IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

1410 North Hilton
Boise, Idaho 83706-1253

RECEIPT

3/5/13
DATE

RECEIVED FROM Knife River

SOURCE
Cash ☐ Check ☒ Money Order ☐ No. 30015028

DESCRIPTION	AMOUNT OF PAYMENT
PTC	1000 00
New facility	
CMI Portable HMA Plant	

RECEIVED BY

TOTAL RECEIVED 1000 00

PID	OBS	CA	SUB-OBJ	WP	BE

NO 83435

KNIFE RIVER
AN MDU RESOURCES COMPANY
Southern Idaho Division
5450 W. Gowen Rd.
Boise, ID 83709

RECEIVED
MAR 05 2013
DEPARTMENT OF ENVIRONMENTAL QUALITY
STATE AQ PROGRAM

March 1, 2013

Air Quality Permit Compliance
Department of Environmental Quality
1410 North Hilton
Boise, ID 83706-1255

Subject: Knife River, Inc Portable HMA Plant
Air Quality Permit-to-Construct

Knife River, Inc. (Knife River) is requesting an air quality Permit-to-Construct (PTC) for a portable hot-mix asphalt (HMA) plant in the state of Idaho with operational flexibility to operate on electric-lined power or diesel generator power. In addition, Knife River is requesting the operational flexibility to use refined fuel oil (RFO), diesel, natural gas or propane as a fuel source for mixing asphalt.

An intitial kick-off meeting was held at the Idaho Department of Enviromental Quality (DEQ) state office on February 21, 2013. During that meeting, DEQ described the process involved in permitting a portable HMA plant to operate within the State of Idaho.

The HMA applicable information requested by DEQ includes: a process flow diagram, DEQ forms including the HMA plant spreadsheet provided by Darrin Pampaian (DEQ), stack information, grain loading calculation, EPA tanks results, manufactuer data, and a copy of the 2001 stack test.

Knife River is requesting DEQ to perform ambient air dispersion modeling for the proposed portable HMA plant based on the information provided for both electric-lined and diesel generator power to establish minimum setback distances (meters). Knife River is also requesting DEQ to establish setback distances when operating No 2 fuel oil (diesel), RFO, natural gas, and propane as a fuel source (see attachments).

Knife River has included an application fee of $1,000 with the submittal of this PTC application.

Sincerely,

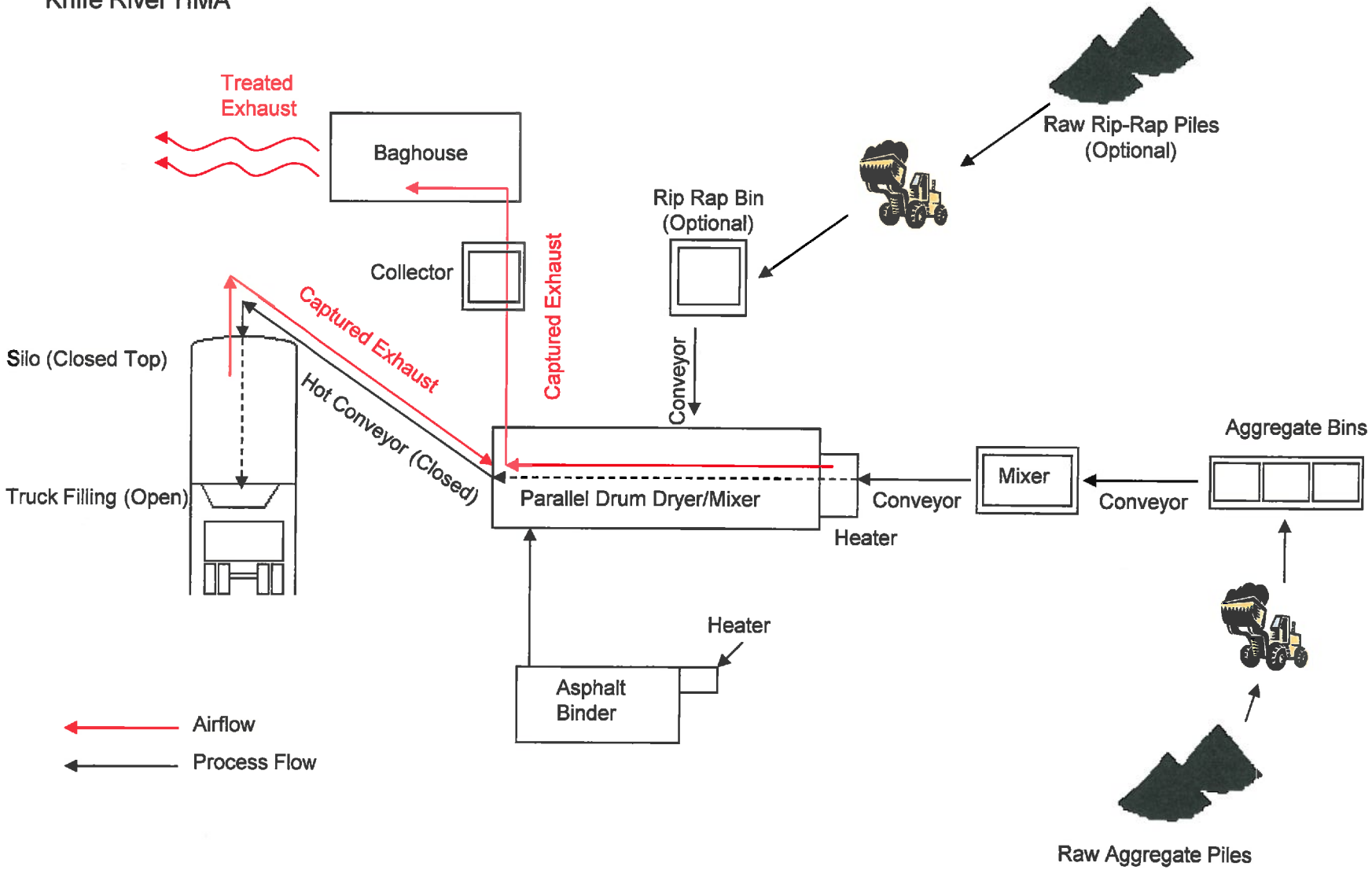
Josh Smith
Asphalt Manager, Knife River, Inc.

RECEIVED
MAR 05 2013
By

Attachments:

- Figure 1 – Process Flow Diagram for Parallel Flow with Closed Top Silo
- DEQ Forms including the HMA plant spreadsheet (no changes were made to formulas)
- Additional Calculations including stack information, grain loading, and EPA tanks
- Manufactuer Data
- 2001 Stack Test
- CD with digital copy of all attached information

Figure 1
Parallel Flow Drum Mix HMA with Closed Top Silo
Process Flow Diagram
Knife River HMA



DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Cover Sheet for Air Permit Application – Permit to Construct **Form CSPTC**

Please see instructions on page 2 before filling out the form.

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER

1. Company Name	Knife River, Inc.	
2. Facility Name	CMI Portable HMA Plant	3. Facility ID No.
4. Brief Project Description - One sentence or less	Construction of a new portable HMA plant to be located in Idaho	

PERMIT APPLICATION TYPE

5. ☒ New Source ☐ New Source at Existing Facility ☐ PTC for a Tier I Source Processed Pursuant to IDAPA 58.01.01.209.05.c
☐ Unpermitted Existing Source ☐ Facility Emissions Cap ☐ Modify Existing Source: Permit No.:____ Date Issued:____
☐ Required by Enforcement Action: Case No.:____

6. ☒ Minor PTC ☐ Major PTC

FORMS INCLUDED

Included	N/A	Forms		DEQ Verify
☒	☐	Form CSPTC – Cover Sheet		☐
☒	☐	Form GI – Facility Information		☐
☐	☒	Form EU0 – Emissions Units General		☐
☒	☐	Form EU1– Industrial Engine Information	Please specify number of EU1s attached: 2	☐
☐	☒	Form EU2– Nonmetallic Mineral Processing Plants	Please specify number of EU2s attached: ____	☐
☐	☒	Form EU3– Spray Paint Booth Information	Please specify number of EU3s attached: ____	☐
☐	☒	Form EU4– Cooling Tower Information	Please specify number of EU3s attached: ____	☐
☐	☒	Form EU5 – Boiler Information	Please specify number of EU4s attached: ____	☐
☐	☒	Form CBP– Concrete Batch Plant	Please specify number of CBPs attached: ____	☐
☒	☐	Form HMAP – Hot Mix Asphalt Plant	Please specify number of HMAPs attached: 1	☐
☐	☒	PERF – Portable Equipment Relocation Form		☐
☐	☒	Form AO – Afterburner/Oxidizer		☐
☐	☒	Form CA – Carbon Adsorber		☐
☐	☒	Form CYS – Cyclone Separator		☐
☐	☒	Form ESP – Electrostatic Precipitator		☐
☒	☐	Form BCE– Baghouses Control Equipment		☐
☐	☒	Form SCE– Scrubbers Control Equipment		☐
☐	☒	Form VSCE – Venturi Scrubber Control Equipment		☐
☐	☒	Form CAM – Compliance Assurance Monitoring		☐
☐	☒	Forms EI-CP1 - EI-CP4– Emissions Inventory– criteria pollutants	(Excel workbook, all 4 worksheets)	☐
☐	☒	PP – Plot Plan		☐
☐	☒	Forms MI1 – MI4 – Modeling (Performed by IDEQ)		☒
☒	☐	Form FRA – Federal Regulation Applicability		☐

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline: 1-877-5PERMIT

General Information **Form GI**
Revision 7
6/29/12

Please see instructions on back page before filling out the form. All information is required. If information is missing, the application will not be processed.

Identification

1. Facility name: Knife River

2. Existing facility identification number:

☒ **Check if new facility (not yet operating)**

3. Brief project description: Permitting a portable HMA plant

Facility Information

4. Primary facility permitting contact name: Josh Smith, Asphalt Manager
Contact type: Responsible official
Telephone number: 208-407-8918
E-mail: Josh.Smith@kniferiver.com

5. Alternate facility permitting contact name: Trevor Brown, Plant Operator
Alternate contact type: Responsible official
Telephone number: 509-690-0678
E-mail: Trevor.Brown@kniferiver.com

6. Mailing address where permit will be sent (street/city/county/state/zip code): 5450 West Gowen Road, Boise, Idaho 83709

7. Physical address of permitted facility (if different than mailing address) (street/city/county/state/zip code): NA, portable equipment

8. Is the equipment portable? ☒ **Yes*** ☐ **No** ***If yes, complete and attach PERF; see instructions.**

9. NAICS codes: **Primary NAICS**: 324121 **Secondary NAICS**: 333131

10. Brief business description and principal product produced: Hot mix asphalt production

11. Identify any adjacent or contiguous facility this company owns and/or operates: portable rock crusher

12. Specify type of application ☒ **Permit to construct (PTC); application fee of $1,000 required. See instructions.**

☐ **Tier I permit** ☐ **Tier II permit** ☒ **Tier II/Permit to construct**

For Tier I permitted facilities only: If you are applying for a PTC then you must also specify how the PTC will be incorporated into the Tier I permit.

☐ **Co-process Tier I modification and PTC** ☐ **Incorporate PTC at the time of Tier I renewal** ☐ **Administratively amend the Tier I permit to incorporate the PTC upon applicant's request (IDAPA 58.01.01.209.05.a, b, or c)**

Certification

In accordance with IDAPA 58.01.01.123 (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the document(s) are true, accurate, and complete.

13. Responsible official's name: Josh Smith **Official's title**: Asphalt Manager
Official's address: 5450 West Gowen Road, Boise, Idaho 83709
Telephone number: 208-407-8918 **E-mail**: Josh.Smith@kniferiver.com
Official's signature: Josh Smith **Date**: 2/26/13

☑ **14. Check here to indicate that you want to review the draft permit before final issuance.**

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Asphalt Plant - **Form HMAP**
Revision 10
2/11/13

Please see instructions on pages 3-4 before filling out the form.

IDENTIFICATION

1. Company Name	2. Facility Name:
Knife River, Inc	CMI Portable HMA Plant

3. Brief Project Description: Permitting a new portable HMA plant to be sited in Idaho

GENERAL INFORMATION

4. Proposed Location of the Asphalt Plant and other plant details:

☐ Not portable, will remain at one location. **Note:** Please include a specific location (location address, UTM coordinates, Section, Township, Range, etc.) and a plot plan of the proposed location on a separate sheet.
☒ Portable throughout the entire state of Idaho. Has this asphalt plant been previously permitted? ☐ Yes (provide details) ☒ No
Will the facility use electrical line power (no IC engines powering generators)? ☒ Yes (IC engines sections below may be skipped) ☐ No
Will the facility use IC engines to generate electricity? ☒ Yes (complete the IC engine sections below) ☐ No
Will the facility produce asphalt at the same time as when aggregate is being crushed at the facility? ☒ Yes (provide details) ☐ No

ASPHALT DRUM DRYER SPECIFICATIONS

5. Drum Dryer Manufacturer: Hauck 6. Model: SJO 4580 E 7. Date Manufactured: _____

8. Rated heat input capacity: 95.35676 MMBtu/hr 9. Maximum Asphalt Production: 325 T/hr 3500 T/day 150000 T/yr

10. Maximum percentage of Recycled Asphalt Product (RAP) to be used? 50 % **Note:** Up to 50% can be allowed.

11. Are emissions from filling of the asphalt storage silo routed back to the drum dryer? ☒ Yes ☐ No 12. Date of the most recent source test: 2001

13. Fuel(s) combusted in the drum dryer (check all that apply)? ☒ Distillate (#2) fuel oil ☒ Used oil/RFO4 oil ☒ Natural gas/LNG ☒ LPG/propane
If distillate fuel oil or used oil/RFO4 oil is used, what is the maximum sulfur content?
Distillate (#2) fuel oil: ☒ 15 ppm (0.0015% by weight) ☐ 500 ppm (0.05% by weight) ☐ Other – List the sulfur content _____ % by weight
Used oil/RFO4 oil: ☒ 1,000 ppm (0.1% by weight is the lowest available)
☐ Other – List the sulfur content of used oil/RFO4 oil 0.5 % by weight (if higher than 0.1% by weight, not to exceed 0.5% by weight)

14. Does the drum dryer have an emissions control device? ☒ Yes ☐ No
If "yes", what emissions control device is used? ☒ Baghouse (also complete Form **BCE**) ☐ Scrubber (also complete Form **SCE**)

15. Drum dryer exhaust stack parameters: Diameter SEE BCE inches Height _____ feet Temperature _____ °F Flow rate _____ acfm

ASPHATIC OIL TANK HEATER SPECIFICATIONS

16. Asphaltic Oil Tank Heater Manufacturer: Firelake 17. Model: 500 18. Rated heat input capacity: 0.5 MMBtu/hr

19. Is worst-case operation of the heater **greater than 8 hrs/day or 2,000 hrs/yr**? No ☐ Go to question 22 Yes ☒ Answer questions 20 and 21

20. If "Yes", what is the maximum daily operation: 12 hrs/day 21. If "Yes", what is the maximum annual operation: 4000 hrs/yr

22. Fuel combusted in the asphaltic oil tank heater? ☒ Distillate fuel ☒ Natural gas/LNG ☒ LPG/propane
If distillate fuel oil (#1, #2, or a mixture) is used, what is the maximum sulfur content? ☒ 15 ppm (0.0015% by weight) ☐ 500 ppm (0.05% by weight)

23. Tank heater exhaust stack parameters: Diameter 10 inches Height 8 feet Temperature 170 °F Flow rate 5800 acfm

PRIMARY IC ENGINE (≥600 bhp) SPECIFICATIONS

24. IC Engine Manufacturer: Cat 25. Model: C32 (or equivalent) 26. Date Manufactured: 2013 27. Model year: 2013

28. Maximum rated horsepower (per the data plate): 1220 bhp 29. EPA Certification: Tier rating number II or ☐ None

30. Maximum daily operation: 14 hrs/day 31. Maximum annual operation: 2500 hrs/yr **Note:** These operational limits will be placed in the permit.

32. Fuel combusted in the IC engine? ☒ Distillate fuel oil ☐ Natural gas/LNG ☒ LPG/propane
If distillate fuel oil (#1, #2, or a mixture) is used, what is the maximum sulfur content? ☒ 15 ppm (0.0015% by weight) ☐ 500 ppm (0.05% by weight)

33. IC engine exhaust stack parameters: Diameter 8 inches Height 7.5 feet Temperature 859.1 °F Flow rate 22053 acfm

Questions 34 through 39 apply to non-Tier certified IC engines or Tier certified IC engines manufactured prior to July 11, 2005. If you are proposing a Tier certified IC engine manufactured on and after July 11, 2005 do not answer questions 34 through 39.

34. Will CO emissions be limited to a specific ppmvd (i.e. 49 or 23)? ☐ Yes ☐ No 35. Will CO emissions be reduced by 70% or more? ☐ Yes ☐ No

36. Will a CEMS (Continuous Emissions Monitoring System) be used to measure pollutants in the IC engine exhaust stream? ☐ Yes ☐ No

37. Will a CPMS (Continuous Parameters Monitoring System) be used to measure parameters of the IC engine exhaust stream? ☐ Yes ☐ No

SECONDARY IC ENGINE (<600 bhp) SPECIFICATIONS

40. IC Engine Manufacturer: Cat 41. Model: C6.6 (or equivalent) 42. Date Manufactured: 2013 43. Model year: 2013

44. Maximum rated horsepower (per the data plate): 181 bhp 45. EPA Certification: Tier rating number III or ☐ None

46. Maximum daily operation: 16 hrs/day 47. Maximum annual operation: 5000 hrs/yr **Note:** These operational limits will be placed in the permit.

48. Fuel combusted in the IC engine? ☒ Distillate fuel oil ☐ Natural gas/LNG ☒ LPG/propane
If distillate fuel oil (#1, #2, or a mixture) is used, what is the maximum sulfur content? ☒ 15 ppm (0.0015% by weight) ☐ 500 ppm (0.05% by weight)

49. IC engine exhaust stack parameters: Diameter 4 inches Height 5 feet Temperature 1130 °F Flow rate 1077 acfm

Questions 50 through 55 apply to non-Tier certified IC engines rated at > 300 bhp or Tier certified IC engines rated at > 300 bhp and manufactured prior to July 11, 2005. If you are proposing a non-Tier certified IC engine rated at ≤ 300 bhp or a Tier certified IC engine rated at ≤ 300 bhp and manufactured on and after July 11, 2005 do not answer questions 50 through 55.

