERATOR EMISSIONS

Generator Set	kW	hp	Hours of Operation	Emission Factors (g/hp-hr)(lb/hr)				
				PM_{10}[1]	NO_x[1]	SO_2[1,2]	CO[1]	VOC[1,2]
Generator Set	250	335	250	0.150	4.800	0.000	2.600	0.001
TOTAL	**250**	**335**						

Notes: 1 EPA Tier 2 Emission factors for nonroad diesel engines
2 EPA AP-42 Table 3.3-1 diesel industrial engine emission factors for engines less than 600 hp

Emissions

	PM_{10}		NO_x		SO_2		CO		VOC		Total HAPs	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Generator Set	0.111	0.014	3.548	0.443	0.000	0.017	1.922	0.240	0.001	0.055	0.015	0.002
Total	**0.111**	**0.014**	**3.548**	**0.443**	**0.000**	**0.017**	**1.922**	**0.240**	**0.001**	**0.001**	**0.015**	**0.002**

HAPS

Generator Set	kW	hp	Hours of Operation	Emission Factors lb/MMBtu[1]							Emissions (lb/hr)						
				HCHO	Benzene	Toluene	Xylenes	Propylene	Acetald.	Acrolein	HCHO	Benzene	Toluene	Xylenes	Propylene	Acetald.	Acrolein
Generator Set	250	335	250	1.18E-03	9.33E-04	4.09E-04	2.85E-04	2.58E-03	7.67E-04	9.25E-05	0.003	0.002	0.001	0.001	0.006	0.002	0.000
TOTAL	**250**	**335**									**0.003**	**0.002**	**0.001**	**0.001**	**0.006**	**0.002**	**0.000**

Notes: 1 AP-42, 5th Edition, Table 3.3-1,2

Generator Set	kW	hp	Hours of Operation	Annual Emissions (tpy)						
				HCHO	Benzene	Toluene	Xylenes	Propylene	Acetald.	Acrolein
Generator Set	250	335	250	0.000	0.000	0.000	0.000	0.001	0.000	0.000
TOTAL	**250**	**335**		**0.000**	**0.000**	**0.000**	**0.000**	**0.001**	**0.000**	**0.000**

NATURAL GAS GENERATOR EMISSIONS

Generator Set	kW	hp	Hours of Operation	Emission Factors lb/MMBtu				
				PM_{10}[1]	NO_x[3]	SO_2[1,2]	CO[3]	VOC[1,2]
Generator Set	500	671	8,760	0.001	1.000	0.001	1.000	0.030
TOTAL	500	671						

Notes:
1 EPA AP-42 Table 3.2-3 Emission Factors
2 Assumed brake specific fuel consumption of 5000 Btu/hp-hr
3 Controlled with an NSCR t

Emissions

	PM_{10}		NO_x		SO_2		CO		VOC		Total HAPs	
	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
Generator Set	0.003	0.001	3.353	14.684	0.002	0.009	3.353	14.684	0.099	0.435	0.095	0.415
Total	0.003	0.001	3.353	14.684	0.002	0.009	3.353	14.684	0.099	0.435	0.095	0.415

HAPS

Generator Set	kW	hp	Hours of Operation	Emission Factors lb/MMBtu[1]							Emissions (lb/hr)						
				HCHO	Benzene	Toluene	Xylenes	Propylene	Acetald.	Acrolein	HCHO	Benzene	Toluene	Xylenes	Propylene	Acetald.	Acrolein
Generator Set	500	671	8,760	2.05E-02	1.58E-03	5.58E-04	1.95E-04	0.00E+00	2.79E-03	2.63E-03	0.069	0.005	0.002	0.001	0.000	0.009	0.009
TOTAL	500	671									0.069	0.005	0.002	0.001	0.000	0.009	0.009

Notes: 1 AP-42, 5th Edition, Tables 3.3-1.2 & 3.4-1,2,3

Generator Set	kW	hp	Hours of Operation	Annual Emissions (tpy)						
				HCHO	Benzene	Toluene	Xylenes	Propylene	Acetald.	Acrolein
Generator Set	TPY	671	TPY	0.301	0.023	0.008	0.003	0.000	0.041	0.039
TOTAL	0	671		0.301	0.023	0.008	0.003	0.000	0.041	0.039

Source	Burner Rating (MMBtu/Hr)	Annual Op Time (hours)	Fuel Type	Fuel Htg Value (Btu/scf)
Process Heater	25.000	8760	Field	1000

Emission Factors

Source	Burner Rating (MMBtu/Hr)	Emission Factors				
		NOx (Lb/MMFt^3)	CO (Lb/MMFt^3)	SO_2 (Lb/MMFt^3)	PM (Lb/MMFt^3)	VOC^3 (Lb/MMFt^3)
Process Heater	25.000	100.0	84.0	0.6	7.6	8.0
EF Source		AP-42	AP-42	AP-42	AP-42	AP-42

[1]AP-42, 5th Ed., Table 1.4-1,2

Emissions (Lb/Hr) = E.F. (Lb/MMft ^{3}) * FHV/1000 * Burner Rating (MMbtu/Hr) * 1/FHV (btu/scf) * 1 MMft ^{3}/1x10^6 ft^3 * 1x10^6 Btu/MMbtu

Emissions (TPY) = Emissions (Lb/Hr) * Annual Operating Time (Hr/Yr) * 1 ton/2,000 Lb

Emissions

Source	Source Emissions									
	NOx		CO		SO_2		PM		VOC	
	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)	(Lb/Hr)	(TPY)
Process Heater	2.50	10.95	2.10	9.20	0.02	0.07	0.19	0.83	0.20	0.88
Total	**2.50**	**10.95**	**2.10**	**9.20**	**0.02**	**0.07**	**0.19**	**0.83**	**0.20**	**0.88**

TANK VOC EMISSIONS

4-500 bbl. Crude Storage Tanks

Composition	Average Throughput (BCPD)	Working Losses (Lb/Yr)	Breathing Losses (Lb/Yr)	Working Losses (TPY)	Breathing Losses (TPY)	Total Losses (Lb/Hr)	Total Losses (TPY)
Crude	2000	7387.66	828.16	3.69	0.41	0.94	4.11

TANKS 4.0.9d
Emissions Report - Summary Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	Earth Energy Tar Sands Mine
City:	Vernal
State:	Utah
Company:	Earth Energy
Type of Tank:	Vertical Fixed Roof Tank
Description:	4-500 bbl tanks operating in parallel

Tank Dimensions

Shell Height (ft):	25.00
Diameter (ft):	12.00
Liquid Height (ft) :	24.00
Avg. Liquid Height (ft):	12.50
Volume (gallons):	20,304.71
Turnovers:	679.50
Net Throughput(gal/yr):	13,797,000.00
Is Tank Heated (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good
Roof Color/Shade:	Gray/Light
Roof Condition:	Good

Roof Characteristics

Type:	Cone
Height (ft)	1.00
Slope (ft/ft) (Cone Roof)	0.17

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

TANKS 4.0.9d
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Earth Energy Tar Sands Mine - Vertical Fixed Roof Tank
Vernal, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Crude oil (RVP 5)	All	59.41	49.72	69.11	54.20	2.8447	2.3420	3.4307	50.0000			207.00	Option 4: RVP=5

