STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 012005-008 Project Number: 2001-10-058

Owner: The Doe Run Company - Buick Resource Recycling Facility

Owner's Address: Highway KK, Boss, MO 65440

Installation Name: The Doe Run Company - Buick Resource Recycling Facility

Installation Address: HC1 Box 1395, Highway KK, Boss, MO 65440

Location Information: Iron County, S8, T22N, R21W

Application for Authority to Construct was made for:

Eliminating the annual lead production limits from the individual furnaces and increasing the installation's total lead production limit to 175,000 tons per year. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required.*

☐ Standard Conditions (on reverse) are applicable to this permit.

☑ Standard Conditions (on reverse) and Special Conditions (listed as attachments starting on page 2) are applicable to this permit.

JAN 26 2005

EFFECTIVE DATE

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

MO 780-1204 (1-03)

2001-10-058

The Doe Run Company - Buick Resource Recycling Facility

Highway KK, Boss, MO 65440

The Doe Run Company - Buick Resource Recycling Facility

HC1 Box 1395, Highway KK, Boss, MO 65440

Iron County, S8, T22N, R21W

Eliminating the annual lead production limits from the individual furnaces and increasing the installation's total lead production limit to 175,000 tons per year. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

The Doe Run Company - Buick Resource Recycling Facility
Iron County, S8, T22N, R21W

Superseding Condition

1. The conditions of this permit supersede all special conditions found in the previously issued construction permits from the Air Pollution Control Program.

Emission Limitations, Recordkeeping & Reporting

2. The Doe Run Company – Buick Resource Recycling Center (Doe Run) shall emit less than 3,400 tons of sulfur oxide (SO_x) from the installation in any rolling twelve (12) month period.

3. Doe Run shall emit less than 14,790 tons of carbon monoxide (CO) from the installation in any rolling twelve (12) month period.

4. Doe Run shall emit less than 54.72 tons of nitrogen oxide (NO_x) from the installation in any rolling twelve (12) month period.

5. Doe Run shall emit less than 30.57 tons of filterable and condensable particulate matter less than 10 micron in diameter (PM_{10}) from the installation in any rolling twelve (12) month period.

6. Doe Run shall emit less than 12.55 tons of lead (Pb) from the installation in any rolling twelve (12) month period.

7. Doe Run shall keep track of monthly SO_x, CO, NO_x, PM_{10} and Pb emissions from the installation and calculate the rolling twelve (12) month emissions at the end of each month to demonstrate compliance with the above limits. Doe Run shall use Attachment A, Attachment B, Attachment C, Attachment D, and Attachment E or equivalent forms approved by the Air Pollution Control Program to keep track of the emissions. All records shall be kept onsite for at least five (5) years.

8. Doe Run shall report to the Air Pollution Control Program's Enforcement Section, P.O. Box 176, Jefferson City, Missouri 65102, no later than ten (10) days after

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

the end of the month during which the records from Special Condition Number 7 indicates that the source exceeds the limitation of Special Condition Number 2, 3, 4, 5, or 6.

9. Doe Run shall not have emission rates greater than those listed in Table 1: Maximum Allowable Emission Rate. These limits are the Best Available Control Technology (BACT) limits and apply to the sources listed in the table. Compliance with these limits will be considered compliance with the Best Available Control Technology (BACT) requirements. These limits also apply to the National Ambient Air Quality Standards (NAAQS) and the increment analysis.

Table 1: Maximum Allowable Emission Rate

Emission Points	Description	Pollutants	Control Technology	Emission Rate lb/hr
EP08	Main Stack – Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler	SO_x	N/A	1688.43
		NO_x	Oxy-fuel firing	0.8600
		CO	N/A	7412.59
		PM_{10}	Baghouse	7.698
		Pb	Baghouse	3.33
EP16	BDC Scrubber	PM_{10}	Scrubber	0.034
		Pb	Scrubber	0.029
EP18	Na2SO4 Crystallizer	PM_{10}	Baghouse	1.75
EP19	Na2CO3 Surge Bin Baghouse	PM_{10}	Baghouse	0.311
EP19A	Na2CO3 Transfer	PM_{10}	N/A	0.622
EP20	Na2CO3 Silo Baghouse	PM_{10}	Baghouse	0.311
EP71	Reverb Furnace - Captured	PM_{10}	Baghouse	0.001
		Pb	Baghouse	0.001
EP71	Reverb Furnace - Captured	SO_x	N/A	8.36
EP72	Rotary Furnace – Captured	PM_{10}	Baghouse	0.001
		Pb	Baghouse	0.001
EP72	Rotary Furnace – Captured	SO_x	N/A	5.86
EP73	Sweat Furnace - Captured	PM_{10}	Baghouse	0.002
		Pb	Baghouse	0.001

Performance Testing

10. Doe Run shall demonstrate compliance with the emission limitations listed in condition 9 by performing stack tests within 180 days after the issuance of this permit. In order to show continued compliance, stack tests shall be conducted once every two years for the main stack (EP08) and initial testing of other stacks listed in Table 1 after the issuance of this permit. The applicable test methods

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

and procedures for the permitted pollutants are summarized next. An alternate method(s) of quantifying the emission rates of pollutants may be used in place of the above testing requirement, if requested by Doe Run and approved by the Director. An alternate testing method can also be used if approved by the Compliance Unit of the Air Pollution Control Program.

A. The test methods and procedures outlined at 40 CFR 60 Appendix A, Method 7E shall be adhered to by the applicant in testing for NO_x.

B. The test methods and procedures outlined at 40 CFR Part 51, Appendix M, Methods 201, 201A, and 202 shall be adhered to by the applicant in testing for PM_{10}.

C. The test methods and procedures outlined at 40 CFR Part 60, Appendix A, Method 12 shall be adhered to by the applicant in testing for lead.

D. The test methods and procedures outlined at 40 CFR Part 60, Appendix A, Method 8 shall be adhered to by the applicant in testing for SO_x.

E. The test methods and procedures outlined at 40 CFR Part 60, Appendix A, Method 10 shall be adhered to by the applicant in testing for CO.

F. The above test procedures shall have at least 3 test runs and minimum test time of 1-hour.

11. The date on which performance tests are conducted must be pre-arranged with the Air Pollution Control Program a minimum of 30 days prior to the proposed test date so that this Program may arrange a pretest meeting, if necessary, and assure that the test date is acceptable for an observer to be present. A completed Proposed Test Plan form (copy enclosed) may serve the purpose of notification and must be approved by the Air Pollution Control Program prior to conducting the required emission testing.

12. Two (2) copies of a written report of the performance test results shall be submitted to the Director of the Air Pollution Control Program within 30 days of completion of any required testing. The report must include legible copies of the raw data sheets, analytical instrument laboratory data, and complete sample calculations from the required EPA Method for at least one (1) sample run.

13. If one (1) or more of the above air pollutants for which testing is required by Special Condition 9 is also required to be tested to demonstrate compliance with an applicable rule (such as 40 CFR Part 60 Subpart L, *Standards of Performance*

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

for Secondary Lead Smelters, and 40 CFR Part 63 Subpart X, *National Emission Standard for Hazardous Air Pollutants from the Secondary Lead Smelting, etc.)*, then Doe Run may conduct the performance testing according to the time frames indicated by the applicable regulation.

Continuous Emissions Monitoring

14. Doe Run shall install, calibrate, maintain, and operate a Continuous Emissions Monitoring System (CEMS), and record the output of the system, for measuring SO_x emissions discharged into the atmosphere whenever secondary lead furnaces are in operation. The CEMS shall be placed in an appropriate location such that accurate readings are possible. Doe Run shall also monitor flow to measure amount of SO_x emitted in tons. SO_x CEMS shall be used to demonstrate compliance with the SO_x BACT limit specified in Special Condition No. 2. When monitoring data is unavailable, Doe Run shall use emission factor derived from the stack test as required in Special Condition 10 to demonstrate compliance with emission limit. SO_x CEMS shall also be used to demonstrate continuous compliance with 10 CSR 10-6.260 *Restriction of Emissions of Sulfur Compound*.

15. Doe Run shall install, calibrate, maintain, and operate a Continuous Emissions Monitoring System (CEMS), and record the output of the system, for measuring CO emissions discharged into the atmosphere whenever secondary lead furnaces are in operation. The CEMS shall be placed in an appropriate location such that accurate readings are possible. Doe Run shall also monitor flow to measure amount of CO emitted in tons. CO CEMS shall be used to demonstrate compliance with the CO BACT limit specified in Special Condition No. 3. When monitoring data is unavailable, Doe Run shall use emission factor derived from the stack test as required in Special Condition 10 to demonstrate compliance with emission limit.

Best Achievable Control Technology

16. Doe Run shall apply BACT on emission sources as listed below to control air pollutant emissions as specified in the permit application.

Table 2: Control Technologies Established as BACT

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Emission Unit	Pollutant	BACT
Blast Furnace	NO_x	Good Combustion practices
	PM_{10}	Baghouse w/2 of 14 Compartment using coated bags
	Lead	Baghouse w/2 of 14 Compartment using coated bags
	CO	Good Combustion practices
	SO_2	Improvements to battery paste desulfurization system and continued use of low sulfur coke and coal
Blast Furnace Fugitive	PM_{10}	Operational change to Blast Furnace charging system
	Lead	Operational change to Blast Furnace charging system
Reverberatory Furnace	NO_x	Oxy-fuel firing
	PM_{10}	Baghouse w/2 of 14 Compartment using coated bags
	Lead	Baghouse w/2 of 14 Compartment using coated bags
	CO	Good Combustion practices
	SO_2	Improvements to battery paste desulfurization system and continued use of low sulfur coke and coal
Rotary Melter	NO_x	Good Combustion practices
	PM_{10}	Baghouse w/2 of 14 Compartment using coated bags
	Lead	Baghouse w/2 of 14 Compartment using coated bags
	CO	Good Combustion practices
	SO_2	Low sulfur fuel – propane
Refinery Kettles	NO_x	Good Combustion practices
	PM	Hood Capture
	Lead	None
	CO	Good Combustion practices
	SO_2	Low sulfur fuel – propane
Refinery Kettles Fugitive	PM_{10}	Negative ventilation to Main Baghouse
	Lead	Negative ventilation to Main Baghouse
Dross Plant Fugitives	PM_{10}	Hood and vent to the Main Baghouse
	Lead	Hood and vent to the Main Baghouse
Open Storage	PM	Encloures, wet suppression, and good operating practices
	Lead	Encloures, wet suppression, and good operating practices
Units Exhausting to the BDC Scrubber	SO_2	Scrubber
Secondary SO_2 Fugitives	SO_2	See other furnaces
Sodium Sulfate Dryer/Baghouse	NO_x	Good Combustion practices
	PM_{10}	Enclosed and vent to baghouse
	CO	Good Combustion practices
	SO2	Low sulfur fuel – propane
Sodium Carbonate Baghouse Unloading	PM_{10}	Baghouse

