Appendix D: Emission Factor References and Reports

AIR POLLUTANT EMISSIONS FACTORS FOR ABOVE-GROUND, REFRACTORY –LINED AIR CURTAIN INCINERATORS

FIREBOX AIR CURTAIN

Stephen Smallwood, PE
Air Quality Services
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July 12, 2005

AIR EMISSIONS FACTOR DATA FOR ABOVE-GROUND
REFRACTORV-LINED AIR CURTAIN INCINERATORS
(EPA AP-42, Fountainhead Engineering, Arkansas Permits
DEFRA BRE Report, U.K.)

FDEP 1986 Memo

In a June 5,1986 Memo entitled *"Interim Policy on Air Curtain Incinerators,"* the FDEP air permitting bureau chief explained that although the EP A's Compilation of Air Pollutant Emission Factor, AP-42 listed the particulate matter emission factor for "trench burners" as 13 1bs per ton of woodwaste burned, he had concluded (based on discussions with the US EPA air staff) that the then newer above-ground steel box "air curtain incinerator" units would further reduce PM emissions by 80-90%, and the emission rates of carbon monoxide (CO), nitrogen oxides (NOx), and sulfur dioxide (SO2) for the new design burners would be less than the particulate matter (PM) emissions rate, therefore an appropriate PM emission factor for the ACI units for permitting purposes would be approximately 2lbs PM per ton of woodwaste burned (for a well operated unit burning clean wood).

The EPA document provides a PM, SO2, & NOx emissions factor for a trench burner burning wood. The FDEP assumed that the PM emissions from the above ground units (as for the older design of "trench burners") would be the pollutant that would have the greatest emissions rate. So they just addressed the PM emission factor in the memo.

US EPA Air Pollutant Emission Factors

The EP A air emissions factor document, Compilation of Air Pollutant Emissions Factors (AP-42) provides PM (particulate matter), SO2, (sulfur dioxide) & NOx (nitrogen oxide) emissions factor for an older design trench (pit) burner combusting woodwaste, AP-42 does not include any emissions data that is directly based on mass emissions tests conducted on the new design above-ground refractory-lined air curtain incinerator (ACI).

Since the sulfur dioxide (SO2) emissions from an ACI are solely a function of the amount of sulfur compounds in the wood waste burned, the new above-ground units will emit the same amount of SO2 as the older design trench (pit) burner will for the same amount of the same type wood burned. Therefore, the AP-42 trench burner ACI wood waste burning emission factor for SO2 [0.10 lbs / ton woodwaste burned] can be used to estimate the typical SO2 emissions from burning woodwaste in a new design ACI. A copy of the AP42 ACI emissions factors is attached.

The other AP-42 trench burner ACI emission factors (PM, NOx) in AP-42 do not apply to the above ground refractory lined firebox "air curtain incinerators."

Other Air Burner Air Pollutant Emission Factors

The available emissions and combustion efficiency data for the new design units are based on mass emissions tests and a computer modeling study conducted by Fountainhead Engineering (Chicago) of the new design ACIs made by Whitton Engineering, and a combustion efficiency study preformed for the British government on the Air Burners LLC ACIs.

The above-ground Whitton ACIs that Fountainhead Engineering tested are the predecessor units for the Air Burners LLC units (palm Bay, FL). Air Burners LLC acquired Whitton, made the new units smaller that the corresponding older units, and improved the performance of the air curtain. Air Burners LLC holds patents for some of the design features of their burners.

See Section 1.1 of the attached Fountainhead Engineering Test Report of the Michigan ACI Emissions Test for a description of the dimensions of the various Whitton burner models.

A summary of the emission factors for the Michigan test and the Arkansas air permits are listed at the end of this technical note.

A second technical note that accompanies this one provides AP-42 emissions factor data that can be used to calculate the typical emissions from the diesel engine used by Air

Burners LLC to power the air curtain blower, (for installations that do not use electrical power to drive the blower).

The following discussion provided the data I have found on the technical description, performance, and air emissions of the above-ground, refractory-lined ACI manufactured by Air Burners LLC of Palm Bay, Florida.

Fountainhead Engineering, Ltd
Clarkston, Michigan Test

In it's December 26,2000 emissions test report entitled *"Final Report Describing Particulate and Carbon Monoxide Emissions From the Whit ton 8-127 Air Curtain Destructor"*, Fountainhead Engineering reported the results of an emissions test conducted in Clarkston, Michigan, using the appropriate EP A test methods to determine the actual emissions rates of PM, CO, SO2, & NOx for the Whitton ACI unit.

The ACI unit used in the Clarkston test was operated at approximately 20 tons per hour of clean wood waste (wood pallets) with an approximate density of 440 lbs per cubic yard. The overall length of the unit was 37 ft 4 inches x 11 ft 9 inches wide x 10 ft 3 inches high. The inside of the firebox was approximately 27' 3" x 11' 0" x 10' 3" (Volume ~ 114 cu. yds). About 75 - 80% of that (88 cu. yds) can be filled with wood waste, after the unit has reached it normal operating temperature.

Based on the average of the three full test runs, the average **PM** emissions factor was **0.11 bs PM per ton of woodwaste burned**. The **SO2** emissions were **1 ppm**. The **NOx emissions were variable at 1-4 ppm**. Visible emissions averaged approximately **5% opacity**, which is approximately the minimum change in opacity the human eye can detect. To most observers, 5% opacity looks like "no visible emissions".

The Clarkston Fountainhead Engineering report concludes that the air pollutant with the greatest emissions rate for this type of ACI was **carbon monoxide (CO) @ 1.0 lbs per ton of woodwaste burned**. PM emissions were very low @ 0.11 lbs per ton of wood waste burned, compared with the old design trench burners (13 lbs/ton), and there were no visible emissions after the unit was brought up to its normal operating temperature in about 20-30 minutes. The emissions of ***SO2 & NOx*** **were less than the CO emissions and were described as *insignificant.***

The permit was written to authorize the re-location of the unit to other locations with the same limitation after written approval of the department.

The permit describes the unit as "using a high velocity curtain of air to contain the smoke within the fire pit (firebox) and control the opacity of gaseous and particulate emissions. The curtain of air also injects excess oxygen into the fire and raises the temperature above 1600 of, reducing burned debris to 1% or less of its original volume. The high temperature burns off many pollutants that would otherwise escape into the atmosphere or ground water during open burning. *At the same time, the large excess of air minimizes the formation of NOx; so that emissions of NOx and SO2 are negligible.* "

The unit was subject to the us EP A rule 40 CFR 60 - Subpart CCCC - Standards of Performance for Commercial and Industrial Solid Waste Incineration Units. Based on Fountainhead test data, the maximum hourly emissions for this unit were determined to be:

TOTAL ALLOWABLE EMISSIONS		
Pollutant	Emission Rates	
	lb/hr	typ
PM	3.0	2.4
CO	20.0	20.0

Fountainhead Engineering
Data Summary

If you convert the Arkansas test data to emission factors (lbs pollutant / ton of woodwaste burned), the measured particulate matter (PM) emission factors for the Whitton units range from < 0.1 (Michigan test on clean pallets) to ~ 0.2 lbs PM / ton for land clearing debris, Arkansas Data). 140 tons debris burned in 8-10 hours is approximately 15.6 tons per hour. 3.0 lbs emission for 15.6 tons debris burned is 0.192lbs / ton (~ 0.20 lbs PM / ton land clearing debris burned.)

Hogeye Pallet Company
West Fork, Arkansas
Permit #: 1992-A

The company filed an application on January 2,2001, for a minor source permit to use a Whitton S-127 Air Curtain Destructor unit (the same type of unit that was the subject of the Michigan mass emissions test), to "incinerate broken parts and scraps of untreated wood left over from the manufacture of wooden pallets. The unit was subject to 40 CFR 60 - Subpart CCCC - Standards of Performance for Commercial and Industrial Solid Waste Incineration Units.'; Based on Fountainhead Engineering emissions test data and a computer modeling study of the combustion process, the maximum hourly emissions for this unit were determined to be:

TOTAL ALLOWABLE EMISSIONS		
Pollutant	Emission Rates	
	lb/hr	typ
PM	3.0	1.9
SO2	0.9	0.6
CO	20.0	12.5
Nox	1.6	1.0

The unit was expected to incinerate up to 140 tons of wood waste during an 8 - 10 hour work day.

Lasiter Construction
Little Rock, Arkansas
Permit #: 2027-A

The company filed an application on July 26, 2002, for a minor source permit to use a Whitton S-127 Air Curtain Destructor unit (the same type of unit that was the subject of the Michigan mass emissions test), to "dispose of land clearing debris and other allowed solid waste with controlled combustion to minimize the emission particulates." The permitting summary described the unit "as being capable of disposing of debris including tree stumps and combustible construction site waste that includes clean lumber and wood waste. The unit was expected to incinerate up to 140 tons of wood waste during an 8 - 10 hour work day, and to operate 30 to 45 days during the year."

The factor for the Arkansas (AR) CO emissions data is 20/3 time as much as the PM factor, which is approximately: **1.3 1bs CO / ton land clearing debris burned.** For the Michigan test it was 1.0 lbs CO / ton of clean pallets burned.

The AR factor for SO2. is 0.913 times as much as the AR PM factor, which is: 0.06 lbs SO2 / ton wood waste burned. The sulfur dioxide emitted from an ACI, unlike the other air pollutants is solely dependent on the amount of sulfur in the wood waste burned. The AP-42 factor, which represents a relatively large data set, is 0.10 lbs SO21ton of wood waste burned.

The Michigan test report lists 1 ppm for SO2, and 1-4 ppm for NOx for that test.

The S- 127 Whitton has a nominal maximum manifold blower flow rate of 760 scfm per foot of manifold length (19,700 scfm at 95% maximum). For a one hour period, at 95% of the maximum, the air flow rate is 1,182,000 scf 1 hr . Since an ACI operates with a relatively large amount of excess air, the dry scf/hr of air into the firebox (from the air curtain manifold), and the dry scf/hr of exhaust gas leaving the firebox (from the top edge of the furnace opposite the manifold) is approximately the same.

One ppm by volume is therefore approximately 1.18 scf. One pound mole of S02 weighs 64 pounds. One lb-mole at STP occupies ~ 385 ft3. So 1.18 scf weighs ~ 0.196lbs. The wood waste burn rate during the Michigan test was approximately 20 ton per hour. That gives an SO2 emission factor for that test of ~ 0.01 lbs SO2 per ton of waste wood pallets burned. For general use (unless wood sulfur content data is available, I recommend using the AP-42 factor for trench (pit) burners, which is **0.10 lbs SO2 / ton waste wood burned** for the above ground units, since this emission factor is primarily a function of the sulfur content of the wood.

For NOx, one pound mole of NO2 weighs 60 pounds. So 4 ppm NO2 weights ~ 0.736 lbs. That gives an NO2 emission factor for that test of ~ 0.04 lbs NO2 per ton of waste wood pallets burned for the Michigan test. The **Hogeye Pallet Company** test (see above), which like the Michigan test, burned wood pallets give a NO2 emission factor for that test of ~ 0.10 lbs NO2 per ton of wastewood pallets burned. (1.6 lbs / 15.6 tons burned).

UK Department of Environment, Food and Rural Affairs (DEFRA)
Investigation into Burning Characteristics of an Air Curtain Burner
Prepared By:
Building Research Establishment Ltd (BRE)
Fire and Risk Sciences Division (FRS)
June 2002

The BRE Report to D EFRA, U .K., "Investigation Into Burning Characteristics of an Air Curtain Incinerator," is primarily concerned with determining the nature and the efficiency of the combustion of woodwaste that occurs inside of the firebox of a new

design above-ground refractory-lined Air Curtain Burner (ACB), particularly with respect to the effectiveness of using ACBs to incinerate the carcasses of diseased cattle in the U .K. The part of the investigation that is relevant to estimating air emissions from the new burners is their findings on the effectiveness of the combustion that occurred in the unit tested, and the extent to which sulfur dioxide and nitrogen oxides are emitted from the firebox of the Air Curtain Burner (the term the British use for an ACI).

The unit tested was a Whitton S-121 , which is a smaller version of the Whitton S-127, which was the subject of the Fountainhead Engineering emissions tests. The S-121 is 32.17 ft (I) x 11.75 ft(w) x 10.25 ft(ht). The firebox is 22.17 ft (I) x 11.0 ft (w) inside. It can hold approximately 70 cubic yards of wood waste at atypical bulk density of ~ 440 lbs / cubic yard. Fully loaded it can hold about 15 tons of softwood logs, land clearing debris, pallets or other clean, relatively dry wood waste. The air curtain exit volume flow rate at 95% nominal maximum load is approximately 16,000 scfm *(N* 960,000 scf/hr). The water content, by weight, of wood waste air dried (for at least six months) is typically about 20%.

During the first two burn days (using wood waste only) approximately 34 tonnes (~2200 lbs = one British Tonne) of wood waste was burned during two six-hour burn periods. The middle 4-hour period provided steady-state fully-developed combustion conditions, during which various tests described in the report were conducted. During these two periods the firebox was burning woodwaste at approximately 3.5 tonnes per hour. At that fuel load the air curtain blower would be at about one half the maximum nominal flow rate (~ 500, 000 scf/hr).

The minimum detection level for the SO2 and NOx test methods used by BRE was 20 ppm. All measurements taken were below the minimum detection level for both air pollutants.