TANKS 4.0.9d
Emissions Report - Summary Format
Individual Tank Emission Totals

Emissions Report for: Annual

Earth Energy Tar Sands Mine - Vertical Fixed Roof Tank
Vernal, Utah

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Crude oil (RVP 5)	7,387.66	828.16	8,215.81

Earth Energy Resources PR Springs Mine NOI

TANK TO TRUCK LOADING EMISSIONS

LL = 12.46 * S P M /T

- LL = Loading loss (Lb/1,000 gal.), of liquid loaded
- S = Saturation factor (from AP-42 Table 5.2-1)
- P = True vapor pressure of liquid loaded (psia), (from AP-42 Table 7.1-2)
- M = Molecular weight of vapors (Lb/Lb-mole)
- T = Temperature of liquid loaded (0R = 460 + 0F)

S = 0.6 (For dedicated Hydrocarbon service)
P = 2.8 True Vapor Pressure (psia) @ T = 60 for a RVP = 10 fluid
M = 50 Lb/Lb-mole (from composition of vapor phase as per Tanks 4.09)
T = 60 ^{0F} or 520 ^{0R}

LL = 2.0128 Lb/1,000 gal. Loaded

-For a production facility making: 660,000 bbl/yr

LL (TPY) = LL (Lb/1,000 gal) * annual production (bbl/yr) * 42 gal/bbl * 1ton/2000Lbs

Truck Load out Emissions = 27.90 TPY of VOC

LL (lb/hr) = LL (Lb/1,000 gal) * 240 bbl tank truck * 42 gal/bbl * 1 hr load out duration

Truck Load out Emissions = 20.29 lb/hr of VOC

APPENDIX E

Air Dispersion Modeling Protocol

Air Dispersion Modeling Documentation

AIR QUALITY MODELING REPORT

1. PURPOSE

This air quality modeling report documents analyses prepared to support an NOI application to the Utah Department of Environmental Quality Air Quality Bureau (UDAQ) for the Earth Energy resources PR Spring Oil Sand mine on their EERI lease area in northeast Utah north of Vernal. The analyses documented were prepared consistent with a modeling protocol provided to Tom Orth of UDAQ in the form of modeling input and output files, a facility emission inventory, maps, and background information, and the limited conditions on approval by Mr. Orth. These analysis show that the proposed actions at the facility would not cause or significantly contribute to exceedances of ambient air quality standards or any other applicable air quality impact limit.

2. MODEL DESCRIPTION / JUSTIFICATION

The model chosen is ISCST3, the US EPA approved Industrial Source Complex model. This model is approved by UDAQ for minor source impact analyses, and was recommended for this application. Building downwash was not included because the proposed actions involve primarily fugitive emissions, the few stack emissions do not have nearby structures which would lead to downwash and/or are far from property boundaries as compared to the potential downwash area(s). ISCST3 was applied consistent with recommendations by UDAQ and in EPA's *Guideline on Air Quality Models* (2003), consistent with guidance in UDAQ's *Modeling Guidelines*, utilizing the recommended regulatory default options and simple and complex terrain calculation options. Other model parameters and settings were shared with UDAQ graphically and/or via model input and output files. The details of the analyses described here were reviewed and approved by Mr. Orth, with the limited issues where refinements from the proposed protocol were recommended (combining the Bonanza meteorological data into one four year file and comparing fifth highest 24 hour impacts over the period against applicable impact limits. Modeling analyses were performed for each pollutant emitted above UDAQ modeling thresholds to estimate maximum impacts during each averaging period for which an applicable ambient air quality impact limit exists. Chemical transformation of emissions was not considered.

3. EMISSION AND SOURCE DATA

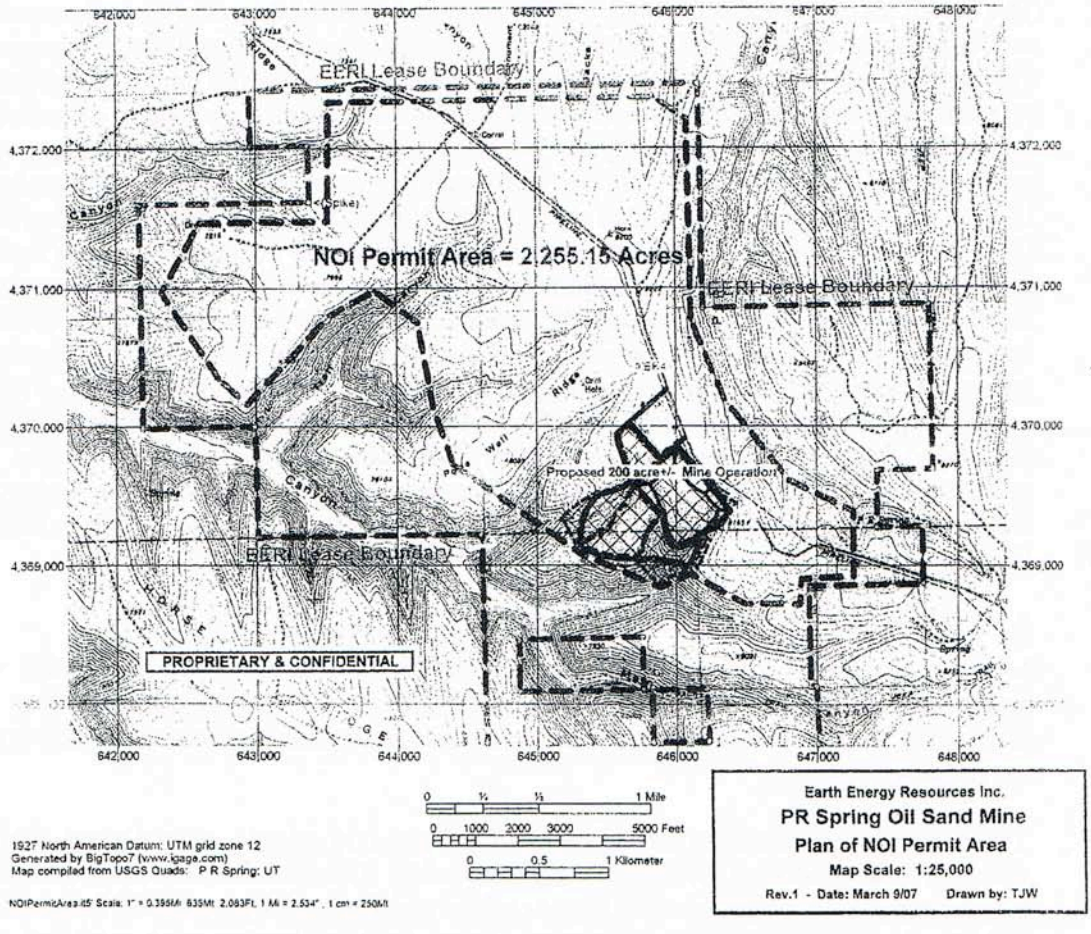
Modeled emissions include all sources in the emission inventory submitted with this application, including onsite vehicular traffic emissions. Those sources were spatially distributed consistent with typical plant operations, interpreted in worst-case scenarios under the proposed permit.

The facility's emission inventory shows that only one criteria air pollutant, PM_{10}, has a potential to emit above UDAQ modeling thresholds. The emission inventory also shows that two hazardous air pollutants (HAPs), Acrolein and formaldehyde, would be emitted above UDAQ modeling thresholds. Therefore, those three pollutants were modeled, and their predicted impacts compared against applicable impact limits to demonstrate compliance with those impact limits.

