0012

GK General

From: Priscilla Burton
To: OGMCOAL
Date: 5/21/2008 11:02 AM
Subject: General/2008/Incoming/DAQ Small Exemption WETC research facility
Place: OGMCOAL
Attachments: Terra Final Letter2.pdf; Terra Request1.pdf

>>> Tad Anderson Tuesday, May 20, 2008 3:43 PM >>>
Priscilla,

The document that they are referencing is a small source exemption letter. This letter allows them to operate their facilities as per there application that they had submitted. I have read through the application and talked to the engineer that had granted the exemption. Terra Systems is only allowed to run three batches of finished briquettes for a combined total of 1,500 tons annually. If the source exceeds these levels of operations, the source would be have to submit another exemption request or an approval order. If you would like to contact the engineer which worked on this his name Alan Humpherys (801-536-4142). He would have more detailed information on the source than I would. I have attached both the application and the exemption letter. If you have any more question from me please feel free to contact me.

Tad Anderson

>>> Priscilla Burton 5/20/2008 3:08 PM >>>
Hello Tad,

It turns out that the location provided in DAQE-R-0141330001 is the same location as the WETC facility (T12 S R10 E, SW Sec. 31), even though the address is Terra Systems, Midvale UT.

The recent Sun Advocate article about the site is found at the following web site:

http://www.sunad.com/index.php?tier=1&pub=2008-04-24&page=focus

Attached is my internal memo concerning the activity at WETC.

Would you send me a copy of DAQE-R-0141330001.

Thanks,

Priscilla Burton, CPSSc
Division of Oil Gas & Mining
317 Carbonville Rd.
Price UT 84501

priscillaburton@utah.gov
(435) 613-3733

State of Utah

Department of
Environmental Quality

Richard W. Sprott
Executive Director

DIVISION OF AIR QUALITY
Cheryl Heying
Director

JON M. HUNTSMAN, JR.
Governor

GARY HERBERT
Lieutenant Governor

FILE COPY

Small Source Registration

DAQE-EN0141330001-08

May 12, 2008

Clayton Timothy
Terra Systems Inc.
Western Energy Training Center
7001 South 900 East, Suite 260
Midvale, Utah 84047

Dear Mr. Timothy:

Re: Request for Evaluation of Compliance with Rule R307-401-9,UAC: Exemptions and Special Provisions - Small Source Exemptions - De Minimis Emissions, for Terra Systems Inc., Briquette Pilot Plant, located at SWSW of Section 31, Township 12 South, Range 10 East, near Helper, Utah, Carbon County. Project code: N014133-0001

The Utah Department of Environmental Quality, Division of Air Quality (DAQ) has reviewed your letter, submitted April 21, 2008, requesting a small source exemption for the Briquette Pilot Plant and determined that the small source exemption applies as long as the above-referenced equipment and associated processes are operated as specified in the Registration Request.

The small source exemption does not exempt a source from complying with other applicable Federal, State, and local regulations and the current Utah Administrative Code. If you change your operation such that there is an increase in the emissions submitted to DAQ, it is recommended that you notify us, as an Approval Order may be required.

The fee for issuing the small source / de minimis designation is the cost, as authorized by the Legislature of the actual time spent by the Review Engineer and all other staff on the project, and a one-time filing fee. Payment should be sent to the DAQ upon receipt of the invoice.

Thank you for informing the DAQ of this process. If you have any additional questions, please contact Alan Humpherys at (801) 536-4142.

Sincerely,

M. Cheryl Heying, Executive Secretary
Utah Air Quality Board

John T. Blanchard, Manager
Minor New Source Review Section

MCH:JTB:AH:sa

Attachments: Small Source Exemption Registration Request and attached forms

cc: Tom Paluso
31 North Main St.
Helper, Utah 84526

ENVIRONMENTAL INDUSTRIAL SERVICES
435-472-3814 • 800-641-2927 • FAX 435-472-3760 • eisec@eisut.com • 31 NORTH MAIN STREET HELPER, UTAH 84526

April 18, 2008

Richard W. Sprott, Director
Division of Air Quality
P. O. Box 144820
Salt Lake City, Utah 84114-4820

RE: Air Quality Calculations for Pilot Plant

Dear Mr. Sprott:

A consortium of companies and academic institutions are planning on construction a pilot plant. The group consists of Terra Systems, Combustion Resources, Western Energy Training Center (WETC) and the College of Eastern Utah (CEU). The pilot plant will be constructed at WETC and will produce briquettes. The briquettes will be manufactured from coal fines, petroleum coke and tar. The pilot plant will produce 1,500 tons of the briquettes and consist of three test burns of 500 tons each.