50. Will CO emissions be limited to a specific ppmvd (i.e. 49 or 23)? ☐ Yes ☐ No 51. Will CO emissions be reduced by 70% or more? ☐ Yes ☐ No

52. Will a CEMS (Continuous Emissions Monitoring System) be used to measure pollutants in the IC engine exhaust stream? ☐ Yes ☐ No

53. Will a CPMS (Continuous Parameters Monitoring System) be used to measure parameters of the IC engine exhaust stream? ☐ Yes ☐ No

54. Will the IC engine be equipped with an oxidation catalyst? ☐ Yes ☐ No

55. Will the oxidation catalyst be equipped with a temperature measurement system to ensure it is operating properly? ☐ Yes ☐ No

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Baghouse Control Equipment - **Form BCE**
Revision 5
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION		
1. Company Name: Knife River, Inc.	2. Facility Name: CMI Portable HMA Plant	3. Facility ID No.:
4. Brief Project Description: Construction of new portable HMA plant to be located in Idaho		

EMISSION UNIT ID				BAGHOUSE			BAGS			
5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
Emission Unit	EU ID No.	CE ID No.	Stack ID No.	Baghouse Manufacturer	Baghouse Model No.	Type	Type	Size (Dia x Ht)	No. of Bags	Air to Cloth
Baghouse	BAGHOUSE			CMI	APM 810		12085 ft2 cloth			5.96:1

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Units - Industrial Engine Information **Form EU1**

Revision 7
1/27/09

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Knife River, Inc.	CMI Portable HMA Plant	

4 Brief Project Description: new portable HMA plant to be located in Idaho

ENGINE (EMISSION UNIT) DESCRIPTION AND SPECIFICATIONS

5. Type of Unit: ☒ New Unit ☐ Unpermitted Existing Unit ☐ Modification to a Unit with Permit #: Date Issued:

6. Engine Displacement:	1.1 liter (liters per cylinder)	7. Ignition Type: ☒ Compression ☐ Spark	
8. Use	☐ Emergency ☒ Non-Emergency		
9. Engine ID Number: 135 kW Generator Engine (or equivalent)	10. Rated Power: ☐ 181 Brake Horsepower (bhp) ☐ Kilowatts(kW)		
11. Construction Date: 2013	12. Manufacturer: Caterpillar	13. Model: c6.6 (or equivalent)	14. Model Year: 2013
15. Date of Modification (if applicable):	16. Serial Number (if available):	17. Control Device (if any):	

FUEL DESCRIPTION AND SPECIFICATIONS

18. Fuel Type	☒ Diesel Fuel (#) (gal/hr)	☐ Gasoline Fuel (gal/hr)	☐ Natural Gas (cf/hr)	☒ Other Fuels (unit:)
19. Full Load Consumption Rate	9.1			
20. Actual Consumption Rate				
21. Sulfur Content wt%	0.0015	N/A	N/A	

OPERATING LIMITS & SCHEDULE

22. Imposed Operating Limits (hours/year, or gallons fuel/year, etc.):

16 hours per day

23. Operating Schedule (hours/day, months/year, etc.):

7 days a week

24. Tier 1, Tier 2 and Tier 3 Exhaust Emission Compliance Statement.

Engines subject to 40 CFR 89 are subject to the emissions standards pursuant to 40 CFR 89.112(a). If this engine(s) is subject to Part 89, provide as part of this application the engine manufacturer's EPA Tier 1, 2, or 3 Exhaust Emission Compliance Statement.

Check the box to the right if this engine(s) is not subject to Part 89. ☐

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Units - Industrial Engine Information **Form EU1**

Revision 7
1/27/09

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Knife River, Inc.	CMI Portable HMA Plant	

4 Brief Project Description: new portable HMA plant to be located in Idaho

ENGINE (EMISSION UNIT) DESCRIPTION AND SPECIFICATIONS

5. Type of Unit: ☒ New Unit ☐ Unpermitted Existing Unit ☐ Modification to a Unit with Permit #: Date Issued:

6. Engine Displacement:	2.68 (liters per cylinder)	7. Ignition Type:	☒ Compression ☐ Spark

8. Use ☐ Emergency ☒ Non-Emergency

9. Engine ID Number:	10. Rated Power:		
910 kW Generator Engine (or equivalent)	☒ 1220 Brake Horsepower (bhp)	☒ Kilowatts(kW)	
11. Construction Date:	12. Manufacturer:	13. Model:	14. Model Year:
2013	Caterpillar	C32 (or equivalent)	2013
15. Date of Modification (if applicable):	16. Serial Number (if available):	17. Control Device (if any):	
		Diesel oxidation catalyst muffler (DOC)	

FUEL DESCRIPTION AND SPECIFICATIONS

18. Fuel Type	☒ Diesel Fuel (#) (gal/hr)	☐ Gasoline Fuel (gal/hr)	☐ Natural Gas (cf/hr)	☒ Other Fuels (unit:)
19. Full Load Consumption Rate	65.7			
20. Actual Consumption Rate	52 (75% load)			
21. Sulfur Content wt%	0.0015	N/A	N/A	Propane

OPERATING LIMITS & SCHEDULE

22. Imposed Operating Limits (hours/year, or gallons fuel/year, etc.):

14 hours per day

23. Operating Schedule (hours/day, months/year, etc.):

7 days a week

24. Tier 1, Tier 2 and Tier 3 Exhaust Emission Compliance Statement.

Engines subject to 40 CFR 89 are subject to the emissions standards pursuant to 40 CFR 89.112(a). If this engine(s) is subject to Part 89, provide as part of this application the engine manufacturer's EPA Tier 1, 2, or 3 Exhaust Emission Compliance Statement.

Check the box to the right if this engine(s) is not subject to Part 89. ☐

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

AIR PERMIT APPLICATION

Revision 6
10/7/09

For each box in the table below, CTRL+click on the blue underlined text for instructions and information.

IDENTIFICATION	
1. Company Name: Knife River, Inc.	2. Facility Name: CMI Portable HMA Plant
3. Brief Project Description: Construction of a new portable HMA plant to be located in Idaho	

APPLICABILITY DETERMINATION	
4. List applicable subparts of the New Source Performance Standards (NSPS) (40 CFR part 60). Examples of NSPS affected emissions units include internal combustion engines, boilers, turbines, etc. The applicant must thoroughly review the list of affected emissions units.	List of applicable subpart(s): Subpart I and Subpart IIII – Note, as discussed in the kickoff meeting with DEQ (2/21/13), the 2001 source test will be satisfy Subpart I. Knife River will need to perform source testing to satisfy Subpart IIII ☐ Not Applicable
5. List applicable subpart(s) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) found in 40 CFR part 61 and 40 CFR part 63. Examples of affected emission units include solvent cleaning operations, industrial cooling towers, paint stripping and miscellaneous surface coating. EPA has a web page dedicated to NESHAP that should be useful to applicants.	List of applicable subpart(s): ☑ Not Applicable
6. For each subpart identified above, conduct a complete a regulatory analysis using the instructions and referencing the example provided on the following pages. **Note** - Regulatory reviews must be submitted with sufficient detail so that DEQ can verify applicability and document in legal terms why the regulation applies. Regulatory reviews that are submitted with insufficient detail will be determined incomplete.	☑ A detailed regulatory review is provided (Follow instructions and example). ☐ DEQ has already been provided a detailed regulatory review. Give a reference to the document including the date.

CMI HMA Stack Parameters

Point Sources	Type of Stack	Stack Height (ft)	Stack Height (m)	Stack Diameter (ft)	Stack Diameter (m)	Stack Flow (scfm)	Stack Flow (acfm)	Stack Temp (°f)	Stack Temp (k)	Stack Orientation	Comments
Drum Dryer w/ baghouse	Point	18	5.49	39.25" x 52"		72000	116208	290	416	vertical	4/20/01 Stack test
Burner SJ520 equivalent	Point						53000	350	450	vertical	emissions go through baghouse
30,000 gal asphalt tank #1	Point	16	4.88	0.25						vertical	Use EPA tanks (12' x 36')
Aphalt tank heater	Point	8	2.44	0.67			5800	170	350	vertical	
12,000 gal RFO storage tank	Point	9.5	2.90	0.25						vertical	Use EPA tanks (11' x 16')
910 kW Generator	Point	7.5	2.29	0.67			7490	859.1	733	vertical	
125 kW Generator	Point	5	1.52	0.33			1077	1130	883	vertical	

Notes:
Converting from SCFM to ACFM see attached spreadsheet

Point Sources	Type of Stack	Stack Height (ft)	Stack Height (m)	Emission Area (ft)	Emission Area (m)	Stack Flow (scfm)	Stack Flow (acfm)	Stack Temp (°f)	Stack Temp (k)	Stack Orientation	Comments
Aggregate Transfer to bin	Area	1' (est)	0.30	10' x 72'		NA	NA	77	298	vertical	Bin Loading
Bins to conveyor	Area	1' (est)	0.30	2' x 5'		NA	NA	77	298	vertical	Transfer #1 (estimated drop height based on scaled diagrams and pictures of fully assembled HMA plant)
Conveyor to Screen	Area	2' (est)	0.61	2.5 x 30'		NA	NA	77	298	vertical	Transfer #2 (estimated drop height based on scaled diagrams and pictures of fully assembled HMA plant)
Screen to Conveyor	Area	1' (est)	0.30	5' x 12'		NA	NA	77	298	vertical	Transfer #3 (estimated drop height based on scaled diagrams and pictures of fully assembled HMA plant)
Conveyor to drum	Area	1' (est)	0.30	2.5 x 70'		NA	NA	77	298	vertical	Transfer #4 (estimated drop height based on scaled diagrams and pictures of fully assembled HMA plant)
Silo to truck	Area	12	3.66			NA	NA	290	416	vertical	temperature of asphalt

Converting SCFM to ACFM

$ACFM = SCFM * (P_{std} / P_{act}) * (T_{act} / T_{std})$

Where

ACFM = Actual cubic feet per minute
SCFM = Standard cubic feet per minute
Pstd = Standard absolute air pressure (psia)
Pact = Absolute pressure at the actual level (psia)
Tact = Actual ambient air temperature (°R)
Tstd = Standard temperature (°R)

Drum Dryer Baghouse

SCFM =	72000.00	Maximum Flow		
Pstd =	14.7	psia		
Pact =	12.89	psia (3,600 ft elevation)		
Tact =	300	°F (exhaust)	760	°R
Tstd =	77	°F	537	°R

Drum Dryer ACFM = 116208

Annual Turnovers:	6.3
Turnover Factor:	1
Tank Diameter (ft):	11.92
Working Loss Product Factor:	1
Total Losses (lb):	1.8135

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

Emissions Report for: Annual

30,000 gallon diesel - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1.81	0	1.81

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

Identification

User Identification:	12,000 gallon RFO
City:	
State:	Idaho
Company:	
Type of Tank:	Horizontal Tank
Description:	12,000 gallon RFO tank Knife River

Tank Dimensions

Shell Length (ft):	16
Diameter (ft):	11.33
Volume (gallons):	12,000.00
Turnovers:	15.5
Net Throughput(gal/yr):	186,000.00
Is Tank Heated (y/n):	Y
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0
Pressure Settings (psig)	0

Meterological Data used in Emissions Calculations: Spokane, Washington (Avg Atmospheric Pressure = 13.51 psia)

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

12,000 gallon RFO - Horizontal Tank

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)
Residual oil no. 6	All	0	0	0	0

Vapor Pressure (psia)			Vapor Mol.	Liquid Mass	Vapor Mass		
Avg.	Min.	Max.	Weight.	Fract.	Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
0	0	0	190			387	Option 1: VP-42 .00002

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

12,000 gallon RFO - Horizontal Tank

Annual Emission Calcaulations

Standing Losses (lb): 0

Vapor Space Volume (cu ft):	1,028.08
Vapor Density (lb/cu ft):	0
Vapor Space Expansion Factor:	0
Vented Vapor Saturation Factor:	1

Tank Vapor Space Volume:

Vapor Space Volume (cu ft):	1,028.08
Tank Diameter (ft):	11.3333
Effective Diameter (ft):	15.1986
Vapor Space Outage (ft):	5.6667
Tank Shell Length (ft):	16

Vapor Density

Vapor Density (lb/cu ft):	0
Vapor Molecular Weight (lb/lb-mole):	190
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0
Daily Avg. Liquid Surface Temp. (deg. R):	459.67
Daily Average Ambient Temp. (deg. F):	47.2292
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	459.67
Tank Paint Solar Absorptance (Shell):	0.17
Daily Total Solar Insulation Factor (Btu/sqft day):	1,216.52

Vapor Space Expansion Factor

Vapor Space Expansion Factor:	0
Daily Vapor Temperature Range (deg. R):	0
Daily Vapor Pressure Range (psia):	0
Breather Vent Press. Setting Range(psia):	0
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0
Daily Avg. Liquid Surface Temp. (deg R):	459.67
Daily Min. Liquid Surface Temp. (deg R):	459.67
Daily Max. Liquid Surface Temp. (deg R):	459.67
Daily Ambient Temp. Range (deg. R):	20.6083

Vented Vapor Saturation Factor

Vented Vapor Saturation Factor:	1
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	0
Vapor Space Outage (ft):	5.6667

Working Losses (lb):	0.0168
Vapor Molecular Weight (lb/lb-mole):	190
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0
Annual Net Throughput (gal/yr.):	186,000.00
Annual Turnovers:	15.5
Turnover Factor:	1
Tank Diameter (ft):	11.3333
Working Loss Product Factor:	1

Total Losses (lb):	0.0168

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

Emissions Report for: Annual

12,000 gallon RFO - Horizontal Tank

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Residual oil no. 6	0.02	0	0.02

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

Identification

User Identification:	30,000 gallon diesel
City:	
State:	Idaho
Company:	
Type of Tank:	Horizontal Tank
Description:	30,000 gallon diesel for Knife River

Tank Dimensions

Shell Length (ft):		36
Diameter (ft):		11.92
Volume (gallons):		30,000.00
Turnovers:		6.3
Net Throughput(gal/yr):		189,000.00
Is Tank Heated (y/n):	Y	
Is Tank Underground (y/n):	N	

Paint Characteristics

Shell Color/Shade:	Gray/Light
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	0
Pressure Settings (psig)	0

Meterological Data used in Emissions Calculations: Spokane, Washington (Avg Atmospheric Pressure = 13.51 psia)

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

30,000 gallon diesel - Horizontal Tank

		Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)
Mixture/Component	Month	Avg.	Min.	Max.	
Distillate fuel oil no. 2	All	0	0	0	0

Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Avg.	Min.	Max.					
0.0031	0.0031	0.0031	130			188	Option 1: API 42 .0031

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

30,000 gallon diesel - Horizontal Tank

Annual Emission Calcaulations	
Standing Losses (lb):	0
Vapor Space Volume (cu ft):	2,558.85
Vapor Density (lb/cu ft):	0.0001
Vapor Space Expansion Factor:	0
Vented Vapor Saturation Factor:	0.999
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	2,558.85
Tank Diameter (ft):	11.92
Effective Diameter (ft):	23.3805
Vapor Space Outage (ft):	5.96
Tank Shell Length (ft):	36
Vapor Density	
Vapor Density (lb/cu ft):	0.0001
Vapor Molecular Weight (lb/lb-mole):	130
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0031
Daily Avg. Liquid Surface Temp. (deg. R):	459.67
Daily Average Ambient Temp. (deg. F):	47.2292
Ideal Gas Constant R	
(psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	459.67
Tank Paint Solar Absorptance (Shell):	0.54
Daily Total Solar Insulation	
Factor (Btu/sqft day):	1,216.52
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0
Daily Vapor Temperature Range (deg. R):	0
Daily Vapor Pressure Range (psia):	0
Breather Vent Press. Setting Range(psia):	0
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0031
Vapor Pressure at Daily Minimum Liquid	
Surface Temperature (psia):	0.0031
Vapor Pressure at Daily Maximum Liquid	
Surface Temperature (psia):	0.0031
Daily Avg. Liquid Surface Temp. (deg R):	459.67
Daily Min. Liquid Surface Temp. (deg R):	459.67
Daily Max. Liquid Surface Temp. (deg R):	459.67
Daily Ambient Temp. Range (deg. R):	20.6083
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.999
Vapor Pressure at Daily Average Liquid:	
Surface Temperature (psia):	0.0031
Vapor Space Outage (ft):	5.96
Working Losses (lb):	1.8135
Vapor Molecular Weight (lb/lb-mole):	130
Vapor Pressure at Daily Average Liquid	
Surface Temperature (psia):	0.0031
Annual Net Throughput (gal/yr.):	189,000.00

PM Standard Calculation

Compliance with 40 CFR 60 Subpart I
Standard for Fuel Burning Equipment

Unit	HMA Dryer
Fuel	Diesel
Throughput (ton/hr)	325
Rated Heat Input (MM Btu/hr)	95.36
PM Emission Rate (lb/hr)[1]	9.0
Exit/Flue Gas Flowrate Calculation	
Exit flowrate @ 12.3% O_2: (dscfm)[2]	26,200
Calculated Grain Loading (gr/dscf)[3]	0.040
40 CFR 60 Subpart I -NSPA for HMA	0.040
Compliance w/ PM Loading Standard	Yes

Notes:

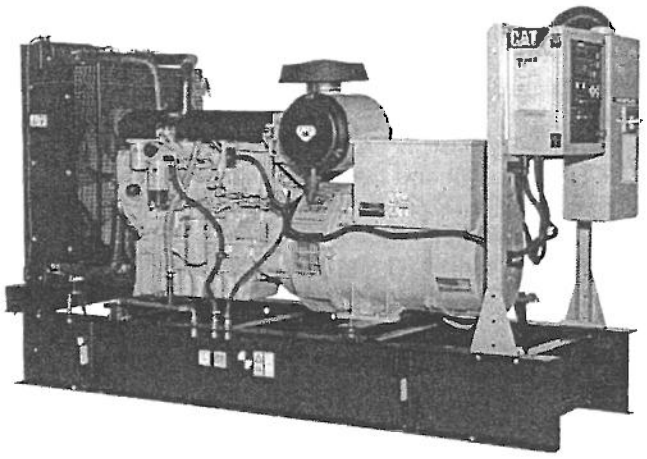
[1] PM emission rate - based on performance test dated 4/20/01, performed by OMNI in Troutdale, OR

[2] dscfm - performance test dated 4/20/01 & 9/18/08, performed by OMNI in Troutdale, OR

[3] (Flow (dscfm) x (7,000 gr/lb) x (PM lb/hr) x (60 min/ hr) = gr/dscf

DIESEL GENERATOR SET

CATERPILLAR®



Picture shown may not reflect actual package

STANDBY 125-150 kW
PRIME 114-135 kW
60 Hz

Model	Standby kW (kVA)	Prime kW (kVA)
D125-6	125 (156.3)	114 (142.5)
D150-8	150 (187.5)	135 (168.8)

Tier 3 EPA Approved, Emissions Certified

FEATURES

GENERATOR SET
- Complete system designed and built at ISO 9001 certified facilities
- Factory tested to design specifications at full load conditions

ENGINE
- Governor, electronic
- Electrical system, 12 VDC
- Cartridge type filters
- Battery rack and cables
- Coolant and lube drains piped to edge of base

GENERATOR
- Insulation system, class H
- Drip proof generator air intake (NEMA 2, IP23)
- Electrical design in accordance with BS5000 Part 99, EN61000-6, IEC60034-1, NEMA MG-1.33

CONTROL SYSTEM
- EMCP 3.1 digital control panel
- Vibration isolated NEMA 1 enclosure with lockable hinged door
- DC and AC wiring harnesses

MOUNTING ARRANGEMENT
- Heavy-duty fabricated steel base with lifting points
- Anti-vibration pads to ensure vibration isolation
- Complete OSHA guarding
- Stub-up pipe ready for connection to silencer pipework
- Flexible fuel lines to base with NPT connections

COOLING SYSTEM
- Radiator and cooling fan complete with protective guards
- Standard ambient temperatures up to 50° C (122° F)

CIRCUIT BREAKER
- UL/CSA listed
- 3-pole with solid neutral
- NEMA 1 steel enclosure, vibration isolated
- Electrical stub-up area directly below circuit breaker

AUTOMATIC VOLTAGE REGULATOR
- Voltage within ± 0.5% 3-phase at steady state from no load to full load
- Provides fast recovery from transient load changes

EQUIPMENT FINISH
- All electroplated hardware
- Anticorrosive paint protection
- High gloss polyurethane paint for durability and scuff resistance

QUALITY STANDARDS
- BS4999, BS5000, BS5514, EN61000-6, IEC60034, NEMA MG-1.33, NFPA 110 (with optional equipment)

DOCUMENTATION
- Operation and maintenance manuals provided
- Wiring diagrams included

WARRANTY
- All equipment carries full manufacturer's warranty.