Emission rates modeled represent the maximum anticipated operating rates for each averaging period modeled. For that reason, emissions of PM-10, which has a 24-hour and an annual average impact standard, were calculated separately to determine separate potential emission rates for short term averaging period (as pollutant PMTEN) and long-term averaging period (as pollutant PMTENAN). In this analysis, though, PMTEN results alone are reported. That use of short term maximum emission rates is overly conservative for the annual average period, but sufficient to show compliance with all applicable impact limits.

The proposed operations at the Earth Energy PR Spring Oil Sand Mine cover up to 200 acres of activity in a parcel of over 2000 acres. Up to 140 acres of that ground will be disturbed. Figure 1 shows the location and boundaries of the facility on a USGS topographic map. The location is further documented by UTM coordinates in figures below.

Figure 1
Facility Location and Boundary



The 200 acres of activity within the lease boundary is shown above in the labeled area in the center of the figure. Project proponents will control access to the lease area, so would have significant setback to ambient air at the lease boundary. For added conservatism, all modeled mine, ore transport, and pit activity emissions were modeled from the possible west pit expansion, which will only be cindered if the north pit, further from property boundaries, is

played out after initial years of operation and the project is profitable to consider expansion to the west pit. Also, no credit was taken for any it retention, though such retention is expected. The modeled scenario uses the HROFDAY emission factor in the model to account for the up to 12 hours of operation per day between the hours of 6AM and 10PM proposed. Consistent with the modeling protocol, analyses were prepared to assess the impact of operations from 6AM to 6PM, and also from 10AM to 10PM. All wind erosion emissions, and emissions from plant crushing, screening operations and their feed supplies are modeled assuming continuous operations. The crushing and screening operation will be capable of operating overnight via an automated feed from stockpiles after the crew leaves for the night. The highest predicted impacts for either operating period scenario are reported in the results section below. Table 2 below shows the model source parameters for the onsite emission sources modeled.

Figure 1 shows the facility layout in the model. Red Highlights identify model sources. The surrounding solid line shows the facility boundary.

Figure 2
Facility Layout in the Model

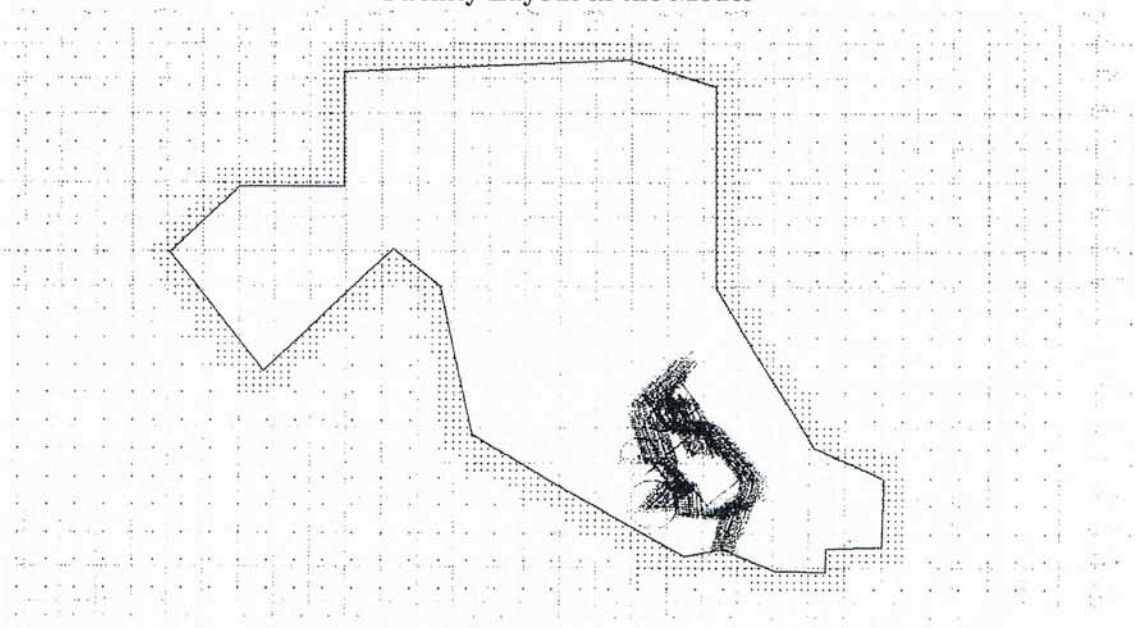


Table 2
Model Source Data

POINT SOURCES		Source Description	Easting (X)	Northing (Y)	Base Elevation	Stack Height	Temperature	Exit Velocity	Stack Diameter	PMTEN	ACROLEIN	FORMALD
Source ID	Stack Release Type		(m)	(m)	(m)	(ft)	(°F)	(fps)	(ft)	(lb/hr)	(lb/hr)	(lb/hr)
DGEN	DEFAULT	diesel generator	645830	4369950	2478	12	995.0	184.4	0.5	0.111		0.003
NGGEN	DEFAULT	natural gas generator	645825	4369955	2477.5	14	826.0	224.9	0.5	0.003	0.009	0.069

AREA SOURCES		Easting (X)	Northing (Y)	Base Elevation	Release Height	Easterly Length	Northerly Length	Angle from North	Vertical Dimension	PMTEN	ACROLEIN	FORMALD
Source ID	Source Description	(m)	(m)	(m)	(ft)	(ft)	(ft)		(ft)	(lb/hr)	(lb/hr)	(lb/hr)
DISTNP	Distrubed ground North pit area	646030	4369200	2457	0	1050	1500	-40	2.00	0.784		
DISTPLNT	Plant disturbed area	645865	4369818	2476.6	0	425	750	-35	2.00	0.191		
CONVY1	conveyor	645845	4369970	2479.7	16.4	6.6	6.6		13.12	0.030		
CONVY2	conveyor	645855	4369954	2480.1	16.4	6.6	6.6		13.12	0.030		
CONVYIN	conv for init rd gravel	645830	4369972	2478.1	16.4	6.6	6.6		13.12	0.030		
LUOVERBT	load / unload topsoil	645785	4369830	2473	6.6	16.4	16.4		14.76	0.200		
LUOVBDNW	load /unload waste ovb	645675	4369565	2437.5	6.6	16.4	16.4		14.76	0.230		
LUORE	load / unload ore	645834	4369982	2478.9	6.6	16.4	16.4		14.76	0.110		
LUOREREM	load overburden in pit	645646	4369209.5	2457.9	6.6	49.2	49.2		6.56	0.430		

CIRCULAR AREA SOURCES		Easting (X)	Northing (Y)	Base Elevation	Release Height	Radius of Circle	Number of Vertices	Vertical Dimension	PMTEN	ACROLEIN	FORMALD
Source ID	Source Description	(m)	(m)	(m)	(ft)	(ft)		(ft)	(lb/hr)	(lb/hr)	(lb/hr)
STORPTPS	Wind Er Topsoil storage pile	645711	4369810	2463.9	2.99	285.01		10.99	0.05161		
STORWR	Wind Er Waste material storage pile	645550	4369550	2439.3	4.00	425.00		12.99	0.33493		
DWEXTPIT	Dist area Poss W pit ext	645644.31	4369209.5	2457.9	0.00	575.00		12.99	0.38788		