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Sodium Carbonate Transfer Fugitives	PM_{10}	Good Operating practices
Sodium Carbonate Silo	PM_{10}	Sodium Carbonate Silo Baghouse
BDC Boiler	NO_x	Good Combustion practices
	PM_{10}	Good Combustion practices
	CO	Good Combustion practices
	SO2	Low sulfur fuel – propane
Shredder Baghouse	PM_{10}	Baghouse
	Lead	Baghouse
Lab Baghouse	PM_{10}	Baghouse
	Lead	Baghouse
Resuspension (Haul Roads)	PM_{10}	Paving, sweeping/flushing, operating practices
	Lead	Paving, sweeping/flushing, operating practices
Pallet Burner	Nox	Increase pallet recycling rate. Modify combustion method – install small combustion units.
	PM_{10}	Increase pallet recycling rate. Modify combustion method – install small combustion units.
	CO	Increase pallet recycling rate. Modify combustion method – install small combustion units.
	SO_2	Increase recycling rate. Low sulfur fuel (wood).
Dust Agglomeration Furnace	NO_x	Limitation on operating hours
	PM_{10}	Baghouse
	Lead	Baghouse
	CO	Limitation on operating hours
	SO2	Limitation on operating hours and low sulfur fuel
Sweat Furnaces	NO_x	Good Combustion practices
	PM_{10}	Baghouse
	Lead	Baghouse
	CO	Afterburner
	SO_2	Low sulfur fuel – propane
Sweat Furnaces Fugitives	PM_{10}	Baghouse
	Lead	Baghouse
Material Blender	PM_{10}	Wet Suppression
	Lead	Wet Suppression

<u>Baghouses – Operational & Recordkeeping Requirement</u>

17. Doe Run shall control emissions from the equipment listed in Table 3 using baghouses.

Table 3: Equipment Controlled by Baghouses

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Emission Points	Description
EP08	Main Stack - Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler
EP18	Na_2SO_4 Crystallizer
EP19	Na_2CO_3 Surge Bin Baghouse
EP20	Na_2CO_3 Silo Baghouse
EP39A	Sweat Furnace – Fuel
EP39B	Sweat Furnace - Metal Reclamation
EP39C	Sweat Furnace – Captured
EP63A	Main Stack – Propane (Dust Agg Center)
EP63B	Main Stack – Dust Agg Furnace
EP64A	Sweat Furnace – Fuel
EP64B	Sweat Furnace – Material Reclamation
EP64C	Sweat Furnace – Captured
EP71	Reverb Furnace – Captured
EP72	Rotary Furnace – Captured
EP73	Sweat Furnace – Captured

These baghouses shall be operated and maintained in accordance with the manufacturer's specifications. All baghouses except EP18, 19, & 20 shall be equipped with a continuous particulate monitor such as Triboflow, or equivalent, to monitor gases exiting the baghouse. This device shall be located such that the Department of Natural Resources' employees may easily observe it. This monitor shall be designed to alert operators when particulate matter levels in the gases exiting the baghouse are above those seen during normal bag cleaning cycles. The setpoint of the continuous particulate matter monitor shall be set and recalibrated as necessary as part of the quarterly ventilation system inspections as required under the agreements of the State Implementation Plan. The monitor shall be operated such that it is out of service for no more than 48 hours each calendar quarter. Doe Run shall maintain all necessary spare parts to assure that an extended outage does not occur. Doe Run shall provide the department a quarterly report within 30 days of the end of each calendar quarter summarizing monitor setpoints, alarm incidents, and any corrective actions taken. This report shall be included with the current State Implementation Plan reporting. Replacement filters for the baghouse shall be kept on hand at all times. The bags shall be made of fibers appropriate for operating conditions expected to occur (i.e. temperature limits, acidic and alkali resistance, and abrasion resistance).

18. Doe Run shall monitor and record the operating pressure drop across all baghouses

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

at least once a day. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.

19. Doe Run shall maintain an operating and maintenance log for the baghouses, which shall include the following:
    - A. Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
    - B. Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
    - C. A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.

Scrubber – Operational & Recordkeeping Requirement

20. The scrubbing system associated with the desulfurization area shall be used to control PM_{10} and lead emissions and be utilized at all times that the equipment in the desulfurization area is in use.

21. Doe Run shall monitor and record the operating pressure drop across each scrubber at least once every twenty four (24) hours of operation. The scrubber shall be equipped with a gauge or meter that indicates the pressure drop across the scrubber. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.

22. Doe Run shall monitor and record the flow rate through the scrubber at least once every twenty four (24) hours. The scrubber shall be equipped with a flow meter that indicates the flow through the scrubber. The flow rate shall be maintained within the design conditions specified by the manufacturer's performance warranty.

23. Doe Run shall maintain an operating and maintenance log for the scrubber which shall include the following:
    - A. Incidents of malfunction, with impact on emissions, duration of event, probable cause, and corrective actions; and
    - B. Maintenance activities, with inspection schedule, repair actions, and replacements, etc.
    - C. A written record of regular inspection schedule, the date and results of all inspections including any actions or maintenance activities that result from that inspection.

Low-sulfur Coke

24. The sulfur content of the coke to be burned in the blast furnace shall not exceed the

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

annual average of 1.5% by weight of coke received. Doe Run shall maintain records of the fuel supplier certifications or analytical testing documentation on site for not less than five (5) years for Missouri Department of Natural Resources' review.

Oxygen-fired Combustion

25. Doe Run shall install, operate and maintain an oxygen-fired combustion technology to reduce NO_x emissions from the reverberatory furnace as proposed in the permit application for this project.

Haul Roads Requirements

26. Doe Run shall control particulate matter and lead emissions from the haul road(s) and vehicular activity area(s) by paving with asphalt (or with other paving materials approved by the APCP) and maintaining these areas.

27. Doe Run shall clean the paved haul road(s) twice per day by applying water flushing followed by vacuum sweeping, except on days when natural precipitation makes cleaning unnecessary, when minimum temperature conditions prevent safe and effective cleaning and/or when sand or a similar material has been spread on plant haul road(s) to provide traction on ice or snow.

New Sources Performance Standards (NSPS)

28. This installation shall comply with all applicable emission limits, monitoring, testing, reporting, and record keeping requirements of 40 CFR 60, Subpart L, *Standards of Performance for Secondary Lead Smelters*.

National Emission Standards for Hazardous Air Pollutants (NESHAP)

29. This installation shall comply with all applicable emission limits, testing, monitoring, sampling, reporting, and record keeping requirements of 40 CFR Part 63, Subpart X, *National Emission Standards for Hazardous Air Pollutants from Secondary Lead Smelting*.

Restriction of Public Access

30. Doe Run shall preclude all public access to Doe Run's declared property boundary. Doe Run shall submit documentation to demonstrate preclusion to the

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Air Pollution Control Program for review and approval.

Conditions Resulting from Ambient Air Quality Analyses

31. Ambient air quality monitoring for SO_2 should be conducted on a continuous basis in all areas of maximum impact as identified by the Industrial Source Complex Short Term (ISCST3) dispersion model. Meteorological data must be collocated with at least one SO_2 monitor for culpability determinations during review of the monitoring data. The number of ambient air quality monitoring sites and the duration of the study will be determined in conjunction the Air Pollution Control Program.

32. A Quality Assurance Project Plan should be submitted to the Air Quality Monitoring Unit no later than 90 days after the issuance of the permit.

33. Doe Run shall be required to perform additional lead and PM_{10} model analyses and/or testing to determine what, if any adjustments should be made to the characterization of the emission releases associated with the facilities mining activities. A proposal should be provided to the Air Pollution Control Program no later than 90 days after the issuance of the PSD permit. If National Ambient Air Quality Standards (NAAQS) violations are still predicted upon completion of the mine study, the facility should submit a corrective action plan no later than 90 days after the discovery of the modeled violation.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (8) REVIEW
Project Number: 2001-10-058
Installation ID Number: 093-0009
Permit Number:

The Doe Run Company
Buick Resource Recycling Facility
HC1 Box 1395, Highway KK
Boss, MO 65440

Complete: July 9, 2004
Reviewed: July 12, 2004

Parent Company:
The Doe Run Company
Buick Resource Recycling Facility
Highway KK
Boss, MO 65440

Iron County, S8, T22N, R21W

REVIEW SUMMARY

- The Doe Run Company - Buick Resource Recycling Facility (Doe Run) has applied for authority to eliminate the annual lead production limits from the individual furnaces and increasing the installation's total lead production limit to 175,000 tons per year.

- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment. HAPs of concern from this process are lead compounds, hydrogen chloride, chlorine, mercury, antimony, arsenic, beryllium, cadmium, chromium, and nickel. However, the HAP emissions associated with the increase in production are expected to be insignificant.

- Subpart L, *Standards of Performance for Secondary Lead Smelters*, of the New Source Performance Standards (NSPS) applies to this installation.

- Subpart X of the *National Emission Standards for Hazardous Air Pollutants (NESHAPs) from Secondary Lead Smelting* applies to this installation.

- Please refer to the Special Conditions for all the control devices/control methods associated with this installation.

- This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Doe Run is an existing major source and potential emissions are above de minimis levels for PM_{10}, SO_x, NO_x, CO, and Lead.

- This installation is located in Dent Township - Iron County, an attainment area for all criteria air pollutants.

- This installation is on the List of Named Installations [10 CSR 10-6.020(3)(B), Table 2], Number 19, *Secondary Metal Production Plants*.

- Ambient air quality modeling was performed to determine the ambient impact of PM_{10}, SO_x, NO_x, CO, and Lead.

- Emissions testing is required for the equipment as specified in detail in the Special Conditions.

- A revision to Part 70 Operating Permit is required for this installation within 1 year of the issuance of this permit.

- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

The Doe Run Company - Buick Resource Recycling Facility (Doe Run) produces secondary lead by processing vehicle and industrial batteries, lead shielding from X-ray equipment, balistic sand from firing ranges, lead-lined television screens, lead paint chips, and other lead scrap. This installation also produces high grade sodium sulphate which is marketted to the laundry detergent, paper and glass industries, by reacting battery acid with sodium carbonate.

Doe Run's Part 70 Operating Permit (Project Number 093-0003-020) is currently being reviewed by the Environmental Protection Agency (EPA). The following construction permits have been issued to Doe Run from the Air Pollution Control Program.

Permit Number	Description
0179-018	Installation of an electric furnace to replace a fuel fired reverberatory furnace which was used to treat all dross produced at this facility
0989-003	Construction and operation of a new secondary lead operation on the same property as the primary smelter.
0792-017	Installation of a steel drum shedder/chipper system to replace the existing drum dumping and material screening apparatus already in place and in use at the industrial battery processing area.
0493-006	Removal of 2 LPG warming units.
1093-010	Installation of LPG burner to flame skim lead bar surface.
1093-003	Installation of a metal reclamation furnace with fugitive dust capture hoods. The system includes afterburner control and exhausts to main baghouse collector.
0989-003A	Amendment to Permit Number 0989-003. This amendment changes the blast furnace annual throughput limit from 10,200 tons of lead bouillon to 60,000 tons when operating on secondary feed.
0989-003B	Amendment to Permit Number 0989-003A. This amendment reflects an increase (from 46,200 tons to 60,000 tons) in the annual maximum production in the reverberatory furnace with a corresponding decrease (from 60,000 tons to 41,500 tons)
1095-009	Installation of a baghouse dust agglomeration furnace with associated screw conveyor and surge bin.
1296-012	Installation of a bulk storage silo and pneumatic conveying system (lead oxide transfer system) that exhaust to an existing baghouse.
0297-015	Installation of a slag treatment system consisting of a hopper, blender, material silo, and two conveyors.
0997-006	Installation of a sweat furnace, mold pouring, and material screening process.
102000-007	This is a temporary permit to increase the blast furnace lead production by 8,000 tons and temporarily reduce the rotary melter lead production by 10,000 tons until December 31, 2000.