OPTIONAL EQUIPMENT*

ENCLOSURE
- B Series weather protective enclosure (includes internal silencer system)
- Sound attenuated enclosure (includes internal silencer system)
  - Single point lift
  - Panel viewing window
  - External emergency stop pushbutton

SILENCER SYSTEM – OPEN UNIT
- Level 1 silencer
- Level 2 silencer
- Level 3 silencer
- Mounting kit
- Through-wall installation kits

ENGINE
- Battery heater
- Lube oil drain pump
- High lube oil temperature shutdown
- Lube oil sump heater

CIRCUIT BREAKER
- Auxiliary voltfree contacts
- Shunt trip

GENERATOR
- Anti-condensation heater
- Permanent magnet generator
- AREP excitation system
- Generator upgrade 1 size

CONTROL SYSTEM
- No control system
- EMCP 3.2 digital control panel

MOUNTING ACCESSORIES
- Seismic (Zone 4) vibration isolators

FUEL SYSTEM
- UL listed closed top-diked skid-mounted fuel tank base (12/24-hour capacity) with fuel alarm (low level/leak detected)
- Critical high fuel alarm
- Critical low fuel level shutdown

COOLING SYSTEM
- Coolant heater
- Low coolant temperature alarm
- Low coolant level shutdown
- Radiator transition flange

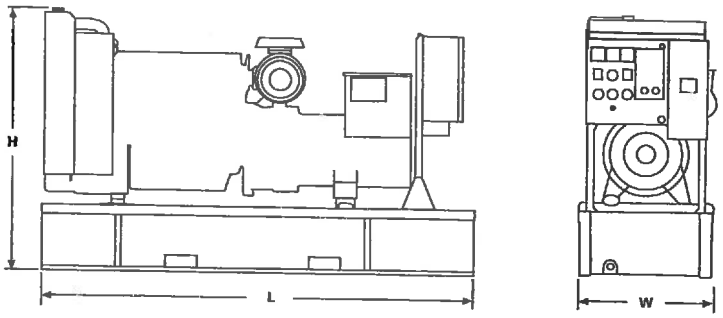
REMOTE ANNUNCIATORS
- 16-channel remote annunciator panel (supplied loose)

MISCELLANEOUS ACCESSORIES
- Toolkit
- Additional operator's manual pack
- Special enclosure color
- UL listing
- CSA certification
- French or Spanish language labels

EXTENDED SERVICE CONTRACTS
- Extended Service Coverage available

* Some options may not be available on all models. Not all options are listed.

GENERATOR SET DIMENSIONS AND WEIGHTS



Model	Length mm (in)	Width mm (in)	Height mm (in)	Weight kg (lb)*
D125-6	2780 (109.4)	900 (35.4)	1543 (60.7)	1347 (2,970)
D150-8	2780 (109.4)	900 (35.4)	1543 (60.7)	1407 (3,102)

NOTE: General configuration not to be used for installation. See specific dimensional drawings for detail.

*Includes oil and coolant

SPECIFICATIONS

GENERATOR

Voltage regulation ..... ± 0.5% 3-phase at steady state from no load to full load
Frequency..... ± 0.25% for constant load, no load to full load
Waveform distortion ..... THD < 4%, at no load
Radio interference ..... Compliance with EN61000-6
Telephone interference..... TIF < 50, THF < 2%
Overspeed limit ..... 2250 rpm
Insulation..... Class H
Temperature rise ..... Within Class H limits
Available voltages 277/480, 266/460, 120/240, 127/220, 120/208, 347/600
Deration ..... Consult factory for available outputs
Ratings ..... At 30° C (86° F), 152.4 m (500 ft), 60% humidity, 0.8 pf

ENGINE

Manufacturer..... Caterpillar
Type 4-cycle
Bore – mm (in) 105.0 (4.13)
Stroke – mm (in)..... 127.0 (5.00)
Governor Type..... Electronic
Class..... G2
Piston speed – m/sec (ft/sec)..... 7.62 (25.0)
Engine speed – rpm 1800
Air cleaner type ..... Dry, replaceable paper element type with restriction indicator

D125-6 – C6.6 ACERT

Aspiration ..... ATAAC
Cylinder configuration..... In-line 6
Displacement – L (cu in)..... 6.6 (404)
Compression ratio 16.3:1
Max power at rated rpm – kW (hp)
  Standby..... 161.6 (217)
  Prime 144.6 (194)
BMEP – kPa (psi)
  Standby 1633 (237)
  Prime..... 1461 (212)
Regenerative power – kW (hp)..... 14.9 (20)

D150-8 – C6.6 ACERT

Aspiration ..... ATAAC
Cylinder configuration..... In-line 6
Displacement – L (cu in)..... 6.6 (404)
Compression ratio 16.3:1
Max power at rated rpm – kW (hp)
  Standby..... 171.3 (230)
  Prime 154.4 (207)
BMEP – kPa (psi)
  Standby 1731 (251)
  Prime..... 1560 (226)
Regenerative power – kW (hp)..... 14.9 (20)

CONTROL PANEL

- Heavy duty sheet steel enclosure with lockable hinged door
- Vibration isolated from generating set
- LCD display
- AC metering
- DC metering
- Fail to start shutdown
- Low oil pressure shutdown
- High engine temperature
- Low/high battery voltage
- Underspeed/overspeed
- Loss of engine speed detection
- 2 spare fault channels
- 20 event fault log
- 2 LED status indicators
- Lockdown emergency stop push button

RATING DEFINITIONS AND CONDITIONS

Standby – Applicable for supplying continuous electrical power (at variable load) in the event of a utility power failure. No overload is permitted on these ratings. The generator is peak rated (as defined in ISO8528-3).

Prime – Applicable for supplying continuous electrical power (at variable load) in lieu of commercially purchased power. There is no limitation to the annual hours of operation and the generator set can supply 10 percent overload power for 1 hour in 12 hours.

D125-6 (3-Phase)

Materials and specifications are subject to change without notice.

Generator Set Technical Data – 1800 rpm/60 Hz			Standby		Prime	
Power Rating	kW	kVA	125	156.3	114	142.5
Lubricating System						
Type: full pressure						
Oil filter: spin-on, full flow						
Oil cooler: watercooled						
Oil type required: API CH4/CI4						
Total oil capacity	L	U.S. gal	16.5	4.4	16.5	4.4
Oil pan	L	U.S. gal	15.5	4.1	15.5	4.1
Fuel System						
Generator set fuel consumption						
100% load	L/hr	gal/hr	40.6	10.7	36.0	9.5
75% load	L/hr	gal/hr	31.6	8.3	30.0	7.9
50% load	L/hr	gal/hr	24.5	6.5	23.2	6.1
Engine Electrical System						
Voltage/ground: 12/negative						
Battery charging generator ampere rating	amps		100		100	
Cooling System						
Water pump type: centrifugal						
Radiator system capacity incl. engine	L	U.S. gal	21.0	5.5	21.0	5.5
Maximum coolant static head	m H_2O	ft H_2O	8.0	26.0	8.0	26.0
Coolant flow rate	L/hr	U.S. gal/hr	10 200	2,693	10 200	2,693
Minimum temperature to engine	°C	°F	85	185	85	185
Temperature rise across engine	°C	°F	7.9	14.2	7.9	14.2
Heat rejected to coolant at rated power	kW	Btu/min	74.9	4,262	69.8	3,971
Total heat radiated to room at rated power	kW	Btu/min	13.0	740	12.1	688
Radiator fan load	kW	hp	8.0	10.7	8.0	10.7
Air Requirements						
Combustion air flow	m^3/min	cfm	12.6	445	12.3	434
Maximum air cleaner restriction	kPa	in H_2O	5	20	5	20
Radiator cooling air (zero restriction)	m^3/min	cfm	327	11,548	327	11,548
Generator cooling air	m^3/min	cfm	26.4	923	26.4	923
Allowable air flow restriction (after radiator)	kPa	in H_2O	0.12	0.50	0.12	0.50
Cooling air flow (@ rated speed)						
Rate with restriction	m^3/min	cfm	317	11,195	317	11,195
Exhaust System						
Maximum allowable backpressure	kPa	in Hg	15	4.4	15	4.4
Exhaust flow at rated kW	m^3/min	cfm	29.7	1,049	28.6	1,010
Exhaust temperature at rated kW –						
Dry exhaust	°C	°F	437	819	427	801
Generator Set Noise Rating*						
(without attenuation) at 1 m (3 ft)	dB(A)		97		97	

Generator Technical Data		277/480V	266/460V	127/220V	120/240V 120/208V	347/600V
Motor Starting Capability (30% voltage dip)	(kVA)					
	Self excited	360	335	311	283	N/A
	PM excited**	469	437	406	370	437
	AREP excited	469	437	406	370	437
Full Load Efficiencies:	Standby	92.7	92.6	92.5	92.3	92.6
	Prime	92.8	92.8	92.7	92.5	92.8
Reactances (per unit):	X_d	2.74	2.99	3.27	3.65	2.99
	X'_d	0.10	0.10	0.11	0.13	0.10
Reactances shown are applicable to the standby rating.	X''_d	0.057	0.062	0.068	0.076	0.062
	X_q	1.65	1.79	1.96	2.19	1.79
	X''_q	0.068	0.074	0.080	0.090	0.074
	X_2	0.063	0.068	0.075	0.083	0.068
	X_0	0.004	0.005	0.005	0.006	0.005
Time Constants:		t'_d 100 ms	t''_d 10 ms	t'_{do} 2865 ms		t_a 15 ms

* dB(A) levels are for guidance only
** With PMG Excited Option AVR12

D150-8 (3-Phase)

Materials and specifications are subject to change without notice.

Generator Set Technical Data – 1800 rpm/60 Hz			Standby		Prime	
Power Rating	kW	kVA	150	187.5	135	168.8
Lubricating System						
Type: full pressure						
Oil filter: spin-on, full flow						
Oil cooler: watercooled						
Oil type required: API CH4/CI4						
Total oil capacity	L	U.S. gal	16.5	4.4	16.5	4.4
Oil pan	L	U.S. gal	15.5	4.1	15.5	4.1
Fuel System						
Generator set fuel consumption						
100% load	L/hr	gal/hr	44.7	11.8	41.5	11.0
75% load	L/hr	gal/hr	36.8	9.7	34.3	9.1
50% load	L/hr	gal/hr	28.4	7.5	26.6	7.0
Engine Electrical System						
Voltage/ground: 12/negative						
Battery charging generator ampere rating	amps		100		100	
Cooling System						
Water pump type: centrifugal						
Radiator system capacity incl. engine	L	U.S. gal	21.0	5.5	21.0	5.5
Maximum coolant static head	m H_2O	ft H_2O	8.0	26.0	8.0	26.0
Coolant flow rate	L/hr	U.S. gal/hr	10 200	2,693	10 200	2,693
Minimum temperature to engine	°C	°F	85	185	85	185
Temperature rise across engine	°C	°F	7.9	14.2	7.9	14.2
Heat rejected to coolant at rated power	kW	Btu/min	78.4	4,461	73.5	4,182
Total heat radiated to room at rated power	kW	Btu/min	13.6	774	12.7	723
Radiator fan load	kW	hp	8.0	10.7	8.0	10.7
Air Requirements						
Combustion air flow	m³/min	cfm	12.9	456	12.6	445
Maximum air cleaner restriction	kPa	in H_2O	5	20	5	20
Radiator cooling air (zero restriction)	m³/min	cfm	327	11,548	327	11,548
Generator cooling air	m³/min	cfm	26.4	923	26.4	923
Allowable air flow restriction (after radiator)	kPa	in H_2O	0.12	0.50	0.12	0.50
Cooling airflow (@ rated speed)						
Rate with restriction	m³/min	cfm	317	11,195	317	11,195
Exhaust System						
Maximum allowable backpressure	kPa	in Hg	15	4.4	15	4.4
Exhaust flow at rated kW	m³/min	cfm	31.5	1,112	30.5	1,077
Exhaust temperature at rated kW –						
Dry exhaust	°C	°F	625	1,157	610	1,130
Generator Set Noise Rating*						
(without attenuation) at 1 m (3 ft)	dB(A)		97.3		97.3	

Generator Technical Data		277/480V	266/460V	127/220V	120/240V 120/208V	347/600V
Motor Starting Capability: (30% voltage dip)	(kVA)					
	Self excited	420	391	363	330	N/A
	PM excited**	548	511	476	433	511
	AREP excited	548	511	476	433	511
Full Load Efficiencies:	Standby	92.9	92.9	92.9	92.5	92.9
	Prime	93.1	93.1	93.1	92.8	93.1
Reactances (per unit):	X_d	2.90	3.16	3.45	3.86	3.16
	X'_d	0.10	0.11	0.12	0.13	0.11
Reactances shown are applicable to the standby rating.	X''_d	0.058	0.063	0.069	0.078	0.063
	X_q	1.74	1.89	2.07	2.32	1.89
	X''_q	0.069	0.075	0.082	0.092	0.075
	X_2	0.063	0.069	0.075	0.084	0.069
	X_0	0.005	0.005	0.006	0.007	0.005
Time Constants:		t'_d 100 ms	t''_d 10 ms	t'_{do} 2966 ms		t_a 15 ms

* dB(A) levels are for guidance only
** With PMG Excited Option AVR12

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DIESEL GENERATOR SET

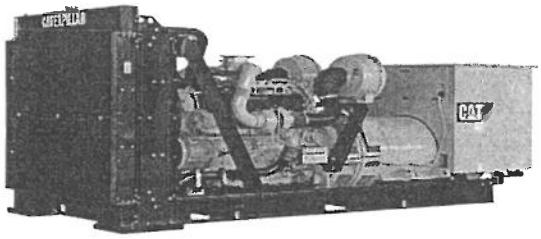

Image shown may not reflect actual package.

PRIME
910 ekW 1138 kVA
60 Hz 1800 rpm 480 Volts

Caterpillar is leading the power generation marketplace with Power Solutions engineered to deliver unmatched flexibility, expandability, reliability, and cost-effectiveness.

FEATURES

FUEL/EMISSIONS STRATEGY
- EPA Certified for Stationary Emergency Application (EPA Tier 2 emissions levels)

DESIGN CRITERIA
- The generator set accepts 100% rated load in one step per NFPA 110 and meets ISO 8528-5 transient response.

UL 2200 / CSA - Optional
- UL 2200 listed packages
- CSA Certified

Certain restrictions may apply. Consult with your Cat® Dealer.

FULL RANGE OF ATTACHMENTS
- Wide range of bolt-on system expansion attachments, factory designed and tested
- Flexible packaging options for easy and cost effective installation

SINGLE-SOURCE SUPPLIER
- Fully prototype tested with certified torsional vibration analysis available

WORLDWIDE PRODUCT SUPPORT
- Cat dealers provide extensive post sale support including maintenance and repair agreements
- Cat dealers have over 1,800 dealer branch stores operating in 200 countries
- The Cat® S•O•S℠ program cost effectively detects internal engine component condition, even the presence of unwanted fluids and combustion by-products

CAT® C32 ATAAC DIESEL ENGINE
- Utilizes ACERT™ Technology
- Reliable, rugged, durable design
- Four-cycle diesel engine combines consistent performance and excellent fuel economy with minimum weight
- Electronic engine control

CAT GENERATOR
- Designed to match the performance and output characteristics of Cat diesel engines
- Single point access to accessory connections
- UL 1446 recognized Class H insulation

CAT EMCP 4 CONTROL PANELS
- Simple user friendly interface and navigation
- Scalable system to meet a wide range of customer needs
- Integrated Control System and Communications Gateway

SEISMIC CERTIFICATION
- Seismic Certification available
- Anchoring details are site specific, and are dependent on many factors such as generator set size, weight, and concrete strength. IBC Certification requires that the anchoring system used is reviewed and approved by a Professional Engineer
- Seismic Certification per Applicable Building Codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007
- Pre-approved by OSHPD and carries an OSP-0084-10 for use in healthcare projects in California

FACTORY INSTALLED STANDARD & OPTIONAL EQUIPMENT

System	Standard	Optional
Air Inlet	• Single element canister type air cleaner • Service indicator	[ ] Dual element air cleaners [ ] Air inlet adapters
Cooling	• Radiator with guard • Coolant drain line with valve • Fan and belt guards • Cat Extended Life Coolant • Coolant level sensors • Radiator duct flange	[ ] Jacket water heater
Exhaust	• Dry exhaust manifold • Flanged faced outlets	[ ] Stainless steel exhaust flex fittings [ ] Elbows, flanges, expanders & Y adapters
Fuel	• Primary fuel filter with water separator • Secondary fuel filter • Fuel priming pump • Flexible fuel lines • Fuel cooler	
Cat Generator	• Class H insulation • Cat Digital Voltage Regulator (CDVR) with kVAR/PF control, 3-phase sensing • Reactive droop	[ ] Oversize & premium generators [ ] Winding temperature detectors [ ] Anti-condensation heaters [ ] Bearing temperature detectors
Power Termination	• Bus bar (NEMA or IEC mechanical lug holes) • Top cable entry	[ ] Circuit breakers, UL listed, 3 pole with shunt trip, 100% rated, manual or electrically operated [ ] Circuit breakers, IEC compliant, 3 or 4 pole with shunt trip, manual or electrically operated [ ] Bottom cable entry [ ] Power terminations can be located on the right, left and/or rear as an option. Multiple circuit breaker options
Governor	• ADEM™ A4	[ ] Load Share Module
Control Panels	• EMCP 4.2 • User Interface panel (UIP) - rear mount • AC & DC customer wiring area (right side) • Emergency stop pushbutton	[ ] EMCP 4.3 ... [ ] EMCP 4.4 [ ] Option for right or left mount UIP [ ] Local & remote annunciator modules [ ] Digital I/O Module [ ] Generator temperature monitoring & protection [ ] Remote monitoring software
Lube	• Lubricating oil and filter • Oil drain line with valves • Fumes disposal • Gear type lube oil pump	
Mounting	• Rails - engine / generator / radiator mounting • Rubber anti-vibration mounts (shipped loose)	[ ] Spring-type vibration isolator [ ] IBC Isolators
Starting/Charging	• 24 volt starting motor(s) • Batteries with rack and cables • Battery disconnect	[ ] Battery chargers (10 amp) [ ] 45 amp charging alternator [ ] Oversize batteries [ ] Ether starting aid
General	• Right-hand service • Paint - Caterpillar Yellow (except rails and radiators that are gloss black) • SAE standard rotation • Flywheel and Flywheel housing - SAE No. 0	[ ] CSA certification [ ] EU Declaration of Incorporation [ ] EEC Declaration of Conformity [ ] Seismic Certification per Applicable Building Codes: IBC 2000, IBC 2003, IBC 2006, IBC 2009, CBC 2007