Source ID	Source Description	Easting (X)	Northing (Y)	Base Elevation	Release Height	Horizontal Dimension	Vertical Dimension	PMTEN	ACROLEIN	FORMALD

		(m)	(m)	(m)	(ft)	(ft)	(ft)	(lb/hr)	(lb/hr)	(lb/hr)
ROAD1	main road segment	646135.2	4368900.7	2434.7	2.001	27.887	3.248	0.15606		
ROAD2	main road segment	646141.6	4368918.0	2440.5	2.001	27.887	3.248	0.15606		
ROAD3	main road segment	646148.1	4368935.3	2444.7	2.001	27.887	3.248	0.15606		
ROAD4	main road segment	646154.5	4368952.7	2448.4	2.001	27.887	3.248	0.15606		
ROAD5	main road segment	646160.9	4368970.0	2451.3	2.001	27.887	3.248	0.15606		
ROAD6	main road segment	646167.4	4368987.3	2452.4	2.001	27.887	3.248	0.15606		
ROAD7	main road segment	646173.8	4369004.7	2453.2	2.001	27.887	3.248	0.15606		
ROAD8	main road segment	646180.2	4369022.0	2453.3	2.001	27.887	3.248	0.15606		
ROAD9	main road segment	646186.6	4369039.3	2453.1	2.001	27.887	3.248	0.15606		
ROAD10	main road segment	646193.1	4369056.7	2452.6	2.001	27.887	3.248	0.15606		
ROAD11	main road segment	646199.5	4369074.0	2451.6	2.001	27.887	3.248	0.15606		
ROAD12	main road segment	646205.9	4369091.3	2450	2.001	27.887	3.248	0.15606		
ROAD13	main road segment	646212.4	4369108.7	2448.9	2.001	27.887	3.248	0.15606		
ROAD14	main road segment	646218.8	4369126.0	2448.4	2.001	27.887	3.248	0.15606		
ROAD15	main road segment	646225.2	4369143.3	2447.9	2.001	27.887	3.248	0.15606		
ROAD16	main road segment	646231.6	4369160.7	2447.8	2.001	27.887	3.248	0.15606		
ROAD17	main road segment	646238.1	4369178.0	2447.6	2.001	27.887	3.248	0.15606		
ROAD18	main road segment	646244.5	4369195.3	2447.7	2.001	27.887	3.248	0.15606		
ROAD19	main road segment	646250.9	4369212.7	2447.6	2.001	27.887	3.248	0.15606		
ROAD20	main road segment	646257.4	4369230.0	2448	2.001	27.887	3.248	0.15606		
ROAD21	main road segment	646263.8	4369247.3	2448.8	2.001	27.887	3.248	0.15606		
ROAD22	main road segment	646276.9	4369261.8	2449.5	2.001	27.887	3.248	0.15606		
ROAD23	main road segment	646296.6	4369273.3	2452.8	2.001	27.887	3.248	0.15606		
ROAD24	main road segment	646316.4	4369284.8	2457.8	2.001	27.887	3.248	0.15606		
ROAD25	main road segment	646336.1	4369296.3	2462.3	2.001	27.887	3.248	0.15606		
ROAD26	main road segment	646348.1	4369311.0	2464.9	2.001	27.887	3.248	0.15606		
ROAD27	main road segment	646352.3	4369329.0	2464.9	2.001	27.887	3.248	0.15606		
ROAD28	main road segment	646356.4	4369347.0	2465.3	2.001	27.887	3.248	0.15606		
ROAD29	main road segment	646360.6	4369365.0	2466.8	2.001	27.887	3.248	0.15606		
ROAD30	main road segment	646364.8	4369383.0	2469.3	2.001	27.887	3.248	0.15606		
ROAD31	main road segment	646368.9	4369401.0	2472.5	2.001	27.887	3.248	0.15606		
ROAD32	main road segment	646365.0	4369417.0	2474.4	2.001	27.887	3.248	0.15606		
ROAD33	main road segment	646353.0	4369431.0	2474	2.001	27.887	3.248	0.15606		

ROAD34	main road segment	646340.9	4369444.9	2475	2.001	27.887	3.248	0.15606		
ROAD35	main road segment	646328.9	4369458.9	2476.7	2.001	27.887	3.248	0.15606		
ROAD36	main road segment	646316.9	4369472.9	2478.1	2.001	27.887	3.248	0.15606		
ROAD37	main road segment	646304.8	4369486.8	2479.2	2.001	27.887	3.248	0.15606		
ROAD38	main road segment	646292.8	4369500.8	2479.7	2.001	27.887	3.248	0.15606		
ROAD39	main road segment	646280.8	4369514.8	2479.9	2.001	27.887	3.248	0.15606		
ROAD40	main road segment	646268.7	4369528.7	2480.1	2.001	27.887	3.248	0.15606		
ROAD41	main road segment	646256.7	4369542.7	2480.5	2.001	27.887	3.248	0.15606		
ROAD42	main road segment	646244.7	4369556.7	2481.1	2.001	27.887	3.248	0.15606		
ROAD43	main road segment	646232.6	4369570.6	2481.6	2.001	27.887	3.248	0.15606		
ROAD44	main road segment	646220.6	4369584.6	2482	2.001	27.887	3.248	0.15606		
ROAD45	main road segment	646208.6	4369598.6	2482.6	2.001	27.887	3.248	0.15606		
ROAD46	main road segment	646196.5	4369612.5	2483.3	2.001	27.887	3.248	0.15606		
ROAD47	main road segment	646184.5	4369626.5	2484.3	2.001	27.887	3.248	0.15606		
ROAD48	main road segment	646172.5	4369640.5	2485.4	2.001	27.887	3.248	0.15606		
ROAD49	main road segment	646160.4	4369654.4	2486.4	2.001	27.887	3.248	0.15606		
ROAD50	main road segment	646148.4	4369668.4	2487.2	2.001	27.887	3.248	0.15606		
ROAD51	main road segment	646136.4	4369682.4	2487.4	2.001	27.887	3.248	0.15606		
ROAD52	main road segment	646124.3	4369696.3	2487.6	2.001	27.887	3.248	0.15606		
ROAD53	main road segment	646112.3	4369710.3	2487.5	2.001	27.887	3.248	0.15606		
ROAD54	main road segment	646100.3	4369724.3	2487.3	2.001	27.887	3.248	0.15606		
ROAD55	main road segment	646088.2	4369738.2	2486.9	2.001	27.887	3.248	0.15606		
ROAD56	main road segment	646076.2	4369752.2	2486.3	2.001	27.887	3.248	0.15606		
ROAD57	main road segment	646064.2	4369766.2	2485.6	2.001	27.887	3.248	0.15606		
ROAD58	main road segment	646052.1	4369780.1	2484.8	2.001	27.887	3.248	0.15606		
ROAD59	main road segment	646040.1	4369794.1	2484.2	2.001	27.887	3.248	0.15606		
ROAD60	main road segment	646028.1	4369808.1	2483.5	2.001	27.887	3.248	0.15606		
ROAD61	main road segment	646016.0	4369822.0	2483.1	2.001	27.887	3.248	0.15606		
ROAD62	main road segment	646001.6	4369824.3	2482.9	2.001	27.887	3.248	0.15606		
ROAD63	main road segment	645984.7	4369814.8	2482.4	2.001	27.887	3.248	0.15606		
ROAD64	main road segment	645967.8	4369805.3	2481	2.001	27.887	3.248	0.15606		
ROAD65	main road segment	645950.9	4369795.8	2479.5	2.001	27.887	3.248	0.15606		
ROAD66	main road segment	645934.1	4369786.3	2477.9	2.001	27.887	3.248	0.15606		
ROAD67	main road segment	645917.2	4369776.8	2476.5	2.001	27.887	3.248	0.15606		