PROCESS DESCRIPTION

Doe Run's secondary lead production operation can be divided into three (3) major areas: 1) Raw material Preparation & Pretreatment, 2) Smelting, and 3) Refining.

1. Raw Material Preparation & Pretreatment

Doe Run receives raw material in the form of large industrial batteries, small automotive batteries, and other lead bearing materials contained in drums. Batteries are drained, and crushed and lead is manually separated from non-metallic materials at the battery storage bunker. The battery storage bunker is designed with an acid resistant primary liner system, including an acid brick floor, and a leak detection system. Electrolyte from the broken batteries drains to a sump and is subsequently pumped to one of the two 40,000 gallon rubber-lined process tanks for further processing into sodium sulfate (Na_2SO_4).

The separated lead scraps (lead plates, posts, and intercell connectors) are collected and stored in a pile for subsequent charging to the furnace. Oversize pieces of scrap and residue are put through a stainless steel hammermill (crusher). The hammermill is vented to the BDC scrubber to keep acid mist and particulate matter contained within the mill. A water screen receives the crushed feed from the hammermill where the feed materials are spray washed to remove the paste fraction of the broken batteries.

The battery paste is transferred to one of the two desulfurization reaction tanks and mixed with a slurry of sodium carbonate (Na_2CO_3), which is prepared in a soda ash slurry tank. Paste desulfurization involves the chemical removal of sulfur from the lead battery paste. The Na_2CO_3 reacts with the lead sulfate ($PbSO_4$) in the battery paste to produce a lead carbonate ($PbCO_3$) paste and a Na_2SO_4 solution. This process improves the furnace efficiency by reducing the need for fluxing agents to reduce lead-sulfur compounds to lead metal. The process also reduces sulfur dioxide (SO_2) furnace emissions.

The lead bearing scrap cable is sweated in a propane fired reclamation furnace to separate lead from metals with higher melting points and non-metal contaminants. This partially purified lead is tapped from the reclamation furnace for further processing in the refinery area. The exhaust from the reclamation furnace is first vented to an afterburner to control volatile organic materials driven off in the furnace. Secondly, the exhaust is vented to the main baghouse for particulate matter control.

2. Smelting

The smelting process produces lead by melting and separating the lead from metal and non-metallic contaminants and by reducing oxides to elemental lead. Smelting is carried out in the blast furnace, reverberatory furnace and rotary furnace.

2.1.Blast Furnace

The blast furnace produces hard or antimonial lead containing about 10 percent antimony. Pretreated scrap metal, rerun slag, scrap iron, coke, recycled dross, flue dust, and limestone are used as charge materials to the furnace. The raw materials are fed through a series of conveyors and layered on the tip of the blast furnace with coke. As the material slowly moves through the furnace, the material becomes fluid as the coke burns and melts the charge. In the process, the lead oxide is reduced to elemental lead, and the limestone and iron form a slag by-product.

The molten lead and slag are transferred to a settler that separates the two components. The lead is poured into a transfer pot and is further processed in the refinery. The slag is sent through a cooling tower, chemically treated, and shipped off-site for disposal.

The exhaust from the blast furnace is transferred through a cooling chamber to the main baghouse for particulate matter control. The dust captured in the main baghouse is conveyed to an agglomeration furnace where the collected particulate matter is melted and transfered to a mold, cooled and recycled back in the blast furnace feed.

2.2.Reverberatory Furnace

The reverberatory furnace produces soft lead. Soft lead is a product with low antimony content and is typically produced from the battery paste processed in the BDC building. The battery paste is transferred from the paste storage building and continuously fed to the reverberatory furnace through screw feeders.

The reverberatory furnace has internal dimensions of 17ft x 35ft. The furnace has three NAMCO fuel Directed Burners Model 4385-10 rated at 10,000,000 Btu/hr each. The fuel source for this furnace is propane. Gases exit the furnace at 2300-2400 degrees Fahrenheit (^{o}F) and drop vertically into a brick lined cooling chamber where it is cooled to 800-1200 ^{o}F. The gases leave the cooling chamber vertically and are cooled enough to be handled in the steel ducts. The exhaust gases are then transferred to the main baghouse for particulate matter control.

The slag is continuously tapped via water cooled launder. The slag produced in the reverberatory furnace is recycled back to either the reverberatory furnace or the blast furnace. The lead tap is made intermittently through an underflow siphon leadwell from the reverberatory furnace to a 225 ton dross kettle (D-3).

2.3.Rotary Furnace

The rotary furnace produces hard lead. Hard lead is a high antimony content lead normally derived from the grid metal portion of the battery.

The rotary furnace continuously melts grids and posts from the battery processing plant. The material is fed into the rotary furnace through a belt hopper and a vibrating feeder. The gradual rotation of the drum moves the material through the length of the furnace to ensure complete melting and smelting of the material.

Drosses formed in the furnace float on the molten lead bath in the bottom end of the slope drum, and are automatically separated with a plow device. Lead is overflowed to one side of the plow while the dross is dropped into toe boxes under the rotary furnace. The ash, dross, and slag material separated by the rotary furnace are returned to the blast furnace feed and the tapped lead is transferred to the drossing kettle. The fumes generated by the rotary furnace are sent to the main baghouse for particulate matter control.

3. Refining

Refining and casting the crude lead from the smelting furnaces consists of softening, allowing, and oxidation depending on the degree of purity or alloy type desired.

3.1.Drossing Kettles

The D-3, D-4, & D-5 kettles are considered the drossing kettles. Agents used to create dry dross typically include coke breeze, saw dust, and ebonite. The lead is pumped from underneath the dross layer to a refinery kettle (R-1 or R-2).

3.2.Refining Kettles

The refining kettles (R-1 and R-2) are normally used to remove copper from the lead. This is accomplished by adding a mixture of pyrite and sulfur into the molten lead. The dross containing the copper is then shimmed off the kettle and sent to the blast furnace normally as dry dross. When required, the copper-free lead metal is treated for tin, antimony, and arsenic removal or addition in Kettles R-3, R-5, and R-6 prior to being pumped to the Cleanup Kettles.

The Cleanup Kettles (R-7, R-8, and R-9) are normally used to remove the last remaining antimony from the lead or to make final additions to the lead. After the metal is checked, it is pumped to one of the casting operations. Emissions from the refining kettles are captured and sent to the main baghouse for particulate matter control.

3.3.Casting Machines

From the casting kettle, the lead is then pumped to the casting machines. The lead can be cast into 1 ton blocks, 60-lb pigs, or 25-lb links (5 lb. x 5) or Billets.

PROJECT DESCRIPTION

Doe Run received a PSD permit (Permit Number 0989-003) from the APCP on September 12, 1989, which established individual annual lead production limits for the blast, reverberatory and smelting furnaces (10,200 tons for blast furnace, 46,200 tons for reverberatory furnace, and 42,150 tons of smelting furnace). The installation received an amendment to the PSD permit on November 10, 1993, and another amendment on August 7, 1996, from the APCP for increased limits. The final PSD permit, as amended, established individual lead production limits for the blast furnace, reverberatory furnace and smelting furnace of 41,500 ton per year, 60,000 ton per year, and 42,150 ton per year, respectively, for a total of 143,650 ton per year.

Doe Run submitted this PSD permit application proposing to eliminate the annual lead production limits from the individual furnaces and increase the installation’s total lead production limit to 175,000 ton per year. The annual emission limitations of this permit reflect the production limitation proposed by the applicant.

Due to the discrepancy of estimating emissions in previous PSD permit (Permit Number 0989-003), the Air Pollution Control program has performed PSD review for the entire installation in this project.

EMISSIONS/CONTROLS EVALUATION

In this secondary lead smelting operation, lead is emitted to some degree from each unit operation. Hazardous air pollutants and criteria air pollutants are emitted from secondary lead smelters as process emissions from the main smelting furnace exhaust, process fugitive emissions from smelting changing and tapping and lead refining, and fugitive dust emissions from materials storage and handling and vehicle traffic. Table 5 provides the control technologies with control efficiencies and source of emission factors associated with each emission point.

Table 5: Control Technologies, Control Efficiency & Source of Emission Factor

Emission Points	Description	Pollutants	Control Technology	Control Efficiency (%)	Source of Emission Factors
EP08	Main Stack - Blast Furnace & Processes	SO_x	N/A	N/A	CEM
		NO_x	Oxy-fuel firing	75.000	Stack Test (Airsource 2001)
		CO	N/A	N/A	Stack Test (Aeromet 2003)
EP08	Main Stack - Sweat Furnace & Processes	PM_{10}	Baghouse	99.700	Stack Test (Airsource 2001)
		Pb	Baghouse	99.700	Stack Test (Aeromet 2003)
		HAPs	N/A	N/A	Stack Test (Aeromet 1993)
EP08	Main Stack - Blast Furnace (Coke)	VOC	N/A	N/A	FIRE (SCC 1-02-008-02)
EP08	Main Stack - Blast Furnace LPG - Tap	VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
EP08	Main Stack - Blast Furnace LPG - Settler	VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
EP08	Main Stack - Blast Furnace LPG - Rotary Melter	VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
EP08	Main Stack - Propane (Reverb. Furnace)	VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
EP10	Blast Furnace Fugitives	SO_x	N/A	N/A	Pb SIP
EP10	Blast Furnace Fugitives	PM_{10}	N/A	N/A	Personnel Sampling (1996)
		Pb	N/A	N/A	Personnel Sampling (1996)
		HAPs	N/A	N/A	Personnel Sampling (1993)
EP11	Dross Plant Fugitive	PM_{10}	N/A	N/A	Personnel Sampling (1996)
		Pb	N/A	N/A	Personnel Sampling (1996)
		HAPs	N/A	N/A	Personnel Sampling (1993)
EP12	Refinery Fugitive	PM_{10}	N/A	N/A	Personnel Sampling (1996)
		Pb	N/A	N/A	Personnel Sampling (1996)
EP13	Open Storage Fugitive	PM_{10}	Partial Enclosure	55.000	FIRE (SCC 3-03-010-12)
		Pb	Partial Enclosure	55.000	Table 7.6-8 AP-42 10/86
EP15	Diesel Storage Tank - Breathing Loss	VOC	N/A	N/A	FIRE (SCC 4-03-010-19)
EP15	Diesel Storage Tank - Working Loss	VOC	N/A	N/A	FIRE (SCC 4-03-010-21)
EP15A	Unleaded Storage Tank - Breathing Loss	VOC	N/A	N/A	FIRE (SCC 4-03-010-06)
EP15A	Unleaded Storage Tank - Working Loss	VOC	N/A	N/A	FIRE (SCC 4-03-010-09)
EP16	BDC Scrubber	PM_{10}	Scrubber	98.000	MDNR Permit 0989-003
		Pb	Scrubber	98.000	MDNR Permit 0989-003
EP18	Na2SO4 Crystallizer	PM_{10}	Baghouse	99.500	MDNR Permit 0989-003
EP19	Na2CO3 Surge Bin Baghouse	PM_{10}	Baghouse	99.500	MDNR Permit 0989-003
EP19A	Na2CO3 Transfer	PM_{10}	N/A	N/A	MDNR Permit 0989-003
EP20	Na2CO3 Silo Baghouse	PM_{10}	Baghouse	99.500	MDNR Permit 0989-003
EP21	BDC Crystallizer Boiler	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP22	Dross Plant Kettle D1 & D2	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)