PRIME 910 ekW 1138 kVA

60 Hz 1800 rpm 480 Volts

SPECIFICATIONS

CAT GENERATOR

Frame size..... 1402
Excitation.....Internal Excitation
Pitch..... 0.6667
Number of poles.....4
Number of bearings..... 2
Number of Leads..... 006
Insulation..... UL 1446 Recognized Class H with tropicalization and antiabrasion
- Consult your Caterpillar dealer for available voltages
IP Rating..... IP23
Alignment.....Closed Coupled
Overspeed capability.....125
Wave form Deviation (Line to Line)..... 002.00
Voltage regulator.....3 Phase sensing with selectible volts/Hz
Voltage regulation.....Less than +/- 1/2% (steady state)
Less than +/- 1% (no load to full load)

CAT DIESEL ENGINE

C32 TA, V-12, 4-Stroke Water-cooled Diesel
Bore..... 145.00 mm (5.71 in)
Stroke..... 162.00 mm (6.38 in)
Displacement.....32.10 L (1958.86 in^3)
Compression Ratio..... 15.0:1
Aspiration..... TA
Fuel System..... MEUI
Governor Type.....ADEM™ A4

CAT EMCP 4 SERIES CONTROLS

EMCP 4 controls including:
- Run / Auto / Stop Control
- Speed and Voltage Adjust
- Engine Cycle Crank
- 24-volt DC operation
- Environmental sealed front face
- Text alarm/event descriptions

Digital indication for:
- RPM
- DC volts
- Operating hours
- Oil pressure (psi, kPa or bar)
- Coolant temperature
- Volts (L-L & L-N), frequency (Hz)
- Amps (per phase & average)
- ekW, kVA, kVAR, kW-hr, %kW, PF

Warning/shutdown with common LED indication of:
- Low oil pressure
- High coolant temperature
- Overspeed
- Emergency stop
- Failure to start (overcrank)
- Low coolant temperature
- Low coolant level

Programmable protective relaying functions:
- Generator phase sequence
- Over/Under voltage (27/59)
- Over/Under Frequency (81 o/u)
- Reverse Power (kW) (32)
- Reverse reactive power (kVAr) (32RV)
- Overcurrent (50/51)

Communications:
- Six digital inputs (4.2 only)
- Four relay outputs (Form A)
- Two relay outputs (Form C)
- Two digital outputs
- Customer data link (Modbus RTU)
- Accessory module data link
- Serial annunciator module data link
- Emergency stop pushbutton

Compatible with the following:
- Digital I/O module
- Local Annunciator
- Remote CAN annunciator
- Remote serial annunciator

PRIME 910 ekW 1138 kVA

60 Hz 1800 rpm 480 Volts

TECHNICAL DATA

Open Generator Set - - 1800 rpm/60 Hz/480 Volts	DM9934	
EPA Certified for Stationary Emergency Application (EPA Tier 2 emissions levels)		
Generator Set Package Performance		
Genset Power rating @ 0.8 pf	1137.5 kVA	
Genset Power rating with fan	910 ekW	
Fuel Consumption		
100% load with fan	248.6 L/hr	65.7 Gal/hr
75% load with fan	197.0 L/hr	52.0 Gal/hr
50% load with fan	134.2 L/hr	35.5 Gal/hr
Cooling System[1]		
Air flow restriction (system)	0.12 kPa	0.48 in. water
Engine coolant capacity	55.0 L	14.5 gal
Inlet Air		
Combustion air inlet flow rate	83.7 m³/min	2955.8 cfm
Exhaust System		
Exhaust stack gas temperature	459.5 ° C	859.1 ° F
Exhaust gas flow rate	212.1 m³/min	7490.2 cfm
Exhaust flange size (internal diameter)	203 mm	8 in
Exhaust system backpressure (maximum allowable)	10.0 kPa	40.2 in. water
Heat Rejection		
Heat rejection to coolant (total)	327 kW	18596 Btu/min
Heat rejection to exhaust (total)	933 kW	53060 Btu/min
Heat rejection to aftercooler	255 kW	14502 Btu/min
Heat rejection to atmosphere from engine	124 kW	7052 Btu/min
Heat rejection to atmosphere from generator	56.0 kW	3184.7 Btu/min
Alternator[2]		
Motor starting capability @ 30% voltage dip	2734 skVA	
Frame	1402	
Temperature Rise	105 ° C	189 ° F
Lube System		
Sump refill with filter	99.0 L	26.2 gal
Emissions (Nominal)[3]		
NOx g/hp-hr	4.82 g/hp-hr	
CO g/hp-hr	.12 g/hp-hr	
HC g/hp-hr	.02 g/hp-hr	
PM g/hp-hr	.016 g/hp-hr	

[1] For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.
[2] UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40°C ambient per NEMA MG1-32.
[3] Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77°F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

RATING DEFINITIONS AND CONDITIONS

Meets or Exceeds International Specifications: AS1359, CSA, IEC60034-1, ISO3046, ISO8528, NEMA MG 1-22, NEMA MG 1-33, UL508A, 72/23/EEC, 98/37/EC, 2004/108/EC

Prime - Output available with varying load for an unlimited time. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year. Prime power in accordance with ISO3046. Prime ambients shown indicate ambient temperature at 100% load which results in a coolant top tank temperature just below the alarm temperature.

Ratings are based on SAE J1349 standard conditions. These ratings also apply at ISO3046 standard conditions. **Fuel rates** are based on fuel oil of 35° API [16° C (60° F)] gravity having an LHV of 42 780 kJ/kg (18,390 Btu/lb) when used at 29° C (85° F) and weighing 838.9 g/liter (7.001 lbs/U.S. gal.). Additional ratings may be available for specific customer requirements, contact your Cat representative for details. For information regarding Low Sulfur fuel and Biodiesel capability, please consult your Cat dealer.

PRIME 910 ekW 1138 kVA

60 Hz 1800 rpm 480 Volts

DIMENSIONS

Package Dimensions		
Length	4474.2 mm	176.15 in
Width	2010.4 mm	79.15 in
Height	2173.7 mm	85.58 in

NOTE: For reference only - do not use for installation design. Please contact your local dealer for exact weight and dimensions. (General Dimension Drawing #).

Performance No.: DM9934

Feature Code: C32DR41

Gen. Arr. Number: 3002236

Source: U.S. Sourced

July 10 2012

20505849

www.Cat-ElectricPower.com

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Materials and specifications are subject to change without notice. The International System of Units (SI) is used in this publication.

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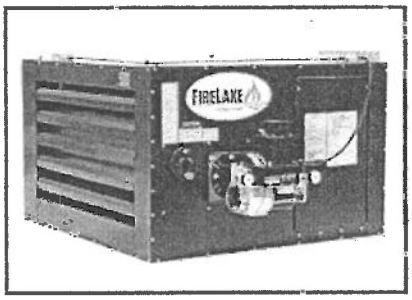
FIRELAKE
MANUFACTURING

Heater Model 500



- Easy to Maintain: Firelake's three-pass heater models are easy to maintain with clean-out panels on both ends of the heat exchanger
- Durability: Designed for a maximum heat transfer with 100% steel corrosion resistant fire chamber and heat exchanger
- Download Brochure Operating Manual is on page http://www.firelakemfg.com/products/heaters/

SPECIFICATIONS

Input (approx. BTU/hr.)	500,000 (126,000 Kcal)
Output (approx. BTU/hr.)	400,000 (100,800 Kcal)
Stack size	10" (25.4 cm)
Shipping Weight	927lbs. (421 kg.)
Heater dimensions (L x W x H) Includes outside measurements of fan and burner	52.31" x 69.5" x 34" (132 x 177 x 86 cm)
Electrical requirements (maximum circuit protection)	220 vac ,30 amp
Approx. fuel consumption	3.6 GPH (13.63 liter/hour
Blower CFM	5800 (164 cubic meter/minute)
Outlet Air Temperature	170 F (77 C)
Compressed air requirements	2 CFM @ 40 PSI / .057 m3/min.@.28Mpa
Agency listings	UL, C-UL
Patents	5,950,616
Fuels	Crankcase oil, transmission and hydraulic fluids, as well as other petroleum-based lubricants (any weight

	combinations up to SAE 50 as well as #1 and #2 fuel oil.) fuel oil.)
Oil transfer pump	18 GPH @ 35 PSI (68 LPH @ .24 Mpa)

Print This Page

WHAT MODEL HEATER DO YOU NEED?

MODEL	ESTIMATED
500	12,500 SQ FEET (1160 sq meter)
350	8,750 SQ FEET (812 sq meter)
315	7,875 SQ FEET (732 sq meter)
245	6,125 SQ FEET (569 sq meter)
235	5,875 SQ FEET (546 sq meter)
200	5,000 SQ FEET (465 sq meter)
155	3,875 SQ FEET (360 sq meter)

WHAT IS MY RETURN ON INVESTMENT?

AVERAGE HOURS PER YEAR A HEATER OPERATES IS 1500
ASSUME YOUR CURRENT PROPANE HEATER SIZE IS 200,000 BTU
ASSUME YOUR CURRENT PROPANE COST IS $2.25/GALLON (90,000 BTU)
YOU CONSUME 200,000 / 90,000 = 2.22 GALLONS/HOUR
2.22 GALLONS X $2.25/GALLON = $5.55/HOUR TO USE PROPANE
AT 1500 HOURS OF HEATER TIME A YEAR X $5.55 = $8,325 IN PROPANE COST.

IF YOU HAVE ACCESS TO USED OIL AT LITTLE OR NO COST, OR EVEN

IF YOU HAVE BEEN OFFERED CASH FOR THE WASTE OIL THINK ABOUT THIS.

OUR HEATERS COST LESS THAN ONE HEATING SEASON OF PROPANE !!
YOUR MONEY IS MADE BACK IN LESS THAN 1 YEAR !!
YOU ARE SAVING $8,325 EACH YEAR AFTER !!

IF YOU LIVE IN A ENERGY CREDIT STATE YOU MAY GET TAX CREDIT FOR $5,000.
YOU CAN PAY FOR THE HEATER IN JUST A FEW MONTHS TIME.

SAVINGS ARE SIMILAR FOR OTHER HEATING FUELS.
IF YOU HAVE CONCERNS OR WANT A PERSONAL CALCULATION DONE CALL OUR DEALERS LOCATED ON OUR DEALER LOCATOR PAGE, OR CALL FIRELAKE.

BOTTOM LINE : IF YOU ARE NOT USING OUR HEATERS YOU ARE BURNING CASH.

What's New...

Estey's Garage Recommends Firelake Waste Oil Furnace

Reliable Heat when Cold Weather Strikes

Reliable Heat and Savings with Waste Oil Heat

. . . . . .

Random Quote

"The heaters we use in our car washes have surpassed our expectations. We thought the high moisture conditions inside the car wash bay would prove challenging, but the Firelake heaters run reliably in the wet atmosphere and have resisted excessive wear over the years very well."

— McCarthy Tire and Automotive Center

Next quote »

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Equipment Categories

- Asphalt Hot Mix Plants
  - New Equipment
  - Used Equipment
    - AC Tanks
    - Baghouses, Compressors, Fans
    - Batch Plants
    - Burners
    - Cold Feed Bins, RAP Bins, Conveyors
    - Concrete Plants
    - Crushers
    - Drum Mixer Plants
    - Drums Mixers & Dryers Only
    - Electrical Controls, Houses, Generators
    - Fuel Preheaters
    - Fuel Tanks
    - Hot Oil Heaters
    - Mineral Filler Bins, Cellulose Injection
    - Miscelleanous
    - Primary Collectors
    - Pugmills & Pugmill Plants
    - RAP Systems
    - Rubber Blending
    - Screens, Batch & Drum Mixers
    - Surge Storage Bins
    - Truck Scales
- Thermal Soil Remediation
- Sand Drying

CMI 72,000 ACFM STATIONARY BAGHOUSE

BH-175

Description
MODEL AP810, 72,000 ACFM. 12,085 SQUARE FT OF CLOTH. 200HP FAN, RETURN BLOWER FOR FINES, SULLAIR COMPRESSOR.

Location
Midwest

Price
Price On Request

Images

Click an image below to enlarge

Warm Mix

Cellulose Fiber Injection

Bench Scale Thermal Desorption Unit

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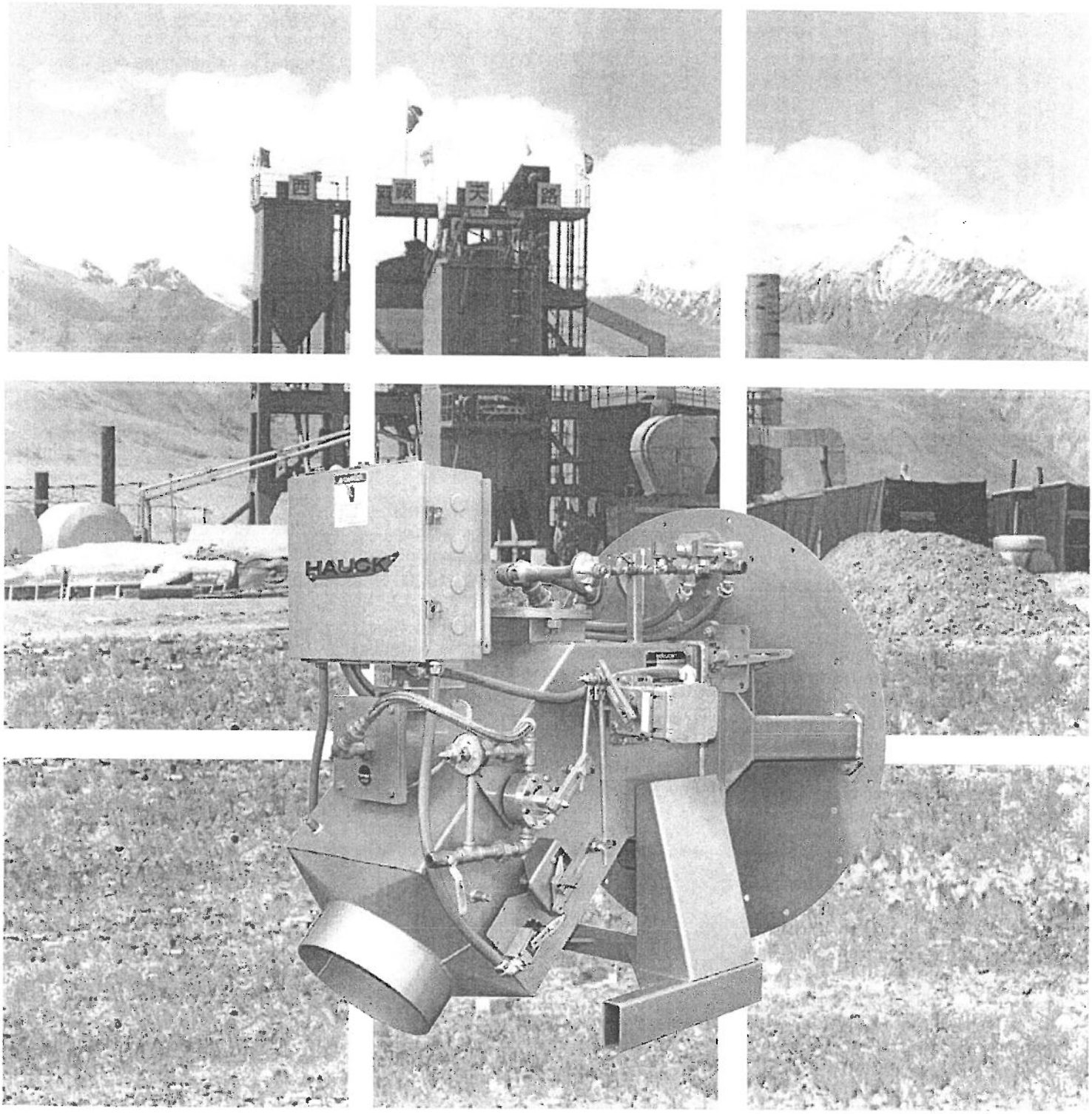
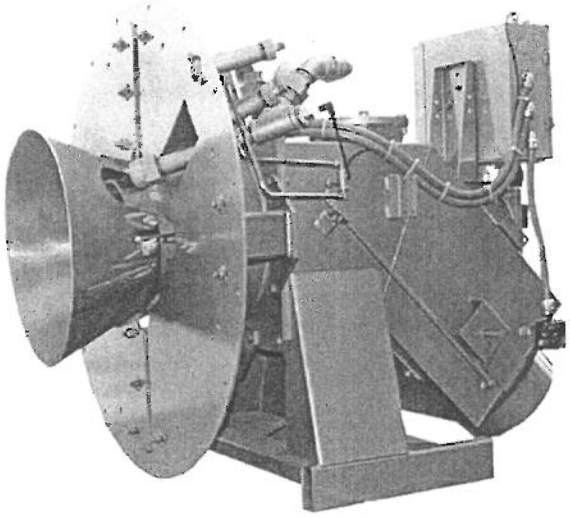
STARJET

Open-Fired Multi-Fuel Burner



STARJET



ADVANTAGES

- No ignition tile
- No combustion chamber required
- Convenient flame shaping
- Wide turndown
- Compressed air option available
- Fuels fired:
  - Heavy Fuel Oil*
  - Light Fuel Oil
  - Natural Gas
  - Liquid Propane (LP)
  - Landfill Gas

The StarJet continues Hauck's long-standing reputation for providing efficient and durable burners for the asphalt industry. The burner is designed to recirculate the hot gases, providing flame stability over its wide operating range. This eliminates the need for refractory ignition tile and combustion chamber. The StarJet can have the short, bushy flame for drum mixing or a long flame depending on the application. The burner's wide turndown is particularly useful when lower production rates are desired, such as when making cold patch material.

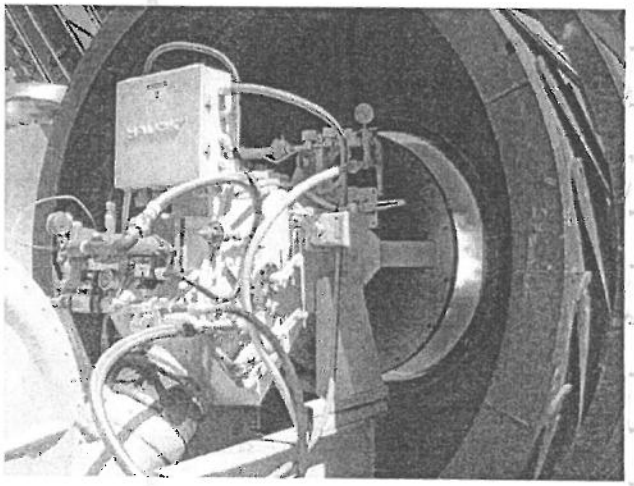
* Heavy and waste fuel oils require heating and filtration. 90 SSU or less viscosity required.