One ppm by volume of 500,000 scf is therefore approximately 0.50 scf. One pound mole of NO2 weighs 60 pounds. One lb-mole at STP occupies ~385 W. Therefore 0.50 scf weighs ~ 0.078 lbs. So, 20 ppm would be 1.56 lbs. The wood waste burn rate during the UK test was approximately 3.7 ton per hour. That gives <u>max</u> NO2 emission factor for that test of ~ <u>0.42 lbs NO2 per ton of wastewood burned.</u> For SO2 ,0.50 scf weighs 0.083 lbs. So, 20 ppm would be 1.66 lbs. That gives a ~ SO2 emission factor for that test of ~ 0.45 lbs SO2 per ton of wastewood burned.

Based on the previous discussion, the AP-42 data for SO2 emissions from both trench burners and above ground firebox burners (<u>0.10 Ibs 8021 ton wood waste burned</u> is probably the best data for that pollutant, absent specific wood sulfur content data). The ratio of the NOx / SO2emission factors in AP-42 for trench burners is 40:1. The ratio of the NOx / SO2 emission factors in Fountainhead Engineering Michigan test was 4:1. The 1ogeye Pallets Company data indicated a N Ox emission factor of 0.10 lbs/ ton woodwaste burned.

Considering all of the available information for N Ox emission from the above ground refractory lined air burners, I think the best emission factor we currently have is 0.40 lbs NOx / ton waste wood burned. In many cases, the emissions are probably less than this amount. I think it is unlikely that they will be greater than that amount very often.

The BRE Report to DEFRA, U .K. ,"Investigation Into Burning Characteristics of an Air Curtain Incinerator,," also found that in the "above air curtain position" the absolute concentrations ofCO2 were relatively low, averaging about 5000 ppm. The CO emissions were typically less than 100 ppm (~ 1.0 lbs/ton woodwaste burned). The oxygen concentrations in the "above air curtain position" generally ranged between 20.9% and 19.7%.

The report noted that of more significance than that data (. . . for their investigation. . .) is the fact that the British Standards for fire types, which uses the ratio *CO2/CO* to classify filetypes, classifies the air burner fire as a "Well Ventilated Flaming" fire, a *CO2/CO* ratio > 20. The ratios for the BRE tests on a Whitton ACI were normally > 1,000, indicating that highly efficient combustion was occurring in the burner firebox prior to the very hot combustion gases being released to the outside air.

Conclusions

I have provided this additional information on the air emissions and combustion efficiency data that is available for the older Whitton and the newer Air Burners LLC above-ground refractory-lined units, to assist those who need to make air emission estimates for planning or permitting purposes. It is my opinion that this data is the best available to estimate the emissions from the new design ACIs.

In Florida, the FDEP Air Division's Emissions Monitoring Section, during October 2004, reviewed the Clarkston Fountainhead ACI Test Report. I had not found the Arkansas and British data at that time. The Section concluded that the methodology used for the air burner mass emissions test was reasonable, absent an adopted US EP A test method for air burner mass emissions tests, but the Department should continue to use the Clair Fancy Memo as the applicable technical guidance until more test data becomes available.

Therefore, for now, the appropriate emissions factor to use for air permitting of above-ground, refractory-lined air curtain incinerators, in Florida, that are manufactured by **Air Burners LLC** (Palm City, FL), or any other air burner manufacture, is the **2.0 lbs PM / ton woodwaste burned factor presented in the 1986 Air Division Technical Memo.**

The other air burner emissions factors discussed above should not be used in a Florida air application to estimate air pollutant emissions for permitting purposes (determining the processing fee or determining whether a facility is a Title V source). Nor should the AP42 trench (pit) burner emissions factors be used for permitting purposes in Florida or elsewhere, except for the SO2 emissions factor.

The following summarizes the results of the previous discussion on Other Air Burner Emission Factors. This information is presented for general information only. I recommend it not be used for planning or permitting purposes, unless the planning agency or air permitting office has reviewed the technical material presented in the previous discussion and in the attachments; and have approve it's use for a specific purpose.

1. PM =/< 0.20 lbs per ton of wood waste burned. (Arkansas Air Permits)

2. SO2 =/< 0.10 lbs per ton of wood waste burned. (AP 42 emission factor)

3. CO =/< 1.30 lbs per ton of wood waste burned (Fountainhead Michigan test results, Arkansas Permits, UK DEFRA Rpt)

4. NOx = /< 0.40 lbs per ton of wood waste burned (Fountainhead Michigan test results, Arkansas Permits, UK DEFRA Rpt)

Attachments

The AP-42 trench burner emissions factors, a 2000 letter to the Georgia DNR about the Michigan test results from Fountainhead Engineering, and selected pages from the Fountainhead Michigan test report, the relevant parts of two Arkansas air permits (2001, 2002), and the relevant parts of the UK Report "Investigation into Burning Characteristics of an Air Curtain Burner,"(2002) prepared by Building Research Establishment Ltd, 2002, are attached.

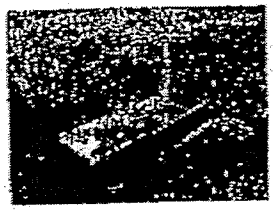
For additional information on the Fountainhead emissions test, and other available data, go to the Air Burners, LLC website: airburners.com. Scroll down the yellow column on the left side of the page "Literature Downloads," click on, "Technical Reports." Click on the download link for the version (format) of the report you want.

Reducing PM2.5 Emissions Through Technology

Results from a Recent Study Evaluating the Effectiveness of an Air Curtain Incinerator

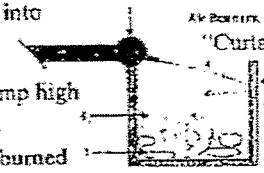
Ronald A. Susott, Ronald Babbitt, Emily Lincoln, and Wei Min Hao Contact: rbabbitt@fs.fed.us
USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT

An Air Burners LLC 200 Series Incinerator in Operation



In October of 2002, scientists from the Missoula Fire Sciences Laboratory (FiSL) teamed with engineers from the San Dimas Technology and Development Center (SDTDC) to evaluate the performance of an air curtain incinerator. A model 217, with a capacity of 6 tons per hour, was provided by the manufacturer. Other air curtain burners, with through-puts ranging from 1 to 15 tons per hour, are available from Air Burners LLC. For more information contact them at: www.airburners.com

How the Incinerator Works



The curtain of air created in this process traps unburned fine particles under the curtain in the high temperature zone where temperatures can reach 1,832° F (1,000° C). The increased combustion time and turbulence results in a re-burn and more complete combustion of the biomass.

How Effective Was It in Reducing Emissions?

Comparing Air Curtain to Pile and Understory Burn Emissions

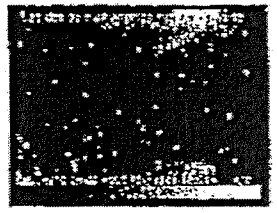
Type of Burn	EFCO2 (lbs/ton)	EFCO (lbs/ton)	EFCH4 (lbs/ton)	EFNMHC (lbs/ton)	EFPM2.5 (lbs/ton)	CE %
Average Pile	3268	179	13.9	9.9	25.5	89%
Average Understory	3286	180	6.6	5.4	36.0	90%
Average Air Curtain	3616	26	1.4	1.1	1.1	99%

Emission Reduction Factors (EF common method/EF air curtain)				
Type of Burn	CO	CH4	NMHC	PM2.5
Pile	7	10	9	23
Understory	7	5	5	33

With similar fuels (P. Pine), the air curtain incinerator tested gave approximately a 23-fold reduction in $PM_{2.5}$ emissions over pile burns and a 33-fold reduction over understory burns.

Hot Stuff

The image to the right was taken with an infrared camera and shows the high ember production from the incinerator. The incinerator requires a large operational area and the high quantity of embers ejected could pose a hazard at some locations.



The Bottom Line

The air curtain incinerator is very effective in reducing PM2.5 emissions.

Engineers at the SDTDC are currently performing a cost analysis – but the air curtain incinerator will likely be more costly than other common burning methods. SDTDC contact: Sue Zahn at szahn@fs.fed.us.

High ember production could be a problem in some cases.

Emission Factors Calculated for an Air Curtain Incinerator, Pile and Understory Burns with P. Pine as the Primary Type of Fuel

Ronald A. Susott, Ronald Babbitt, Emily Lincoln, and Wei Min Hao

USDA Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory, Missoula, MT
contact: rbabbitt@fs.fed.us (406) 329-4817

Emission Factors for Air Curtain Burner (OR 2002)

Air Curtain Emission Factors						
sample number	EFCO2 (lbs/ton)	EFCO (lbs/ton)	EFCH4 (lbs/ton)	EFNMHC (lbs/ton)	EFPM2.5 (lbs/ton)	CE %
1	3634	16	1.1	0.9	0.7	99%
2	3636	17	0.9	0.6		99%
3	3589	40	2.6	1.7	1.1	98%
4	3613	28	1.5	1.2	1.1	98%
5	3646	11	0.6	0.5		99%
6	3587	41	2.7	1.7	0.9	98%
7	3624	23	0.6	0.7	0.9	99%
8	3603	34	1.2	1.2	1.7	98%
Average	3616	26	1.4	1.1	1.1	99%

Emission Factors for P. Pine Understory Burns (AZ 1993=1994)

Emission Factors for P. Pine Understory Burns							
Burn Type Fire Code	EFCO2 (lbs/ton)	EFCO (lbs/ton)	EFCH4 (lbs/ton)	EFNMHC (lbs/ton)	EFPM2.5 (lbs/ton)	CE Ratio	Fuel tons/acre
8 year rotation under-burn							
AZ1_93	3316	167	4.5	4.1	29.3	90%	5
AZ2_93	3334	156	5.1	5.4	26.6	91%	9
AZ4_94	3216	199	7.0	5.8	45.5	88%	35
Broadcast burn							
AZ3_93	3214	201	8.7	6.6	41.7	88%	49
AZ6_93	3288	187	7.6	5.5	50.7	90%	95
First fire in 80+ years							
AZ4_93	3296	173	6.2	5.7	28.9	90%	32
AZ5_93	3246	206	7.5	6.1	48.6	89%	55
AZ2_94	3350	141	5.1	3.9	31.7	91%	43
6 year rotation under-burn							
AZ1_94	3278	185	7.1	5.3	28.8	89%	14
Under-burn, 3 years since last burn							
AZ3_94	3438	114	3.5	3.5	13.3	94%	NA
Average	3286	180	6.6	5.4	36.0	90%	37

Emission Factors for P. Pine Pile Burns (AZ 1994)

Emission Factors for P. Pine Pile Burns						
Fire Code	EFCO2 lbs/ton	EFCO lbs/ton	EFCH4 lbs/ton	EFNMHC lbs/ton	EFPM2.5 lbs/ton	CE %
AZP1 Flaming	3462	100	7.4	5.9	11.7	95%
AZP1 Smoldering	3172	210	21.0	10.76	33.9	86%
AZP2 Flaming	3534	58	3.6	2.96	10.3	96%
AZP2 Smoldering	3160	247	20.3	10.5	15.0	86%
AZP3 Flaming	3454	97	5.0	5.7	13.8	94%
AZP3 Smoldering	3076	268	19.5	12.66	52.8	84%
AZP4 Flaming	3376	129	7.7	9.14	18.8	92%
AZP4 Smoldering	3056	277	22.2	12.98	34.7	83%
AZP5 Flaming	3392	115	7.9	10.42	18.6	92%
AZP5 Smoldering	3080	260	21.6	14.02	55.1	84%
AZP6 Flaming	3454	97	5.8	6.94	11.1	94%
AZP6 Smoldering	3008	285	24.5	16.84	49.9	82%
Average Flaming	3444	99	6.2	6.84	14.0	94%
Average Smoldering	3092	258	21.5	12.96	36.9	84%
Average all	3268	179	13.9	9.9	25.5	89%

Appendix E: SCREEN3 Model Information for Criteria Pollutants

07/19/07

16:32:28
*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

FRS Portable Air Curtain Incinerator with Diesel Engine PM-10 Analysis

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	POINT
EMISSION RATE (G/S)	=	0.129700
STACK HEIGHT (M)	=	2.1336
STK INSIDE DIAM (M)	=	3.8100
STK EXIT VELOCITY (M/S)	=	2.5908
STK GAS EXIT TEMP (K)	=	810.9278
AMBIENT AIR TEMP (K)	=	293.1500
RECEPTOR HEIGHT (M)	=	0.0000
URBAN/RURAL OPTION	=	RURAL
BUILDING HEIGHT (M)	=	0.0000
MIN HORIZ BLDG DIM (M)	=	0.0000
MAX HORIZ BLDG DIM (M)	=	0.0000

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

BUOY. FLUX = 58.869 M**4/S**3; MOM. FLUX = 8.806 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

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

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGMA Z (M)	DWASH
1.	0.000	1	1.0	1.0	449.6	448.56	1.83	1.79	NO
100.	0.9411E-01	6	1.0	1.0	10000.0	98.10	27.72	27.52	NO
200.	0.6780	4	20.0	20.0	6400.0	22.32	15.86	9.03	NO
300.	1.519	4	20.0	20.0	6400.0	22.32	22.96	12.73	NO
400.	1.635	4	20.0	20.0	6400.0	22.32	29.85	16.01	NO
500.	1.494	4	20.0	20.0	6400.0	22.32	36.58	19.14	NO
600.	1.299	4	20.0	20.0	6400.0	22.32	43.18	22.13	NO
700.	1.119	4	20.0	20.0	6400.0	22.32	49.60	24.87	NO
800.	0.9943	4	15.0	15.0	4800.0	29.76	56.22	28.10	NO