		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP23	Dross Plant Kettle D3 - D5	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP24	Refinery Kettle R1 & R2	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP25	Refinery Kettle R3 & R4	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP26	Refinery Kettle R5 & R6	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP27	Refinery Kettle R7 & R8	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP28	Refinery Kettle R9 & R11	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP31	Shredder Baghouse	PM_{10}	Baghouse	99.800	MDNR Permit 0792-016
		Pb	Baghouse	99.800	MDNR Permit 0792-016
EP32	Laboratory Baghouse	PM_{10}	N/A	N/A	Mass Balance
EP33	Changehouse Boiler	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP34	Main Shop Forge	PM_{10}	N/A	N/A	FIRE (SCC 1-02-010-02)
		SO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		NO_x	N/A	N/A	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
		CO	N/A	N/A	FIRE (SCC 1-02-010-02)
EP37	Resuspention	PM_{10}	Paved, Swept, & Water Flushing	95.000	N/A

		Pb	Paved, Swept, & Water Flushing	95.000	Pb SIP
EP39A	Sweat Furnace - Fuel	PM_{10}	Baghouse	96.200	FIRE (SCC 1-02-010-02)
		VOC	Afterburner	96.000	FIRE (SCC 1-02-010-02)
EP39B	Sweat Furnace - Metal Reclamation	PM_{10}	Afterburner & Baghouse	96.200	FIRE (SCC 3-04-004-05)
		Pb	Afterburner & Baghouse	98.400	MDNR Permit 0693-013
EP39C	Sweat Furnace - Captured Fugitives	PM_{10}	Baghouse	90.500	90% of SCC 3-04-004-12
		Pb	Baghouse	98.400	FIRE (SCC 3-04-004-12)
EP44	Wood Burning Boiler	PM_{10}	N/A	N/A	AP-42 (Table 1.6-1)
		SO_x	N/A	N/A	AP-42 (Table 1.6-2)
		NO_x	N/A	N/A	AP-42 (Table 1.6-2)
		VOC	N/A	N/A	AP-42 (Table 1.6-3)
		CO	N/A	N/A	AP-42 (Table 1.6-2)
EP57	CaS Silo	PM_{10}	N/A	N/A	FIRE (SCC 3-05-011-07)
EP58	Material Blender	PM_{10}	Wet Material	50.000	FIRE (SCC 3-05-011-09)
EP63A	Main Stack - Propane (Dust Agg Center)	PM_{10}	Baghouse	96.200	FIRE (SCC 1-02-010-02)
		VOC	N/A	N/A	FIRE (SCC 1-02-010-02)
EP63B	Main Stack - Dust Agg Furnace	PM_{10}	Baghouse	96.200	MDNR Permit 1095-009
		VOC	N/A	N/A	MDNR Permit 1095-009
EP64A	Sweat Furnace - Fuel	PM_{10}	Afterburner & Baghouse	96.200	FIRE (SCC 1-02-010-02)
		VOC	Afterburner	96.000	FIRE (SCC 1-02-010-02)
EP64B	Sweat Furnace - Material Reclamation	PM_{10}	Afterburner & Baghouse	96.200	FIRE (SCC 3-04-004-05)
		Pb	Afterburner & Baghouse	98.400	MDNR Permit 0693-013
EP64C	Sweat Furnace - Captured	PM_{10}	Baghouse	90.500	90% of SCC 3-04-004-12
		Pb	Baghouse	98.400	FIRE (3-04-004-12)
EP71	Reverb Furnace – Captured	PM_{10}	Baghouse	99.000	Personnel Sampling (1996)
		Pb	Baghouse	99.000	Personnel Sampling (1996)
EP71	Reverb Furnace – Captured	SO_x	N/A	N/A	Pb SIP
EP72	Rotary Furnace - Captured	PM_{10}	Baghouse	99.000	Personnel Sampling (1996)
		Pb	Baghouse	99.000	Personnel Sampling (1996)
EP72	Rotary Furnace – Captured	SO_x	N/A	N/A	Pb SIP
EP73	Sweat Furnace - Captured	PM_{10}	Baghouse	99.000	10% of SCC 3-04-004-12
		Pb	Baghouse	99.000	Mass Balance
EP74	Coke Delivery Route	PM_{10}	Paved, Swept, & water flushing	95.96	AP-42 Chapter 13.2.1
		Pb	Paved, Swept, & water flushing	95.96	AP-42 Chapter 13.2.1
EP75	Battery Delivery Route	PM_{10}	Paved, Swept, & water flushing	88.11	AP-42 Chapter 13.2.1
		Pb	Paved, Swept, & water flushing	88.11	AP-42 Chapter 13.2.1
EP76	Paste Transfer Route	PM_{10}	Paved, Swept, & water flushing	92.84	AP-42 Chapter 13.2.1
		Pb	Paved, Swept, & water flushing	92.84	AP-42 Chapter 13.2.1
EP77	Feed Transfer Route 1	PM_{10}	Paved, Swept, & water flushing	94.69	AP-42 Chapter 13.2.1
		Pb	Paved, Swept, & water flushing	94.69	AP-42 Chapter 13.2.1
EP78	Feed Transfer Route 2	PM_{10}	Paved, Swept, & water flushing	94.69	AP-42 Chapter 13.2.1

		Pb	Paved, Swept, & water flushing	94.69	AP-42 Chapter 13.2.1
EP79	Feed Transfer Route 3	PM_{10}	Paved, Swept, & water flushing	94.69	AP-42 Chapter 13.2.1
		Pb	Paved, Swept, & water flushing	94.69	AP-42 Chapter 13.2.1

Existing actual emissions were taken from the 2003 Emission Inventory Questionnaire (EIQ). Potential emissions of the application represent the potential of the entire installation, assuming continuous operation (8760 hours per year). The installation's conditioned potential reflects the production limitation proposed by the applicant. The following table provides an emissions summary for this project.

Table 6: Emissions Summary (tons per year)

Pollutant	Regulatory *De Minimis* Levels	Existing Potential Emissions	Existing Actual Emissions (2003 EIQ)	Potential Emissions of the Application	Installation Conditioned Potential
PM_{10}	15.0	Major	18.79	89.83	30.57
SOx	40.0	Major	3105.7	7484.37	3400.0
NOx	40.0	Major	47.78	133.89	54.72
VOC	40.0	N/A	4.96	5.65	N/A
CO	100.0	Major	10721.37	32518.53	14790
Lead	0.6	Major	6.86	21.61	12.55
HAPs	10.0/25.0	Major	13.79	27.36	12.65

*N/A = Not Applicable

BACT ANALYSIS

Any source subject to Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, Section (8) must conduct a Best Available Control Technology (BACT) analysis on any pollutant emitted in greater than de minimis levels. The BACT requirement is detailed in Section 165(a)(4) of the Clean Air Act, at 40 CFR 52.21 and 10 CSR 10-0.60(8)(B).

A BACT analysis is done on a case by case basis and is performed using a "top down" method. The following steps detail the top-down approach:

1. Identify all potential control technologies – must be a comprehensive list, it may include technology employed outside the United States and must include the Lowest Achievable Emission Rate (LAER) determinations.
2. Eliminate technically infeasible options – must be well documented and must preclude the successful use of the control option.
3. Rank remaining control technologies – based on control effectiveness, expected emission rate, expected emission reduction, energy impacts, environmental impacts, and economic impacts.
4. Evaluate the most effective controls – based on case by case consideration of energy, environmental, and economic impacts.
5. Select BACT

The proposed modification is subject to the PSD regulations, which mandate that case-by-case BACT analyses be performed. The potential emissions are above de minimis levels for PM, SO_2, NO_x, CO, and Lead. As a consequence, BACT demonstrations are presented for PM, NO_x, CO, SO_2, and Lead (Pb).

Particulate Matter BACT Analysis

The following table lists the technologies identified as possible PM reduction technologies for the operations at Doe Run and their expected percent reduction.

Emission Sources	Control Technologies	Theoretical Control Efficiency	Technically Feasible	Economically Feasible	BACT
Process & Process Fugitive Sources	Baghouse	95 - 99%	Yes	N/A	Yes
	Electrostatic Precipitators	95 - 99%	N/A	N/A	N/A
	Scrubber	95 - 98%	N/A	N/A	N/A
	Cyclone	80%	N/A	N/A	N/A
	Operational changes	Varies	N/A	N/A	N/A
Open Storage Sources	Enclosures	Varies	Yes	N/A	Yes
	Surface Treatment	Varies	N/A	N/A	N/A
	Operational practices	Varies	N/A	N/A	N/A
Resuspension (Haul Roads)	Paving	90%	Yes	N/A	Yes
	water flushing/sweeping	95%	Yes	N/A	Yes
	Operating procedures	Varies	N/A	N/A	N/A
Boiler	Add-on Controls	90 - 99%	N/A	No	No
	Fuel Specification	Varies	Yes	Yes	Yes
	Good Combustion Practices	Varies	Yes	Yes	Yes
Pallet Burner	Add-on Control	90 - 99%	No	No	No
	change in combustion method	95%	Yes	N/A	N/A
	Recycling	80 - 90%	N/A	N/A	N/A
	Good Combustion Practice	Varies	N/A	N/A	N/A

PM_{10} Control Technology Discussion

<u>Control Technologies for Process and Process Fugitive Emission Sources</u>

Add-on Control

Traditionally add-on control technologies, such as baghouses, electrostatic precipitator (ESPs), scrubbers, and cyclones, are all possible options for reducing PM emissions from process and process fugitive emission sources. Baghouses and electrostatic precipitators (ESPs) have similar anticipated control efficiencies in the applications at Doe Run. The control efficiency of a scrubber is probably a little lower than a baghouse

or ESP. Cyclones have an even lower estimated control efficiency.
The use of baghouses or ESP are technically feasible controls for all sources of process PM and process fugitive PM, except for several emissions in the BDC Building. The emission sources in the BDC Building include moist exhaust streams and are better suited for control by a scrubber. The use of a cyclone is technically feasible for control of particulate matter emissions from Doe Run's operations; however, the expected removal efficiency is lower than that of other add-on control devices; hence, this technology was not considered any further.