The StarJet fires all commercial grades of fuel oil, natural gas, LP, and landfill gas. As a combination burner, the StarJet will burn any two fuels in combination with the exception of LP in the liquid state and fuel oil. When these two fuel combinations are desired, it is necessary to specify the primary fuel and purchase the separate atomizer set assembly for the standby fuel.

The StarJet also provides greater flexibility in mounting a burner/blower combination on dryer frames in confined spaces. This mounting flexibility is achieved by a 45° air entry available at the 3, 6, 9, or 12 o'clock position, providing a wide range of burner/blower angle arrangements. The burner air inlet is the same diameter as the Hauck Turbo Blower outlet. Hauck's line of standard and high pressure direct-drive blowers matched to the StarJet burner simplifies installation.

Flame shaping is achieved by moving the adjustment lever at the side of the burner. This lever is directly linked to the adjustable spin vanes. This feature greatly reduces setup time at initial startup or whenever the plant is relocated, and permits fine-tuning when mix changes require a change in flame shape and intensity. The operator can ensure that flame shape and intensity are always optimal because fine-tuning can be accomplished in minutes instead of hours.

StarJet fuel manifolds and air systems conform to the standards of the National Fire Protection Association (NFPA). The StarJet burner is fitted with automatic valving and controls to allow for full flame supervision and optimum compatibility with Hauck combustion control systems. Specifically designed for asphalt plants, these control systems are described in separate data sheets.



StarJet Burner with compressed air atomizer.

STARJET

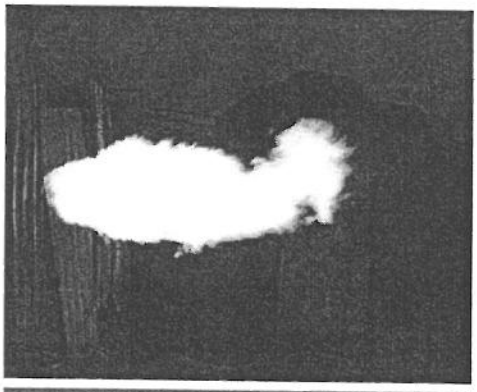
FEATURES THAT DELIVER FUEL EFFICIENCY AND IMPROVED PRODUCTION PERFORMANCE

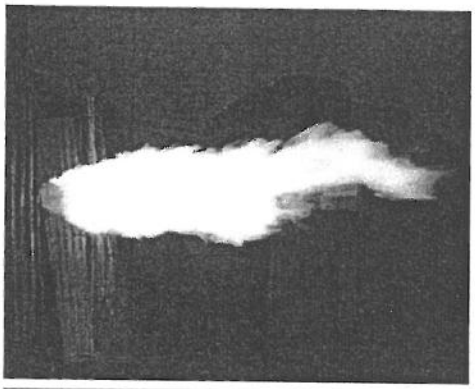
High Intensity Flame
Hauck's proven experience in the asphalt industry clearly shows that combustion volume intensity is the key to burner performance. The StarJet was designed to maximize flame intensity and deliver a quick heat release. Combustion is completed in a much shorter space than that of any other burner on the market today. This minimizes flame quenching by the aggregate and allows more space in the dryer for material vailing, thus improving production performance and fuel efficiency.

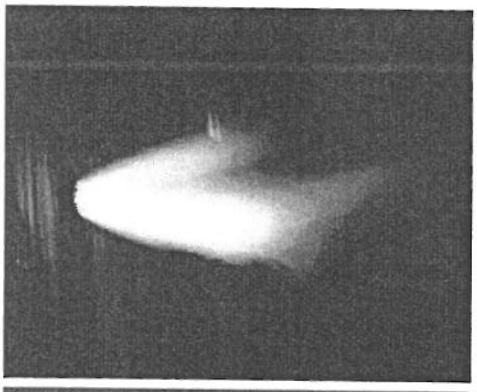
High Pressure Blowers
Hauck's 36 ounce blowers deliver superior fuel atomization and combustion intensity. Atomizing air is supplied by the burner blower.

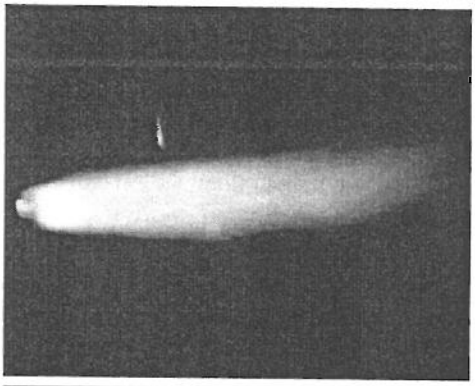
For 50 Hz requirements, high pressure belt-drive blowers at 3600 rpm are available.

Flame Shaping
The StarJet allows flame shaping to tailor the flame shape to the requirements of any drum through adjustment of the spin vanes. A single adjustment lever changes the angle of the spin vanes in the secondary air passage. The flame is easily adaptable from a short bushy flame to a long, narrow pencil flame. The plant operator can change the flame shape in a matter of minutes. The change from a virgin mix to a recycle mix is a simple process. For the first time, there is a burner designed for all applications: batch plant drums, drum mixers, and drum mixers with recycle.

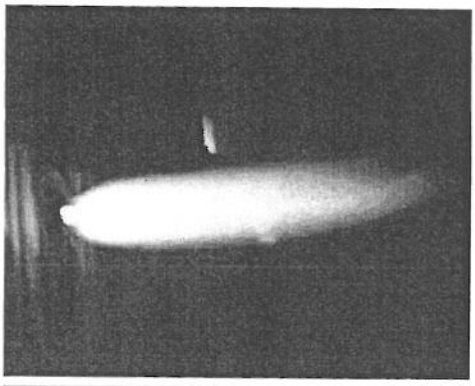

SHORT FLAME OIL


LONG FLAME OIL


SHORT FLAME GAS

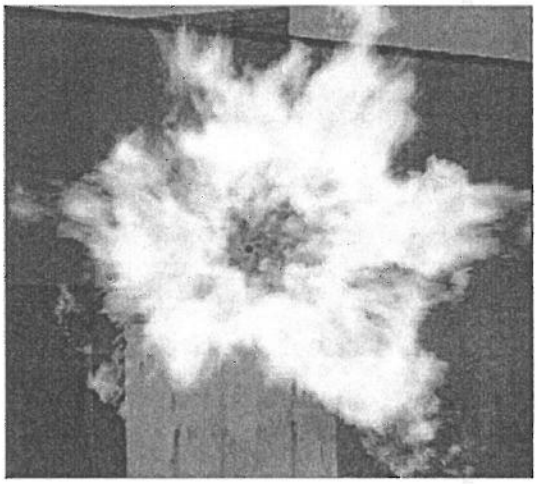

LONG FLAME GAS

SHORT FLAME L.P.


LONG FLAME L.P.

Flame shaping on all fuels permit matching the StarJet Flame to most rotary dryers.

S T A R J E T



StarJet Burner

Hauck has designed the StarJet with an internal zone of hot recirculating gases. This assures the stability of the burner flame. Combustion can be completed in a much shorter space with an intense bushy flame ideal for drum mixing - or with a long flame depending on the application. With a properly designed combustion zone within the dryer, the StarJet provides the most efficient heat transfer to the material.

Superior Oil Atomization

The StarJet is capable of burning a complete range of available fuel oils including heavy oils and waste oils. The unique 'Swirl Generator' oil nozzle efficiently atomizes even the most difficult heavy oil and waste oil. As evidenced in the photograph above, the 'Star' shaped atomization pattern is clearly evident. Low pressure oil and blower air are mixed in the nozzle and create a vaporized fuel mist. The swirl generator causes rapid combustion resulting in a flame that is low pressure center stabilized. Compressed air atomization is also available for high altitude or heavy oil applications.

Natural Gas and LP

As is true of the oil flame, both the LP flame and the natural gas flame have maximum flame intensity and a rapid heat release. This ensures improved fuel efficiency and production performance. In addition, the constant pressure LP system available from Hauck provides excellent temperature control and a wide turndown (7:1 or more). Whatever your fuel requirements are, the StarJet is your best combustion choice.

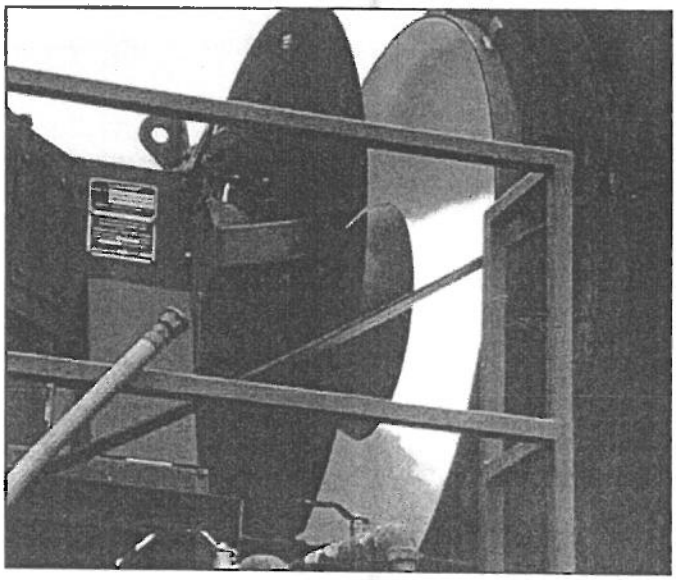
The StarJet, with all of its outstanding features, is the best open-fired combustion system on the market today. It burns light and heavy fuel oils, waste oils, natural gas, landfill gas and L.P.

Combustion Flights

Combustion flights are a means of providing a volume within the drum for the combustion process to take place without being quenched by the material to be dried. They also help divert material flow along the drum shell to reduce shell temperatures. Shell temperatures are a function of:

1. available combustion volume for the required heat
2. the density of the material vail downstream
3. the required material outlet temperature
4. the design of the material flow through the combustion zone.

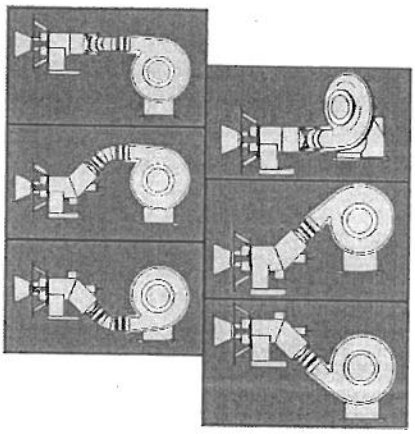
Hauck recommends that flights be sized to provide a solution for two of the four parameters - the combustion volume and material flow through the combustion zone.



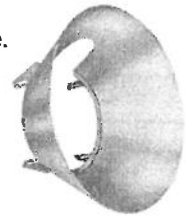
STARJET

MORE STARJET FEATURES

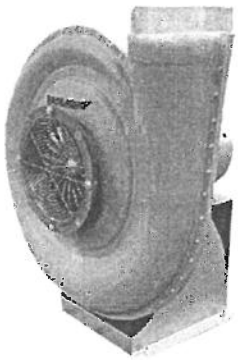
Maximum Mounting Flexibility
provided by 45° air inlet. Four air inlet orientations and wide range of burner and blower mounting arrangements available.



Stainless Steel Ignition Cone
eliminates heavy refractory ignition tile. The cone lasts considerably longer and is less expensive to replace.

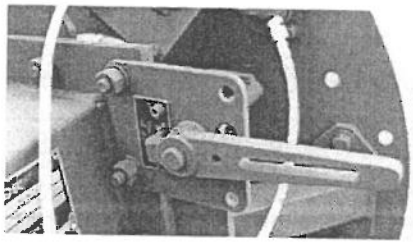


Direct Drive Blowers
are available at 24 and 36 osig. The low pressure 24 osig blowers are typically used on gas and light fuel oil for long flame, non-vailing type drum designs.

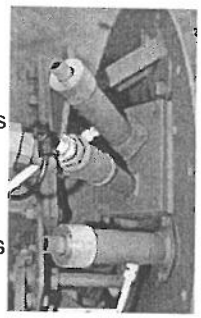


The higher pressure 36 osig blowers, highly desirable for burning heavy fuel oil, are necessary for operation at higher elevations to achieve high combustion intensities in the dryer. For severe elevation and heavy fuel oil, compressed air atomization is available.

Flame Shape Adjustment
is achieved by moving the adjustment lever at the side of the burner. This lever is directly linked to the adjustable spin vanes. This feature greatly reduced set up time at initial start-up or whenever the plant is relocated, and permits fine-tuning when mix changes require. Fine-tuning can be accomplished in minutes instead of hours.

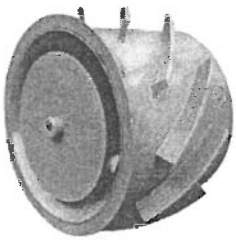


Dual UV Scanner Tubes
permit monitoring pilot and main flames individually. The UV scanner tubes are connected to an air purge, which minimizes dirt infiltration and provides cooling air.



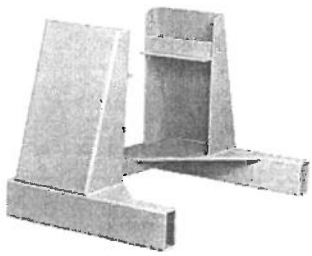
Fuel Flow Meter
is standard on both oil and LP fuel manifolds.

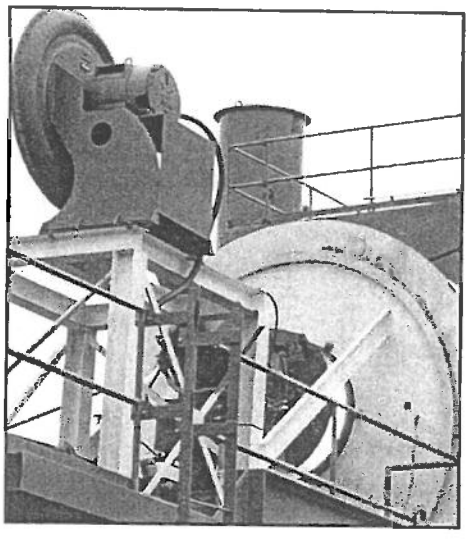
Oil Atomizer
requires only low pressure air in most applications. When higher elevations and heavy oil so dictate, compressed air atomization is available.



Oil or LP Nozzle
is removable from rear of burner for easy-access maintenance.

Miniskid
permits the burner to be mounted with the air inlet at any of four positions.





S T A R J E T

STARJET CAPACITIES

24 osig Direct Drive Blowers

BURNER MODEL	AIR FLOW (scfm)	PRESSURE (osig)	TBA BLOWER MODEL	MOTOR HP	FAN RATING (acfm @ 350 °F)	MAX CAPACITY (BTU/hr)
SJ075	983	24	TBA-24-10	10	7,000	12.1×10^6
SJ150	1,496	24	TBA-24-15	15	13,000	22.7×10^6
SJ200	2,350	24	TBA-24-20	20	21,000	37.0×10^6
SJ 260	2,870	24	TBA-24-25	25	26,000	45.1×10^6
SJ360	4,350	24	TBA-24-50X	40	40,000	70.4×10^6
SJ520	6,000	24	TBA-24-50	50	53,000	93.3×10^6

36 osig Direct Drive Blowers

BURNER MODEL	AIR FLOW (scfm)	PRESSURE (osig)	TBA BLOWER MODEL	MOTOR HP	FAN RATING (acfm @ 350 °F)	MAX CAPACITY (BTU/hr)
SJ075	1,200	36	TBA-36-20	20	8,600	15.2×10^6
SJ150	1,832	36	TBA-36-25	25	16,000	27.9×10^6
SJ200	2,800	37	TBA-36-40	40	23,000	40.5×10^6
SJ 260	3,500	36	TBA-36-50	50	28,000	49.3×10^6
SJ360	5,400	37	TBA-36-75	75	43,000	75.6×10^6
SJ520	7,300	36	TBA-36-100	100	55,000	96.8×10^6
SJ580	7,900	33	TBA-36-100	100	68,000	120×10^6
SJ750	9,940	38	TBA36-125	125	85,000	150×10^6
SJ980	12,220	36	TBA-36-150	150	128,000	200×10^6

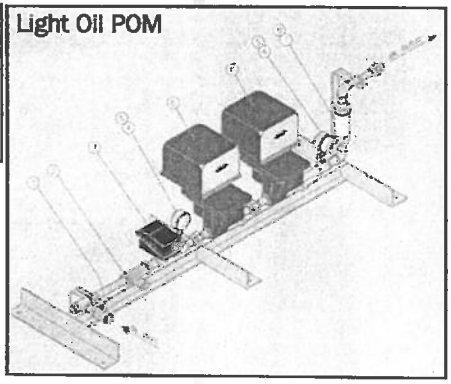
Note: Only 40% of air for combustion is passed through the burner. The remaining 60% of air for combustion plus a minimum of 20% excess air must be induced by the dryer exhaust system at a negative pressure (-0.25"w.c.) at the burner breeching ring. Dryer leakage air is not useable in the combustion process.

NFPA FUEL MANIFOLDS

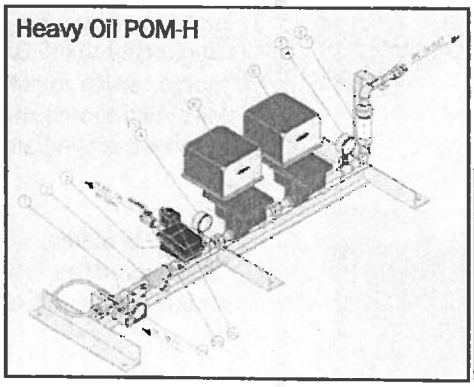
Hauck fuel manifolds conform to the safety standards of the NFPA as established in their publications.