A summary of the estimated emissions from the pilot plant as shown on Summary Table, page 4 of the attached report, has determined that the pilot plant will produce less than 5 tons per year per air contaminants. The consortium is requesting that a small source exemption be granted because of de minimis emission. We have been work with Mr. Tim DeJulis on this project. If you have any questions please contact me at 435-472-3814, my email address is "tompaluso@preciscom.net.

Your approval of this request is appreciated.

Best Regards,

Tom Paluso

J. T. Paluso, P. E.
Chief Engineer

AIR QUALITY CALCULATIONS

FOR

BRIQUETTE PILOT PLANT

AT

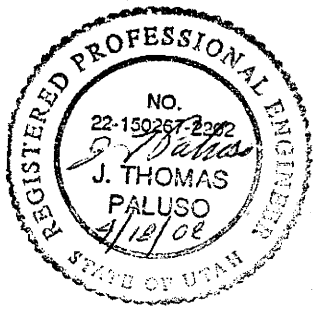
WESTERN ENERGY TRAINING CENTER

For

Terra Systems

Submitted by

EIS Environmental & Engineering Consulting
31 North Main Street
Helper, Utah 84526



I. INTRODUCTION

Terra Systems (TSI) inconjuction with Combustion Resources, Western Energy Training Center (WETC) and College of Eastern Utah (CEU) is submitting information to construct and operate a new briquette manufacturing test plant at WETC in Carbon County, Utah. The test facility is located in SWSW of Section 31, Township 12 South, Range 10 East, Salt Lake Base and Medium. Refer to the Location Map in Appendix 1. The plant is being set-up to develop 1,500 tons of finished briquettes for three (3); 500-ton test burns for three (3) different customers.

II. EXEMPTION FROM NOTICE OF INTENT

The project is considered exempt under the exemption criteria found in Appendix 1 of the Notice of Intent Guidelines. The emission calculation will confirm the exemption shown in Appendix 3 and Table 1of this submittal.

III. DATA REQUIRMENTS

Terra Systems' briquette facilities will not be located within a Non-attainment area as described in Appendix III of the NOI Guide.

A. A description of the operations area as follows:

Terra Systems has recently purchased the equipment for this process from a company in Ohio. TSI will receive coal and petroleum coke from a supplier outside the area and will improve the final coal quality. At a later date, if the process is successful, a full-scale plant will be built and coal fines will be obtained from the Carbon/Emery area. The facility will be divided into the following areas: coal/coke mixing area, briquette, heating and cooling, gas condenser, and finish product. All equipment will be located inside of an existing building.

Coal/Coke Mixing

Incoming trucks will bring a coal/coke mixture in one (1) ton sacks that will be dumped into coal/coke loading bin. Refer to the Plant Layout in Appendix 2. The coal/coke will be mixed with a binder. The mixer will be equipped with a bag house for collecting dust.

Briquette

The coal/coke and binder will travel to the briquetter by enclosed feed screw conveyor. The briquettes will be dumped onto a conveyor and taken to the pallet loading station where they will be loaded onto pallets.

Heating and Cooling

The pallets loaded with briquettes will travel through two (2) heating ovens and a cooling station. The first oven will pre-heat the briquettes to a temperature of 1,600° F and will drive off volatile gases from the coal and coke. The second oven will heat the briquettes to approximately 2,000° F. When the briquettes leave the second oven they will enter into a two-stage cooler to cool down the briquettes before they are packaged.

Gas Condenser

The volatile gases will be pulled off the first oven and sent to a condenser. The condenser will liquefy the gas. The liquid product will be pumped to the binder tank and the remainder of the gases will be flared.

Finish Product

The finished briquettes will be conveyed to the bagging station and loaded into two (2) ton bags for shipment to the customer.