900.	0.8972	4	15.0	15.0	4800.0	29.76	62.46	30.67	NO
1000.	0.8079	4	15.0	15.0	4800.0	29.76	68.66	33.20	NO
1100.	0.7314	4	15.0	15.0	4800.0	29.76	74.80	35.17	NO
1200.	0.6708	4	10.0	10.0	3200.0	44.64	81.44	38.28	NO
1300.	0.6334	4	10.0	10.0	3200.0	44.64	87.45	40.08	NO
1400.	0.5978	4	10.0	10.0	3200.0	44.64	93.43	41.85	NO
1500.	0.5642	4	10.0	10.0	3200.0	44.64	99.36	43.58	NO
1600.	0.5327	4	10.0	10.0	3200.0	44.64	105.27	45.27	NO
1700.	0.5035	4	10.0	10.0	3200.0	44.64	111.14	46.93	NO
1800.	0.4859	6	4.0	4.0	10000.0	60.45	60.39	26.60	NO
1900.	0.5038	6	4.0	4.0	10000.0	60.45	63.19	27.14	NO
2000.	0.5203	6	4.0	4.0	10000.0	60.45	65.98	27.68	NO
2100.	0.5305	6	4.0	4.0	10000.0	60.45	68.76	28.14	NO
2200.	0.5395	6	4.0	4.0	10000.0	60.45	71.54	28.59	NO
2300.	0.5475	6	4.0	4.0	10000.0	60.45	74.31	29.04	NO
2400.	0.5546	6	4.0	4.0	10000.0	60.45	77.08	29.48	NO
2500.	0.5608	6	4.0	4.0	10000.0	60.45	79.84	29.91	NO
2600.	0.5662	6	4.0	4.0	10000.0	60.45	82.59	30.35	NO
2700.	0.5708	6	4.0	4.0	10000.0	60.45	85.34	30.77	NO
2800.	0.5747	6	4.0	4.0	10000.0	60.45	88.08	31.20	NO
2900.	0.5790	6	3.5	3.5	10000.0	63.21	90.96	32.05	NO
3000.	0.5828	6	3.5	3.5	10000.0	63.21	93.68	32.46	NO
3500.	0.5864	6	2.5	2.5	10000.0	70.71	107.57	35.33	NO
4000.	0.5890	6	2.5	2.5	10000.0	70.71	120.87	36.86	NO
4500.	0.5863	6	2.5	2.5	10000.0	70.71	134.03	38.33	NO
5000.	0.5800	6	2.5	2.5	10000.0	70.71	147.06	39.73	NO
5500.	0.5735	6	2.0	2.0	10000.0	76.74	160.18	41.86	NO
6000.	0.5682	6	2.0	2.0	10000.0	76.74	172.95	43.13	NO
6500.	0.5612	6	2.0	2.0	10000.0	76.74	185.62	44.35	NO
7000.	0.5533	6	1.0	1.0	10000.0	98.10	198.89	48.50	NO
7500.	0.5525	6	1.0	1.0	10000.0	98.10	211.32	49.46	

```
NO
   8000.  0.5507        6     1.0    1.0 10000.0   98.10  223.67   50.39
NO
   8500.  0.5481        6     1.0    1.0 10000.0   98.10  235.94   51.30
NO
   9000.  0.5448        6     1.0    1.0 10000.0   98.10  248.13   52.18
NO
   9500.  0.5409        6     1.0    1.0 10000.0   98.10  260.24   53.04
NO
  10000.  0.5365        6     1.0    1.0 10000.0   98.10  272.29   53.88
NO
  15000.  0.4813        6     1.0    1.0 10000.0   98.10  389.39   61.35
NO
  20000.  0.4149        6     1.0    1.0 10000.0   98.10  501.70   66.24
NO
  25000.  0.3640        6     1.0    1.0 10000.0   98.10  610.37   70.41
NO
  30000.  0.3239        6     1.0    1.0 10000.0   98.10  716.11   74.10
NO
  40000.  0.2632        6     1.0    1.0 10000.0   98.10  920.63   79.38
NO
  50000.  0.2221        6     1.0    1.0 10000.0   98.10 1117.76   83.80
NO

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND     1. M:
    376.   1.643        4    20.0   20.0  6400.0   22.32   28.28   15.28
NO

  DWASH=   MEANS NO CALC MADE (CONC = 0.0)
  DWASH=NO MEANS NO BUILDING DOWNWASH USED
  DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED
  DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED
  DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3*LB

      ***************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ***************************************

  CALCULATION         MAX CONC    DIST TO   TERRAIN
   PROCEDURE         (UG/M**3)    MAX (M)    HT (M)
 --------------     -----------   -------   -------
 SIMPLE TERRAIN       1.643          376.        0.
```

Fuels Reduction Services
Air Curtain Burner Air Permit Application
Modeling information

SCREEN3 Model Run

Air Burners, LLC S-220 Model Inputs	
Simple Terrain Inputs:	
Source Type	Point
Emission Rate (g/s)	0.1297
Stack Height (m)	2.1336
Stack Inside Diam (m)	3.8100
Stack Exit Velocity (m/s)	2.5900
Stack Gas Exit Temp (K)	810.9278
Ambient Air Temp (K)	293.1500
Urban/Rural Option	Rural
Building Height (m)	0.0000
Min. Horiz. Building Dimension (m)	0.0000
Max.Horiz. Building Dimension (m)	0.0000

SCREEN3 Model Results

Pollutant	Rate* (lbs/hr)	Calculation Procedure	Maximum 1-hr Conc. (μ/m^3)	24-hr Persistence Factor	Maximum 24-hr Conc. (μ/m^3)	Annual Persistence Factor	Maximum Annual Conc. (μ/m^3)	Distance to Max. (m)	SCL	Period	Result	SCL	Period	Result	SCL	Period	Result
PM10	1.03	Simple Terrain	1.643	0.4	0.657	0.08	0.131	376	5	24 hour	PASS	1	Annual	PASS			
NOx	4.23	Simple Terrain	6.747	0.4	2.699	0.08	0.540	376	1	Annual	PASS						
CO	8.2	Simple Terrain	13.080	0.4	5.232	0.08	1.046	376	2000	1 hour	PASS	500	8 hour	PASS			
SO2	0.72	Simple Terrain	1.149	0.4	0.459	0.08	0.092	376	5	24 hour	PASS	1	Annual	PASS	25	1 hour	PASS
VOC	1.07	Simple Terrain	1.707	0.4	0.683	0.08	0.137	376									

Appendix F: SCREEN3 Model Information for Toxic Air Pollutants

Fuels Reduction Services
Air Curtain Burner Air Permit Application
Modeling information

SCREEN3 Model Run

Air Burners, LLC S-220 Model Inputs	
Simple Terrain Inputs:	
Source Type	Point
Emission Rate (g/s)	0.1297
Stack Height (m)	2.1336
Stack Inside Diam (m)	3.8100
Stack Exit Velocity (m/s)	2.5900
Stack Gas Exit Temp (K)	810.9278
Ambient Air Temp (K)	293.1500
Urban/Rural Option	Rural
Building Height (m)	0.0000
Min. Horiz. Building Dimension (m)	0.0000
Max.Horiz. Building Dimension (m)	0.0000

SCREEN3 Model Results

Pollutant	Rate* (lbs/hr)	Calculation Procedure	Maximum 1-hr Conc. (μ/m^3)	24-hr Persistence Factor	Maximum 24-hr Conc. (μ/m^3)	Annual Persistence Factor	Maximum Annual Conc. (μ/m^3)	Distance to Max. (m)	SCL	Period	Result	SCL	Period	Result	SCL	Period	Result
PM10	1.03	Simple Terrain	1.643	0.4	0.657	0.08	0.131	376	5	24 hour	PASS	1	Annual	PASS			
TAPs -																	
Hydrogen chloride	1.29E-01	Simple Terrain	2.06E-01	0.4	0.082			376	See TAPs page								
Manganese	9.53E-03	Simple Terrain	1.52E-02	0.4	0.006			376	See TAPs page								
2,3,7,8-Tetrachlorodibenzo-p-dioxin	2.72E-11	Simple Terrain	4.34E-11			0.125	3.47E-12	376	See TAPs page								
Acetaldehyde	1.45E-03	Simple Terrain	2.32E-03			0.125	1.85E-04	376	See TAPs page								
Arsenic	6.45E-05	Simple Terrain	1.03E-04			0.125	8.23E-06	376	See TAPs page								
Benzene	2.27E-01	Simple Terrain	3.62E-01			0.125	2.90E-02	376	See TAPs page								
Cadmium	1.60E-05	Simple Terrain	2.56E-05			0.125	2.05E-06	376	See TAPs page								
Carbon tetrachloride	3.06E-04	Simple Terrain	4.88E-04			0.125	3.91E-05	376	See TAPs page								
Chloroform	1.91E-04	Simple Terrain	3.04E-04			0.125	2.43E-05	376	See TAPs page								
Chromium (VI)	1.18E-04	Simple Terrain	1.88E-04			0.125	1.51E-05	376	See TAPs page								
Formaldehyde	4.96E-02	Simple Terrain	7.91E-02			0.125	6.33E-03	376	See TAPs page								
Nickel	5.22E-05	Simple Terrain	8.32E-05			0.125	6.66E-06	376	See TAPs page								
1,3-Butadiene	3.03E-04	Simple Terrain	4.83E-04			0.125	3.87E-05	376	See TAPs page								

Fuels Reduction Services
Air Curtain Burner Air Permit Application
TAPS Emissions vs. Emission Rate and Ambient Concentration Standards

				Idaho Thresholds - Emission Level				Idaho Thresholds - Ambient Concentration					
				Non-Carcinogenic		Carcinogenic		Non-Carcinogenic	Modeled		Carcinogenic	Modeled	
POLLUTANT	SOURCE	EMISSIONS	UNITS	lb/hr	RESULT	lb/hr	RESULT	mg/m3	mg/m3	RESULT	mg/m3	mg/m3	RESULT
1,2-Dichloropropane	Wood Combustion	1.78E-03	lbs/hr	23.133	PASS								
2,3,7,8-Tetrachlorodibenzo-p-dioxin	Wood Combustion	2.16E-10	lbs/hr			1.50E-10	FAIL				2.20E-08	3.47E-15	PASS
2-Butanone (MEK)	Wood Combustion	2.92E-04	lbs/hr	39.3	PASS								
2-Chlorophenol	Wood Combustion	3.08E-06	lbs/hr	0.033	PASS								
Acetaldehyde	Wood and Diesel Combustion	1.18E-02	lbs/hr			3.00E-03	FAIL				4.50E-01	1.85E-07	PASS
Acetone	Wood Combustion	1.03E-02	lbs/hr	119	PASS								
Acrolein	Wood and Diesel Combustion	5.41E-05	lbs/hr	0.017	PASS								
Arsenic	Wood Combustion	5.12E-04	lbs/hr			1.50E-06	FAIL				2.30E-04	8.23E-09	PASS
Benzene	Wood and Diesel Combustion	2.27E-01	lbs/hr			8.00E-04	FAIL				1.20E-01	2.90E-02	PASS
Benzo (a) pyrene	Wood Combustion	4.05E-07	lbs/hr			2.00E-06	PASS						
1,3-Butadiene	Diesel Combustion	3.03E-04	lbs/hr			2.40E-05	FAIL				3.60E-03	3.87E-05	PASS
Bromine	Wood Combustion	2.34E-03	lbs/hr		PASS								
Cadmium	Wood Combustion	1.27E-04	lbs/hr			3.70E-06	FAIL				5.60E-04	2.05E-09	PASS
Carbon tetrachloride	Wood Combustion	2.43E-03	lbs/hr			4.40E-04	FAIL				6.70E-02	3.91E-08	PASS
Chlorine	Wood Combustion	4.68E-02	lbs/hr	0.2	PASS								
Chlorobenzene	Wood Combustion	1.78E-03	lbs/hr	23.3	PASS								
Chloroform	Wood Combustion	1.51E-03	lbs/hr			2.80E-04	FAIL				4.30E-02	2.43E-08	PASS
Chromium	Wood Combustion	9.36E-04	lbs/hr	0.033	PASS								
Chromium (VI)	Wood Combustion	2.76E-04	lbs/hr			5.60E-07	FAIL				8.30E-05	1.51E-08	PASS
Cobalt	Wood Combustion	7.80E-04	lbs/hr	0.0033	PASS								
Copper	Wood Combustion	2.24E-03	lbs/hr	0.013	PASS								
Crotonaldehyde	Wood Combustion	5.35E-04	lbs/hr	0.38	PASS								
Ethylbenzene	Wood Combustion	1.67E-03	lbs/hr	29	PASS								
Fluorene	Diesel Combustion	9.49E-06	lbs/hr	0.133	PASS								
Formaldehyde	Wood and Diesel Combustion	4.96E-02	lbs/hr			5.10E-04	FAIL				7.70E-02	6.33E-03	PASS
Hydrogen chloride	Wood Combustion	1.03E+00	lbs/hr	0.05	FAIL			0.375	8.20E-05	PASS			
Iodine	Wood Combustion	1.08E-04	lbs/hr	0.0067	PASS								
Manganese	Wood Combustion	7.56E-02	lbs/hr	0.067	FAIL			0.05	6.00E-06	PASS			
Mercury	Wood Combustion	3.09E-05	lbs/hr	0.003	PASS								
Molybdenum	Wood Combustion	1.14E-03	lbs/hr	0.333	PASS								
Naphthalene	Wood and Diesel Combustion	2.04E-02	lbs/hr	3.33	PASS								
Nickel	Wood Combustion	4.14E-04	lbs/hr			2.70E-05	FAIL				4.20E-03	6.66E-09	PASS
PAH's as benzo(a)pyrene	Diesel Combustion	1.16E-06	lbs/hr			9.10E-05	PASS						
Phenol	Wood Combustion	8.82E-04	lbs/hr	1.27	PASS								
Propionaldehyde	Wood Combustion	3.29E-03	lbs/hr	0.0287	PASS								
Selenium	Wood Combustion	2.75E-04	lbs/hr	1.30E-02	PASS								
Styrene	Wood Combustion	1.03E-01	lbs/hr	6.67	PASS								
Tin	Wood Combustion	1.86E-04	lbs/hr	0.007	PASS								
Toluene	Wood and Diesel Combustion	4.98E-02	lbs/hr	25	PASS								
Tungsten	Wood Combustion	6.60E-05	lbs/hr	0.067	PASS								
Xylene	Wood and Diesel Combustion	1.44E-03	lbs/hr	29	PASS								
Zinc	Wood Combustion	1.51E-02	lbs/hr	0.667	PASS								
TOTAL		**1.66E+00**	**lbs/hr**										

Appendix G: Montana Air Quality Permit Issued to FRS

Air Quality Permit

Issued to: Fuels Reduction Services
1104 35th Ave. NE
Great Falls, MT 59404

Permit #4116-00
Application Complete: 08/03/07
Preliminary Determination Issued: 09/11/07
Department Decision Issued: 09/27/07
Permit Final: 10/13/07
AFS #777-4116

A Montana Air Quality Permit (MAQP), with conditions, is hereby granted to the Fuels Reduction Services (FRS), pursuant to Sections 75-2-204, 211, and 215, Montana Code Annotated (MCA), as amended, and Administrative Rules of Montana (ARM) 17.8.740, *et seq.*, as amended, for the following:

SECTION I: Permitted Facilities

A. Permitted Equipment

FRS operates a portable Model S-220 Air Burners, LLC, Self Contained Refractory Walled Air Curtain Destructor (incinerator) and associated equipment. A description of the permitted equipment is contained in the permit analysis.