ROAD68	main road segment	645900.3	4369767.3	2475.2	2.001	27.887	3.248	0.15606		
ROAD69	main road segment	645883.4	4369757.8	2474	2.001	27.887	3.248	0.15606		
ROAD70	main road segment	645869.4	4369760.6	2473.4	2.001	27.887	3.248	0.15606		
ROAD71	main road segment	645858.1	4369775.7	2473.9	2.001	27.887	3.248	0.15606		
ROAD72	main road segment	645846.8	4369790.8	2474.9	2.001	27.887	3.248	0.15606		
ROAD73	main road segment	645835.5	4369805.9	2475.2	2.001	27.887	3.248	0.15606		
ROAD74	main road segment	645824.3	4369821.0	2475.6	2.001	27.887	3.248	0.15606		
ROAD75	main road segment	645813.0	4369836.1	2475.6	2.001	27.887	3.248	0.15606		
ROAD76	main road segment	645801.7	4369851.2	2475.1	2.001	27.887	3.248	0.15606		
ROAD77	main road segment	645790.4	4369866.3	2474.7	2.001	27.887	3.248	0.15606		
ROAD78	main road segment	645779.1	4369881.4	2474	2.001	27.887	3.248	0.15606		
ROAD79	main road segment	645767.9	4369896.6	2473.6	2.001	27.887	3.248	0.15606		
ROAD80	main road segment	645756.6	4369911.7	2473.4	2.001	27.887	3.248	0.15606		
ROAD81	main road segment	645745.3	4369926.8	2473.8	2.001	27.887	3.248	0.15606		
ROAD82	main road segment	645734.0	4369941.9	2474.3	2.001	27.887	3.248	0.15606		
ROAD83	main road segment	645722.8	4369957.0	2474.7	2.001	27.887	3.248	0.15606		
ROAD84	main road segment	645711.5	4369972.1	2474.7	2.001	27.887	3.248	0.15606		
ROAD85	main road segment	645700.2	4369987.2	2474.4	2.001	27.887	3.248	0.15606		
ROAD86	main road segment	645688.9	4370002.3	2474.1	2.001	27.887	3.248	0.15606		
ROAD87	main road segment	645677.6	4370017.4	2473.3	2.001	27.887	3.248	0.15606		
ROAD88	main road segment	645919.7	4370300.2	2483.2	2.001	27.887	3.248	0.15606		
ROAD89	main road segment	645907.0	4370286.7	2483.8	2.001	27.887	3.248	0.15606		
ROAD90	main road segment	645894.4	4370273.2	2484.4	2.001	27.887	3.248	0.15606		
ROAD91	main road segment	645881.8	4370259.6	2485.1	2.001	27.887	3.248	0.15606		
ROAD92	main road segment	645869.1	4370246.1	2485.9	2.001	27.887	3.248	0.15606		
ROAD93	main road segment	645856.5	4370232.6	2486.6	2.001	27.887	3.248	0.15606		
ROAD94	main road segment	645843.8	4370219.0	2487.3	2.001	27.887	3.248	0.15606		
ROAD95	main road segment	645831.2	4370205.5	2487.5	2.001	27.887	3.248	0.15606		
ROAD96	main road segment	645818.5	4370192.0	2486.7	2.001	27.887	3.248	0.15606		
ROAD97	main road segment	645805.9	4370178.4	2485.2	2.001	27.887	3.248	0.15606		
ROAD98	main road segment	645793.3	4370164.9	2483.6	2.001	27.887	3.248	0.15606		
ROAD99	main road segment	645780.6	4370151.3	2481.8	2.001	27.887	3.248	0.15606		
ROAD100	main road segment	645768.0	4370137.8	2480.3	2.001	27.887	3.248	0.15606		
ROAD101	main road segment	645755.3	4370124.3	2479.2	2.001	27.887	3.248	0.15606		

ROAD102	main road segment	645742.7	4370110.7	2478.2	2.001	27.887	3.248	0.15606		
ROAD103	main road segment	645730.0	4370097.2	2477.4	2.001	27.887	3.248	0.15606		
ROAD104	main road segment	645717.4	4370083.7	2476.6	2.001	27.887	3.248	0.15606		
ROAD105	main road segment	645704.8	4370070.1	2475.9	2.001	27.887	3.248	0.15606		
ROAD106	main road segment	645692.1	4370056.6	2474.9	2.001	27.887	3.248	0.15606		
ROAD107	main road segment	645679.5	4370043.1	2473.7	2.001	27.887	3.248	0.15606		
ROAD108	main road segment	645666.8	4370029.5	2472.8	2.001	27.887	3.248	0.15606		
ROAD109	main road segment	645654.2	4370016.0	2471.5	2.001	27.887	3.248	0.15606		
ROAD110	main road segment	645641.5	4370002.5	2470.5	2.001	27.887	3.248	0.15606		
ROAD111	main road segment	645628.9	4369988.9	2469.1	2.001	27.887	3.248	0.15606		
ROAD112	main road segment	645616.3	4369975.4	2468.1	2.001	27.887	3.248	0.15606		
ROAD113	main road segment	645603.6	4369961.8	2467.3	2.001	27.887	3.248	0.15606		
ROAD114	main road segment	645591.0	4369948.3	2466.4	2.001	27.887	3.248	0.15606		
ROAD115	main road segment	645578.3	4369934.8	2465.5	2.001	27.887	3.248	0.15606		
ROAD116	main road segment	645575.3	4369919.1	2465.4	2.001	27.887	3.248	0.15606		
ROAD117	main road segment	645581.8	4369901.4	2465.7	2.001	27.887	3.248	0.15606		
ROAD118	main road segment	645588.3	4369883.7	2466	2.001	27.887	3.248	0.15606		
ROAD119	main road segment	645594.8	4369866.0	2466.4	2.001	27.887	3.248	0.15606		
ROAD120	main road segment	645601.3	4369848.2	2466.8	2.001	27.887	3.248	0.15606		
ROAD121	main road segment	645607.8	4369830.5	2467.2	2.001	27.887	3.248	0.15606		
ROAD122	main road segment	645614.3	4369812.8	2467.3	2.001	27.887	3.248	0.15606		
ROAD123	main road segment	645620.8	4369795.1	2467.4	2.001	27.887	3.248	0.15606		
ROAD124	main road segment	645627.3	4369777.3	2467.2	2.001	27.887	3.248	0.15606		
ROAD125	main road segment	645633.8	4369759.6	2466.6	2.001	27.887	3.248	0.15606		
ROAD126	main road segment	645640.3	4369741.9	2466.5	2.001	27.887	3.248	0.15606		
ROAD127	main road segment	645646.8	4369724.1	2465.4	2.001	27.887	3.248	0.15606		
ROAD128	main road segment	645653.3	4369706.4	2464.3	2.001	27.887	3.248	0.15606		
ROAD129	main road segment	645659.8	4369688.7	2461.8	2.001	27.887	3.248	0.15606		
ROAD130	main road segment	645666.3	4369671.0	2457.5	2.001	27.887	3.248	0.15606		
ROAD131	main road segment	645672.8	4369653.2	2453.4	2.001	27.887	3.248	0.15606		
ROAD132	main road segment	645679.3	4369635.5	2448.5	2.001	27.887	3.248	0.15606		
ROAD133	main road segment	645685.8	4369617.8	2441.7	2.001	27.887	3.248	0.15606		
ROAD134	main road segment	645692.3	4369600.1	2438.6	2.001	27.887	3.248	0.15606		
ROAD135	main road segment	645698.8	4369582.3	2441.3	2.001	27.887	3.248	0.15606		