Open Sources (Fugitive Emissions)

Control technologies for reducing emissions from open sources of fugitive emissions include: enclosures or partial enclosures, wet suppression, and operational practices. Essentially, these technologies are designed to prevent materials from becoming wind borne.

Types of enclosures include three-sided bunkers, open-ended buildings, storage silos, or similar structures. All of these techniques reduce entrainment of PM by wind during storage and handling. Enclosures are technically feasible technologies for reducing fugitive PM emissions from many raw material storage and material handling operations at Doe Run

Wet suppression involves wetting the surface of the material, either with water or a chemical suppressant, to suppress the formation of airborne dust. This technique is technically feasible in situations where the additional moisture added to the raw material does not adversely impact the process or product. At Doe Run, wet suppression is a technically feasible alternative for this material blending operation.

Operational practices or "good operating practices" is a broad term that cover a wide variety of techniques to reduce airborne fugitive PM. These practices can include:

- Prompt clean-up of spillage
- Minimizing drop heights during material transfer operations
- Proper loading/unloading operations
- Minimizing areas disturbed during material transfer operations.

These techniques are technically feasible for reducing open source fugitive emissions at Doe Run.

Haul Roads

Fugitive emissions from haul roads can be reduced by: paving the roads, using water flushing or weeping, or implementing operational practices. All are technically viable techniques for reducing PM emissions from the haul roads.

Paving unpaved roads reduces the amount of silt on the surface of the road, thereby reducing the amount of fugitive dust that can become airborne from the road surface. Sweeping removes silt from the road surface reducing the amount of dust that can become airborne. Flushing wets the road surface, minimizing the amount of dust that can become airborne. Operational practices can include a variety of techniques for reducing PM emissions, such as the following techniques:

- Prompt clean-up of spillage
- Covering trucks containing material that may become airborne
- Preventing track-on materials
- Storm water control
- Proper use of salting/sanding materials

All of the techniques discussed in this section are technically feasible at Doe Run for reducing PM emissions from haul roads.

BDC Boiler

There are several options available for reducing PM emissions from the BDC Boiler including: installation of add-on control technology (baghouse, ESP, etc.), fuel specification, and good combustion practices.

Use of an add-on control technology, such as the baghouses or other technologies described above, can be used to reduce PM emissions from the boiler. However, in practice, for a boiler the size of the BDC boiler burning propane (40.6 MMBtu/hr, estimated PM_{10} emissions of 0.40 tons/year), there is no evidence that add-on technology have been applied. Therefore, add-on technologies for the BDC Boiler were not reviewed further.

The type of fuel burned in the boiler will directly impact PM emissions; therefore, specifying a “clean” fuel for the boiler is technically feasible way of reducing PM emissions. LPG, the fuel burned in the boiler, is an inherently clean fuel. Finally, good combustion practices, essentially keeping the boiler properly tuned and operated in accordance with manufacturer’s specifications, can also minimize PM emissions. Good combustion practice is a technically feasible control technique for the BDC Boiler.

Pallet Burner

Emission from the pallet burner are difficult control because it is a hot emission source (approximately 1,500^{o}F) with a large air flow (approximately 24,000 scfm without dilution cooling air). However, there are three basic option for reducing emissions from this operation: (1) source reduction, (2) enclosing the unit and exhausting the gases to an air pollution control devices, and (3) changing the method of burning the pallets by enclosing the combustion source.

The emission from this operation can be reduced using source reduction – to reduce the volume of pallets burned through a recycling program. It is technically feasible to recycle pallets that are not damaged and to make repairs on pallets that are only marginally damaged.

Currently, Doe Run has a pallet-recycling program, reducing the number of pallets disposed of. Approximately 80 to 90% of the incoming pallets are recycled. However, Doe Run can not recycle all of the pallets because a fraction of the pallets are too damaged to be recycled.

Enclosing the unit and exhausting the emissions to an air pollution control device would require cooling of the exhaust stream before entering an air pollution control device. Cooling of the air steam would increase the volume of air to be treated to approximately 75,000 acfm. The manufacturer of the pallet burner reported that it is not aware of any facility that has enclosed one of its units; they were not designed for this purpose. Therefore, Doe Run does not believe it is technically practical and feasible to enclose the unit and clean the gases using air pollution control device.

Changing the method of burning the pallets by using an enclosed combustion source is technically feasible. Wood-fired boilers are routinely used for this purpose.

RBLC Search Result

The RBLC database contains limited information on PM controls employed at secondary lead smelting facilities; therefore, the RBLC database search was expanded to cover non-ferrous smelting operations. The following is a summary of the information in the RBLC database.

- Two blast furnaces with two different secondary lead smelters show PM control information. One facility uses a baghouse with a stated control efficiency of 84 percent and the second facility uses a scrubber with a control efficiency of 90 percent. Both listings were determined to be BACT.
- Lead furnace (unspecified type) controlled using a baghouse with an unspecified efficiency stated to be BACT.
- Lead smelting furnace using a scrubber with a control efficiency of 90 percent stated to be BACT.
- Reverberatory furnace at a secondary lead operation using a baghouse with a control efficiency of 99 percent was determined to be BACT.
- For various types of furnace at a variety of non-lead operations – Furnace at 19 facilities controlled using baghouse with control efficiencies ranging from 98 to 99.9 percent. Thirteen of determinations are BACT. Two of the determinations are LEAR; the higher control efficiencies reported are for the LAER determinations. Furnaces at four facilities, predominately cupola-type furnaces, were reported to be using scrubbers with control efficiencies between 98 and 99.7 percent to meet BACT. One facility controlled PM emissions from a sweat furnace using an afterburner with a control efficiency of 99 percent.
- For various types of process fugitive emissions from a variety sources at non-lead operations – Twenty five facilities used baghouses with control efficiency ranging from 91.4 to 99.7 percent; one facility used a spray chamber with an unspecified control efficiency, four facility used wet suppression techniques with reported efficiencies between 70 to 97 percent, and four facility used work or operational practices with unspecified control efficiencies.
- For various types of non-process fugitive emission sources, predominately material

handling operations, at non-lead operations – Thirteen facilities used baghouses with control efficiencies ranging from 99 to 99.8 percent, four facilities used enclosures, usually in combination with another technology (wet suppression or work practices) with control efficiency between 90 to 97 percent, one facility used a cyclone and a wet scrubber with an unspecified control efficiency, two facilities used wet suppression (one was in combination with an enclosure), and one facility stated that it used material balance to achieve a control efficiency of 100 percent. Most of the determinations specified in the database were for BACT, although a few were for LAER.

- For paved roads, the types of technologies identified in the database include: vacuum sweeping and speed control and water flushing followed by vacuum sweeping.
- Two non-secondary lead furnaces use baghouses to control VE to meet BACT. Three other non-lead furnaces showed no controls for VE.
- Two material handling emission sources (non-lead), controlled VE to meet BACT requirements using either watering (piles) with an effectiveness of 90 percent or an enclosure with an effectiveness of 99 percent. Three other sources did not identify any emission controls.
- The database has 12 entries for process fugitive emission source (non-lead). Three sources use baghouses, two facilities use water suppression, one facility uses a building enclosure, and the control technology is unspecified for the remaining sources. None of the listings identify control efficiency. All of the determinations are BACT except for one listed as NSPS.
- There are two entries for VE from roads; one uses speed control to meet BACT and the other uses an unspecified technology.

There is no information in the RBLC database on any operation similar to the pallet burner or propane-fired boiler. The search was expanded to include natural gas-fired boilers of similar size to the BDC boiler. Twelve boilers used no controls or did not specify any controls, six boilers used fuel specifications, and one boiler used good combustion practices. These determinations are a mixture of BACT, “other,” and LAER.

The RBLC database for wood-fired boilers showed typical air pollution controls for PM are cyclones (five boilers), and ESP (two boilers), a cyclone/ESP combination (one boiler), a cyclone/scrubber combination (one boiler), or no control (one boiler).

PM BACT Selection

For process fugitive emissions of PM, BACT for the proposed project has been determined to be the installation of several additional baghouses. A 40,000-cfm baghouse is proposed for sweat furnace fugitive emissions, a 20,000-cfm baghouse is proposed to control fugitive emissions in the rotary melter area and a 60,000-cfm baghouse is proposed to control fugitive emissions from the reverberatory furnace area (including dross area fugitive emissions).

A change in the method of combusting the wood pallets is also proposed as BACT for the wood pallet operation. All other sources already have a BACT level of control for PM emissions using existing air pollution control technologies, predominately baghouses or operational controls. Table 7 presents a list of the units that emit particulate matter, the control technologies currently used, and estimated efficiency of the air pollution control devices.

Table 7: List of particulate matter control technologies currently used

Emission Unit	Air Pollution Control Technology	Estimated Efficiency (%)
Furnaces & related burners that exhaust to the Main Stack, including the Blast Furnace, Rotary Melter, Reverberatory Furnace, and the burners on the blast furnace tapping area and the Settler	Baghouse, 2 of 14 compartments including Teflon-coated bag	99.69
Blast Furnace area fugitive emissions	Redesigned furnace charging system and other operational changes	Unknown
Dross Plant fugitive emissions	Enclosure (building)	Unknown
Open storage	Partial enclosure	Unknown
Units exhausting to the BDC scrubber	Scrubber	98
Sodium Sulfate Baghouse	Enclosed storage & baghouse	99.5
Sodium Carbonate Baghouse Unloading	Enclosed storage & baghouse	99.5
Sodium Carbonate transfer (fugitive)	Bulk of emissions to baghouse	Unknown
Sodium Carbonate Silo Baghouse	Enclosed storage & baghouse	99.5
BDC Boiler	"clean" fuel, good combustion practices	Unknown
Refinery Kettles - Stack emissions	Enclosure (building)	Unknown
Refinery Kettles - Fugitive emissions	Enclosure (building)	Unknown
Shredder Baghouses	Baghouses	99.8
Lab Baghouse	Baghouse	99
Haul Roads	Paved, flushed, & vacuumed	95
Pallet Burner	Air curtain destructor	Unknown
Dust Agglomeration Furnace	Baghouse	96.2
Sweat furnaces - Stack emissions	Baghouses & afterburners	96.2
Sweat furnaces - fugitive emissions	Enclosure (building)	90.5
Material Blender	Wet suppresion	50
Sodium Sulfate Dryer	Baghouse	99

Lead BACT Analysis

Lead is generated from the following emission sources:

- Sources that exhaust to the Main Stack
- Blast Furnace fugitive emissions
- Dross plant fugitive emissions
- Refinery fugitive emissions
- Open storage
- BDC scrubber
- Shredder baghouses
- Haul Roads
- Sweat furnace
- Sweat furnace fugitive emissions

- Dust agglomeration furnace

Lead Technology Discussion

The air pollution control techniques and the BACT alternatives for the lead emission sources are the same as those discussed for PM controls.