B. Plant Location

MAQP #4116-00 applies while operating at any location in Montana, except within those areas that have a Department of Environmental Quality (Department)-approved permitting program, those areas within tribal lands, and those areas in or within 10 kilometers (km) of certain particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) nonattainment areas. *A Missoula County air quality permit will be required for locations within Missoula County, Montana.*

Addendum #1 applies to the FRS facility while operating at any location in or within 10 km of nonattainment areas for PM_{10} during the summer months (April 1 – September 30) and at sites approved by the Department during the winter months (October 1 – March 31). A complete list of the permitted equipment is contained in Section I.A of the permit analysis.

SECTION II: Limitations and Conditions

A. Operational Requirements

1. FRS shall not incinerate any material other than untreated wood, untreated wood slash, untreated wood waste, yard waste, plants, plant products, and paper products, unless otherwise approved by the Department. FRS shall provide written notice to the Department and obtain approval from the Department if material other than that previously described is to be incinerated (ARM 17.8.749).

2. FRS shall have a fire accelerant (i.e. diesel fuel) available for use, as necessary, to initiate incineration (ARM 17.8.749).

3. The air curtain over the firing chamber shall be in operation continuously while

the unit is incinerating materials (ARM 17.8.752).

4. FRS shall operate the incinerator as specified in the application for MAQP #4116-00. Further, FRS shall develop incinerator operation procedures, print those procedures in an incinerator operation procedures manual, and require all personnel who operate the incinerator to familiarize themselves with the operating procedures. A copy of this manual shall be supplied to the Department (ARM 17.8.752).

5. FRS shall not cause or authorize the use of any street, road, or parking lot without taking reasonable precautions to control emissions of airborne particulate matter (ARM 17.8.308).

6. FRS shall treat all unpaved portions of the haul roads, access roads, parking lots, or the general project area with water and/or chemical dust suppressant, as necessary, to maintain compliance with the reasonable precautions limitation in Section II.A.6 (ARM 17.8.749).

7. If the permitted equipment is used in conjunction with any other equipment owned or operated by FRS, at the same site, production shall be limited to correspond with an emission level that does not exceed 250 tons during any rolling 12-month time period. Any calculations used to establish production levels shall be approved by the Department (ARM 17.8.749).

8. FRS shall comply with all applicable standards and limitations, and the reporting, recordkeeping and notification requirements contained in 40 CFR 60, Subpart CCCC, Standards of Performance for Commercial and Industrial Solid Waste Incineration Units for which Construction is Commenced After November 30, 1999, or for which Reconstruction is Commenced on or after June 1, 2001, as applicable (ARM 17.8.340 and 40 CFR 60, Subpart CCCC).

B. Emission Limitations

FRS shall not cause or authorize to be discharged into the atmosphere from the incinerator:

1. Visible emissions that exhibit an opacity of 10% or greater averaged over 6 consecutive minutes after the first half hour of operations has expired (ARM 17.8.752);

2. Visible emissions that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes during start-up and within the first 30 minutes of operation (ARM 17.8.752); and

3. Any particulate emissions in excess of 0.10 gr/dscf, corrected to 12% CO_2 (ARM 17.8.752).

C. Testing Requirements

1. All compliance source tests shall conform to the requirements of the Montana Source Test Protocol and Procedures Manual (ARM 17.8.106).

2. The Department may require testing (ARM 17.8.105).

D. Operational Reporting Requirement

1. If the incinerator is moved to another location, an Intent to Transfer form must be sent to the Department and a Public Notice Form for Change of Location must be published in a newspaper of general circulation in the area to which the transfer is to be made, at least 15 days prior to the move. The proof of publication (affidavit) of the Public Notice Form for Change of Location must be submitted to the Department prior to the move. These forms are available from the Department (ARM 17.8.765).

2. FRS shall supply the Department with annual production information for all emission points, as required by the Department in the annual emission inventory request. The request will include, but is not limited to, all sources of emissions covered by this permit.

   Production information shall be gathered on a calendar-year basis and submitted to the Department by the date required in the emission inventory request. Information shall be in units as required by the Department (ARM 17.8.505).

3. FRS shall notify the Department of any construction or improvement project conducted pursuant to ARM 17.8.745 that would include the addition of a new emission unit, change in control equipment, stack height, stack diameter, stack flow, stack gas temperature, source location, or fuel specifications, or would result in an increase in source capacity above its permitted operation or the addition of a new emissions unit. The notice must be submitted to the Department in writing 10 days prior to start up or use of the proposed de minimis change, or as soon as reasonably practicable in the event of an unanticipated circumstance causing the de minimis change, and must include the information requested in ARM 17.8.745(1)(d) (ARM 17.8.745).

4. The records compiled in accordance with this permit shall be maintained by FRS as a permanent business record for at least 5 years following the date of the measurement, shall be submitted to the Department upon request, and shall be available at the plant site for inspection by the Department (ARM 17.8.749).

E. Notification

FRS shall provide the Department with written notification of the following activities within the specified time periods:

1. Commencement of construction of the incinerator within 30 days after initial commencement of construction.

2. Actual start-up date of the incinerator within 15 days after the actual initial start-up date.

SECTION III: General Conditions

A. Inspection – FRS shall allow the Department's representatives access to the source at all reasonable times for the purpose of making inspections or surveys, collecting samples, obtaining data, auditing any monitoring equipment (CEMS, CERMS) or observing any monitoring or testing, and otherwise conducting all necessary functions related to this

permit.

B. Waiver – The permit and all the terms, conditions, and matters stated herein shall be deemed accepted if FRS fails to appeal as indicated below.

C. Compliance with Statutes and Regulations – Nothing in this permit shall be construed as relieving FRS of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided for in ARM 17.8.740, *et seq.* (ARM 17.8.756).

D. Enforcement – Violations of limitations, conditions and requirements contained herein may constitute grounds for permit revocation, penalties or other enforcement as specified in Section 75-2-401, *et seq.*, MCA.

E. Appeals – Any person or persons jointly or severally adversely affected by the Department's decision may request, within 15 days after the Department renders its decision, upon affidavit setting forth the grounds therefore, a hearing before the Board of Environmental Review (Board). A hearing shall be held under the provisions of the Montana Administrative Procedures Act. The filing of a request for a hearing does not stay the Department's decision, unless the Board issues a stay upon receipt of a petition and a finding that a stay is appropriate under Section 75-2-211(11)(b), MCA. The issuance of a stay on a permit by the Board postpones the effective date of the Department's decision until conclusion of the hearing and issuance of a final decision by the Board. If a stay is not issued by the board, the Department's decision on the application is final 16 days after the Department's decision is made.

F. Permit Inspection – As required by ARM 17.8.755, Inspection of Permit, a copy of the air quality permit shall be made available for inspection by Department personnel at the location of the permitted source.

G. Permit Fee – Pursuant to Section 75-2-220, MCA, as amended by the 1991 Legislature, failure to pay the annual operation fee by FRS may be grounds for revocation of this permit, as required by that section and rules adopted thereunder by the Board.

H. Construction Commencement – Construction must be begin within 3 years of permit issuance and proceed with due diligence until the project is complete or the permit shall be revoked (ARM 17.8.762).

I. The Department may modify the conditions of this permit based on local conditions of any future site. These factors may include, but are not limited to, local terrain, meteorological conditions, proximity to residences, etc.

J. FRS shall comply with the conditions contained in this permit while operating in any location in Montana, except within those areas that have a Department-approved permitting program.

Permit Analysis
Fuels Reduction Services
Permit #4116-00

I. Introduction

A. Permitted Equipment

On August 3, 2007, the Fuels Reduction Services (FRS) submitted a complete application for a Montana Air Quality Permit (MAQP) to operate a portable Model S-220 Air Burners, LLC, Self Contained Refractory Walled Air Curtain Destructor (incinerator). MAQP #4116-00 applies while operating at any location in Montana, except within those areas that have a Department of Environmental Quality (Department) approved permitting program, those areas within tribal lands, and those areas in or within 10 kilometers (km) of certain particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) nonattainment areas. *A Missoula County air quality permit will be required for locations within Missoula County, Montana.*

Addendum #1 applies to the FRS facility while operating at any location in or within 10 km of nonattainment areas for PM_{10} during the summer months (April 1 – September 30) and at sites approved by the Department during the winter months (October 1 – March 31).

B. Source Description

FRS operates a portable, self contained, refractory walled air curtain destructor (incinerator). FRS intends to use the incinerator as a method of disposing of forest slash throughout Montana on a year-round basis without the use of open burning and associated open burning permits. Other combustible materials such as yard waste, paper, plants and plant products may also be burned in the destructor.

Combustion in the incinerator is initiated by the use of finer wood products and, when necessary, a fire accelerant, such as diesel fuel. Once combustion is initiated, the air curtain destructor introduces high velocity air into a combustion environment. As the air continuously rotates in the chamber and over the flame, a "curtain" is created over the fire trapping smoke and particulate matter. The constant airflow allows temperatures to remain high (less than 1,000 degrees Celsius (°C)), resulting in more complete combustion of all emission products.

The S-220 model incinerator, powered by a diesel engine (up to 59 horsepower (hp)), is capable of burning approximately 144 tons of wood per 24-hour period. The incinerator does not operate on a continuous basis because of adverse weather and wind conditions. In addition, time is required for relocation, set-up, tear down, and maintenance activities.

The primary use of the incinerator is for the disposal of forest slash. The unit is expected to effectively and efficiently reduce the volume of wood, wood slash, and other wood waste products harvested from road clearing and other operating areas.

II. Applicable Rules and Regulations

The following are partial explanations of some applicable rules and regulations that apply to the facility. The complete rules are stated in the Administrative Rules of Montana (ARM) and are available upon request from the Department. Upon request, the Department will provide references for locations of complete copies of all applicable rules and regulations or copies where appropriate.

A. ARM 17.8, Subchapter 1, General Provisions, including, but not limited to:

1. ARM 17.8.101 Definitions. This rule includes a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.105 Testing Requirements. Any person or persons responsible for the emission of any air contaminant into the outdoor atmosphere shall, upon written request of the Department, provide the facilities and necessary equipment (including instruments and sensing devices), and shall conduct tests, emission or ambient, for such periods of time as may be necessary using methods approved by the Department.

3. ARM 17.8.106 Source Testing Protocol. The requirements of this rule apply to any emission source testing conducted by the Department, any source or other entity as required by any rule in this chapter, or any permit or order issued pursuant to this chapter, or the provisions of the Clean Air Act of Montana, 75-2-101, *et seq.*, Montana Code Annotated (MCA).

   FRS shall comply with the requirements contained in the Montana Source Test Protocol and Procedures Manual, including, but not limited, using the proper test methods and supplying the required reports. A copy of the Montana Source Test Protocol and Procedures Manual is available from the Department upon request.

4. ARM 17.8.110 Malfunctions. (2) The Department must be notified promptly by telephone whenever a malfunction occurs that can be expected to create emissions in excess of any applicable emission limitation or to continue for a period.

5. ARM 17.8.111 Circumvention. (1) No person shall cause or permit the installation or use of any device or any means that, without resulting in reduction of the total amount of air contaminant emitted, conceals or dilutes an emission of air contaminant that would otherwise violate an air pollution control regulation. (2) No equipment that may produce emissions shall be operated or maintained in such a manner as to create a public nuisance.

B. ARM 17.8, Subchapter 2, Ambient Air Quality, including, but not limited to:

1. ARM 17.8.210 Ambient Air Quality Standards for Sulfur Dioxide
2. ARM 17.8.211 Ambient Air Quality Standards for Nitrogen Dioxide
3. ARM 17.8.212 Ambient Air Quality Standards for Carbon Monoxide
4. ARM 17.8.214 Ambient Air Quality Standard for Hydrogen Sulfide
5. ARM 17.8.220 Ambient Air Quality Standard for Settled Particulate Matter
6. ARM 17.8.223 Ambient Air Quality Standard for PM_{10}

FRS must comply with all applicable ambient air quality standards.