B. Pollution Producing Equipment

Pollution producing equipment proposed at the TSI facility consists of the following:

1. Paved Roads
2. Coal/Coke Loading Bin
3. Heated Binder Tank
4. Coal/Coke Mixer
5. Bag House
6. Feed Screw Conveyor
7. Briquetter
8. Load Conveyor
9. Briquette Load Station
10. Feed Conveyor
11. Ovens and Cooling Station
12. Gas Condenser
13. Flare
14. Exit Conveyor
15. Briquette Dump Station
16. Finished Product Conveyor
17. Product Bagging Station
18. Associated Mobile Diesel Equipment

C. Potential Emission Points and air contaminants

A list of potential emission points and air contaminants from each point are as follows:

1. Paved Roads	TSP, PM_{10}
2. Coal/Coke Loading Bin	TSP, PM_{10}
3. Heated Binder Tank	VOC
4. Coal/Coke Mixer	TSP, PM_{10}
5. Bag House	TSP, PM_{10}
6. Feed Screw Conveyor	TSP, PM_{10}
7. Briquetter	TSP, PM_{10}
8. Load Conveyor	TSP, PM_{10}
9. Briquette Load Station	TSP, PM_{10}
10. Feed Conveyor	TSP, PM_{10}
11. Ovens and Cooling Station	TSP, PM_{10}
12. Gas Condenser	VOC
13. Flare	VOC
14. Exit Conveyor	TSP, PM_{10}
15. Briquette Dump Station	TSP, PM_{10}
16. Finished Product Conveyor	TSP, PM_{10}
17. Product Bagging Station	TSP, PM_{10}
18. Associated Mobile Diesel Equipment	TSP, PM_{10}, SO_2, CO, VOC

D. Air Pollution Control Equipment (APCE)

A detail description of the air pollution control equipment (APCE) and operational procedures are as follows:

1. Paved Roads: All haul roads will be paved to prevent trucks and other equipment from generating dust.
2. Coal/Coke Loading Bin: The bags will be dumped close to the bin.
3. Heated Binder Tank: The tank will be covered.
4. Coal/Coke Mixer: The mixer is equipped with a bag house.
5. Bag House: The bag house will dump the dust back into the mixer.
6. Feed Screw Conveyor: The conveyor is enclosed.
7. Briquetter: The mixture will have a high moisture content (12%).
8. Load Conveyor: The mixture will have a high moisture content (12%).
9. Briquette Load Station: The mixture will have a high moisture content (12%).
10. Feed Conveyor: The mixture will have a high moisture content (12%).
11. Ovens and Cooling Station: The ovens and cooling station are enclosed.
12. Gas Condenser
13. Flare
14. Exit Conveyor: The briquettes will be dry.
15. Briquette Dump Station: The drop distance will not be high to prevent breaking.
16. Finished Product Conveyor: The briquettes will be dry.
17. Product Bagging Station: The drop distance will be controlled to prevent breaking.
18. Associated Mobile Diesel Equipment: Regular maintenance of the diesel engine and use of only approved fuel are the primary means to minimize fuel combustion emissions.

E. Emission Rates

Emission rates of the air contaminants have been calculated for each emission point listed above using controlled and uncontrolled emission factors.

1. The emissions from all source points are summarized in Table No. 1 and details in Appendix 3. The normal annual emissions rates (in tons per year) that may result from both controlled and uncontrolled conditions can be found in Table No. 1.
2. Assuming that the worse case scenario would be, that no controls were implemented or if all the controls failed. This worse case scenario is also shown as uncontrolled in Table No. 1.

3. The emissions through the stack are shown in Table No. 1.

F. Calculations

Calculations of the emission estimates of the above items are detailed in Appendix 3.

EMISSION CALCULALTION ASSUMPTIONS

1. Maximum total tonnage for the facility is 1,500 tons.
2. 1 ton of product is estimated to emit 40% VOC's.
3. 10% of the emitted gas will be recovered as binder.
4. The coal/coke and binder mixture will have a moisture content of 12%.
5. The coal/coke mixture will have moisture content of 7%.
6. The finish product will have moisture content of 2%.