1 Manual ball valve
2 Strainer
3 Low/High Pressure Switch
4 Pressure Gauge
5 Needle Valve
6 Auto Safety Shutoff Valve
7 Flow Meter
8 Flow Meter Rep Glass

Light Oil POM



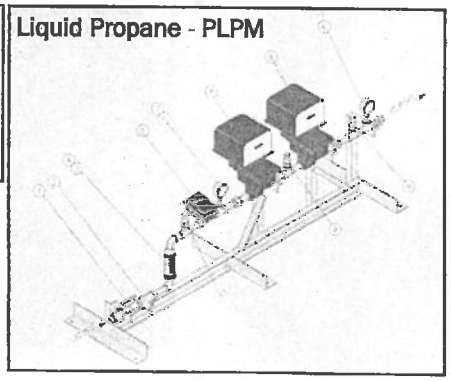
Heavy Oil POM-H



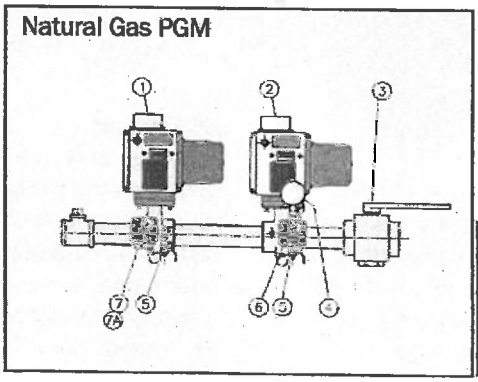
1 Manual ball valve
2 Strainer
3 Low/High Pressure Switch
4 Needle Valve
5 Pressure Gauge
6 Auto Safety Shutoff Valve
7 Flow Meter
8 Flow Meter Rep Glass
9a Low/High Temp Controller
9b Manual Ball Valve
9c Solenoid Valve

1 Manual ball valve
2 Strainer
3 Flow Meter
4 Flow Meter Rep Glass
5 Low/High Pressure Switch
6 Pressure Gauge
7 Snubber
8 Auto Safety Shutoff Valve
9 Relief Valve

Liquid Propane - PLPM



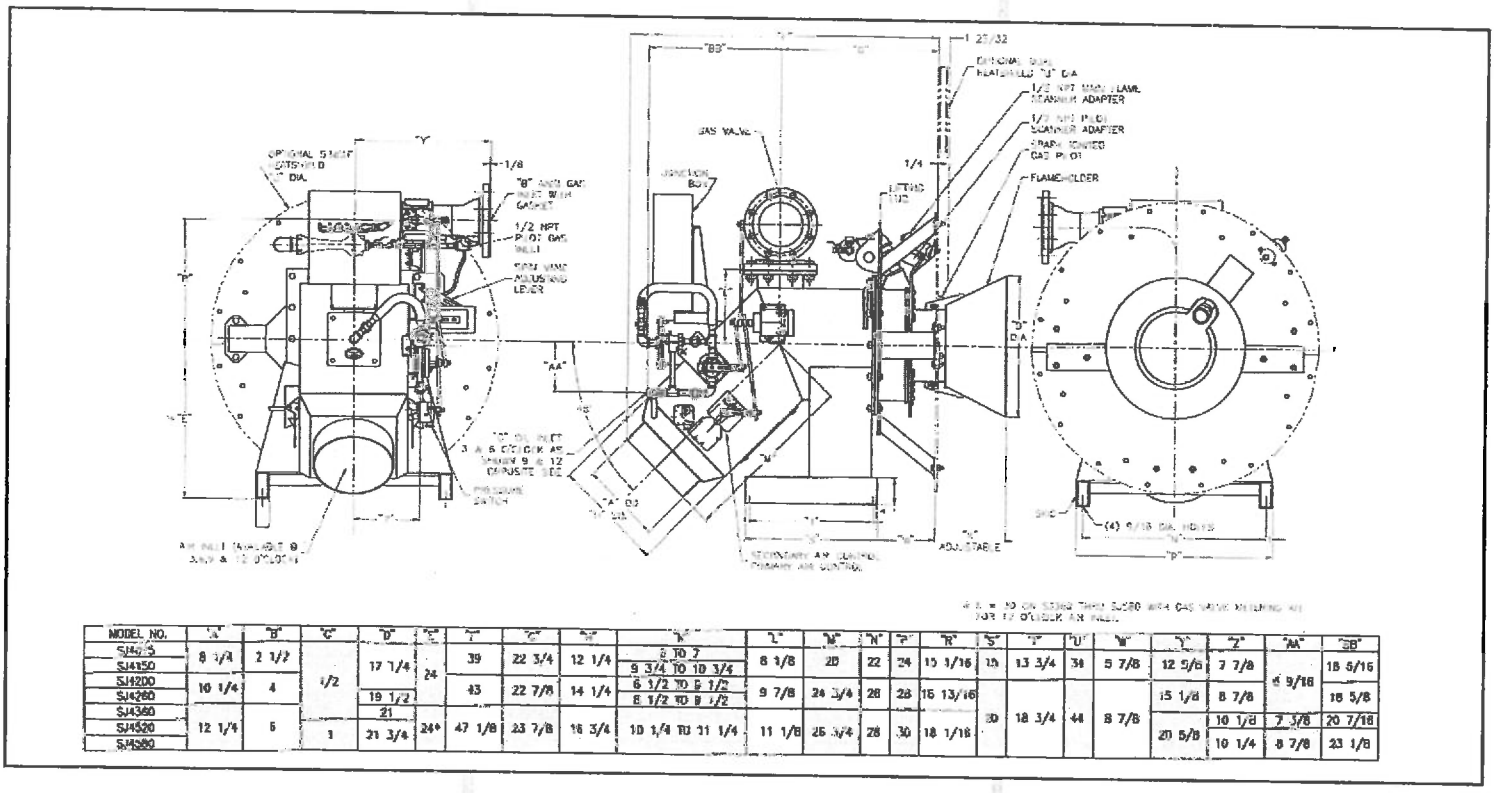
Natural Gas PGM



1 Main Safety Shutoff Valve
2 Blocking Safety Shutoff Valve
3 Leak Test Shutoff Valve
4 Pressure Gauge
5 Leak Test Cock
6 High Gas Pressure Switch
7 Low Gas Pressure Switch
7a Snubber

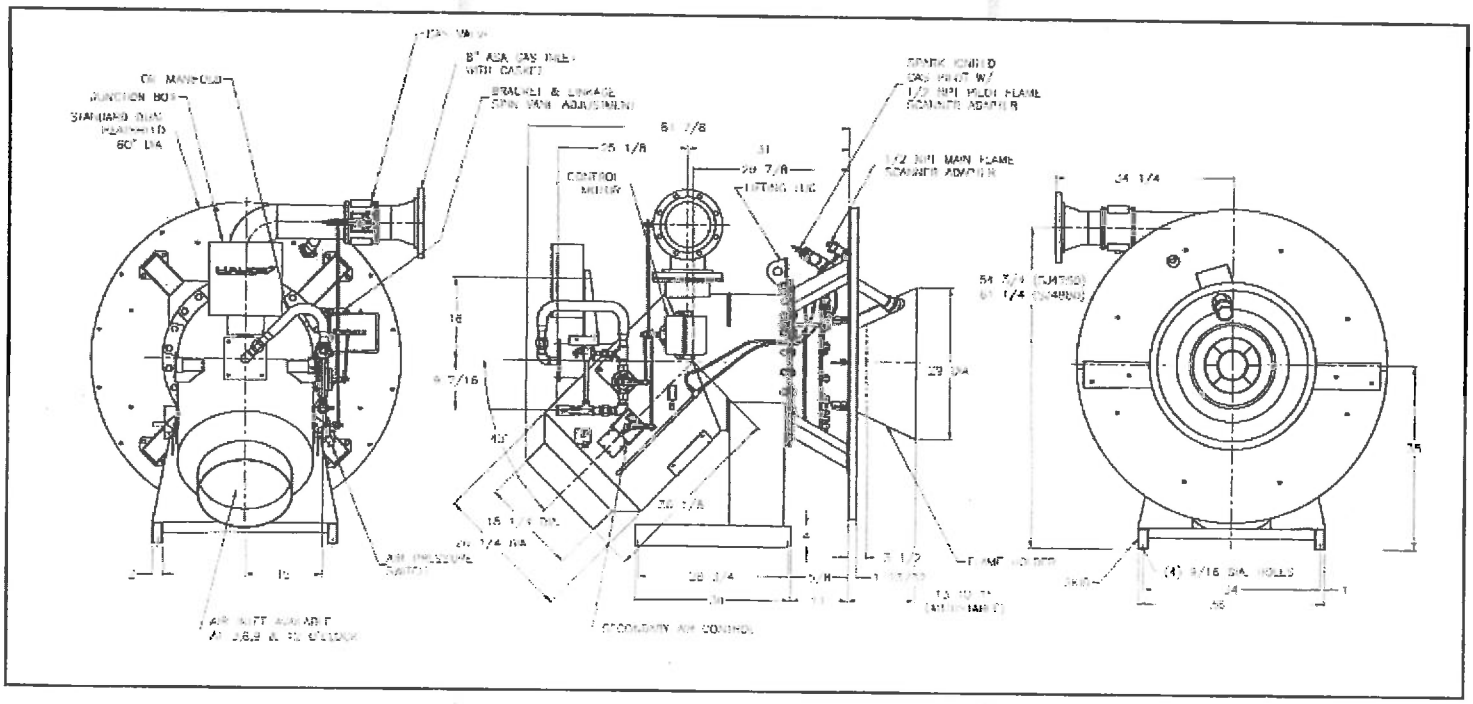
S T A R J E T

DIMENSIONS SJ3.5-SJ45



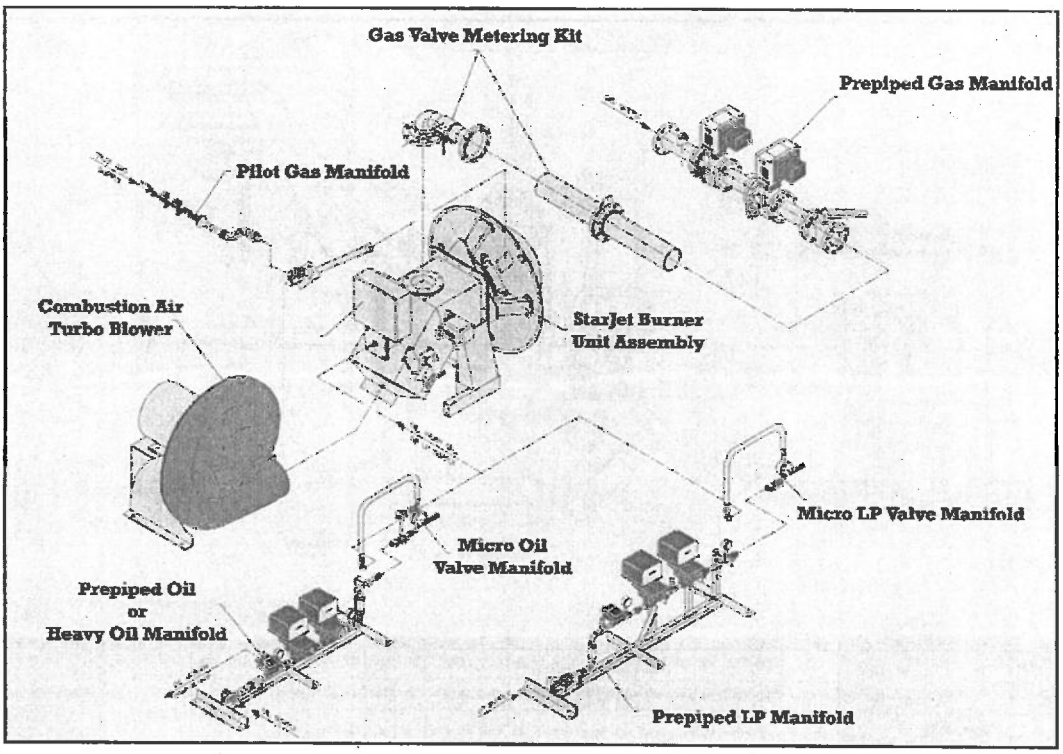
MODEL NO.	"A"	"B"	"C"	"D"	"E"	"F"	"G"	"H"	"K"	"L"	"M"	"N"	"P"	"R"	"S"	"T"	"U"	"W"	"Y"	"Z"	"AA"	"BB"
SJ3.5	8 1/4	2 1/2	1/2	17 1/4	24	39	22 3/4	12 1/4	8 TO 7	8 1/8	20	22	24	15 1/16	19	13 3/4	34	5 7/8	12 5/8	7 7/8	6 9/16	18 5/16
SJ4150									9 3/4 TO 10 3/4													
SJ4200	10 1/4	4				43	22 7/8	14 1/4	6 1/2 TO 8 1/2	9 7/8	24 3/4	28	28	15 13/16	30	18 3/4	44	8 7/8	15 1/8	8 7/8		18 5/8
SJ4260				19 1/2					8 1/2 TO 9 1/2													
SJ4360	12 1/4	5	1	21	24*	47 1/8	23 7/8	16 3/4	10 1/4 TO 11 1/4	11 1/8	25 3/4	28	30	18 1/16					20 5/8	10 1/8	7 3/8	20 7/16
SJ4520				21 3/4																10 1/4	8 7/8	23 1/8
SJ4580																						

DIMENSIONS SJ750-2K0



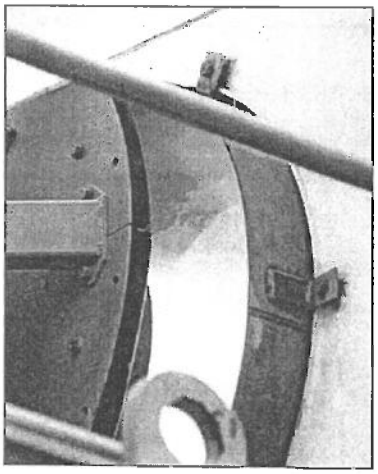
STARJET

TYPICAL PIPING SCHEMATIC



ORDERING INFORMATION

Air Inlet	3 o'clock 6 o'clock 9 o'clock 12 o'clock
Fuel	Oil (Light or Heavy) Natural Gas LP Oil/Natural Gas Natural Gas/LP Special (Specify)
Control Motor	Medium Torque High Torque
Control Panel	Specify Make/Model
Skid	Standard Special (Specify)
Heat Shield	Single Dual
Special Options	Heavy Oil Kit Extended Nose Optimizer



HAUCK MANUFACTURING COMPANY
P.O. BOX 90
LEBANON, PA 17042
PHONE: 717-272-3051
FAX: 717-273-9882
www.hauckburner.com

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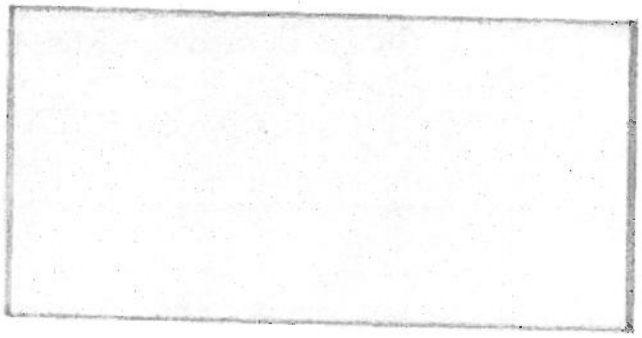


The following source test report including all data collection, data reduction and final results were done in accordance with the referenced methods. To the best of our knowledge there are no omissions of pertinent data and all results should be valid and accurate within the limits of the methods.

by David R. Broderick, OMNI Environmental Services, Inc.

by Joe D. Fiedler, OMNI Environmental Services, Inc.

Introduction

OMNI Environmental Services, Inc. (OMNI) source tested the portable hot mix asphalt plant at Morse Bros. Sundial facility in Troutdale, OR on April 20, 2001. Particulate and opacity were tested on the asphalt plant. Three compliance runs were conducted between 8:30 and 12:01.

Fred Bond of Morse Bros. arranged the testing. Steve Crane of Oregon Department of Environmental Quality (ODEQ) was notified of the testing. No representative of that office was on site during the testing. All testing was done by David Broderick and Joe Fiedler of OMNI. Fred Bond of Morse Bros. collected all production data.

Source Description

The system is a CMI portable asphaltic paving drum plant. The plant is rated between 300 and 350 tons/hr and was running at between 211 and 258 tons/hr during the source test. Normal operating rate is 250 tons/hr. A CMI baghouse controls emissions. On the test day the pressure drop across the bag house was between 5.0 and 5.2 inches of water. Production data is located in the appendix.

The stack did not meet EPA Method 1 criteria. Because there was no reasonable way to extend the stack the maximum number of traverse points was used. The stack is rectangular and the dimensions are 39.25 by 52 inches, the nearest upstream disturbance is 51 in. and the nearest down stream disturbance is 98 inches. The stack had five ports already installed so a 5 by 5 matrix was sampled, 2.5 minutes at each point. There was no positive flow in one of the ports so sample was collected at only 4 ports.

The plant was running on #2 fuel oil during the source tests. In the future the plant will run on natural gas. Natural gas was not used for fuel during the source tests because the natural gas lines were not installed in time. Using fuel oil during the source tests should show the "worst case" emissions.

Results

During the three runs particulate concentrations averaged 0.040 gr/dscf. Mass emissions averaged 9.0 lb/hr. The filters from the testing were very light brown and the catch was made up of a very fine cake. The impinger catch was cloudy.

Visible emissions were not read because it rained on the test day. Due to low clouds and a wet plume, it was not possible to get readings. The very low grain loading would lead us to believe that the opacity readings would have been much lower than the plant's 20% limit.

The stack sampling conditions during the test program are summarized in Table 1 below.

Table 1. Stack Sampling Conditions

Parameter	Value
Number of Sampling Points	25
Barometric Pressure, avg. (in. Hg)	29.8
Stack Temperature, avg. (°F)	290
Static Pressure, in H2O	-0.7
Oxygen, %	12.3
Carbon Dioxide, %	6.4
Stack Gas Flowrate, avg. (dscfm)	26,200
Moisture, avg. (%)	25.4

The emission results are summarized below in Table 2. The emission rates for all parameters are reported per test run, and as an average per test. All supporting data (calculations, field data sheets, laboratory data, plant operating data) are included in the Appendix.

Table 2. Emission Results

	Units	Run 1	Run 2	Run 3	Average
Stack Velocity	fpm	4,210	3,200	3,220	3,540
Stack Flow Rate	dscfm	31,200	23,800	23,700	26,200
Particulate Concentration	gr/dscf	0.038	0.038	0.045	0.40
Particulate Emissions	lb/hr	10.1	7.7	9.2	9.0
Production Rate	ton/hr	211	258	235	235
Emissions/Production	lb/ton	0.048	0.030	0.039	0.039
Isokinetic Sample Rate	%	103	103	100	102

Sampling and Analysis Procedures

Testing was done following EPA and ODEQ methods. EPA Methods 1, 2, 3, 4, and 9 along with ODEQ Method 5 were followed. The Method 5 testing equipment was controlled with a Clean Air Engineering Method 5 metering console. Apex Instruments' nozzles and probes were used to pull the sample into the filter and impinger box. Isokinetics were calculated during the testing using Clean Air's equations supplied with the metering console.

For the EPA Method 3 testing, CO_2 and O_2 were measured with a Fyrite combustion analyzer.

All Method QA and QC checks passed and all calibrations were within allowable ranges.

The particulate catches were well over the method detection limits. Laboratory analysis of the samples were done in house by OMNI. Laboratory worksheets are located in the appendix.

Discussion

All test QA/QC checks passed and testing should be valid.