C. ARM 17.8, Subchapter 3, Emission Standards, including, but not limited to:

1. ARM 17.8.304 Visible Air Contaminants. This rule requires that no person may cause or authorize emissions to be discharged into the outdoor atmosphere from any source installed after November 23, 1968, that exhibit an opacity of 20% or greater averaged over 6 consecutive minutes.

2. ARM 17.8.308 Particulate Matter, Airborne. This rule requires an opacity limitation of less than 20% for all fugitive emission sources and that reasonable precautions be taken to control emissions of airborne particulate matter.

3. ARM 17.8.309 Particulate Matter, Fuel Burning Equipment. This rule requires that no person shall cause, allow, or permit to be discharged into the atmosphere particulate matter caused by the combustion of fuel in excess of the amount determined by this rule.

4. ARM 17.8.310 Particulate Matter, Industrial Process. This rule requires that no person shall cause, allow or permit to be discharged into the atmosphere particulate matter in excess of the amount set forth in this rule.

5. ARM 17.8.316 Incinerators. This rule requires that no person may cause or authorize emissions to be discharged into the outdoor atmosphere from any incinerator, particulate matter (PM) in excess of 0.10 grains per standard cubic foot (gr/dscf) of dry flue gas, adjusted to 12% carbon dioxide and calculated as if no auxiliary fuel had been used. Also, no person shall cause or authorize to be discharged into the outdoor atmosphere from any incinerator, emissions that exhibit an opacity of 10% or greater averaged over 6 consecutive minutes. This rule does not apply to the incinerator because FRS has applied for and received an air quality permit in accordance with ARM 17.8.770 and MCA 75-2-215.

6. ARM 17.8.322 Sulfur Oxide Emissions--Sulfur in Fuel. This rule requires that no person shall burn liquid, solid, or gaseous fuel in excess of the amount set forth in this rule.

7. ARM 17.8.340 New Source Performance Standards. This rule incorporates, by reference, 40 CFR 60, Standards of Performance for New Stationary Sources (NSPS). This facility is not an NSPS affected source because it does not meet the definition of an affected facility under any NSPS subpart defined in 40 CFR 60.

   40 CFR 60, Subpart CCCC, Standards of Performance for Commercial and Industrial Solid Waste Incineration Units for Which Construction Is Commenced After November 30, 1999, or for Which Modification or Reconstruction Is Commenced on or After June 1, 2001. In order for this subpart to apply to a given source, the incineration unit must meet the following three applicability criteria contained in 40 CFR 60.2010: 1) the incineration unit must be a new incineration unit as defined in section 60.2015; 2) the incinerator must not be specifically exempt under 40 CFR 60.2020; and 3) the incineration unit must be a Commercial and Industrial Solid Waste Incinerator (CISWI) as defined in 40 CFR 60.2265.

   In accordance with 40 CFR 60.2015, the FRS incinerator meets the definition of a new incinerator thereby meeting criteria 1. Further, the FRS incinerator is not

specifically exempt under the provision of 40 CFR 60.2020 and thus meets criteria 2. However, under criteria 3, a CISWI is defined as "*any combustion device that combusts commercial and industrial waste, as defined in 40 CFR 60.2265...*" By definition Commercial and Industrial Waste (CIW) "*means solid waste combusted in an enclosed device using controlled flame combustion without energy recovery that is a distinct operating unit of any commercial or industrial facility or solid waste combusted in an air curtain incinerator without energy recovery that is a distinct operating unit of any commercial or industrial facility*". The FRS incinerator does meet the definition of an air curtain incinerator as defined in 40 CFR 60.2245 and 40 CFR 60.2265, however, since the proposed FRS incinerator operation does not constitute a commercial or industrial application, the FRS incinerator does not meet criteria 3 and is therefore exempt form the requirements of 40 CFR 60, Subpart CCCC.

Certain operating scenarios may trigger CISWI applicability. These operating scenarios include the following:

- When a portable air curtain incinerator operates at a commercial or industrial facility and meets one of the exemptions contained in 40 CFR 60.2020, it would be exempt from the rule except to the extent that a few of the exemptions require notification of operations and recordkeeping as described in the applicable sections of 40 CFR 60.2020.

- When a portable air curtain incinerator operates at a commercial or industrial facility, and burns 100% clean wood waste as defined in 40 CFR 60, Subpart CCCC, the project may be subject to the requirements contained in 40 CFR 60.2245 through 40 CFR 60.2260.

- When a portable air curtain incinerator operates at a commercial or industrial facility and burns any other waste not specifically exempted under 40 CFR 60.2020, the project may be subject to the full extent of the rules contained in 40 CFR 60, Subpart CCCC.

If FRS intends to operate the air curtain incinerator under any of these specific operating scenarios, a case-by-case NSPS applicability determination may be appropriate.

D. ARM 17.8, Subchapter 5, Air Quality Permit Application, Operation and Open Burning Fees, including, but not limited to:

1. <u>ARM 17.8.504 Air Quality Permit Application Fees</u>. FRS shall submit an air quality permit application fee concurrent with the submittal of an air quality permit application. A permit application is incomplete until the proper application fee is paid to the Department. FRS submitted the appropriate permit application fee for the current permit action.

2. <u>ARM 17.8.505 Air Quality Operation Fees</u>. An annual air quality operation fee must, as a condition of continued operation, be submitted to the Department by each source of air contaminants holding an air quality permit, excluding an open burning permit, issued by the Department; and the air quality operation fee is based on the actual or estimated actual amount of air pollutants emitted during the previous calendar year.

The annual assessment and collection of the air quality operation fee, as described above, shall take place on a calendar-year basis. The Department may insert into any final permit issued after the effective date of these rules such conditions as may be necessary to require the payment of an air quality operation fee on a calendar-year basis, including provisions which pro-rate the required fee amount.

E. ARM 17.8, Subchapter 7, Permit, Construction and Operation of Air Contaminant Sources, including, but not limited to:

1. ARM 17.8.740 Definitions. This rule is a list of applicable definitions used in this chapter, unless indicated otherwise in a specific subchapter.

2. ARM 17.8.743 Montana Air Quality Permits--When Required. This rule requires a person to obtain an air quality permit or permit modification to construct, alter, or use any air contaminant sources that have the Potential to Emit (PTE) greater than 25 tons per year of any pollutant. FRS does not have the PTE more than 25 tons per year of any pollutant; however, in accordance with MCA 75-2-215, an air quality permit must be obtained prior to incinerator construction and operation, regardless of potential incinerator emissions. Because FRS must obtain an air quality permit, all normally applicable requirements apply in this case.

3. ARM 17.8.744 Montana Air Quality Permits--General Exclusions. This rule identifies the activities that are not subject to the Montana Air Quality Permit program.

4. ARM 17.8.745 Montana Air Quality Permits—Exclusion for De Minimis Changes. This rule identifies the de minimis changes at permitted facilities that do not require a permit under the Montana Air Quality Permit Program.

5. ARM 17.8.748 New or Modified Emitting Units--Permit Application Requirements. (1) This rule requires that a permit application be submitted prior to installation, alteration, or use of a source. FRS submitted the required permit application for the current permit action. (7) This rule requires that the applicant notify the public by means of legal publication in a newspaper of general circulation in the area affected by the application for a permit. FRS submitted an affidavit of publication of public notice for the August 2, 2007, issue of the *Great Falls Tribune* in Cascade County, Montana as proof of compliance with the public notice requirements.

6. ARM 17.8.749 Conditions for Issuance or Denial of Permit. This rule requires that the permits issued by the Department must authorize the construction and operation of the facility or emitting unit subject to the conditions in the permit and the requirements of this subchapter. This rule also requires that the permit must contain any conditions necessary to assure compliance with the Federal Clean Air Act (FCAA), the Clean Air Act of Montana, and rules adopted under those acts.

7. ARM 17.8.752 Emission Control Requirements. This rule requires a source to install the maximum air pollution control capability that is technically practicable and economically feasible, except that Best Available Control Technology

(BACT) shall be utilized. The required BACT analysis is included in Section III of this permit analysis.

8. ARM 17.8.755 Inspection of Permit. This rule requires that air quality permits shall be made available for inspection by the Department at the location of the source.

9. ARM 17.8.756 Compliance with Other Requirements. This rule states that nothing in the permit shall be construed as relieving FRS of the responsibility for complying with any applicable federal or Montana statute, rule, or standard, except as specifically provided in ARM 17.8.740, *et seq*.

10. ARM 17.8.759 Review of Permit Applications. This rule describes the Department's responsibilities for processing permit applications and making permit decisions on those permit applications that do not require the preparation of an environmental impact statement (EIS).

11. ARM 17.8.762 Duration of Permit. An air quality permit shall be valid until revoked or modified, as provided in this subchapter, except that a permit issued prior to construction of a new or altered source may contain a condition providing that the permit will expire unless construction is commenced within the time specified in the permit, which in no event may be less than 1 year after the permit is issued.

12. ARM 17.8.763 Revocation of Permit. An air quality permit may be revoked upon written request of the permittee, or for violations of any requirement of the Clean Air Act of Montana, rules adopted under the Clean Air Act of Montana, the FCAA, rules adopted under the FCAA, or any applicable requirement contained in the Montana State Implementation Plan (SIP).

13. ARM 17.8.764 Administrative Amendment to Permit. An air quality permit may be amended for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack that do not result in an increase of emissions as a result of those changed conditions. The owner or operator of a facility may not increase the facility's emissions beyond permit limits unless the increase meets the criteria in ARM 17.8.745 for a de minimis change not requiring a permit, or unless the owner or operator applies for and receives another permit in accordance with ARM 17.8.748, ARM 17.8.749, ARM 17.8.752, ARM 17.8.755, and ARM 17.8.756, and with all applicable requirements in ARM Title 17, Chapter 8, Subchapters 8, 9, and 10.

14. ARM 17.8.765 Transfer of Permit. (1) This rule states that an air quality permit may be transferred from one location to another if the Department receives a complete notice of intent to transfer location, the facility will operate in the new location for less than 1 year, the facility will comply with the FCAA and the Clean Air Act of Montana, and the facility complies with other applicable rules. (2) This rule states that an air quality permit may be transferred from one person to another if written notice of intent to transfer, including the names of the transferor and the transferee, is sent to the Department.

15. ARM 17.8.770 Additional Requirements for Incinerators. This rule specifies the

additional information that must be submitted to the Department for incineration facilities subject to 75-2-215, MCA. FRS submitted all required information applicable under this rule for the current permit action.

F. ARM 17.8, Subchapter 8, Prevention of Significant Deterioration of Air Quality, including, but not limited to:

1. ARM 17.8.801 Definitions. This rule is a list of applicable definitions used in this subchapter.

2. ARM 17.8.818 Review of Major Stationary Sources and Major Modifications--Source Applicability and Exemptions. The requirements contained in ARM 17.8.819 through ARM 17.8.827 shall apply to any major stationary source and any major modification, with respect to each pollutant subject to regulation under the FCAA that it would emit, except as this subchapter would otherwise allow.

This facility is not a major stationary source since this facility is not a listed source and the facility's PTE is less than 250 tons per year of any pollutant (excluding fugitive emissions).

G. ARM 17.8, Subchapter 12, Operating Permit Program Applicability, including, but not limited to:

1. ARM 17.8.1201 Definitions. (23) Major Source under Section 7412 of the FCAA is defined as any stationary source having:

   a. PTE > 100 tons/year of any pollutant;

   b. PTE > 10 tons/year of any one Hazardous Air Pollutant (HAP), PTE > 25 tons/year of a combination of all HAPs, or lesser quantity as the Department may establish by rule; or

   c. PTE > 70 tons/year of PM_{10} in a serious PM_{10} nonattainment area.

2. ARM 17.8.1204 Air Quality Operating Permit Program Applicability. (1) Title V of the FCAA Amendments of 1990 requires that all sources, as defined in ARM 17.8.1204(1), obtain a Title V Operating Permit. In reviewing and issuing Montana Air Quality Permit #4116-00 for FRS, the following conclusions were made:

   a. The facility's permitted PTE is less than 100 tons/year for any pollutant.

   b. The facility's PTE is less than 10 tons/year for any one HAP and less than 25 tons/year of all HAPs.

   c. This source is not located in a serious PM_{10} nonattainment area.

   d. This facility is not subject to any current NSPS.

   e. This facility is not subject to any current National Emissions Standards for Hazardous Air Pollutants (NESHAP) standards.

   f. This source is not a Title IV affected source.

g. This source is not an EPA designated Title V source.

Based on these facts, the Department determined that FRS will be a minor source of emissions as defined under Title V.

H. MCA 75-2-103, Definitions provides, in part, as follows:

1. "Incinerator" means any single or multiple-chambered combustion device that burns combustible material, alone or with a supplemental fuel or catalytic combustion assistance, primarily for the purpose of removal, destruction, disposal, or volume reduction of all or any portion of the input material.

2. "Solid waste" means all putrescible and nonputrescible solid, semisolid, liquid, or gaseous wastes, including, but not limited to...air pollution control facilities...

I. MCA 75-2-215, Solid or hazardous waste incineration - additional permit requirements:

1. MCA 75-2-215 requires air quality permits for all new solid waste incinerators; therefore, FRS must obtain an air quality permit.

2. MCA 75-2-215 requires the applicant to provide, to the Department's satisfaction, a characterization and estimate of emissions and ambient concentrations of air pollutants, including hazardous air pollutants from the incineration of solid waste. The Department determined that the information submitted in the permit application is sufficient to fulfill this requirement.