RBLC Search Results

A search of the RBLC was conducted for the technologies to control lead emissions from the types of emission sources at Doe Run. The results are summarized below:

- Emissions from furnaces at five lead facilities show four facilities used baghouses with control efficiencies ranging from 84 to 90 percent. The fifth facility used a scrubber with a stated control efficiency of 90 percent. One of the determinations was RACT and the remaining determinations were BACT.
- Emissions from three non-lead furnaces were controlled by baghouses with control efficiencies of 99.2 to 99.4 percent. All were determined to be BACT.
- Emissions at material handling operation were controlled by a baghouse determined to be BACT.
- Emissions from process fugitive sources at 11 non-lead operations were controlled using baghouse with reported efficiencies ranging from 90.8 to 99 percent. All the determinations were BACT, except one was listed as other.

Lead BACT Selection

Lead BACT controls are the same as those presented for PM emission sources. Additionally, the affected lead sources will meet the requirements of MACT standards for secondary lead smelting under 40 CFR part 63 Subpart X.

Sulfur Dioxide BACT Analysis

SO_2 is formed when sulfur compounds found in the recycled batteries (primarily lead sulfate) and other raw materials are oxidized during the various smelting operations. The major sources of SO_2 emissions are reverberatory furnace, blast furnace, and the rotary melter. These emission sources are exhausted to the Main Stack.

Because of the trace sulfur content in LPG and wood fuels, all burners will emit SO_2; however, the emissions rates are low because of the inherently low sulfur content of the fuels. There are also fugitive SO_2 emissions from the refinery; however, these emissions are proportionately small. Therefore, only the reverberatory furnace, blast furnace, and rotary melter will be evaluated for SO_2 control.

SO_2 Control Technology Discussion

The following technologies were identified as possible SO_2 reduction technologies for the sources at the Doe Run facility:

- Wet scrubbing of the tailgas exhaust gases
- Dry/spray dry lime scrubbing of the exhaust gases
- Desulfurization of feed materials
- Operational changes at the blast furnace (height of furnace, low S coke)
- Operational changes at the reverberatory furnace (fluxing and caustic spray scrubbing)

Wet Scrubbing

Wet scrubbing can be applied to the reverberatory furnace, blast furnace, and rotary melter. In a wet scrubber, the SO_2 is absorbed into a water solution in a packed tower, tray tower, spray tower, or venturi scrubber. The resulting sulfur compounds are then neutralized by a base material. Commonly used base materials include calcium (lime, limestone), sodium (sodium carbonate, sodium hydroxide) and ammonia. Lime and limestone are the most commonly used base materials because of their relatively low cost. However, there are many solubility issues with calcium compounds, which can cause operating problems. Sodium compounds are much more soluble and are easier to handle at a facility like Doe Run. Ammonia scrubbers can have some ammonia emissions, and there may also be particulate matter created during the reaction. For these reasons a sodium base material was chosen for neutralization in the scrubber in this BACT analysis.

Without a total redesign of the facility, the only place a scrubber could be placed would be after the baghouse and before the Main Stack. The types of scrubbers evaluated were the packed tower, tray tower, spray tower, and venturi scrubber. A venturi scrubber does not have adequate mass transfer capabilities to remove gaseous pollutants. Packed tower, tray tower, and spray tower scrubbers are all technically feasible options for SO_2 removal at Doe Run. Since the packed tower scrubber has the largest potential reduction for SO_2 removal (95-99%), this type of scrubber was selected for the economic analysis.

Dry/Spray Dry Lime Scrubbing

In a dry or spray dry lime system lime is injected into the air stream between the furnace and the fabric filter. With a dry lime system it is injected as a powder. In a spray dry system, it is injected as a slurry, which is then evaporated by excess heat in the air stream. With both systems, the lime reacts with the SO_2 to form calcium sulfate and other calcium compounds. Estimated removal efficiencies are in the range of 60 to 85%.

The unreacted lime and the calcium sulfate are collected as a dust in the fabric filter. This increases the dust load to the filter and causes the calcium materials to be mixed with the lead-containing dusts from the furnace exhausts. The lead-bearing baghouse dusts are currently recycled at the plant to recover lead. The resulting fabric filter dust from a lime system would need to be disposed of offsite to avoid putting the sulfur compounds back into the furnace, and to avoid metallurgical problems in the furnaces from the additional calcium. Since the dust would also contain significant quantities of lead, it would be classified as a hazardous material.

Approximately 27,000 tons per year of baghouse dust are recycled each year at Doe Run. With the addition of the lime, and the change in SO_2 emissions, approximately 47,890 tons per year of hazardous waste would need to be disposed. Because of the waste generation and reduced lead output, the dry lime or spray dry lime process is not feasible for the Doe Run installation.

Desulfurization of Feed Materials

A large portion of the sulfur emitted from the Doe Run facility originates in the battery paste, which contains greater than 50% lead sulfate. When the lead sulfate is smelted to recover the lead, a large percentage of the sulfur is emitted to the exhaust as SO_2. By removing the sulfur from the lead sulfate prior to introducing it into the furnace, the air emissions will be correspondingly reduced.

During the desulfurization process, the battery paste is separated from other battery components and the sulfuric acid in the battery, and is mixed in a vat with sodium carbonate. The ensuing reaction forms lead oxide and carbon dioxide, as well as sodium sulfate. The sodium sulfate is soluble and is removed from the lead oxide by settling and pressing the material to remove the sodium sulfate solution. The sodium sulfate is recovered through evaporation, crystallization, and solids separation and is then sold.

The desulfurized battery paste is fed to the reverberatory furnace. The sulfur reduction realized in this process step is carried over to the blast furnace because slag and dross from the reverberatory furnace that is fed to the blast furnace will now contain less sulfur.

The desulfurization process is technically feasible for reducing SO_2 emissions from the reverberatory and blast furnaces, which makeup approximately 95% of the overall SO_2 emissions. This technology is already in place at Doe Run and was previously determined to be BACT. Doe Run recently completed upgrades at its desulfurization plant. The capacity of the present desulfurization system will adequately desulfurize the feed materials up to an annual production rate of 175,000 tons of lead.

Operational Changes – Blast Furnace

There are several operational changes available that may reduce SO_2 emissions from the blast furnace. These include the use of low sulfur coke and extending the top of the furnace. Doe Run already uses a low sulfur coke, so this operational means of reducing SO_2 emissions has already been implemented.
Extending the top of the blast furnace is another potential operational change for reducing SO_2 emissions. Extending the top of the furnace will decrease the temperature at the top of the furnace and force more of the sulfur into the slag rather than being emitted into the atmosphere. Doe Run has further evaluated this alternative and has determined that is technically infeasible because of the type of material being

fed to the furnace. Extending the top will cause “bridging” of the raw material which can lead to inconsistent feed to the furnace and potential furnace upsets.

Fluxing and Reagent Spray Scrubbing

Fluxing and spray scrubbing are potential operational alternatives to reducing SO_2 emissions from the reverberatory furnace. Doe Run uses fluxing in the reverberatory furnace to assist in the chemical removal of impurities, including sulfur, from molten metal. The impurities fuse with the fluxing agent and form slag, removing it from the lead and off-take gas streams. The slag from the reverberatory furnace contains a significant amount of lead and is, therefore, charged as a feed to the blast furnace to further extract the lead, which would otherwise be wasted and disposed as a hazardous waste.

Spray scrubbing using a desulfurization reagent can provide additional removal of sulfur in the off-gases of the reverberatory furnace through a solidification process. After spraying, the solidified sulfur combines with the particulate dust at the bottom of the mixing chamber. The dust mixture is then removed and recycled at the blast furnace to recover additional lead.

To maintain proper metallurgical conditions, there is a limitation to the amount of sulfur that can be removed in the reverberatory furnace through fluxing as well as a limitation on the amount of sulfur that can be charged to the blast furnace as part of the reverberatory furnace slag or the sprayed solution. For Doe Run, the upper limit is 200 tons of sulfur per month. Currently, 100 tons per month of sulfur are carried over through the slag. Doe Run can potentially remove an additional 100 tons per month through fluxing and caustic spraying; however, there are some downstream process implications if Doe Run sends an additional 100 tons per month to the blast furnace. Most notably, there is a significant increase in operating costs and a decrease in lead production. Therefore, there is a limit on the amount of fluxing and reagent spray scrubbing that can be routinely conducted without disrupting metallurgical chemistry or production. As a result of limited control effectiveness, high cost and technical obstacles, this control option has been determined not to be feasible as BACT.

RBLC Search Results

There is information in the RBLC database for SO_2 control technologies at only three secondary lead smelters, one of which is Doe Run’s Buick facility. The blast furnace at the Sanders Lead Co. facility in Alabama uses process controls, with an unspecified control efficiency, to meet BACT. The blast and reverberatory furnaces at the Interstate Lead Co. in Alabama used a wet scrubber with a stated efficiency of 94.2 percent to meet RACT.
As listed in the RBLC and as described here, the blast/reverberatory furnace system at Doe Run’s Buick facility uses an acid desulfurization plant to meet BACT.

There are also several non-lead furnaces in the RBLC database that are controlling SO_2 emissions. There are four cupola-type furnaces in the database, one using a dry scrubber with an unspecified efficiency, two using a lime injection system with stated efficiencies of 69.4 percent, and a fourth using a wet impaction scrubber with no stated control efficiency. All are BACT determinations. There are also two rotary furnaces (non-lead) that specify low sulfur fuels to meet BACT requirements. Finally, there are three reverberatory (non-lead) furnaces and two unspecified types of furnaces that do not identify any type of control for SO_2 emissions.

There is no information in the RBLC database for SO_2 emissions from LPG-fired boilers, therefore, the search was expanded to include natural gas-fired units less than 40 MMBtu/hr. Eleven boilers in the database used clean fuels or fuel specifications to reduce emissions, one boiler used good combustion controls, and eight boilers did not specify any type of control for SO_2 emissions.

SO_2 BACT Selection

SO_2 emissions at the facility can be reduced by removing the emissions from the air stream by scrubbing and/or by removing the sulfur from the feed stream (i.e., desulfurization or fluxing) and thereby preventing the formation of SO_2. Doe Run currently employs desulfurization and a limited amount of fluxing.

Wet Scrubbing:

Packed bed wet scrubbing technology is technically feasible to control SO_2 emissions. According to the information in the application, the estimated capital cost of the wet scrubbing system and related equipment is $24.1 million. This cost includes the scrubber, sodium carbonate storage and handling, scrubber blowdown tanks, a boiler, an evaporator, a centrifuge, sodium sulfate sludge load out, and all fans, pumps and controls to operate the system.

The annual operating and maintenance cost of the wet scrubbing control system is estimated to be $7 million. The annualized system cost, including capital recovery, is $11 million. The expected emission reduction is 3,060 tons/yr of SO_2. The annualized cost per ton removed is $3,537. This annualized cost per ton removed is based on a 10% interest rate and 10-year equipment life.