Appendix

Sample Calculations
- Particulate Sample Calculations

Results
- Particulate Calculations
- Moisture Catch
- Particulate Catch

Field Data
- Method 5 Field Data Sheets
- Method 4 Field Data Sheet
- Method 1 Field Data Sheet
- Method 9 Field Data Sheet

Laboratory Data
- Laboratory Worksheets
- Tare Weight Records

Production Data

Calibrations
- Meter Box Calibrations
- Nozzle Measurements
- Pitot Alignment Calibrations
- Thermocouple Calibrations
- Daily Analytical Balance Calibration
- Analytical Balance Calibration
- Portable Electronic Scale Calibration
- Barometer Calibration

Administrative
- Source Test Plan
- Response Letter from ODEQ

Sample Calculations

OMNI Environmental Services, Inc.
(503) 643-3788
Sample Calculations
Source: Morse Bros, Troutdale
Run: RUN 2

Stack Pressure Absolute	$P_{s, abs}$	Stack Static Pressure	P_{static}
Barametric Pressure	P_{bar}	Meter Pressure	P_{meter}
Standard Pressure	P_{stan}	Average Orifice Presure	ΔH
Sample Volume, Dry Standartd	$V_{dry, stan}$	Meter Gamma	Y
Meter Reading	V	Standard Temp	T_{stan}
Stack temp	T_s	Meter Temp	T_m
Volume Water Vapor	V_w	Pitot Constant	Cp
Velocity Pressure	ΔP	Volume Condensate	V_c
% Moisture	Bws	Molecular Weight Dry	MW_{dry}
Molecular Weight Wet	MW_{wet}	Velocity	v
Volumetric Flow Rate	Q_{stan}	Stack Area	A_s
Nozzle Area	A_n	Isokinetics	I
Test Time	Φ	Grain Loading	cg
Particulate Weight	mn	Particulate Mass Emissions	ME

$P_{s, abs} = P_{bar} + P_{static} / 13.6$ *in H20/in Hg*

$P_{s,abs} =$ 29.80 *in Hg* + -0.7 *in H20* / 13.6 *in H20/in Hg* = 29.79 *in Hg*

$P_{meter} = P_{bar}$ + Average ΔH / 13.6 *in H20/in Hg*

$P_{meter} =$ 29.8 *in Hg* + 1.02 *in H2O* / 13.6 *in H20/in Hg* = ~~.075~~ 29.87 *in Hg*

$V_{dry, stan} = Y * V * T_{stan} * P_{meter} / P_{stan} / T_m$

$V_{dry, stan} =$ 1.015 * 32.719 *cft* * 528°R * 29.87 *in Hg* / 29.92 *in Hg* / 537.2 °R = 32.59 *cft*

$V_w = V_c * 0.04707$ *cft/ml*

$V_w =$ 238.4 *ml* * 0.04707 *cft/ml* = 11.22 *cft*

$Bws = 100 * V_w / (V_w + V_{dry, stan})$

Bws = 100 * 11.22 *cft* / (11.22 cft + 32.59 *cft*) = 25.61 %

$MW_{dry} = 0.44 * \%CO2 + 0.32 * \%O2 + 0.28 * (\%N2 + \%\%CO)$

$MW_{dry} = 0.44 *$ ~~13~~ 5.9 % + 0.32 * 13 % + 0.28 * (81.1 % + ~~39~~ 0 %) = ~~31.1~~ 29.46 lb/lb mole

$MW_{wet} = MW_{dry} * (1 - Bws / 100) + 18 * Bws / 100$

$MW_{wet} =$ 29.46 lb/lb mole * (1-.2561 ~~%~~ /100) + 18 lb/lb mole * .2561 ~~%~~ /100 = 26.52 lb/lb mole

$V = k_{constant} * 60$ sec/min $*Cp * \Delta P^{0.5} * T_s^{0.5} / MW_{wet}^{0.5} / P_{s,abs}^{0.5}$

v = 85.49ft/sec((lb\|lbmole)(in Hg)/(°R)(in H2O))^.5 * 60 sec/min * .84 * .7643 in H20^0.5 * 27.27 °R^.5 / 5.15 lb/lb mole^0.5 / 5.46 in Hg^0.5 = 3194 fpm

$Q_{stan} = (1\text{-Bws}/100) * v * A_s * T_{stan} * P_{s,abs} / 144$ in^2/ft^2 / T_s / P_{stan}

Q_{std} = (1- .2561 /100) * 3194 fpm * 2041 in^2 * 528°R * 29.79 in Hg / 144 in^2/ft^2 / 6328 / 743.7 °R / 29.92 in Hg = 23,805 cft/min

$I = 100 * T_s * V_{stan} * P_{stan} * 144$ in^2/ft^2 / T_{stan} / v / Φ / A_n / $P_{s,abs}$ / (1-Bws/100)

I = 100 * 743.7 °R * 32.59 cft * 29.92 in Hg * 144 in^2/ft^2 / 528°R / 3194 fpm / 515 min / .0473 in^2 / 29.79 in Hg / (1- .2561 %/100) = 102.7 %

$cg = mn * 0.01543$ gr/mg / V_{stan}

cg = 79.3 mg * 0.01543 gr/mg / 32.59 dscft = .0375 gr/dscf

$ME = cg * Q_{stan} * 60$ min/hr / 7000 gr/lb

ME = .0375 gr/dscf * 23,805 dscft/min * 60 min/hr / 7000 gr/lb = 7.66 lb/hr

Results

Administrative

February 23, 2001

Jack Herbert
Oregon Department of Environmental Quality
2020 SW Fourth Ave.
Suite 400
Portland, OR 97201-4987

Dear Jack,

The following source test plan is submitted for your review. A letter of acceptance including any changes would be appreciated. If we receive no correspondence from your office before the day of the testing, we will consider this source test plan approved.

1) **Plant Location:**
Morse Bros. portable asphalt plant
5700 NE Sundial Road
Troutdale, OR 97060

2) **Source Contact(s):**
Fred Bond
9710 Wheatland Road N.
Salem, OR 97303

(503) 390-6955
FAX 390-4904

3) **OMNI Environmental Contacts:**
Joe Fiedler or Dave Broderick
(503) 643-3788
FAX 643-3799

4) **Source Description:**
CMI portable asphaltic paving plant. The plant has a 300-350 ton/hour capacity and it will be running at about 325 tons/hour. Emissions are controlled with a CMI baghouse.

5) **Date of Testing:**
April 5, 2001.

6) **Pollutants to be Measured:**
Particulate, NOx, CO and Opacity

OMNI Environmental Services, Inc.
Consulting + Engineering + Testing

Mailing: Post Office Box 743 + Beaverton, Oregon 97075 USA
Street: 5465 SW Western Avenue + Suite M + Beaverton, Oregon 97005 USA

Phone: (503) 643-3788
Fax: (503) 643-3799

7) **Test Methods:**
EPA Methods 1-4, ODEQ Method 5, EPA Methods 7E and 10.

8) **Number of Sampling Replicates:**
Particulate and gases- Three runs of no less than 60 minutes each.
Opacity- Three Runs of no less than 6 minutes each.

9) **Process/ Production Information to be Recorded During Testing:**
Morse Bros. personnel will record tons of asphalt produced per hour, fuel usage, and type of fuel used during the testing replicates.

10) **Control Device Operating Parameters to be Recorded During Testing:**
Morse Bros personnel will record baghouse pressure drop once during each test run.

11) **Fuel Samples and Type of Analysis:**
NA.

12) **Visible Emission Measurements:**
Opacity readings will be performed by a certified opacity reader(s).

13) **Other Sampling Considerations.**
None Known.

14) **Other Process Considerations:**
Morse Bros will not be using any recycled asphalt at this facility or during the source test.

15a) It is assumed today, but it will be confirmed on or before the test day, that the duct air flow measuring meets criteria in EPA Methods 1 and 2.

b) In no case will sampling replicates be separated by a time duration of 24 or more hours, unless prior authorization is granted by the Administrator.

c) The source to be tested must operate at a normal production rate during testing. Rates not in agreement with those stipulated in the Air Contaminate Discharge Permit can result in test rejection. Imposed process limitations could also result from atypical rates.

d) The Department must be notified of any changes in the source test plan prior to testing. Significant changes not acknowledged by the Department which could affect the accuracy and reliability of results could result in test report rejection.

e) Method-specific quality assurance/quality control (QA/QC) procedures must be performed to ensure that the data is valid for determining source compliance. Documentation of the procedures and the results shall be presented in the source test report for review. Omission of this information may result in test report rejection.

Oregon
John A. Kitzhaber, M.D., Governor

Department of Environmental Quality
Western Region – Salem Office
750 Front St. NE, Ste. 120
Salem, OR 97301-1039
(503) 378-8240
(503) 378-3684 TTY

March 6, 2001

Joe D. Fiedler
OMNI Environmental Services, Inc.
PO Box 743
Beaverton, OR 97075

Re: AQ-Morse Bros., Inc.
Portable Asphalt Plant
Permit No. 37-0064

Dear Mr. Fiedler:

The source test plan submitted for conducting compliance emissions testing for PM, NOx, CO and Opacity at the above referenced facility on April 5, 2001 has been reviewed and is approved by the Department. Please notify me if there are any changes in the test dates or test protocol.

If you have any questions regarding the test methods, procedures, or QA/QC, please contact me at (503) 378-8240 ext. 254.

Sincerely,

Stephen Crane
Source Test Coordinator
Western Region

cc: John Ruscigno
ST37-0064 04-05-20001PLN.doc

APEX INSTRUMENTS
EPA Method 5
Model 522 Meter Box Calibration
Pre-Test Orifice Method
English Volume Units, English K' Factor

Model #: 0523-V3665820X
Serial #: 4T 5032-63

Date: 05/07/01
Barometric Pressure: 30.10 in hg

DRY GAS METER READINGS								CALIBRATION ORIFICE READING								
		Volume-			Temperature Tmi	Tmo					Ambient Temperature					
dH (in H20)	Time (min)	Initial (cu ft)	Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)		Orifice Serial No	K' FACTOR (number)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)	DGM Tmo (deg R)	DGM Temp (deg R)	ORIFICE Temp. (deg R)
0.50	14.7	154.144	160.263	6.119	Initial>	72	64	47	0.329	17.000	71	75	73.000	525.50	528.50	533.00
					Final >	71	67									
0.95	12.0	147.231	154.054	6.823	Initial>	70	63	55	0.451	17.000	68	73	70.500	523.50	527.25	530.50
					Final >	72	64									
1.60	8.3	141.085	147.105	6.020	Initial>	67	61	63	0.582	17.000	67	69	68.000	521.50	524.75	528.00
					Final >	69	62									
3.00	6.3	134.831	141.028	6.197	Initial>	67	61	73	0.786	15.000	63	67	65.000	521.00	524.25	525.00
					Final >	68	61									
4.60	5.1	128.548	134.725	6.177	Initial>	64	60	81	0.951	15.000	61	63	62.000	520.50	522.75	522.00
					Final >	66	61									

METER FLOW (cu ft)	ORIFICE FLOW (cu ft)	METER CALIBRATION FACTOR, Yc (number)	dH@ (in H2O)
6.1550	6.29	1.022	1.52
6.8870	7.08	1.027	1.53
6.1151	6.29	1.028	1.53
6.3224	6.45	1.020	1.56
6.3446	6.37	1.004	1.61
AVERAGE METER CALIBRATION FACTOR, Yc		1.020	1.550

OMNI Environmental Services, Inc.
Stainless Steel Nozzle Measurements

Date 27-Sep-00

	Nozzle ID	measurement 1	measurement 2	measurement 3	Average
1/8 "	2-1	0.1179	0.1172	0.1175	**0.1175**
3/16 "	3-1	0.1722	0.1739	0.1728	**0.1730**
	3-2	0.1748	0.1750	0.1751	**0.1750**
	3-3	0.2139	0.2140	0.2149	**0.2143**
1/4 "	4-1	0.2458	0.2462	0.2450	**0.2457**
	4-2	0.2805	0.2782	0.2810	**0.2799**
5/16 "	5-1	0.2991	0.2978	0.2972	**0.2980**
	5-2	0.3020	0.3010	0.3000	**0.3010**
	5-3	0.3432	0.3420	0.3405	**0.3419**
3/8 "	6-1	0.3672	0.3646	0.3658	**0.3659**
	6-2	0.3692	0.3672	0.3692	**0.3685**
7/16 "	7-1	0.4310	0.4285	0.4275	**0.4290**
1/2 "	8-1	0.4921	0.4902	0.4932	**0.4918**

All units are in inches.
Maximum difference between any two measurements is 0.004 inches.

OMNI Environmental Services, Inc.
Stainless Steel Nozzle Measurements

Date 7-May-01

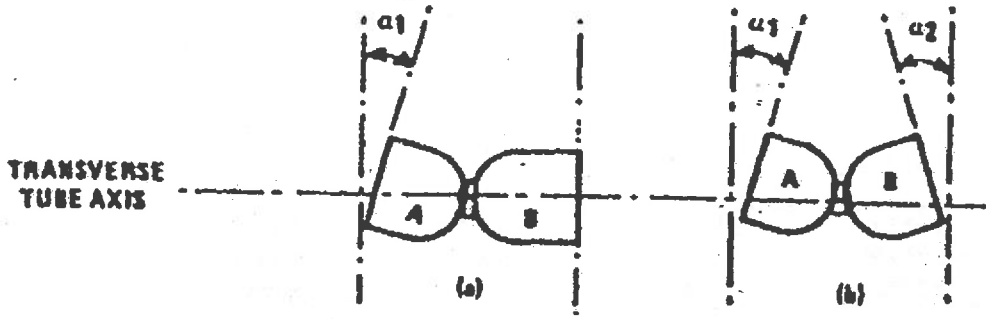
	Nozzle ID	measurement 1	measurement 2	measurement 3	Average
1/8 "	2-1	0.1195	0.1181	0.1192	0.1189
3/16 "	3-1	0.1725	0.1733	0.1742	0.1733
	3-2	0.1748	0.1758	0.1750	0.1752
	3-3	0.2149	0.2179	0.2152	0.2160
1/4 "	4-1	0.2441	0.2449	0.2441	0.2444
	4-2	0.2813	0.2790	0.2785	0.2796
5/16 "	5-1	0.2994	0.2982	0.2980	0.2985
	5-2	0.3022	0.2999	0.3000	0.3007
	5-3	0.3442	0.3403	0.3423	0.3423
3/8 "	6-1	0.3682	0.3656	0.3650	0.3663
	6-2	0.3700	0.3701	0.3700	0.3700
7/16 "	7-1	0.4312	0.4294	0.4280	0.4295
1/2 "	8-1	0.4914	0.4930	0.4915	0.4920

All units are in inches.

Maximum difference between any two measurements is 0.004 inches.

OMNI Envrionmental Services, Inc.
(503) 643-3788
FAX (503) 643-3799

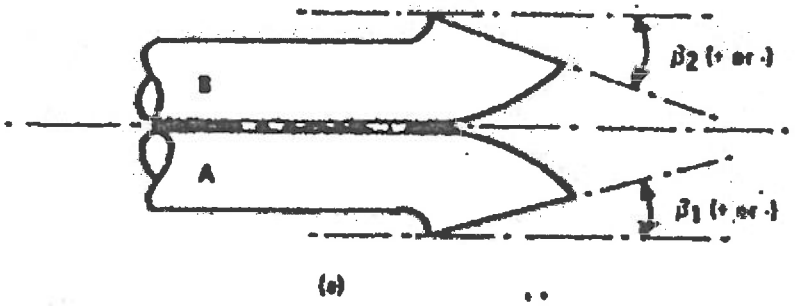
Pitot Alignment Calibration



$\alpha < 10°$

$\alpha_1 =$ 6°

$\alpha_2 =$ 5°

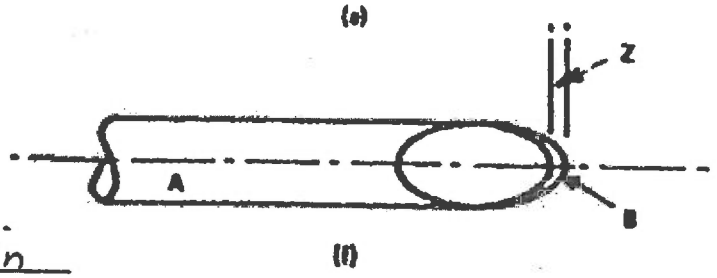


$\beta < 5°$

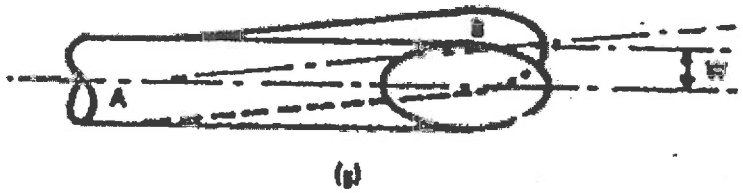
$\beta_1 =$ 1°

$\beta_2 =$ 0°

$z < 1/8"$



z = Øin



$w < 1/32"$

w = Øin

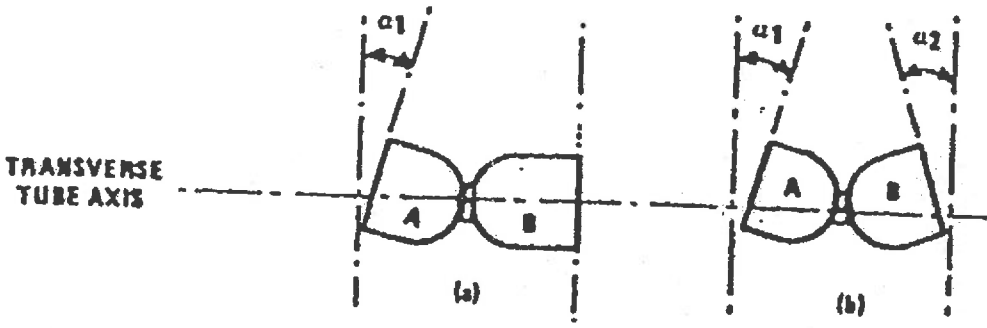
Date 5/7/01

Pitot # 4-1

By JDF

OMNI Envrionmental Services, Inc.
(503) 643-3788
FAX (503) 643-3799

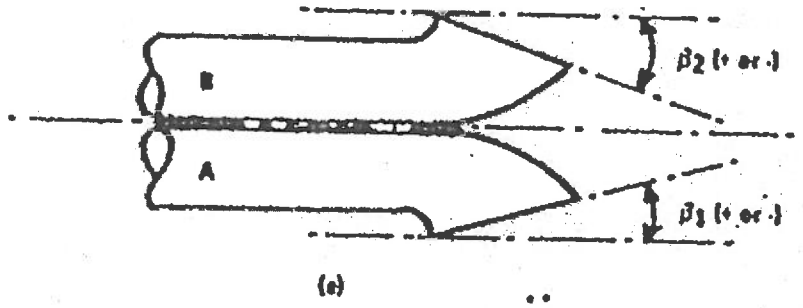
Pitot Alignment Calibration



$\alpha < 10°$

$\alpha 1 =$ 7°

$\alpha 2 =$ 2°

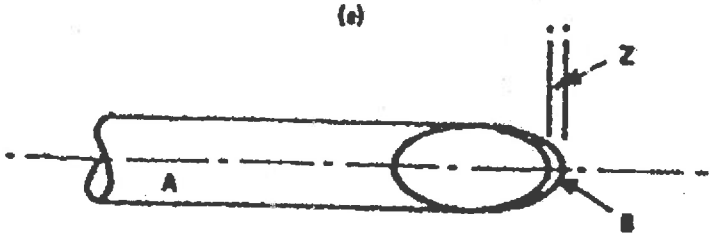


$\beta < 5°$

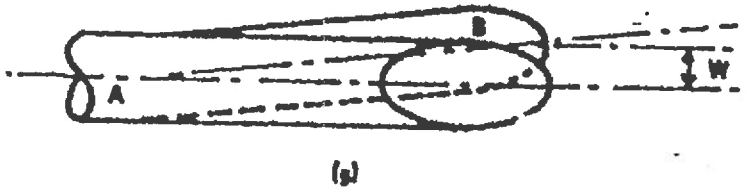
$\beta 1 =$ 0°

$\beta 2 =$ 1°

$Z < 1/8"$



$Z =$ Øin



$W < 1/32"$

$W =$ Øin

Date 5/7/01

Pitot # 4-2

By JDF

OMNI Environmental Services, Inc.
(503) 643-3788
FAX 643-3799

Tc Indicator
Jenco

Thermocouple Calibrations

Date 10-May-01
Pb 30.1

Standard Hg Therm
by jdf

Method 5 Probes	Ice Water Tc	Standard	difference	Boiling Water Tc	Standard	difference	Hot Oil Tc	Standard	difference
4-1	34.9	33	0.4%	205.5	203	0.4%	494	510	-1.6%
4-2	34.8	33	0.4%	204.1	204	0.0%	500.3	506	-0.6%
6-1	34.3	33	0.3%	205.8	207	-0.2%	486	502	-1.7%
6-2	34.7	33	0.3%	209.1	207	0.3%	496	507	-1.1%
Free Standing Thermocouples									
#1	34.4	33	0.3%	208.5	202	1.0%	476	484	-0.8%
#2	34.3	33	0.3%	204.1	204	0.0%	495	493	0.2%