3. MCA 75-2-215 requires that the Department reach a determination that the projected emissions and ambient concentrations constitute a negligible risk to public health, safety, and welfare. The Department completed a health risk assessment based on the emissions inventory and ambient air quality modeling for this proposal. Based on the results of the emission inventory, modeling, and the health risk assessment, the Department determined that FRS's proposal complies with this requirement.

4. MCA 75-2-215 requires the application of pollution control equipment or procedures that meet or exceed BACT. The Department determined that the proposed incinerator constitutes BACT.

III. BACT Analysis

A BACT determination is required for each new or altered source. FRS shall install on the new or altered source the maximum air pollution control capability that is technically practicable and economically feasible, except that BACT shall be utilized. In addition, MCA 75-2-215 requires a BACT determination for all pollutants, not just criteria pollutants.

The Department reviewed other BACT analyses as part of this analysis. FRS proposes to control the emissions from the incinerator with an over-fire air curtain designed specifically to reduce the amount of pollutants, including hazardous air pollutants, emitted from the incinerator. The incinerator is limited by permit to 0.10 gr/dscf for PM and to 10% opacity during normal operations (i.e. after start-up operations during the first half-hour of operations). For the first half hour during start-up operations, the incinerator is subject to an opacity limit of 20%. The Department determined that compliance with the PM and opacity limits, with no additional

controls, constitutes BACT for PM emissions from this source.

BACT for products of combustion (carbon monoxide (CO) and oxides of nitrogen (NO_X)), volatile organic compounds (VOCs), and HAPs is good combustion including the requirement that the over-fire air curtain must be utilized during all incineration operations. As referenced in technical documentation regarding air curtain destructors (Fountainhead Engineering, Ltd., *Final Report Describing Particulate and Carbon Monoxide Emissions From the Whitton S-127 Air Curtain Destructor*), opacity is a consistent and verifiable measure of proper operating conditions and good combustion. Therefore, good operating procedures and opacity limits contained in the permit will ensure good combustion is accomplished and will constitute BACT for gaseous combustion emissions and HAPs from this source.

The control options that have been selected as part of this review have controls and control costs similar to other recently permitted similar sources and are capable of achieving the appropriate emission standards.

IV. Emission Inventory

An emission inventory was completed for FRS's proposal. The emission inventory for criteria pollutants was based on emission factors from various technical resources as referenced in the following emission inventory. The application indicated that the fuel used to run the air curtain manifold creating the air curtain would be diesel fuel; therefore, the Department also used emission factors from AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, for the purpose of estimating emissions resulting from the combustion of diesel fuel.

Criteria Pollutant Emissions (TPY) – Overall Operations							
Emission Source	**PM**	**PM_{10}**	**NO_x**	**VOC**	**CO**	**SO_x**	**HAPs**
Incinerator (Air Curtain Destructor)	5.26	3.94	10.51	3.94	34.16	2.63	9.20
Diesel Fuel Combustion	0.57	0.57	8.01	0.65	1.73	0.54	0.01
Total Potential Criteria Pollutant Emissions	**5.83**	**4.51**	**18.52**	**4.59**	**35.89**	**3.17**	**9.21**

CRITERIA POLLUTANT EMISSION CALCULATIONS

Incinerator

The emission factors used to develop the incinerator criteria pollutant emission inventory are referenced from various technical documents prepared specifically for air curtain type destructors and from applicable sections of AP-42 characterizing emissions based on typical materials combusted from the proposed source.

Permitted Production Capacity: 6 ton/hr (Capacity Operations)
Operating Hours: 8760 hr/yr (Permit Limit – Permit #4116-00)

PM Emissions
Emission Factor: 0.20 lb/ton (Air Pollution Emissions Factors for Above-Ground, Refractory Lined Air Curtain Incinerators, Steven Smallwood, PE, 7/12/07)
Calculations: 6 ton/hr * .200 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **5.26 ton/yr**

PM_{10} Emissions:
Emission Factor: 0.15 lb/ton (Air Pollution Emissions Factors for Above-Ground, Refractory Lined Air Curtain Incinerators, Steven Smallwood, PE, 7/12/07)
Calculations: 6 ton/hr * 0.15 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **3.94 ton/yr**

NO_X Emissions:
Emission Factor: 0.40 lb/ton (Air Pollution Emissions Factors for Above-Ground, Refractory Lined Air Curtain Incinerators, Steven Smallwood, PE, 7/12/07)
Calculations: 6 ton/hr * 0.40 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **10.51 ton/yr**

VOC Emissions:

Emission Factor: 0.15 lb/ton (AP-42, Chapter 1.6, Table 1.6-2, Wildfires and Prescribed Burning, Flaming Phase for Short and Long Needle Conifers Averaged)

Calculations: 6 ton/hr * 0.15 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **3.94 ton/yr**

CO Emissions:

Emission Factor: 1.30 lb/ton (Air Pollution Emissions Factors for Above-Ground, Refractory Lined Air Curtain Incinerators, Steven Smallwood, PE, 7/12/07)

Calculations: 6 ton/hr * 1.30 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **34.16 ton/yr**

SO_X Emissions:

Emission Factor: 0.10 lb/ton (Air Pollution Emissions Factors for Above-Ground, Refractory Lined Air Curtain Incinerators, Steven Smallwood, PE, 7/12/07)

Calculations: 6 ton/hr * 0.10 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **2.63 ton/yr**

HAP Emissions (Wood Waste HAP Emissions)

Emission Factor: 0.35 lb/ton (AP-42, Chapter 1.6, Table 1.6-2, Wood Combustion in Boilers, Assumed Heating Value of 4500 Btu/lb, 03/02, Converted TOC EF from 0.039 lb/MMBtu)

Calculations: 6 ton/hr * 0.35 lb/ton * 8760 hr/yr * 0.0005 ton/lb = **9.20 ton/yr**

Diesel Combustion

Power Output Capacity: 59 hp-hr (Manufacturers Specifications – Kubota V2003-TE or equivalent engine)
Hours of Operation: 8760 hr/yr (Annual Capacity)

PM Emissions

Emission Factor: 0.0022 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 0.0022 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **0.57 ton/yr**

PM_{10} Emissions:

Emission Factor: 0.0022 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 0.0022 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **0.57 ton/yr**

NO_X Emissions:

Emission Factor: 0.031 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 0.031 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **8.01 ton/yr**

VOC Emissions:

Emission Factor: 0.0025 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 0.0025 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **0.65 ton/yr**

CO Emissions:

Emission Factor: 0.0067 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 0.0067 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **1.73 ton/yr**

SO_X Emissions:

Emission Factor: 0.0021 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 0.0021 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **0.54 ton/yr**

HAP Emissions:

Emission Factor: 4.60E-05 lb/hp-hr (AP-42, Chapter 3.3, Table 3.3-1, Uncontrolled Emission Factors for Gasoline and Diesel Internal Combustion Engines, 10/96)

Calculations: 4.60E-05 lb/hp-hr * 59 hp-hr * 8760 hr/yr * 0.0005 ton/lb = **0.01 ton/yr**

V. Air Quality Impacts

Biomass Incineration: PM_{10} Analysis

The facility submitted a SCREEN3 analysis to evaluate ambient PM_{10} impacts from the proposed incinerator while burning wood-waste biomass. This analysis conservatively analyzes worst-case PM_{10} concentrations for purposes of identifying the impact on a nearby PM_{10}nonattainment area. The SCREEN3 model inputs are passed on the design parameters for the proposed air curtain incinerator.

SCREEN3 Model Run: Wood-Waste Biomass (PM_{10} Emission Analysis)

Simple Terrain Inputs:

Source Type	=	POINT
Emission Rate (G/S)	=	1.000
Stack Height (M)	=	2.1336
Stack Inside Diam (M)	=	3.8100
Stack Exit Velocity (M/S)	=	2.5908
Stack Gas Exit Temp (K)	=	810.9278
Ambient Air Temp (K)	=	293.1500
Receptor Height (M)	=	0.0000
Urban/Rural Option	=	RURAL
Building Height (M)	=	0.0000
Minimum Horizontal Building Dimension (M)	=	0.0000
Maximum Horizontal Building Dimension (M)	=	0.0000

The products of combustion of wood waste from the air curtain incinerator are first released from the stack into ambient air. From that point the model assumes that the concentration pattern within the released plume maintains a steady-state Gaussian distribution. In addition, the model further assumes that there is no decay or mass loss that might otherwise occur due to terrain impaction, chemical transformation, etc.

The maximum 1-hour concentration predicted by the model, given all meteorological and terrain considerations, was 1.643 ug/m^3. This concentration was observed at a distance of 376 meters from the stack. The maximum 24-hour concentration predicted by the model was 0.6572 ug/m^3.

The model also predicts the maximum annual concentration of PM_{10} which was 0.1643 ug/m^3. To be conservative, the annual value was calculated from the one-hour concentration, by multiplying the one-hour value by a conversion factor of 0.1. This is the conversion factor used by recently permitted air curtain burner modeling analysis. This calculated value is larger than the value reported by SCREEN3.

The screening model predicted ground level PM_{10} impacts from the FRS operation that are less than the 24-hour and annual significance levels. Therefore, the Department believes the FRS operation of the incinerator will have no significant impact on any PM_{10} non-attainment area, and may be permitted to operate near or within any PM_{10} non-attainment area in Montana.

VI. Health Risk Assessment

A health risk assessment was conducted to determine if the proposed FRS incinerator complies with the negligible risk requirement of ARM 17.8.770 and MCA 75-2-215. The emission inventory did not contain sufficient quantities of any pollutant on the Department's list of pollutants for which non-inhalation impacts must be considered; therefore, the Department determined that inhalation

risk was the only necessary pathway to consider. Only those HAPs for which there were established emission factors were considered in the emission inventory.

Hazardous Air Pollutant	Modeled Concentration ($\mu g/m^3$)	Cancer Potency Factor	ELCR	Non-Cancer RFC Factor	Non-Cancer Hazard Quotient
Acetaldehyde	1.84E-03	2.20E-06	4.05E-09	9.00E+00	2.04E-04
Acrolein	3.83E-06	ND	ND	2.00E-02	1.92E-04
Benzene	9.53E03	7.80E-06	7.43E-08	ND	ND
Benzo (a) anthracene	3.13E06	1.10E-04	3.45E-10	ND	ND
Benzo (a) pyrene	6.47E-08	1.10E-04	7.11E-12	ND	ND
Benzo (g,h,i) perylene	1.35E-06	1.10E-04	1.49E-10	ND	ND
Benzo (k) flouranthene	7.33E-07	1.10E-04	8.06E-11	ND	ND
Benzo (b+k) flouranthene	2.78E-05	1.10E-04	3.06E-09	ND	ND
Chlorine	7.47E-03	ND	ND	ND	ND
Chrysene	4.33E-07	1.10E-05	4.76E-12	ND	ND
2,4-Dinitrophenol	4.05E-06	ND	ND	ND	ND
Flourene	7.87E-06	ND	ND	ND	ND
Formaldehyde	7.85E-03	1.30E-05	1.02E-07	ND	ND
Naphthalene	3.25E-03	ND	ND	3.00E+00	1.08E-03
Phenanthrene	4.98E-05	ND	ND	ND	ND
Phenol	1.41E-04	ND	ND	ND	ND
2,3,7,8-Tetrachlorodibenzo-p-dioxin	3.45E-11	3.30E-11	1.14E-21	ND	ND
Arsenic Compounds	8.17E-05	4.30E-03	3.51E-07	ND	ND
Cadmium Compounds	2.03E-05	1.80E-03	3.66E-08	ND	ND
Chromium IVCompounds	4.41E-05	1.20E-02	5.29E-07	1.00E-01	4.41E-04
Cobalt Compounds	1.25E-04	ND	ND	ND	ND
Lead Compounds	4.26E-04	ND	ND	ND	ND
Manganese Compounds	1.21E-02	ND	ND	5.00E-02	2.41E-01
Mercury Compounds	4.93E-06	ND	ND	3.00E-01	1.64E-05
Nickel Compounds	6.61E-05	2.40E-04	1.59E-08	ND	ND
Selenium Compounds	4.40E-05	ND	ND	ND	ND
Total		**1.12E-06**			**2.43E-01**

ELCR = Excess Lifetime Cancer Risk

ND = Not Determined, No Available Information

- A copy of the SCREEN3 modeling conducted for this project is on file with the Department.

As indicated above, through SCREEN3 air dispersion modeling submitted by the facility, the Department determined that the risks estimated in the risk assessment are in compliance with the requirement to demonstrate negligible risk to human health and the environment. As detailed in the above table, and in accordance with the negligible risk requirement, no single HAP concentration results in an excess lifetime cancer risk (ELCR) greater than 1.00E-06 and the sum of all HAPs results in an ELCR of less than 1.00E-05. Further, the sum of the non-cancer hazard quotient is less than 1.0 as required to demonstrate compliance with the negligible risk requirement.

VII. Taking or Damaging Implication Analysis

As required by 2-10-101 through 105, MCA, the Department conducted a private property taking and damaging assessment and determined there are no taking or damaging implications.

VIII. Environmental Assessment

An environmental assessment, required by the Montana Environmental Policy Act, was completed for this project. A copy is attached.

Addendum #1
Fuels Reduction Services
Permit #4116-00

An addendum to Montana Air Quality Permit (MAQP) #4116-00 is issued to Fuels Reduction Services (FRS), pursuant to Sections 75-2-204, 211, and 215 of the Montana Code Annotated (MCA), as amended, and the Administrative Rules of Montana (ARM) 17.8.765, as amended, for the following:

I. Permitted Equipment

FRS operates a portable 2003 Model S-220 Air Burners, LLC, Self Contained Refractory Walled Air Curtain Destructor (incinerator) and associated equipment. A description of the permitted equipment is contained in the permit analysis.