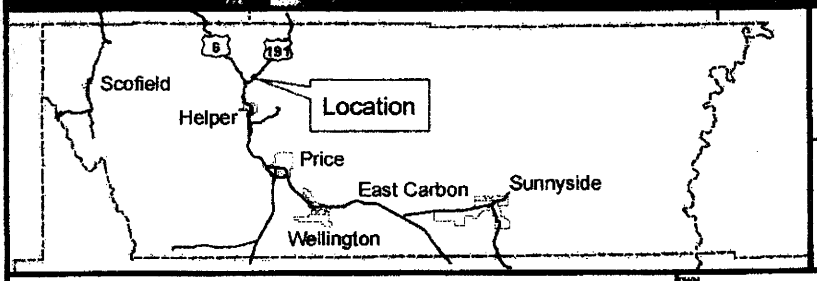
Table No. 1
Emission Summary

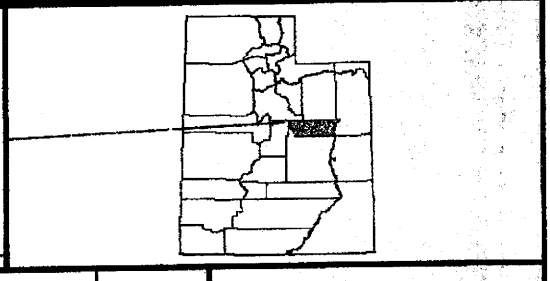
Emission Point	TSP		PM_{10}		SOx	NOx	CO	VOC
	Controlled TPY	Uncontrolled TPY	Controlled TPY	Uncontrolled TPY	TPY	TPY	TPY	TPY
Paved Roads		0.46		0.09				
Coal/Coke Bin	0.000009485	0.004785886	0.000004486	0.002263595				
Binder Tank								0.0037
Coal/Coke Mixer	0.000004460	0.002250328	0.000002109	0.001064344				
Bag House		0.002250328		0.001064344				
Screw Conveyor	0.000004460		0.000002109					
Briquetter	0.000004460	0.002250328	0.000002109	0.001064344				
Load Conveyor	0.000004460	0.002250328	0.000002109	0.001064344				
Load Station	0.000004460	0.002250328	0.000002109	0.001064344				
Feed Conveyor	0.000004460	0.002250328	0.000002109	0.001064344				
Ovens/Cooling Station	0.000004460		0.000002109					
Gas Condenser								0.0037
Flare					3.50	0.04	0.20	0.08
Exit Conveyor	0.000054793	0.027647609	0.000025915	0.013076572				
Dump Station	0.000054793	0.027647609	0.000025915	0.013076572				
Product Conveyor	0.027647609	0.027647609	0.013076572	0.013076572				
Bagging Station	0.000054793	0.027647609	0.000025915	0.013076572				
Fuel Consumption				0.011335037	0.01	0.16	0.03	0.01
Total	0.027852690	0.590861847	0.013173570	0.161453967	3.51	0.20	0.24	0.10

APPENDIX 1

LOCATION MAP

Located in Section 31, Township 12 South, Range 10 East, SLB&M





Environmental Industrial Services

Environmental & Engineering Consulting
31 NORTH MAIN STREET
HELPER, UTAH 84526
(435) 472-3814