ROAD136	main road segment	645705.3	4369564.6	2444.9	2.001	27.887	3.248	0.15606		
ROAD137	main road segment	645711.8	4369546.9	2448.3	2.001	27.887	3.248	0.15606		
ROAD138	main road segment	645721.3	4369530.9	2452.9	2.001	27.887	3.248	0.15606		
ROAD139	main road segment	645733.8	4369516.8	2459.2	2.001	27.887	3.248	0.15606		
ROAD140	main road segment	645746.3	4369502.6	2463.9	2.001	27.887	3.248	0.15606		
ROAD141	main road segment	645758.8	4369488.5	2466.4	2.001	27.887	3.248	0.15606		
ROAD142	main road segment	645771.3	4369474.4	2467.2	2.001	27.887	3.248	0.15606		
ROAD143	main road segment	645783.8	4369460.2	2467.1	2.001	27.887	3.248	0.15606		
ROAD144	main road segment	645796.3	4369446.1	2465.7	2.001	27.887	3.248	0.15606		
ROAD145	main road segment	645808.8	4369431.9	2463.1	2.001	27.887	3.248	0.15606		
ROAD146	main road segment	645821.3	4369417.8	2458.8	2.001	27.887	3.248	0.15606		
ROAD147	main road segment	645833.8	4369403.6	2453.5	2.001	27.887	3.248	0.15606		
ROAD148	main road segment	645846.3	4369389.5	2448.9	2.001	27.887	3.248	0.15606		
ROAD149	main road segment	645858.8	4369375.4	2444.7	2.001	27.887	3.248	0.15606		
ROAD150	main road segment	645871.3	4369361.2	2439.9	2.001	27.887	3.248	0.15606		
ROAD151	main road segment	645883.8	4369347.1	2437.5	2.001	27.887	3.248	0.15606		
INTRD1	interior road segment	645891.1	4369330.1	2438.1	2.001	27.887	3.248	0.07803		
INTRD2	interior road segment	645893.3	4369310.3	2438	2.001	27.887	3.248	0.07803		
INTRD3	interior road segment	645895.6	4369290.6	2437.7	2.001	27.887	3.248	0.07803		
INTRD4	interior road segment	645897.8	4369270.8	2437.5	2.001	27.887	3.248	0.07803		
INTRD5	interior road segment	645900.0	4369251.0	2436.4	2.001	27.887	3.248	0.07803		
INTRD6	interior road segment	645902.2	4369231.2	2435.2	2.001	27.887	3.248	0.07803		
INTRD7	interior road segment	645904.4	4369211.4	2433.9	2.001	27.887	3.248	0.07803		
INTRD8	interior road segment	645906.7	4369191.7	2432	2.001	27.887	3.248	0.07803		
INTRD9	interior road segment	645908.9	4369171.9	2430	2.001	27.887	3.248	0.07803		
INTRD10	interior road segment	645920.2	4369161.8	2433	2.001	27.887	3.248	0.07803		
INTRD11	interior road segment	645940.6	4369161.4	2439.9	2.001	27.887	3.248	0.07803		
INTRD12	interior road segment	645960.9	4369161.1	2444.9	2.001	27.887	3.248	0.07803		
INTRD13	interior road segment	645981.3	4369160.7	2448.7	2.001	27.887	3.248	0.07803		
INTRD14	interior road segment	646001.7	4369160.3	2450.9	2.001	27.887	3.248	0.07803		
INTRD15	interior road segment	646022.1	4369159.9	2450.5	2.001	27.887	3.248	0.07803		
INTRD16	interior road segment	646042.4	4369159.6	2448.7	2.001	27.887	3.248	0.07803		
INTRD17	interior road segment	646062.8	4369159.2	2446	2.001	27.887	3.248	0.07803		
INTRD18	interior road segment	646081.8	4369163.4	2444.1	2.001	27.887	3.248	0.07803		