Since industry-specific data was not available, a search for cost effectiveness information for wet scrubbing technology in general was performed. USEPA has previously estimated the costs of a wet scrubbers to fall in the range of $500 to $3,300 per ton of SO_2 removed. This evaluation was performed as part of the development of NSPS Subpart Dc. Also, the USEPA Air Pollution Control Technology Fact Sheet for wet scrubbers prepared in 2003 lists the cost effectiveness range for this control as $100 to $500 per ton.

More recently, EPA's proposed Interstate Air Quality Rule provides the average cost per ton of recent EPA, State, and local BACT permitting decisions for SO_2. This cost effectiveness range is $500 - $2,100 per ton. Based on the cost evaluation provided by Doe Run, the costs of SO_2 control at the Buick facility would be greater than the ranges of controls estimated by USEPA.

For the economic reasons discussed here, the use of wet scrubbing technology is not considered feasible as BACT for controlling SO_2 emissions at Doe Run's Buick facility.

Desulfurization:

Desulfurization is technically feasible and is already conducted at Doe Run. Paste desulfurization has the largest impact on reducing SO_2 emissions from the reverberatory furnace and also reduces SO_2 emissions at process steps down stream of the reverberatory furnace due to lower sulfur contents in drosses and other materials fed to the down stream furnaces. Doe Run has expanded the desulfurization operation and the cost to add additional tanks to the desulfurization process was approximately $1,000,000, which includes the additional pipes, agitators, motors, a circuit to remove antimony, and installation. The additional annual operating costs are $265,300 per year; the total annualized cost is $428,100. The estimated reduction in SO_2 emissions is approximately 1,100 tons per year; therefore, the cost-effectiveness is $390 per ton of SO_2 reduced. This is an economically feasible alternative. Desulfurization is defined as a sustainable development, meaning desulfurization does not create a ongoing environmental difficulty. Desulfurization creates a usable product. According to the application, several other facilities within the secondary lead industry are retrofitting their operations to include desulfurization technology due to the cost effectiveness and overall environmental benefits.

Fluxing and Reagent Spraying:

Fluxing and reagent spraying are technically feasible options for reducing SO_2 emissions up to an additional 100 tons per month. There are minimal capital costs associated with this option. The estimated annual system operating costs are $9,703,800, which includes loss of lead production capacity, disposal of additional slag, and additional reagents. The cost-effectiveness of this option is $4,043 per ton of pollutant removed. Therefore, this option is not economically feasible.

Conclusion

Several options employed by other secondary lead facilities were evaluated as part of this BACT analysis. As a result of the analyses presented here, and based on economic and technical considerations, the continued use of the desulfurization process and its expansion at Doe Run's Buick facility is proposed as BACT for the control of SO_2 emissions for this facility.

The following table summarizes the SO_2 BACT selection.

Emission Sources	Control Technology	Control Efficiency	Technically Feasible	Economically Feasible	BACT
Reverberatory Furnace	Wet Scrubbing of the exhaust gases	90-95%	Yes	No	No
	Dry/spray dry lime scrubbing of the exhaust gases	60-85%	No	N/A	No
	De-sulfurization of feed materials	60-85% (overall)	Yes	Yes	Yes
	Operational changes (fluxing/caustic spraying)	varies	Yes	No	No
Blast Furnace	Wet Scrubbing of the exhaust gases	90-95%	Yes	No	No
	Dry/spray dry lime scrubbing of the exhaust gases	60-85%	No	N/A	No
	De-sulfurization of feed materials	60-85% (overall)	Yes	Yes	Yes
	Operational changes	< 5.0%	No	No	No
Rotary Melter	Wet Scrubbing of the exhaust gases	90-95%	No	No	No
	Dry/spray dry lime scrubbing of the exhaust gases	60-85%	No	No	No

NO_x BACT Analysis

NO_x emissions are generated from the high temperature dissociation of atmospheric nitrogen molecules and their subsequent reaction with oxygen to form nitrogen monoxide (NO) or nitrogen dioxide (NO_2) and from chemically bound nitrogen in the fuel (fuel NO_x). Thermal NO_x is formed primarily at temperatures above 1,300 ^{O}C; therefore, limiting the temperature of the flame can control its generation. Fuel NO_x is formed when the fuel-bound nitrogen is converted to hydrogen cyanide and then oxidized to form NO that further oxidizes in the atmosphere to NO_2. Since the first step of the oxidation occurs in the combustion zone, providing an oxygen-deficient atmosphere in the combustion zone can significantly reduce NO, and thereby NO_2 formation.

The emission units at Doe Run evaluated as part of this NO_x BACT analysis were:

- Furnace and related burners that exhaust to the Main Stack, including the Blast Furnace, Rotary Melter, Reverberatory Furnace, and burners on the Blast Furnace tapping area and the Settler
- BDC Boiler
- Refinery Kettles
- Pallet Burner
- Dust Agglomeration Furnace
- Sweat Furnaces

- Sodium Sulfate Dryer

With the exceptions of the Blast Furnace that exhausts through the Main Stack and the pallet burning operation, NO_x emissions are formed during the combustion of the liquefied petroleum gas (LPG). The Blast Furnace uses coke; minor NO_x emissions are formed during its combustion. The pallet burning operation burns wood, which also forms a small amount of NO_x during combustion.

NO_x Control Technology Discussion

This section provides a discussion of the possible technologies for reducing NO_x emissions. The technologies are presented in decreasing order of potential effectiveness, i.e., a “top-down” review.

- Selective Catalytic Reduction
- Oxy-Firing
- Low- NO_x Burners with Flue Gas Recirculation
- Selective Non-Catalytic Reduction
- Staged Firing
- Electric Boost
- Burner Tune-ups

The emission units that burn LPG have inherently low fuel-bound nitrogen level. Therefore, the primary focus is on the reduction of thermal NO_x formation, with a secondary focus on reducing NO_x emissions from the combustion of LPG.

<u>Selective Catalytic Reduction</u>

Selective catalytic reduction (SCR) involves injecting ammonia into the flue gas upstream of a catalyst bed. The NO_x and ammonia react to form nitrogen and water. This reaction occurs because the catalyst lowers the activation energy of the NO_x decomposition reaction. This also allows for the use of this technology at lower fuel gas temperatures (600 to 700 F). Because of the nature of the compounds found in the furnaces’ exhaust streams, the successful application of SCR requires its installation downstream of the particulate matter control system with subsequent reheat to the reactor operating temperature.

However, lead can poison the catalyst bed, adversely impacting the performance of an SCR system. Since lead is present in all of the exhaust streams at Doe Run, SCR is not technically feasible for the operations at this installation.

<u>Oxy-Firing</u>

An effective way to reduce the formation of thermal NO_x is to reduce the nitrogen level by using oxygen rather than ambient air (78% Nitrogen) as the combustion gas. During oxy-firing, more than 90 percent of the nitrogen is substituted with oxygen. Oxy-firing improves the combustion efficiency by eliminating the heat loss resulting from heating the nitrogen in the air, which is then lost in the flue gas. Also, the volumetric flow rate of the flue gas during oxy-firing is approximately 40 percent lower, a significant amount.

NO_x emissions are still generated during oxy-firing, mainly from LPG and from air infiltration into the furnace. Practical operating constraints generally mean that the nitrogen concentration in the combustion chamber of the furnaces can not be reduced below 5 to 10 percent. Oxy-fuel firing works effectively in a closed system due to the low rate of air infiltration.

Operating oxy-fuel burners in an open source will increase NO_x emissions above the level found in an uncontrolled environment.

Other advantages of oxy-firing are a substantial particulate matter emission reduction compared to air-fuel combustion, fuel savings, increased production rate, and more consistent furnace operating conditions.

According to the application, oxy-firing is becoming increasingly accepted as a NO_x reduction technique in industry, especially for certain types of furnaces.   Most reverberatory furnaces in this industry employ oxy-assist firing to minimize NO_x emissions and function as a low-NO_x burner system.

The use of oxy-firing is a technically feasible option to reduce NO_x emissions from LPG combustion at the Reverberatory Furnace with no adverse environmental impact. Doe Run conducted an engineering evaluation and determined that converting the reverberatory furnace over to an all oxy-fuel fired system was feasible. The conversion to oxy-fuel firing was completed in February 2003. This conversion involved more than simply replacing the existing burners with oxy-fuel fired burners. It consisted of a complete redesign of the burner and burner control system to ensure that the flame pattern in the furnace operated in the most effective and efficient manner. Concurrently, a new oxygen plant was installed to meet the additional oxygen demand.

Oxy-fuel firing is not technically feasible on the other Doe Run Buick furnaces because the furnaces are too open to the atmosphere, which causes an increase in NO_x above levels found in an uncontrolled environment.

<u>Low-Nox Burners with Flue Gas Recirculation</u>

The use of low-NO_x burners is a widely accepted method to control NO_x emissions from combustion sources. Low- NO_x burners are developed by burner and boiler manufacturers and, therefore, exhibit a wide variety of designs. However, the principle of all NO_x burners is the same; the burners inherently generate lower NO_x emissions due to internal staging of the fuel combustion. Burner staging delays combustion and reduces the peak flaming temperature, thus reducing thermal NO_x formation. High levels of excess air within the primary combustion zone reduce the temperature. Secondary fuel is injected in the combustion zone under high pressure and stimulates fuel gas recirculation. This action results in heat being transferred from the first stage combustion products to the second stage combustion. As a result, the second stage combustion is achieved at lower partial pressure of oxygen and temperature than would normally be encountered.

At this time, no low-NO_x burners have been developed for use in secondary lead furnaces; therefore, this technology is not available for the Doe Run metallurgical operations and was not considered any further in this evaluation.

Low-NO_x burners are typically combined with flue gas recirculation (FGR). FGR is a technique in which a portion of exhaust gas is recycled to a point where it joins and, therefore, dilutes the inlet combustion airflow.
The dilution serves to lower peak flame temperature, thus reducing thermal NO_x formation. The air that would be recirculated through the burners at the metallurgical operations would be "dirty" and would clog the burner system. Therefore, FGR is not a technically feasible control technology for reducing NO_x emissions from the metallurgical operations at Doe Run. Since air recirculation for the BDC Boiler is "clean", a low- NO_x burner with FGR is a technically feasible technology for the BDC Boiler.

Selective Non-Catalytic Reduction (SNCR)

SNCR reduces NO_x emissions through a reaction with ammonia in a temperature range of 1,700 – 1,900 F. The technology is similar to SCR except it does not utilize a catalyst bed. The ammonia may be supplied as anhydrous ammonia, aqueous ammonia, or urea.

The use of SNCR is a technically infeasible control option to reduce NO_x emissions from the operation at Doe Run due to lack of control of the exhaust temperature range. Frequently, the exhaust temperature (800-1,800 F) fluctuates outside the proven effective range required for selective non-catalytic reduction.

Staged Firing

Staged firing is a technology that reduces NO_x formation by operating outside the normal stoichiometric ratio. It includes overfire air, burners-out-of-service, and biased firing methods.

Overfire Air

Overfire air (OFA) can reduce emissions significantly by introducing combustion air above or after the burner zone. The efficiency of this option depends on the percentage of the air staged.