II. Seasonal and Site Restrictions – Winter and Summer Season

Addendum #1 applies to the FRS portable air curtain destructor while operating at any location in or within 10 km of certain particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) non-attainment areas. Additionally, seasonal and site restrictions apply to the facility as follows:

A. During the winter season (October 1-March 31), FRS may operate in or within 10 km of certain PM_{10} non-attainment areas at any site that may be approved, in writing, by the Department of Environmental Quality (Department).

B. During the summer season (April 1-September 30), FRS may operate at any location in or within 10 km of the Butte, Columbia Falls, Libby, Kalispell, Thompson Falls, and Whitefish PM_{10} non-attainment areas.

C. FRS shall comply with the limitations and conditions contained in Addendum #1 to MAQP #4116-00. Addendum #1 shall be valid until revoked or modified. The Department reserves the authority to modify Addendum #1 at any time based on local conditions of any future site. These conditions may include, but are not limited to, local terrain, meteorological conditions, proximity to residences or other businesses, etc.

III. Limitations and Conditions

A. Operational Limitations and Conditions – **Winter Season (October 1 – March 31)**

1. Water spray bars must be operated when necessary on all conveyors whenever the plant is operating (ARM 17.8.749).

2. All visible emissions from the plant may not exhibit an opacity of 10% or greater averaged over 6 consecutive minutes (ARM 17.8.749).

3. FRS shall not cause or authorize to be discharged into the atmosphere from equipment, such as transfer points, any visible emissions that exhibit an opacity of 10% or greater averaged over 6 consecutive minutes (ARM 17.8.749).

4. FRS shall not cause or authorize to be discharged into the atmosphere from haul roads, access roads, parking lots, or the general plant property any visible fugitive emissions that exhibit an opacity of 10% or greater averaged over 6 consecutive minutes (ARM 17.8.749).

5. FRS shall treat all unpaved portions of the haul roads, access roads, parking lots, and general plant area with water and/or chemical dust suppressant as necessary to maintain compliance with the 10% opacity limitation (ARM 17.8.749).

6. FRS shall not operate more than one diesel engine at any given time and the maximum rated design capacity of the engine shall not exceed 59 horsepower (hp) (ARM 17.8.749).

B. Operational Limitations and Conditions – **Summer Season (April 1 – September 30)**

1. Water spray bars must be operated when necessary on all conveyors whenever the plant is operating (ARM 17.8.749).

2. All visible emissions from the plant may not exhibit an opacity of 10% or greater averaged over 6 consecutive minutes (ARM 17.8.749).

3. FRS shall not cause or authorize to be discharged into the atmosphere from equipment, such as transfer points, any visible emissions that exhibit an opacity of 10% or greater averaged over 6 consecutive minutes (ARM 17.8.749).

4. FRS shall not cause or authorize to be discharged into the atmosphere from haul roads, access roads, parking lots, or the general plant property any visible fugitive emissions that exhibit an opacity of 10% or greater averaged over 6 consecutive minutes (ARM 17.8.749).

5. FRS shall treat all unpaved portions of the haul roads, access roads, parking lots, and general plant area with water and/or chemical dust suppressant as necessary to maintain compliance with the 10% opacity limitation (ARM 17.8.749).

6. FRS shall not operate more than one diesel engine at any given time and the maximum rated design capacity of the engine shall not exceed 59 hp (ARM 17.8.749).

C. Operational Reporting Requirements

1. FRS shall provide the Department with written notification of job completion within 10 working days of job completion (ARM 17.8.749).

2. FRS shall provide the Department with written notice of relocation of the permitted equipment within 15 working days before the physical transfer of the equipment (ARM 17.8.765).

3. Production information for the sites covered by this addendum must be submitted to the Department with the annual emission inventory request or within 30 days of completion of the project. The information must include (ARM 17.8.749):

   a. Tons of bulk material loaded at each site;

   b. Daily hours of operation at each site;

   c. Gallons of diesel fuel used for the generators/engines at each site;

d. Fugitive dust information consisting of a listing of all plant vehicles including the following for each vehicle type:

   i. Number of vehicles;
   ii. Vehicle type;
   iii. Vehicle weight, loaded;
   iv. Vehicle weight, unloaded;
   v. Number of tires on vehicle;
   vi. Average trip length;
   vii. Number of trips per day per vehicle;
   viii. Average vehicle speed;
   ix. Area of activity; and
   x. Vehicle fuel usage (gasoline or diesel) annual total.

e. Fugitive dust control for haul roads and general plant area:

   i. Hours of operation of water trucks; and
   ii. Application schedule for chemical dust suppressant, if applicable.

Addendum #1 Analysis
Fuels Reduction Services
Permit #4116-00

I. Permitted Equipment

Fuels Reduction Services (FRS) operates a portable Model S-220 Air Burners, LLC, Self Contained Refractory Walled Air Curtain Destructor (incinerator) and associated equipment. A description of the permitted equipment is contained in the permit analysis.

Addendum #1 applies to the FRS facility while operating at any location in or within 10 kilometers (km) of nonattainment areas for particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) during the summer months (April 1 – September 30) and at sites approved by the Department of Environmental Quality (Department) during the winter months (October 1 – March 31). A complete list of the permitted equipment is contained in Section I.A of the permit analysis.

II. Source Description

FRS operates a portable, self contained incinerator. FRS intends to use the incinerator as a method of disposing of forest slash throughout Montana on a year-round basis without the use of open burning and associated open burning permits. Other combustible materials such as yard waste, paper, plants and plant products may also be burned in the destructor.

Combustion in the incinerator is initiated by the use of finer wood products and, when necessary, a fire accelerant, such as diesel fuel. Once combustion is initiated, the air curtain destructor introduces high velocity air into a combustion environment. As the air continuously rotates in the chamber and over the flame, a "curtain" is created over the fire trapping smoke and particulate matter. The constant airflow allows temperatures to remain high (greater than 1,000 degrees Celsius (°C)), resulting in more complete combustion of all emission products.

The S-220 model incinerator, powered by a diesel engine (up to 59 horsepower (hp)), is capable of burning approximately 144 tons of wood per 24-hour period. The incinerator does not operate on a continuous basis because of adverse weather and wind conditions. In addition, time is required for relocation, set-up, tear down, and maintenance activities.

The primary use of the incinerator is for the disposal of forest slash. The unit is expected to effectively and efficiently reduce the volume of wood, wood slash, and other wood waste products harvested from road clearing and other operating areas.

III. Applicable Rules and Regulations

The following are partial quotations of some applicable rules and regulations that apply to the facility. The complete rules are stated in the Administrative Rules of Montana (ARM) and are available, upon request, from the Department. Upon request, the Department will provide references for locations of complete copies of all applicable rules and regulations or copies where appropriate.

ARM 17.8, Subchapter 7 - Permit, Construction and Operation of Air Contaminant Sources, including, but not limited to:

A. <u>ARM 17.8.749 Conditions for Issuance of Permit</u>. This rule requires that the source demonstrate compliance with applicable rules and standards before a permit can be issued. Also, a permit may be issued with such conditions as are necessary to assure compliance with all applicable rules and standards. FRS demonstrated compliance with

all applicable rules and standards as required for permit issuance.

B. ARM 17.8.764 Modification of Permit. An air quality permit may be modified for changes in any applicable rules and standards adopted by the Board of Environmental Review (Board) or changed conditions of operation at a source or stack which do not result in an increase in emissions because of the changed conditions. A source may not increase its emissions beyond those found in its permit unless the source applies for and receives another permit.

C. ARM 17.8.765 Transfer of Permit. An air quality permit may be transferred from one location to another if:

1. Written notice of Intent to Transfer location and proof of public notice are sent to the Department;

2. The source will operate in the new location for a period of less than 1 year; and

3. The source will not have any significant impact on any non-attainment area or any Class I area.

FRS must submit proof of compliance with the transfer and public notice requirements when FRS transfers to any of the locations covered by this addendum and will only be allowed to stay in the new location for a period of less than 1 year. Also, the conditions and limitations in Addendum #1 to MAQP #4116-00 will prevent FRS from having a significant impact on PM_{10} non-attainment areas.

IV. Emission Inventory

Criteria Pollutant Emissions (pounds/day) – Overall Operations							
Emission Source	**PM**	**PM_{10}**	**NO_x**	**VOC**	**CO**	**SO_x**	**HAPs**
Incinerator (Air Curtain Destructor)	28.8	21.6	57.6	21.6	187.2	14.4	50.4
Diesel Fuel Combustion	3.12	3.12	43.90	3.54	9.49	2.97	0.065
Total Potential Criteria Pollutant Emissions	**31.90**	**24.72**	**101.5**	**25.14**	**196.69**	**17.37**	**50.47**

V. Air Quality Impacts

On July 1, 1987, the Environmental Protection Agency (EPA) promulgated new National Ambient Air Quality Standards (NAAQS) for PM_{10}. Due to exceedances of the national standards for PM_{10}, the cities of Kalispell (and the nearby Evergreen area), Columbia Falls, Butte, Whitefish, Libby, Missoula, and Thompson Falls were designated by EPA as non-attainment for PM_{10}. As a result of this designation, EPA required the Department and the City-County Health Departments to submit PM_{10} State Implementation Plans (SIP). The SIPs consisted of emission control plans that controlled fugitive dust emissions from roads, parking lots, construction, and demolition, since technical studies determined these sources to be the major contributors to PM_{10} emissions.

Addendum #1 to Permit #4116-00 is for a portable concrete plant located at sites in or within 10 km of certain PM_{10} non-attainment areas during the winter season (October 1 through March 31). Winter season operations many include only the locations listed in Section II.A of Addendum #1. Addendum #1 of Permit #4116-00 would also allow for summertime operations (April 1 – September 30) at any location in or within 10 km of the Butte, Columbia Falls, Libby, Kalispell, Thompson Falls, and Whitefish PM_{10} non-attainment areas.

VI. Taking or Damaging Implication Analysis

As required by 2-10-101 through 105, Montana Code Annotated (MCA), the Department conducted a private property taking and damaging assessment and determined there are no taking or damaging implications.

VII. Environmental Assessment

An environmental assessment, required by the Montana Environmental Policy Act, was completed for this project. A copy is attached.

DEPARTMENT OF ENVIRONMENTAL QUALITY
Permitting and Compliance Division
Air Resources Management Bureau
1520 East Sixth Avenue
P.O. Box 200901, Helena, Montana 59620-0901
(406) 444-3490

FINAL ENVIRONMENTAL ASSESSMENT (EA)

Issued For: Fuels Reduction Services
1104 35th Ave. NE
Great Falls, MT 59404

Permit Number: 4116-00

Preliminary Determination Issued: September 11, 2007
Department Decision Issued: September 27, 2007
Permit Final: October 13, 2007

1. *Legal Description of Site*: The facility is a portable unit and would operate at various locations throughout Montana. The initial location would be the SE¼ of Section 17, Township 19 North, Range 3 East in Cascade County.

2. *Description of Project*: FRS would operate a portable, self contained, refractory walled air curtain destructor (incinerator). The incinerator would be used to burn yard trash, forest slash, land clearing debris and untreated wood waste.

   The combustion in the incinerator would be initiated by the use of finer wood products and on occasion a fire starter, such as diesel fuel. Once combustion is initiated, the air curtain destructor would introduce high velocity air into a combustion environment. As the air continuously rotates in the chamber and over the flame, a "curtain" would be created over the fire trapping smoke and particulate matter. The constant airflow would allow temperatures to remain high (greater than 1,000°C), resulting in more complete combustion of all emission products.

   The S-220 model incinerator, powered by a four cylinder diesel engine (up to 59 hp), would be capable of burning approximately 144 tons of wood per 24-hour period. The incinerator would not operate on a continuous basis because of adverse weather and wind conditions. In addition, time would be required for relocation, setup, tear down, and maintenance activities.

3. *Objectives of Project*: The project would allow FRS to safely dispose of solid waste products while maintaining compliance with the negligible risk requirements as discussed in Section VI of the permit analysis.

4. *Alternatives Considered*: In addition to the proposed action, the Department considered the "no-action" alternative. The "no-action" alternative would deny issuance of the Montana Air Quality Permit to the proposed facility. However, the Department does not consider the "no-action" alternative to be appropriate because FRS demonstrated compliance with all applicable rules and regulations as required for permit issuance. Therefore, the "no-action" alternative was eliminated from further consideration.

5. *A Listing of Mitigation, Stipulations, and Other Controls*: A list of enforceable conditions, including a BACT analysis, would be included in Permit #4116-00.

6. *Regulatory Effects on Private Property*: The Department considered alternatives to the conditions imposed in this permit as part of the permit development. The Department determined that the permit conditions are reasonably necessary to ensure compliance with applicable requirements and to demonstrate compliance with those requirements and do not unduly restrict private property rights.

7. The following table summarizes the potential physical and biological effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Terrestrial and Aquatic Life and Habitats			X			Yes
B	Water Quality, Quantity, and Distribution			X			Yes
C	Geology and Soil Quality, Stability and Moisture			X			Yes
D	Vegetation Cover, Quantity, and Quality			X			Yes
E	Aesthetics			X			Yes
F	Air Quality			X			Yes
G	Unique Endangered, Fragile, or Limited Environmental Resources			X			Yes
H	Demands on Environmental Resource of Water, Air and Energy			X			Yes
I	Historical and Archaeological Sites				X		Yes
J	Cumulative and Secondary Impacts			X			Yes

SUMMARY OF COMMENTS ON POTENTIAL PHYSICAL AND BIOLOGICAL EFFECTS: The following comments have been prepared by the Department.