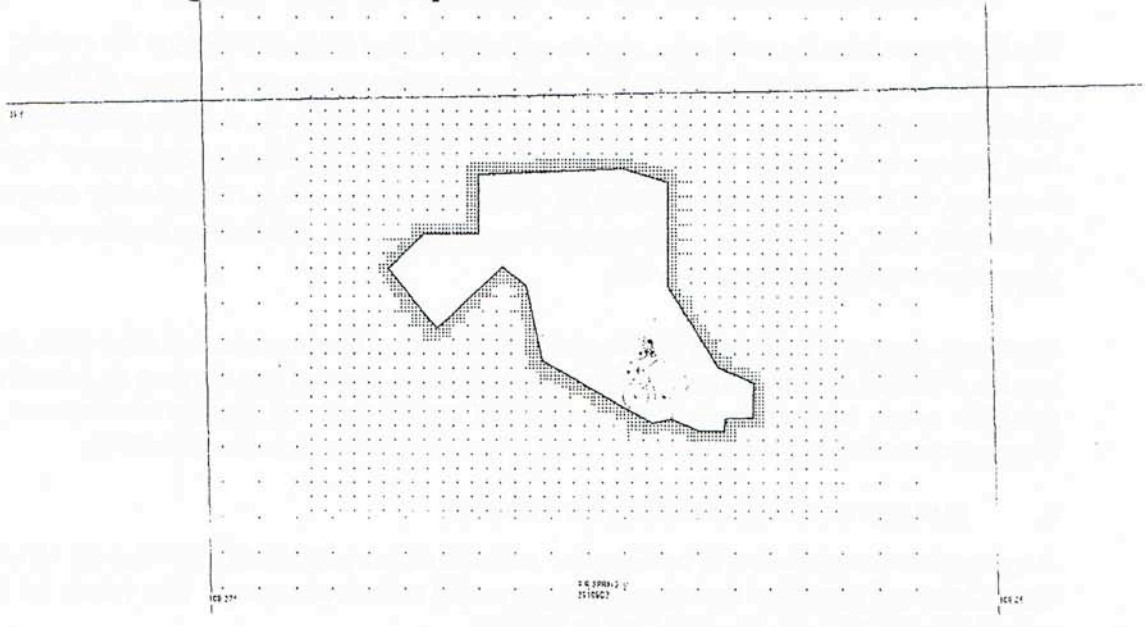
INTRD19	interior road segment	646099.5	4369172.2	2443.5	2.001	27.887	3.248	0.07803		
INTRD20	interior road segment	646117.1	4369181.1	2442.1	2.001	27.887	3.248	0.07803		
INTRD21	interior road segment	646134.7	4369189.9	2440.8	2.001	27.887	3.248	0.07803		
INTRD22	interior road segment	646152.4	4369198.7	2441.2	2.001	27.887	3.248	0.07803		
INTRD23	interior road segment	646170.0	4369207.5	2442.1	2.001	27.887	3.248	0.07803		
INTRD24	interior road segment	646187.6	4369216.3	2443.5	2.001	27.887	3.248	0.07803		
INTRD25	interior road segment	646205.3	4369225.1	2445.6	2.001	27.887	3.248	0.07803		
INTRD26	interior road segment	646222.9	4369234.0	2447.4	2.001	27.887	3.248	0.07803		
INTRD27	interior road segment	646240.6	4369242.8	2448.5	2.001	27.887	3.248	0.07803		
INTRD28	interior road segment	646258.2	4369251.6	2448.8	2.001	27.887	3.248	0.07803		
CRUSHER	process crusher	646000.0	4369600.0	2479.5	4.987	11.155	2.329	0.07803		
SCREEN	plant screen	645860.0	4369945.0	2480.3	4.003	13.025	2.789	0.07803		
INITCRSH	init crsh for rd gravel	645820.0	4369988.0	2477.9	4.987	11.155	2.329	0.07803		
WSHAUL1	Haul tar sand Wpit to proc	645650.8	4369216.9	2458.2	2.001	27.887	3.248	0.07803		
WSHAUL2	Haul tar sand Wpit to proc	645664.4	4369230.8	2458.6	2.001	27.887	3.248	0.07803		
WSHAUL3	Haul tar sand Wpit to proc	645677.9	4369244.6	2458.9	2.001	27.887	3.248	0.07803		
WSHAUL4	Haul tar sand Wpit to proc	645691.5	4369258.5	2459.1	2.001	27.887	3.248	0.07803		
WSHAUL5	Haul tar sand Wpit to proc	645705.1	4369272.4	2458.9	2.001	27.887	3.248	0.07803		
WSHAUL6	Haul tar sand Wpit to proc	645718.6	4369286.2	2459	2.001	27.887	3.248	0.07803		
WSHAUL7	Haul tar sand Wpit to proc	645732.2	4369300.1	2458.7	2.001	27.887	3.248	0.07803		
WSHAUL8	Haul tar sand Wpit to proc	645745.8	4369313.9	2458.7	2.001	27.887	3.248	0.07803		
WSHAUL9	Haul tar sand Wpit to proc	645759.4	4369327.8	2459.1	2.001	27.887	3.248	0.07803		
WSHAUL10	Haul tar sand Wpit to proc	645772.9	4369341.6	2459.2	2.001	27.887	3.248	0.07803		
WSHAUL11	Haul tar sand Wpit to proc	645786.5	4369355.5	2459	2.001	27.887	3.248	0.07803		
WSHAUL12	Haul tar sand Wpit to proc	645800.1	4369369.4	2458.1	2.001	27.887	3.248	0.07803		
WSHAUL13	Haul tar sand Wpit to proc	645813.6	4369383.2	2456.6	2.001	27.887	3.248	0.07803		
WSHAUL14	Haul tar sand Wpit to proc	645827.2	4369397.1	2454.7	2.001	27.887	3.248	0.07803		

4. RECEPTOR NETWORK

The facility is located in a rural area north of Vernal, in Uinta County near the county line. As shown in Figure 1, the terrain in the lease area is generally ridgetop, with lower drainages offsite to the east and the southwest. .

Consistent with the UDAQ approved Modeling Protocol, the ambient air boundary used in this analysis is the facility's lease and ambient air boundary. Model receptors were placed every 25 meters along the ambient air boundary. All model predicted maximum PM-10 impacts from facility operations occurred within this inner 25 meter receptor grid. Beyond the property boundary, the receptor network includes an inner set of receptors spaced 50 meters apart out to at least 150 meters, then 200 meter receptor spacing out to 1200 meters. Beyond 1200 meters, the receptor network was extended out to 2.5 kilometers with 500 meter receptor spacing. The inner receptor network can be seen outside the ambient air boundary in Figure 2. Figure 3 shows the rest of the receptor network, and the USGS topographic maps covering the model domain. It also includes, in red, the Harper model sources in the center, and the external cocontributing sources included in the modeling analysis.

Figure 3 Outer Receptor Network and Modeled Cocontributors



The HAP max impacts occurred approximately 0.45 km east of the lease boundary. Their impacts were at least two orders of magnitude below applicable impacts, and their values were within 10% of neighboring receptor values. Therefore, no refinement of the initial receptor network was necessary for finer resolution analyses because initial ISCST3 modeling runs all showed maximum predicted ambient PM-10 impacts on the property boundary in 25-meter grid spacing, and maximum HAP impacts were well bounded at values less than 2.5% of applicable impact standards.

5. ELEVATION DATA

All source base and receptor elevations were calculated from USGS 7.5-degree (30m or less horizontal resolution) NAD 27 DEM data using the Bee-Line BEEST preprocessing system.

6. METEOROLOGICAL DATA

Consistent with the UDAQ approved modeling protocol, four years of National Weather Service surface data from the Bonanza power station south of Vernal. The UDAQ provided data was actually from the years 1985 – 1987 and 1992. Upon the recommendation of Mr. Orth of UDAQ, the 1992 data was used as if it were from 1988, so that a four year meteorological data file from 1985 to 1988 could be created and used.

7. LAND USE CLASSIFICATION

ISCST3 includes rural and urban algorithm options. These options affect the wind speed profile, dispersion rates, and mixing-height formula used in calculating ground-level pollutant concentrations. A protocol was developed by USEPA to classify an area as either rural or urban for dispersion modeling purposes. The classification is based on average heat flux, land use, or population density within a three-km radius from the plant site. Of these techniques, the USEPA has specified that land use is the most definitive criterion (USEPA, 1987). The urban/rural classification scheme based on land use is as follows:

The land use within the total area, A_0, circumscribed by a 3-km circle about the source, is classified using the meteorological land use typing scheme proposed by Auer (1978). The classification scheme requires that more than 50% of the area, A_0, be from the following land use types in order to be considered urban for dispersion modeling purposes: heavy industrial (I1); light-moderate industrial (I2); commercial (C1); single-family compact residential (R2); and multi-family compact residential (R3). Otherwise, the use of rural dispersion coefficients is appropriate.

The Earth Energy PR Springs Oil Sand Mine is located in a rural area distant from much if any local human activity. Site and map reconnaissance showed that the area A_0 is well below the 50% urban land use criteria necessary for use of urban dispersion coefficients. Rural dispersion coefficients were therefore used in the air quality dispersion modeling.

8. BACKGROUND CONCENTRATIONS

Representative regional rural background concentrations previously provided by UDAQ for the vicinity and approved during modeling protocol review were used. The values for PM-10 provided by UDAQ are shown below in Table 3.

9. EVALUATION OF COMPLIANCE WITH STANDARDS

Model predicted maximum impacts reported in Table 3 are the highest first maximum predicted over the five years for annual average periods, and fifth maximum predicted over the four year period for shorter criteria pollutant averaging periods for either of the operating periods modeled. The first maximum predicted HAP impact for short term averaging periods are reported. All maximum predicted maximum impacts reported come from the 6AM to

6PM operating scenario. As noted, all modeling details and compliance determination methodologies were presented in detail to and approved by UDAQ, with conditions described and employed here, during modeling protocol discussions.