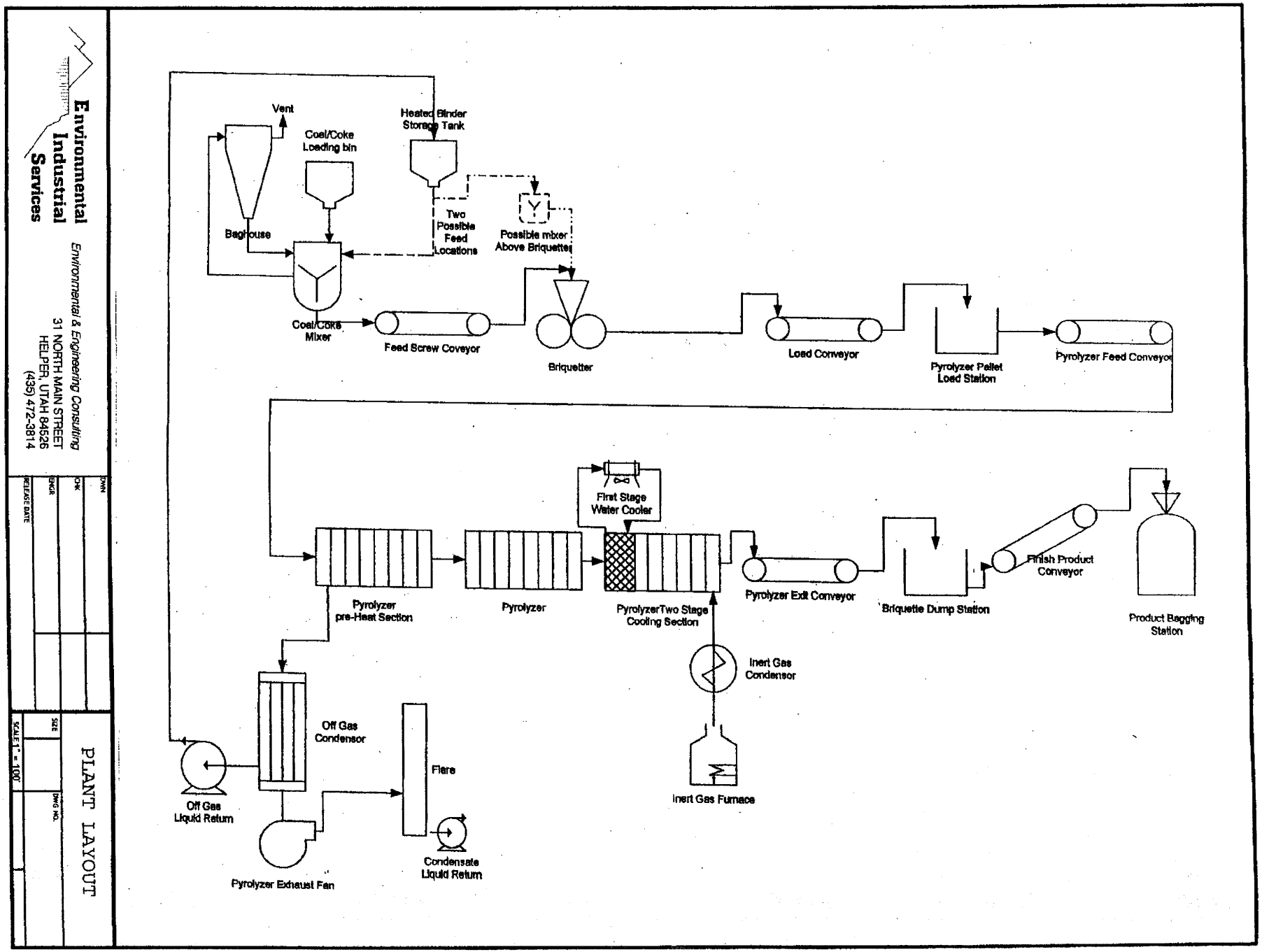
DWN	
CHK	
ENGR	
RELEASE DATE	

Briquette Plant
Western Energy Training Center

SIZE	DWG NO.
A	
SCALE 1" = 100'	

APPENDIX 2

PLANT LAYOUT


Environmental Industrial Services
Environmental & Engineering Consulting
31 NORTH MAIN STREET
HELPER, UTAH 84526
(435) 472-3814
DWN
CHK
ENGR
RELEASE DATE
SIZE
SCALE 1" = 100'
DWG NO.
PLANT LAYOUT
Vent
Heated Binder Storage Tank
Coal/Coke Loading bin
Two Possible Feed Locations
Possible mixer Above Briquettes
Baghouse
Coal/Coke Mixer
Feed Screw Coveyor
Briquetter
Load Conveyor
Pyrolyzer Pellet Load Station
Pyrolyzer Feed Conveyor
First Stage Water Cooler
Pyrolyzer pre-Heat Section
Pyrolyzer
PyrolyzerTwo Stage Cooling Section
Pyrolyzer Exit Conveyor
Briquette Dump Station
Finish Product Conveyor
Product Bagging Station
Inert Gas Condensor
Inert Gas Furnace
Off Gas Condensor
Flare
Off Gas Liquid Return
Pyrolyzer Exhaust Fan
Condensate Liquid Return

APPENDIX 3

EMISSION CALCULATIONS

EMISSION CALCULATIONS

Methodology from AP-42, Sections 13.2.3, (1/95)

$$EF=k(0.032)(U^{1.3}/5)/(M^{1.4}/2)$$

k=TSP=.74 From Section 13.2.4-3
k=PM_{10}=.35 From Section 13.2.4-3
U=Mean Wind Speed
U=6.0 for uncontrolled
U=0.05 for controlled
M=Material Moisture Content
M=7% for Coal/Coke
M=12% for Mixture
M=2% for Dry Briquettes
Total Production = 1,500 tons/year