A. Terrestrial and Aquatic Life and Habitats:

Emissions from the proposed project would impact terrestrial and aquatic life and habitats in the proposed project area. However, as detailed in Section 7.F of this EA, any emissions and resulting impacts from the project would be minor due to the low concentration of those pollutants emitted.

Further, the incinerator would be a temporary and portable source; therefore, any potential impact would be limited to the time period the source would operate at any given location. Overall, any impact to the terrestrial and aquatic life and habitats of the proposed project area would be minor.

B. Water Quality, Quantity and Distribution:

The proposed project would not affect water quantity or distribution in the proposed project area because the project would not discharge or use water as part of normal operations.

Emissions from the proposed project would impact water quality in the proposed project area. However, as detailed in Section 7.F of this EA, any emissions and resulting deposition impacts from the project would be minor due to the low concentration of those pollutants emitted. Further, the incinerator would be a temporary and portable source; therefore, any potential impact would be limited to the time period the source would operate at any given location. Overall, any impact to water quality would be minor.

C. Geology and Soil Quality, Stability, and Moisture:

The proposed project would result in minor impact to the geology, soil quality, stability, and moisture of the proposed project area. The incinerator is an above-ground portable unit, which may require a small amount of dirt be placed around the base of the unit to prevent smoke from escaping the bottom of the unit. No additional construction or ground disturbance would be required for normal operations.

Further, as described in Section 7.F of this EA, the incinerator would result in minor air pollution emissions to the outside ambient environment. These pollutants would deposit on the soils in the surrounding area. Any impact from deposition of these pollutants would be minor due to dispersion characteristics and the low concentration of those pollutants emitted. Further, the incinerator would be a temporary and portable source; therefore, any potential impact would be limited to the time period the source would operate at any given location. Overall, any impact to the geology and soil quality, stability, and moisture would be minor.

D. Vegetation Cover, Quantity, and Quality:

Emissions from the proposed project would impact vegetation cover, quantity, and quality in the proposed project area. However, as detailed in Section 7.F of this EA, any emissions and resulting impacts from the project would be minor. In addition, the incinerator would be a temporary and portable source; therefore, any potential impact would be limited to the time period the source would operate at any given location.

Further, since the incinerator unit would be an above-ground portable unit very little ground or vegetation disturbance would be required for normal operations. Overall, any impact to the vegetation cover, quantity, and quality of the proposed project area would be minor.

E. Aesthetics:

The proposed project would result in minor impacts to the aesthetic nature of the proposed project area because the incinerator would be an above-ground unit requiring very little ground disturbance with no additional construction required in any given operating location thereby resulting in only minor impacts to the land. Further, the incinerator would be a temporary and portable unit that would not maintain operations in any given location for an extended period of time; therefore, the overall land use and aesthetic nature of the proposed project area would not change as a result of the proposed project. In addition, visible emissions from the source would be limited to 10% opacity and the permit would include emission control requirements. Overall, any impact to the aesthetic nature of the project area would be minor.

F. Air Quality:

The proposed project would result in the emission of various criteria pollutants and HAPs to the ambient air in the proposed project area. However, as detailed in Section V and Section VI of the permit analysis, FRS demonstrated through SCREENVIEW air dispersion modeling, that any air quality impacts from the proposed project would be minor.

The Department conducted air dispersion modeling to determine the ambient air quality impacts from PM_{10} and HAPs that would be generated by the incinerator. The SCREENVIEW model was selected for the air dispersion modeling. The full meteorology option was selected to provide a conservative result. Receptors were placed from 1 to 50000 meters in a simple terrain array. Simple terrain receptors were used to represent the topography of the project area.

Stack parameters and emission rates used in the SCREENVIEW model are contained in Section V of the permit analysis and are on file with the Department. Stack velocity and gas temperature were taken from data provided by the manufacturer of the incinerator. Because of the dispersion characteristics of the pollutants, the low levels of pollutants that would be emitted from the proposed project, and the corresponding low deposition of those pollutants, the Department determined that any impacts to air quality would be minor.

The 24-hour PM_{10} ambient air quality standard would be the limiting factor in the modeling analysis (i.e. highest demonstrated pollutant concentration). Enforceable permit conditions/limits would be included in the MAQP to ensure compliance with all applicable PM_{10} ambient air quality standards, all other applicable criteria pollutant ambient air quality standards, and the applicable demonstration of negligible risk to human health and the environment resulting from HAPs emissions. Overall, the proposed project, operating under MAQP #4116-00, would result in a minor impact to air quality in any proposed area of operation.

G. Unique Endangered, Fragile, or Limited Environmental Resources:

Emissions from the proposed project would impact unique, endangered, fragile, or limited environmental resources located in any given project area because the proposed project would result in increased emissions in the proposed project area. However, as detailed in Section 7.F of this EA, any emissions and resulting impacts from the project would be minor due to the low concentration of those pollutants emitted.

Further, the incinerator would be a temporary and portable source; therefore, any potential impact would be limited to the time period the source would operate at any given location. Overall, any impact to any existing unique, endangered, fragile, or limited environmental resources in any given project area would be minor.

H. Demands on Environmental Resource of Water, Air, and Energy:

The proposed project would result in minor demands on environmental resources of water and air as discussed in Section 7.B and 7.F of this EA, respectively. As discussed in Section 7.B, the proposed project would not affect water quantity or distribution in the proposed project area because the project would not discharge or use water as part of normal operations but minor impacts to existing water resources would be realized from air emissions from the proposed source. Further, as discussed in Section 7.F of this EA, project impacts on air resources in the proposed project area would be minor due to dispersion characteristics of the area, the types of pollutants emitted, and the low concentration of those pollutants emitted. Finally, because the project is small by industrial standards and the projects intermittent operations would be temporary in any given location (portable source), little energy would be required for operation and the resulting impact on energy resources would be minor.

I. Historical and Archaeological Sites:

The proposed project would potentially result in minor impact to any existing historical or archaeological site in any given operating location because the incinerator would be an above-ground portable and temporary source requiring little or no additional land disturbance for normal operations. Therefore, the operation would have only a minor impact on any known historic or archaeological site that may be located within or near a given operating site.

J. Cumulative and Secondary Impacts:

Overall, the cumulative and secondary impacts from this project on the physical and biological environment in the immediate area would be minor because the facility is relatively small by industrial standards, would be portable, and would operate on a temporary basis at any given location, and would result in only minor emissions. The Department believes that this facility could be expected to operate in compliance with all applicable rules and regulations as outlined in MAQP #4116-00.

8. The following table summarizes the potential economic and social effects of the proposed project on the human environment. The "no-action" alternative was discussed previously.

		Major	Moderate	Minor	None	Unknown	Comments Included
A	Social Structures and Mores				X		Yes
B	Cultural Uniqueness and Diversity				X		Yes
C	Local and State Tax Base and Tax Revenue				X		Yes
D	Agricultural or Industrial Production				X		Yes
E	Human Health			X			Yes
F	Access to and Quality of Recreational and Wilderness Activities				X		Yes
G	Quantity and Distribution of Employment				X		Yes
H	Distribution of Population				X		Yes
I	Demands for Government Services			X			Yes
J	Industrial and Commercial Activity				X		Yes
K	Locally Adopted Environmental Plans and Goals				X		Yes
L	Cumulative and Secondary Impacts			X			Yes

SUMMARY OF COMMENTS ON POTENTIAL ECONOMIC AND SOCIAL EFFECTS: The Department has prepared the following comments.

A. Social Structures and Mores:
B. Cultural Uniqueness and Diversity:

The proposed project would not impact the above economic and social resources of any given area of operation because the proposed project would not be a commercial operation. Further, the incinerator is a portable unit that would conduct only temporary operations at a given site; therefore, the predominant use of any operating area would not change as a result of the proposed project.

C. Local and State Tax Base and Tax Revenue:

The proposed project would not impact any local and state tax base and tax revenue because the proposed project would not be a commercial operation.

D. Agricultural or Industrial Production:

Because the incinerator would be an above-ground portable and temporary operation requiring very little ground disturbance and no additional construction for normal operations, the project would not impact or displace any land used for agricultural production. Further, the project would not be a commercial operation resulting in increased industrial operations in any given

area of operation.

E. Human Health:

As detailed in Section VI of the permit analysis, a health risk assessment was conducted to determine if the proposed incinerator would comply with the negligible risk requirement of MCA 75-2-215 and ARM 17.8.770. The emission inventory did not contain sufficient quantities of any pollutant on the Department's list of pollutants for which non-inhalation impacts must be considered; therefore, the Department determined that inhalation risk would be the only necessary pathway to consider. As defined in ARM 17.8.740(10), negligible risk is "*an increase in excess lifetime cancer risk of less than 1.0 x 10^{-6} for any individual pollutant, and 1.0 x 10^{-5} for the aggregate of all pollutants, and an increase in the sum of the non-cancer hazard quotients for all pollutants with similar toxic effects of less than 1.0 in order to determine negligible risk.*" For the purposes of determining negligible risk for the incinerator operations, all pollutants were included in the human health risk assessment.

The peak annual ambient impact from the operation of the incinerator would be 0.5279 $\mu g/m^3$ of HAPs. The predicted annual ambient impact for each individual HAP was determined by multiplying the peak annual ambient concentration by the emission rate of the HAP. The impacts calculated for each HAP are compared to the cancer and non-cancer levels specified in Tables 1 and 2 of ARM 17.8.770. If the predicted ambient impact of a particular HAP is less than the level specified in the table and the inhalation pathway is the only appropriate pathway, that HAP can be excluded from the human health risk assessment. The table summarized in Section V of the permit analysis indicates the calculated ambient impacts of the HAPs, the cancer and non-cancer levels, and whether or not each HAP passes the screening criteria.

All of the individual pollutant concentrations for the excess lifetime cancer risk (ELCR) meet the acceptable risk limit because they are less than 1.00E-06 for each pollutant and less than 1.00E-05 for the aggregate of all pollutants. Further, the sums of the chronic and acute non-cancer hazard quotients are less than 1.0. Therefore, the incinerator proposed for the FRS facility meets the criteria of ARM 17.8.770 and operation of the incinerator would be considered a negligible risk to public health, safety, welfare, and to the environment. Overall, any impacts to human health in the proposed project area would be minor.

In addition to the demonstration of negligible risk to human health and the environment conducted for HAP emissions resulting from the proposed operation, the Department analyzed all criteria pollutant emissions to demonstrate compliance with Montana Ambient Air Quality Standards (MAAQS) and NAAQS. The Clean Air Act, which was last amended in 1990, requires EPA to set NAAQS for pollutants considered harmful to public health and the environment (Criteria Pollutants: CO, NOx, Ozone, Lead, PM-10, SOx). Primary Standards set limits to protect public health, including, but not limited to, the health of "sensitive" populations such as asthmatics, children, and the elderly.

The 24-hour PM_{10} ambient air quality standard would be the limiting factor in the modeling analysis (i.e. highest demonstrated pollutant concentration). A demonstration of compliance with the 24-hour and annual PM_{10} NAAQS would be contained in Section V of the permit analysis. Enforceable permit conditions/limits would be included in the permit to ensure compliance with all applicable PM_{10} ambient air quality standards, all other applicable criteria pollutant ambient air quality standards, and the applicable demonstration of negligible risk to human health and the environment resulting from HAP emissions. Overall, the proposed project, operating under MAQP #4116-00, would result in minor impact to air quality in any proposed area of operation.

F. Access to and Quality of Recreational and Wilderness Activities:

Because the incinerator would be an above ground temporary and portable operation and would not require any additional construction or ground disturbance for normal operations, the project would not affect any access to or quality of any recreation or wilderness activities in the area.

G. Quantity and Distribution of Employment:
H. Distribution of Population:

The proposed project would not impact the above-cited economic and social resources of the proposed project area because the project would be a temporary and portable operation. Further, the proposed project would require minimal staff for normal operations and any operations would be accomplished by existing FRS staff on a temporary basis.

I. Demands for Government Services:

Government services would be required for acquiring the appropriate permits from government agencies. In addition, the permitted source of emissions would be subject to periodic inspections by government personnel. Demands for government services would be minor.

J. Industrial and Commercial Activity:

The proposed project would not impact any industrial and commercial activity in any given area of operation because the project would not constitute a commercial activity. Further, because the project would be an above-ground temporary and portable unit, no additional construction activity would be required for normal operations.

K. Locally Adopted Environmental Plans and Goals:

Because the proposed project is a temporary and portable source permitted for operations throughout Montana, the Department is not aware of any specific locally adopted environmental plans or goals which may potentially be impacted by the proposed operation. The conditions and limitations included in MAQP #4116-00 would be protective of any proposed project area and the ambient standards in any proposed project area.

L. Cumulative and Secondary Impacts:

Overall, cumulative and secondary impacts from this project would result in minor impacts to the economic and social environment in the immediate area because the facility is relatively small by industrial standards, would operate on a temporary basis in any given area, and would result in only minor emissions. The Department believes that this facility could be expected to operate in compliance with all applicable rules and regulations as would be outlined in MAQP #4116-00.

Recommendation: No Environmental Impact Statement (EIS) is required.

If an EIS is not required, explain why the EA is an appropriate level of analysis: The current permit action is for the construction and operation of an incinerator. Permit #4116-00 includes conditions and limitations to ensure the facility would operate in compliance with all applicable rules and regulations. In addition, as detailed in the above EA, there are no significant impacts associated with the proposed project.

Other groups or agencies contacted or which may have overlapping jurisdiction: Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program.

Individuals or groups contributing to this EA: Department of Environmental Quality – Air Resources Management Bureau, Montana Historical Society – State Historic Preservation Office, Natural Resource Information System – Montana Natural Heritage Program.

EA prepared by: Julie Merkel
Date: September 4, 2007