All values must agree within 5%

Cascade Air Testing, LLC
PO Box 879
Fairview, OR 97024
(503) 674-9922
FAX 465-1210

Analytical Balance Daily Calibration Record

Date	Temp F	% Humidity	100g	1.00g	By
7/23/00	80	62	100.0001	1.0001	JDF
7/24/00	74	66	99.9999	.9999	JDF
7/27/00	83	62	99.9998	1.0000	JDF
8/8/00	73	70	100.0001	1.0000	JDF
8-9-00	75	69	99.9999	1.0000	JDF
8-10-00	72	68	100.0000	0.9999	JDF
8-11-00	70	70	99.9999	0.9999	JDF
8-14-00	73	64	100.0000	0.9999	JDF
8-18-00	74	66	100.0001	1.0000	JDF
9-20-00	72	64	100.0000	1.0000	JDF
9-21-00	72	66	100.0001	1.0000	JDF
9-25-00	68	59	100.0001	0.9999	JDF
9-26-00	72	56	100.0001	1.0000	JDF
9-27-00	72	60	100.0001	1.0000	JDF
9-28-00	72	62	100.0002	0.9999	JDF
10-3-00	68	65	100.0001	1.0000	JDF
11-1-00	69	65	100.0001	0.9999	JDF
11-2-00	69	67	100.0000	1.0000	JDF
11-3-00	71	66	100.0001	1.0000	JDF
4-24-01	72	64	100.0001	1.0000	JDF
4-25-01	72	66	100.0000	1.0000	JDF
4-26-01	72	65	100.0002	1.0000	JDF
4-27-01	70	65	100.0001	0.9999	JDF
4/30/01	70	66	100.0001	1.0001	JDF
5/1/01	70	63	100.0001	1.0000	JDF

Analytical Balance Calibration Check

Date: 05/07/01
Technician: JDF
Balance: Sartorius # OMNI-00244
Certified Balance: Mettler # OMNI-00023

Standard Weight (g)	Certified Balance (g)	Balance Reading (g)	Difference (g)	Difference (%)
1	1.0000	0.9998	0.0002	0.0200
2	1.9978	1.9976	0.0002	0.0100
3	3.0015	3.0013	0.0002	0.0067
5	4.9965	4.9962	0.0003	0.0060
10	10.0036	10.0033	0.0003	0.0030
20	19.9961	19.9957	0.0004	0.0020
30	29.9987	29.9982	0.0005	0.0017
50	50.0034	50.0030	0.0004	0.0008
100	100.0006	100.0001	0.0005	0.0005

Portable Electronic Scale Calibration Check

Date 05/09/01
Technician JDF
Balance OHAUS LS2000 OMNI-00243
Certified Balance Mettler # OMNI-00023, OMNI 00128

Standard Weight	OMNI-00023	OMNI-00128
10	10.0	
20	20.0	
30	30.0	
50	50.0	
100	100.0	
147.5	147.5	
295		295.1

Standard Weight Total (g)	Standard Weight Individual	Balance Reading	Difference (g)	Difference (%)
50	50	50	0.00	0.00
100	100	100	0.00	0.00
147.5	147.5	148	0.50	0.00
295.1	295.1	296	0.90	0.00
442.6	147.5+295.1	443	0.40	0.00
542.6	147.5+295.1+100	543	0.40	0.00
592.6	147.5+295.1+100+50	592	-0.60	0.00
622.6	147.5+295.1+100+50+30	622	-0.60	0.00
642.6	47.5+295.1+100+50+30+2	642	-0.60	0.00
652.6	7.5+295.1+100+50+30+20+	651	-1.60	0.00

Barometer Calibration

The barometric pressure for today September 15, 1999 according to The Weather Channel is 30.36 inches of Hg. Barometer #1 is reading 30.27 inches of Hg.

On April 3, 2000 according to The Weather Channel the barometric pressure is 30.04 inches of Hg. Barometer #1 is reading 30.00 inches of Hg.

On June 26, 2000 according to the Weather Channel the barometric pressure is 30.09 inches of Hg. Barometer #1 is reading 30.05 inches of Hg.

On September 19, 2000 the Weather Channel had the barometric pressure is 30.18 inches of Hg. Barometer #1 is reading 30.15 inches of Hg.

On May 7, 2001 the barometric pressure was 30.15 in. Hg according to the mercury barometer OMNI #00209. The field barometer read 30.2 in. Hg.

Laboratory Data

ODEQ M5 Laboratory Worksheet
Front Half Acetone and Filter Analysis

Plant Morse Bros, Troutdale Test Date 4-20-01
Source Asphalt Plant Sample Recovered by JDF/DRB

Run 1 Filter		Date	Time	Weight (g)	Temp (F)	RH (%)	By	Final Weight (g)
Filter ID	86	4/24/01	15:27	.6206	72	64	JDF	
Tare weight	.6028	4/25/01	13:17	.6147	72	66	JDF	
Date/time in	4-23-01	4/26/01	14:02	.6143	72	65	JDF	
dessicator	12:00							0.6145

Run 2 Filter								
Filter ID	87	4/24/01	16:13	.6073	72	64	JDF	
Tare weight	.5972	4/25/01	13:15	.6061	72	66	JDF	
Date/time in	4-23-01	4/26/01	13:55	.6045	72	65	JDF	
dessicator	12:00	4/27/01	8:55	.6062	70	65	JDF	.6060
		4/30/01	8:50	.6058	70	68	JDF	

Run 3 Filter								
Filter ID	85	4/24/01	13:55	.6268	72	64	JDF	
Tare weight	.6007	4/25/01	13:16	.6200	72	66	JDF	
Date/time in	4-23-01	4/26/01	14:08	.6298	72	65	JDF	
dessicator	12:00							.6299

Run 1 Front Acetone								
Beaker ID	103	4/26/01	14:47	101.6331	72	65	JDF	
Tare weight	101.6256	4/27/01	9:41	101.6333	70	65	JDF	
Volume	112							
Solv ID								
Date/time in	4-25-01							
dessicator	13:35							101.6332
Sample lost in transfer?				ND				

Run 2 Front Acetone								
Beaker ID	7	4/30/01	8:56	119.3999	70	68	JDF	
Tare weight	119.3956	5/1/01	8:21	119.3995	70	63	JDF	
Volume	64							
Solv ID								
Date/time in	4-27-01							
dessicator	9:35							1193997
Sample lost in transfer?				ND				

Run 3 Front Acetone								
Beaker ID	X 105	4/30/01	8:57	102.9239	70	68	JDF	
Tare weight	102.9219	5/1/01	8:20	102.9234	70	63	JDF	
Volume	64 77							
Solv ID								
Date/time in	4-27-01							
dessicator	9:35							102.9237
Sample lost in transfer?				& ND				

Time/date samples placed in ~~heed~~? desicator 4/23/01 @ 10:30
Color of desiccant? blue blue = dry/ pink = wet

OMNI

ODEQ M5 Laboratory Worksheet
Back Half Acetone and Blank Analysis

Plant Mora Bros, Troutdale
Source Asphalt Plant

Test Date 4-20-01
Sample Recovered by JDF/DRB

Run 1 Back Acetone

		Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID	151	5/3/01	9:51	104.7398	71	61	JDF	
Tare weight	104.7212	5/4/01	1525	104.7402	72	62	DRB	
Volume	166							
Solv ID								
Date/time in dessicator								104.7400

Sample lost in transfer? NO

Run 2 Back Acetone

Beaker ID	55	5/3/01	9:54	109.6698	71	61	JDF	
Tare weight	109.6491	5/4/01	1528	109.6703	72	62	DRB	
Volume	174							
Solv ID								
Date/time in dessicator								109.6701

Sample lost in transfer? NO

Run 3 Back Acetone

Beaker ID	147	5/3/01	9:49	104.4338	71	61	JDF	
Tare weight	104.4124	5/4/01	1530	~~104.4340~~ 104.4338	72	62	DRB	
Volume	162							
Solv ID								
Date/time in dessicator								104.4338

Sample lost in transfer? NO

Blank Filter

Filter ID	90	4/24/01	15:14	.6000	72	64	JDF	
Tare weight	.5999	4/25/01	13:18	.6000	72	66	JDF	
Date/time in dessicator	4-23-01 12:00							.6000

Blank Acetone

Beaker ID	54	4/30/01	8:54	110.1703	70	68	JDF	
Tare weight	110.1701	5/1/01	9:23	110.1699	70	63	JDF	
Volume	107							
Solv ID								
Date/time in dessicator	4-27-01 9:35							110.1701

Sample lost in transfer? ND

Time/date samples placed in hood? 4-25-01 13:30

Color of desiccant? blue (blue = dry, pink = wet)

ODEQ M5 Laboratory Worksheet
Impinger Water Analysis

Plant Morse Bros Troutdale
Source Asphalt Plant

Test Date 4-20-01
Sample Recovered by JDF/DRB

Run 1 Impinger Catch	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID 142	4/26/01	15:04	105.7393	72	65	JDF	
Tare weight 105.7347	4/27/01	9:44	105.7383	70	65	JDF	
Volume 247	4/30/01	8:57	105.7384	70	68	JDF	
Solv ID							
Date/time in 4-25-01							
dessicator 13:25							105.7384

Sample lost in transfer? NO Sample 1 of 3

Run 1 Impinger Catch	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID 121	4/26/01	14:58	105.1581	72	65	JDF	
Tare weight 105.1455	4/27/01	9:38	105.1600	70	65	JDF	
Volume 187	4/30/01	8:59	105.1587	70	68	JDF	
Solv ID	5/1/01	8:19	105.1571	70	63	JDF	
Date/time in 4-25-01	5/1/01	15:22	105.1579	70	64	JDF	
dessicator 13:25	5/2/01	8:27	105.1574	70	62	JDF	105.1577

Sample lost in transfer? NO Sample 2 of 3

Run 2 Impinger Catch	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID 101	4/26/01	14:59	103.6627	72	65	JDF	
Tare weight 103.6568	4/27/01	9:37	103.6635	70	65	JDF	
Volume 235	4/30/01	9:00	103.6628	70	68	JDF	
Solv ID	5/1/01	8:18	103.6618	70	63	JDF	
Date/time in 4-25-01	5/1/01	15:23	103.6623	70	64	JDF	
dessicator 13:25							103.6621

Sample lost in transfer? NO Sample 1 of 3

Run 2 Impinger Catch	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID 107	4/26/01	15:00	102.0309	72	65	JDF	
Tare weight 102.0285	4/27/01	9:36	102.0307	70	65	JDF	
Volume 190							
Solv ID							
Date/time in 4-25-01							
dessicator 13:25							102.0308

Sample lost in transfer? NO Sample 2 of 3

Run 1 Impinger Catch	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID 80	4/26/01	15:03	105.7383	72	65	JDF	
Tare weight 105.7330	4/27/01	9:45	105.7375	70	65	JDF	
Volume NA	4/30/01	8:56	105.7371	70	68	JDF	
Solv ID							
Date/time in 4-25-01							
dessicator 13:25							105.7373

Sample lost in transfer? NO Sample 3 of 3

Oven Temperature for Water Samples? 190°F
Temperature Measurement Device? DI
Color of desiccant? blue blue = dry, pink = wet

OMNI

ODEQ M5 Laboratory Worksheet
Impinger Water Analysis

Plant Morse Bros Troutdale
Source Asphalt Plant

Test Date 4-20-01
Sample Recovered by JDF/DRB

Run 2 Impinger Catch

	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weight (g)
Beaker ID 111	4/26/01	15:02	102.3846	72	65	JDF	
Tare weight 102.3794	4/27/01	9:46	102.3845	70	65	JDF	
Volume NA							
Solv ID							
Date/time in 4-25-01							
dessicator 13:25							102.3846

Sample lost in transfer? NO Sample 3 of 3

Run 3 Impinger Catch

Beaker ID 143	4/26/01	14:57	105.5459	72	65	JDF	
Tare weight 105.5449	4/27/01	9:47	105.5451	70	65	JDF	
Volume 231	4/30/01	8:58	105.5450	70	68	JDF	
Solv ID							
Date/time in 4-25-01							
dessicator 13:25							105.5451

Sample lost in transfer? NO Sample 1 of 3

Run 3 Impinger Catch

Beaker ID 132/135	4/30/01	9:01	107.2727	70	68	JDF	
Tare weight 107.2680	4/30/01	9:03	107.2725	70	68	JDF	
Volume 208	5/1/01	8:20	107.2727	70	63	JDF	
Solv ID							
Date/time in							
dessicator							107.2726

Sample lost in transfer? NO Sample 2 of 3

Run 3 Impinger Catch

Beaker ID 77	4/26/01	15:00	103.9104	72	65	JDF	
Tare weight 103.9097	4/27/01	9:48	103.9104	70	65	JDF	
Volume NA							
Solv ID							
Date/time in 4-25-01							
dessicator 13:25							103.9104

Sample lost in transfer? NO Sample 3 of 3

Blank Water

Beaker ID 76	4/26/01	15:01	103.3404	72	65	JDF	
Tare weight 103.3308	4/27/01	9:47	103.3402	70	65	JDF	
Volume 200							
Solv ID							
Date/time in 4-25-01							
dessicator 13:24							103.3403

Time/date samples placed in oven? 14:00
Oven Temperature for Water Samples? 210°F
Temperature Measurement Device? DI
Color of desiccant? blue blue = dry, pink = wet

ODEQ M5 Laboratory Worksheet
DCM Extraction Analysis

Plant Morse Bros, Troutdale
Source Asphalt Plant

Test Date 4-20-01
Sample Recovered by JDF/DRB

Run 1 Impinger Catch

	Date	Time	Weight (g)	Temp	RH (%)	By	Final Weigl
Beaker ID 113	4/26/01	14:56	104.5984	72	65	JDF	
Tare weight 104.3056	4/27/01	9:42	104.5979	70	65	JDF	
Volume 150							
Solv ID							
Date/time in 4-25-01							
dessicator 13:35							104.5982

Sample lost in transfer? NO

Run 2 Impinger Catch

Beaker ID 14	4/30/01	8:53	111.8975	70	68	JDF	
Tare weight 111.8594	5/1/01	9:23	111.8967	70	63	JDF	
Volume 150	5/1/01	15:24	111.8970	70	64	JDF	
Solv ID							
Date/time in 4-27-01							
dessicator 9:35							111.8969

Sample lost in transfer? NO

Run 3 Impinger Catch

Beaker ID 74	4/26/01	14:53	104.3128	72	65	JDF	
Tare weight 104.2594	4/27/01	9:40	104.3119	70	65	JDF	
Volume 150	4/30/01	8:59	104.3105	70	68	JDF	
Solv ID	5/1/01	8:20	104.3101	70	63	JDF	
Date/time in 4-25-01							
dessicator 13:35							104.3103

Sample lost in transfer? NO

Blank DCM

Beaker ID 110	4/26/01	14:42	106.9177	72	65	JDF	
Tare weight 106.9164	4/27/01	9:43	106.9179	70	65	JDF	
Volume 150							
Solv ID							
Date/time in 4-25-01							
dessicator 13:35							106.9178

Time/date samples placed in ~~oven~~? Hood 14:15
Oven Temperature for Water Samples? NA
Temperature Measurement Device? NA
Color of desiccant? blue blue = dry, pink = wet

Production Data

SOURCE TEST SUNDIAL PLANT
April 20, 2001
TROUTDALE

TIME	INLET TEMP	AC TEMP	BAGHOUSE DIFFERENTIAL PRESSURE	RUNNINGS TONS	T.P.H.	
8:35	286	305	5	242	275	
8:50	294	305	5	284	275	
9:05	292	305	5	324	275	211
9:20	295	305	5.1	399	275	
9:35	295	305	5	453	end of test	
				211		
11:05	284	305	5	482	275	
11:20	292	305	5	542	275	
11:35	294	305	5.1	612	275	258
11:50	292	305	5.1	684	275	
12:05	294	305	5.1	740	275	
12:20	294	305	5.1	742	275	
12:38	294	305	5.1	795	275	
12:55	294	305	5.1	860	275	235
1:10	290	305	5.2	930	275	
1:25	290	305	5.2	997	275	

TO: JOE D. FIEDLER
OMNI
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Calibrations

APEX INSTRUMENTS
EPA Method 5
Model 522 Meter Box Calibration
Pre-Test Orifice Method
English Volume Units, English K' Factor

Model #: 0523-V3665820X
Serial #: 4T 5032-63

Date: 09/15/00
Barometric Pressure: 30.18 in hg

		DRY GAS METER READINGS						CALIBRATION ORIFICE READING								
		Volume		Volume	Temperature Tmi	Tmo	Orifice			Ambient Temperature			DGM	DGM	ORIFICE
dH (in H20)	Time (min)	Initial	Final (cu ft)	Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Serial No	K' FACTOR (number)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)	Tmo (deg R)	Temp (deg R)	Temp. (deg R)
0.51	14.2	850.632	856.619	5.987	Initial> 71	73	47	0.329	17.000	73	73	73.400	534.00	532.75	533.40
					Final > 72	75									
0.95	10.0	882.103	887.930	5.827	Initial> 75	77	55	0.451	17.000	75	75	75.050	537.50	536.50	535.05
					Final > 76	78									
1.65	7.1	888.404	893.698	5.294	Initial> 76	79	63	0.582	17.000	75	75	75.300	540.50	538.50	535.30
					Final > 77	82									
3.05	5.7	868.202	873.934	5.732	Initial> 74	80	73	0.786	17.000	75	74	74.500	541.50	538.00	534.50
					Final > 75	83									
4.65	5.5	874.780	881.652	6.872	Initial> 75	83	81	0.951	16.000	75	75	74.600	543.50	539.50	534.60
					Final > 76	84									

METER FLOW (cu ft)	ORIFICE FLOW (cu ft)	METER CALIBRATION FACTOR, Yc (number)	dH@ (in H2O)
5.9902	6.12	1.022	1.54
5.7956	5.90	1.018	1.54
5.2548	5.39	1.025	1.61
5.7142	5.80	1.014	1.63
6.8581	6.83	0.996	1.69
AVERAGE METER CALIBRATION FACTOR, Yc		1.015	1.604