TSP Uncontrolled - M=7%

EF_{TSP}= 0.006381181 lbs/ton

PM_{10} Uncontrolled - M=7%

$EF_{PM10=}$ 0.003018126 lbs/ton

TSP Uncontrolled - M=12%

EF_{TSP}= 0.003000437 lbs/ton

PM_{10} Uncontrolled - M=12%

EF_{PM10}= 0.001419126 lbs/ton

TSP Uncontrolled - M=2%

EF_{TSP}= 0.036863479 lbs/ton

PM_{10} Uncontrolled - M=2%

EF_{PM10}= 0.017435429 lbs/ton

TSP Controlled - M=7%

EF_{TSP}= 0.0000126 lbs/ton

PM_{10} Controlled - M=7%

$EF_{PM10=}$ 0.0000060 lbs/ton

TSP Controlled - M=12%

EF_{TSP}= 0.0000059 lbs/ton

PM_{10} Controlled - M=12%

EF_{PM10}= 0.0000028 lbs/ton

TSP Controlled - M=2%

EF_{TSP}= 0.0000731 lbs/ton

PM_{10} Controlled - M=2%

EF_{PM10}= 0.0000346 lbs/ton

COAL/COKE LOADING BIN

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=7%

E_{TSP} 0.0048 Tons/Year

E_{PM-10} 0.0023 Tons/Year

Controlled - M=7%

E_{TSP} 0.000009 Tons/Year

E_{PM-10} 0.000004 Tons/Year

COAL/COKE MIXER

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=12%

E_{TSP} 0.0023 Tons/Year

E_{PM-10} 0.0011 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

BAG HOUSE

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=12%

E_{TSP} 0.0023 Tons/Year

E_{PM-10} 0.0011 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

FEED SCREW CONVEYOR - ENCLOSED

E=Emission Factor(EF)xProduction/2000 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