Predicted total concentrations presented are model predicted maximum ambient impacts during facility operation plus background concentrations for criteria pollutants. The impact limit standards applicable to this facility are the National Ambient Air Quality Standards (NAAQS) for criteria pollutants and UDAQ HAP pollutant emission limits.

Table 3
Background Concentrations, Ambient Impact Limits
And Method of Comparison with Ambient Air Quality Standards

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Modeled Impact ($\mu g/m^3$)	Predicted Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Location of Predicted Maximum Impact
PM_{10}	24-hour	76.7	67.1	143.8	150	W property boundary
	Annual	26.0	9.7	35.7	50	
Acrolein	1-hour	-	0.101	-	7.7	0.45 km E of property boundary
Formaldehyde	24-hour	-	0.814	-	37	

Maximum impacts for all pollutants and averaging impacts are shown by Table 3 to be well below the applicable impact limits. The 24 hour average maximum PM-10 impact came from the 10AM to 10PM run, while the annual average maximum impact came from the 6AM to 6PM run. Predicted facility impacts were a maximum of 44.7% of the applicable standards. Predicted total concentrations were well below the applicable standards, in large part because background was 51% of the NAAQS. These model analyses are quite conservative, since they're based upon maximum short term emissions scenarios, and include worst-case setback assumptions that will typically be exceeded in the field.

Figure 4 shows all model receptors for which impacts over 20 $\mu g/m^3$ are predicted for 24-hour average PM-10. Note that facility impacts drop off quite quickly away from the ambient air boundary. Figure 4 shows the maximum predicted impact occurs on the property's west boundary, east of the crushing and screening area.

Figure 4 Maximum 24-hour PM-10 Impacts

10. ELECTRONIC COPIES OF THE MODELING FILES

Electronic copies of all input, output, and support modeling files necessary to duplicate the model results will be provided to UDAQ. Those files include:

One meteorological file named DGT8592.ASC

Model files Earth Energy_hh_85_pp.ext , where
hh = 06 for the 6AM to 6PM analysis, and 10 for the 10AM to 10PM run, and
pp = PMTEN for PM-10, ACROLEIN or FORMALD for Acrolein or formaldehyde
ext = DTA for ISCST3 input files and LST for ISCST3 output files

The Modeling Protocol is not included in this submission. Documentation of agreements reached with UDAQ during extensive modeling protocol discussions can be provided if necessary.

APPENDIX F

Precipitation Data

CISCO, UTAH

ıl Climate Summary - Precipitation

Station:(421440) CISCO From Year=1952 To Year=2006														
	Precipitation											Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	0.48	1.75	1957	0	1961	0.61	16/1956	3	2	0	0	4.3	24	1957
February	0.5	1.63	1955	0	1961	0.5	19/1955	3	2	0	0	2.1	16.5	1955
March	0.52	1.81	1961	0	1966	0.66	May-61	3	2	0	0	1.1	5.3	1958
April	0.61	1.78	1965	0	1967	0.63	27/1965	3	2	0	0	0.3	2	1953
May	0.61	1.42	1967	0	1962	0.49	Jan-54	4	2	0	0	0	0	1953
June	0.26	1.47	1965	0	1955	0.77	30/1962	1	1	0	0	0	0	1953
July	0.37	1.72	1965	0	1955	0.92	24/1965	2	2	0	0	0	0	1953
August	1.03	2.61	1957	0	1962	0.9	25/1961	4	3	1	0	0	0	1953
September	0.8	2.84	1961	0	1953	1.1	Sep-61	3	3	0	0	0	0	1952
October	0.86	2.55	1957	0	1952	1.43	16/1965	3	2	1	0	0.2	2.5	1956
November	0.63	1.7	1965	0	1956	0.87	13/1954	3	2	0	0	0.9	5	1954
December	0.43	1.28	1966	0	1954	0.61	Jun-66	3	2	0	0	2.1	5.3	1953
Annual	7.11	13.99	1957	3.08	1956	1.43	19651016	35	24	3	0	11	30.1	1955
Winter	1.42	2.82	1957	0.08	1961	0.61	19560116	9	5	0	0	8.5	27.5	1955
Spring	1.74	3.86	1961	0.41	1956	0.66	19610305	10	6	0	0	1.4	7.3	1958
Summer	1.66	3.93	1965	0.27	1954	0.92	19650724	7	5	1	0	0	0	1953
Fall	2.29	4.78	1961	0.77	1956	1.43	19651016	9	7	1	0	1.1	5	1954

Table updated on Apr 23, 2007
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb.
Spring = Mar., Apr., and May

Summer = Jun., Jul., and Aug.
Fall = Sep., Oct., and Nov.

BONANZA, UTAH

ıl Climate Summary - Precipitation

Station:(420802) BONANZA
From Year=1948 To Year=2006

	Precipitation										Total Snowfall		
	Mean	High	Year	Low	Year	1 Day Max.		>= 0.01 in.	>= 0.10 in.	>= 0.50 in.	>= 1.00 in.	Mean	High	Year
	in.	in.	-	in.	-	in.	dd/yyyy or yyyymmdd	# Days	# Days	# Days	# Days	in.	in.	-
January	0.58	1.86	1993	0	1972	0.92	16/1956	4	2	0	0	6.4	22.6	1993
February	0.43	1.15	1989	0	1972	0.8	20/1986	3	2	0	0	5.3	17.5	1955
March	0.7	2.62	1979	0	1951	1.03	28/1979	5	2	0	0	4.3	16.5	1952
April	0.79	1.84	1983	0.1	1949	1.02	Jan-75	4	3	0	0	1	15	1975
May	1.03	2.95	1975	0	1969	1.12	31/1985	5	3	1	0	0	0	1949
June	0.73	3.17	1970	0	1950	1.88	Nov-70	4	2	0	0	0	0	1949
July	0.83	3.9	1985	0	1968	1.45	21/1985	4	3	0	0	0	0	1948
August	0.91	3.6	1957	0	1950	1.02	Nov-82	4	3	1	0	0	0	1948
September	0.83	2.83	1954	0	1957	1.3	13/1958	4	2	0	0	0	0	1948
October	1.05	2.55	1981	0	1952	1.45	24/1956	4	3	1	0	0.5	11	1991
November	0.49	1.28	1987	0	1949	0.71	Dec-78	3	2	0	0	1.7	9	1953
December	0.52	1.84	1966	0	1989	1.23	Jun-66	3	2	0	0	5.3	18.5	1984
Annual	8.87	13.23	1957	4.14	1958	1.88	19700611	48	28	4	0	24.5	38.7	1951
Winter	1.53	2.51	1952	0.39	1972	1.23	19661206	10	5	0	0	17	30.6	1949
Spring	2.51	5.68	1983	0.44	1956	1.12	19850531	14	8	1	0	5.4	16.5	1952
Summer	2.46	4.76	1985	0.31	1974	1.88	19700611	12	7	1	0	0	0	1949
Fall	2.37	4.94	1954	0.59	1952	1.45	19561024	11	7	1	0	2.2	11	1991

Table updated on Apr 23, 2007
For monthly and annual means, thresholds, and sums:
Months with 5 or more missing days are not considered
Years with 1 or more missing months are not considered
Seasons are climatological not calendar seasons

Winter = Dec., Jan., and Feb.

Spring = Mar., Apr., and May

Summer = Jun., Jul., and Aug.

Fall = Sep., Oct., and Nov.