BRIQUETTER

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=12%

E_{TSP} 0.0023 Tons/Year

E_{PM-10} 0.0011 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

LOAD CONVEYOR

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=12%

E_{TSP} 0.0023 Tons/Year

E_{PM-10} 0.0011 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

BRIQUETTE LOAD STATION

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=12%

E_{TSP} 0.0023 Tons/Year

E_{PM-10} 0.0011 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

OVEN FEED CONVEYOR

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=12%

E_{TSP} 0.0023 Tons/Year

E_{PM-10} 0.0011 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

OVENS AND COOLING STATION - ENCLOSED

E=Emission Factor(EF)xProduction/2000 Tons/Year

Controlled - M=12%

E_{TSP} 0.000004 Tons/Year

E_{PM-10} 0.000002 Tons/Year

COOLING STATION EXIT CONVEYOR

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=2%

E_{TSP} 0.0276 Tons/Year

E_{PM-10} 0.0131 Tons/Year

Controlled - M=2%

E_{TSP} 0.000055 Tons/Year

E_{PM-10} 0.000026 Tons/Year

BRIQUETTE DUMP STATION

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=2%

E_{TSP} 0.0276 Tons/Year

E_{PM-10} 0.0131 Tons/Year

Controlled - M=2%

E_{TSP} 0.000055 Tons/Year

E_{PM-10} 0.000026 Tons/Year

FINISH PRODUCT CONVEYOR

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=2%

E_{TSP} 0.0276 Tons/Year

E_{PM-10} 0.0131 Tons/Year

Controlled - M=2%

E_{TSP} 0.027648 Tons/Year

E_{PM-10} 0.013077 Tons/Year

PRODUCT BAGGING STATION

E=Emission Factor(EF)xProduction/2000 Tons/Year

Uncontrolled -M=2%

E_{TSP} 0.0276 Tons/Year

E_{PM-10} 0.0131 Tons/Year

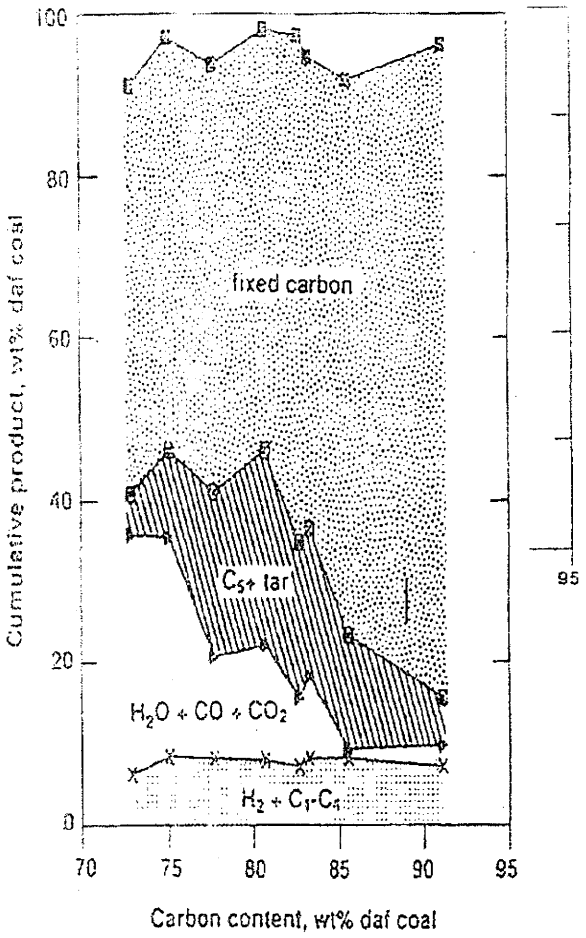
Controlled - M=2%

E_{TSP} 0.000055 Tons/Year

E_{PM-10} 0.000026 Tons/Year

Analysis of Sulfur Emissions for Pilot Facility
Mr. Craig Eatough - Combustion Resources

Approximate split between tars and gases



Smith et al 1994

Proximate analysis on briquettes shows that about 43% of the coal is lost during pyrolysis.

A high coal and low pet coke formulation would represent the highest gas evolution rate

Assume 80% coal, 13% pet coke, 7% tar

Carbon content for this mix is about 81% daf

From the chart on the left, this provides:
~8 wt% gases (hydrogen, methane) daf
~14 wt% water,CO,CO2 daf
~21 wt% tars and oils daf

The tars and oils are about: Noller, 1957
5% light oil (bp <200C)
17% middle oil (bp 200-250C)
7% heavy oil (bp 250-300C)
71% pitch (bp > 300C)

All condensibles are modeled as naphthalen (bp=218C)

Gas Composition (averaged test data)
24% H2
14% CH4
6% CO
2% CO2
53.42% H2O
0.32% H2S
0.06% CS2

Tar and oils are condensed and recycled within the process as a binder while the gases are flared
The gases represent 21% of the weight of the green briquettes and 1.56 tons of green briquettes will produce 1 ton of product

Sulfur emissions per ton of product

lbs H2S	2.1	lbs S	1.973308
lbs CS2	0.4	lbs S	0.331048

Assume all sulfur goes to SO2 in flare

moles SO2	0	0
lbs SO2	0	0

Therefore we expect to emit about 4.6 lbs sulfur as SO2 per ton of produced briquettes
Our anticipated production for 2008 is 1,500 tons briquettes
This production would emit 3.5 tons sulfur as SO2 for the year.

PAVED ROADS
Methodology from AP-42, Sections 13.2.1, (11/06)

$EF=k(sL/2)^{0.65}x(W/3)^{1.5}-C$ Eq. 1, AP-42, Section 13.2.1.3

k=Particle size multiplier - 0.016 lb/VMT PM_{10}
k=Particle size multiplier - 0.082 lb/VMT TSP
sL=Road surface silt loading - 2.4 g/m^2
C=Emission Factor for vehicle fleet exhaust, brake wear and tire wear - 0.00047 lb/VMT
W=Average weight (tons) of the vehicle traveling the road - 20 tons

EF_{PM10}=	0.31 lbs/VMT
EF_{TSP}=	1.60 lbs/VMT

Number of trips with raw material and finish product

Raw Material

1.56 ton of material will produce 1 ton of finish product

2,340 ton of raw material will brought in

20 tons per truck load of bagged material

117 Trucks

3 miles per truck round trip

351 miles