An OFA system uses air ports above the burners to provide secondary combustion air above the burners. The resulting interstage cooling reduces peak flame temperature, which also suppresses thermal NO_x formation. However, the combustion zones in the metallurgical furnaces and the BDC Boiler are not physically large enough to accommodate the staging technology.

Burners-Out-of-Service

Burners-out-of-service (BOOS) is similar to OFA; it is an appropriate control technique for oil- and gas-fired combustion units. BOOS consists of firing fuel in certain burners, thereby creating fuel-rich and fuel-lean zones that lead to reduced NO_x emissions. However, in many cases, the burners can not handle the increased fuel flow, necessitating a reduction in firing load. A reduced load would not be able to maintain the necessary temperature; therefore, BOOS is not a technically feasible control technology for the metallurgical operations. Since the boiler only has one burner, it is also not technically feasible for these sources.

Biased Firing

In biased burner firing, the lower rows of the burners are fired more than the upper rows. This is achieved by maintaining the normal distribution of air to the burners while the fuel flow is adjusted so that more of the fuel enters the furnace through the lower burners. The additional air required for complete combustion enters through the upper burners, which are fuel lean.

Biased firing, similar to BOOS, results in a reduced firing load. A reduced firing load would not be able to maintain the necessary temperature for the metallurgical operations; therefore, this technology is not feasible for Doe Run. Additionally, since there is only one burner in the current boiler system, it is not technically feasible.

Electric Boost

Electric boosting is the use of electrical current passing between electrodes submerged in the furnace charge to resistively heat the batch materials. This is accomplished by placing electrodes through the sidewalls or furnace bottom into the furnace charge.

This technology is not technically feasible for the metallurgical operations at Doe Run as it would essentially change the entire nature of the operations (chemistry, type of furnace, etc.). Furthermore, this technology has not been used in the secondary lead smelting industry, except on a very limited basis.

Burner Tune-ups

A properly operated burner will increase the burner efficiency, improve fuel consumption, and reduce air emissions. During a tune-up, the combustion and heat extraction processes are optimized and the emissions of air contaminants are minimized. This is a technically feasible alternative for the combustion operation at Doe Run.

RBLC Search Results

There is no information in the RBLC database on NO_x controls techniques at secondary lead smelting facilities. Expanding the search of the database to nonferrous smelting facilities, includes the following furnaces:

- A foundry cupola with a low-NO_x recuperative combustor/heat recovery system
- A reheat furnace using staged combustion, fuel specifications, and low-NO_x burners
- A cupola for which low-NO_x burners or an incinerator are proposed
- Tow furnaces with unspecified burner control
- A tunnel furnace with low-NO_x burners
- Six aluminum holding furnace (at one facility) with conventional burners.

None of the entries in the database included data on the control efficiency of the NO_x technology. All of the technologies are identified in the RBLC database as BACT.

There is not much information in the RBLC database on the LPG-fired boilers; therefore, the RBLC database search was expanded to cover natural gas-fired boilers with capacities less than 40 MMBtu/hr. The following is a summary of the information in the RBLC database:

- Six boilers have low NO_x burners as the lone control for NO_x emissions. One of the determinations is listed as LAER and the others are considered BACT.
- Seventeen boilers used no controls or did not specify controls to control NO_x emissions. This was determined to be LAER for one boiler, “other” for two boilers, and BACT for the remaining boilers.
- Three boilers used flue gas recirculation along with low NO_x burners for control of NO_x emissions; one was determined to be LAER, another was determined to be BACT, and the third was listed as “other.”
- One facility used natural gas to control emissions to meet a determination for “other.”
- Two facilities used flue gas recirculation for the control of NO_x emissions, both of which were determined to be BACT.
- One boiler limited its operations to meet a LAER determination.
- One boiler used low excess air for the control of NO_x and was listed under BACT.
- Three boilers used good combustion practices for the control of NO_x and were listed under BACT.

NO_x BACT Selection

Oxy-fuel firing was determined to be technically feasible in reducing NO_x emissions from the Reverberatory Furnace. Oxy-Fuel firing has higher anticipated control efficiency and is economically feasible as it has a negative cost-effectiveness. Therefore, oxy-fuel firing is BACT for the Reverberatory Furnace. Oxy-Fuel burners were installed on the reverberatory furnace in February 2003.

There are several technically feasible control technologies for the BDC Boiler. In decreasing order of possible effectiveness they are: SCR, Low-Nox Burners with FGR, SNCR, and burner tune-up. Based on the search of the RBLC database, SCR and SNCR are not used on boilers the size of the BDC Boiler (40.6 MMBtu/hr, estimated NO_x emissions of 12.78 tons/year); therefore, these technologies were eliminated. The cost to retrofit the boiler to include a low-NO_x burner with FGR is $207,500; the annualized cost is $6,200/tons of NO_x removed. According to the application, Doe Run proposes to install low-NO_x burners at their BDC boiler within 3 years of permit issuance.

Burner tune-ups are the only technically feasible alternative for the remaining combustion sources at Doe Run. Burner tune-ups are economically feasible for these emission sources; therefore, this is BACT for the remaining NO_x emission sources.

The following table summarizes the NO_x BACT selection.

Emission Sources	Control Technologies	Theoretical Control Eff.	Technically Feasible	Economically Feasible	BACT
LPG-Fired Metallurgical Operations	Selective Catalytic Reduction (SCR)	80 - 90%	No	N/A	N/A
	Oxy-firing (only on Reverberatory Furnace*)	up to 85%	Yes	Yes	Yes
	Low-NO_x burner with flue gas recirculation	up to 60%	N/A	N/A	N/A
	Selective Non-Catalytic Reduction (SNCR)	25 - 40%	No	N/A	N/A
	air staging	< 40%	No	N/A	N/A
	burner tune-up	< 20%	Yes	Yes	Yes
	electric boost	varies	No	N/A	N/A
LPG-Fired BDC Boiler	Selective Catalytic Reduction (SCR)	80 - 90%	Yes	No	No
	Low-NO_x burner with flue gas recirculation	up to 60%	Yes	No	No
	Selective Non-Catalytic Reduction (SNCR)	25 - 40%	Yes	No	No
	air staging	< 40%	No	N/A	N/A
	burner tune-up	< 20%	Yes	Yes	Yes

* Oxy-fuel firing is not technically feasible on the other Doe Run Buick furnaces.

Carbon Monoxide BACT Analysis

Carbon monoxide (CO) results from incomplete combustion of fuel and is a function of the air-to-fuel ratio. The following processes emit CO at the proposed facility:

- Reverberatory furnace
- Blast Furnace
- Rotary Melter
- Sweat Furnace
- BDC Boiler
- Refining Kettles
- Pallet Burner
- Miscellaneous Burners

With the exception of the blast furnace and the pallet burner, the CO emissions are a result of the combustion of LPG. CO emissions from the blast furnace result from the reducing atmosphere that is required at this furnace to produce lead. CO emissions from the pallet burner result from the combustion of wood.

Control Technology Discussion

The following technologies were identified as possible CO reduction technologies for the sources at the Doe Run facility:

- Combustion control
- Thermal Oxidizer (with or without heat recovery)
- Catalytic Oxidizer
- Change in combustion method
- Operational changes
- Source Reduction

LPG-Burning Sources

Thermal Oxidizer

Thermal oxidizers are often used to remove CO and other combustible emissions. The CO is oxidized to CO_2 by heating the air stream to 1,300 to 1,500 ^{O}F and adding sufficient oxygen for combustion. However, since all of the processes, which burn LPG, are thermal processes operated in an oxidizing atmosphere, adding a thermal oxidizer would provide little additional control of CO emissions. Depending on the final discharge temperature from the LPG-fired unit, substantial additional heat would be required to achieve additional CO destruction. Since this heat will come from burning of additional LPG, additional emissions of NO_x and more CO will occur. For this reason, thermal oxidation is not technically feasible for the LPG-fired emission sources.

Catalytic Oxidizer

Catalytic oxidation is similar to thermal oxidation in that the CO is oxidized to CO_2, but the oxidation is completed at a much lower temperature through the use of a catalyst. The catalyst generally operates in a temperature range of 600 to 900^{o} F. A catalytic oxidizer is not applicable to any of the process exhaust streams where lead may be present, as lead will poison the catalyst.

The other non-lead emitting sources, such as the BDC boiler and various refinery kettle burners, would see very little improvement with the catalytic oxidizer, as the CO emissions from these sources are already fairly low. A catalytic oxidizer is not technically feasible for these sources.

Combustion Control

Excess oxygen or air promotes CO oxidation to CO_2. According to the application, the processes at Doe Run that burn LPG are all operated with the combustion chamber in an oxidizing atmosphere in order to ensure complete combustion and provide maximum yield from the fuel.   Since an oxidizing atmosphere and excess oxygen promote complete combustion, the expected level of CO emissions is low. As long as these burners are set up and run properly, CO emissions will be minimized. Oxy-Fuel Burners were identified and evaluated for the reverberatory furnace and found to be feasible to reduce CO through better control burning. Combustion control is a technically feasible way to reduce CO emissions from the LPG-fired sources.

Blast Furnace

Thermal Oxidizer

A thermal oxidizer is a potential control device to reduce CO emissions from the blast furnace. The thermal oxidizer can operate with or without heat recovery system. The thermal oxidizer without heat recovery will consume more fuel and generate additional NO_x compared with a unit with heat recovery. Additionally, significant particulate matter emissions from the blast furnace would result, fouling the heat recovery system. So a thermal oxidizer with heat recovery would need to be installed downstream of the particulate matter collection device (baghouse) at Main Stack, increasing its size and heat requirement.

The thermal oxidizer with heat recovery is technically feasible for control of CO from the Main Stack. This thermal oxidizer needs to be capable of handling 400,000 scfm air flow inlet at an ambient air temperature of approximately 40^o F. This oxidizer also needs to maintain input air flow for a minimum of ½ second at 1450^o F.

Catalytic Oxidizer

A catalytic oxidizer is not an acceptable technology for exhaust streams containing lead dust as lead will poison the catalyst. Since the blast furnace exhaust contains lead dust, a catalytic oxidizer is not technically feasible.

Combustion Control

The blast furnace is fired using coke. The coke is both a fuel and a means of support for the batch bed in the furnace. In the blast furnace, lead oxide is reduced to elemental lead, which is then separated from the other constituents. In order for this process to occur, the atmosphere in the blast furnace must be reducing. Since this is a reducing atmosphere, some CO will be generated. While combustion control can reduce the amount of CO, it can not achieve the same measure of control as would be affected in an oxidizing atmosphere. Combustion control is not technically feasible for the blast furnace.

Operational Changes

According to the application, Doe Run has made number of changes over the years to the operation of the blast furnace. These changes, specifically the tuyere control system, have reduced CO emissions.

Pallet Burner

<u>Change in Combustion Method</u>

Changing the method of burning the pallets by using an enclosed combustion source is technically feasible. Wood-fired boilers are routinely used for this purpose. It is estimated that a wood-fired boiler would reduce CO emissions by 90 to 95 percent.
<u>Source Reduction</u>

Another option for reducing emissions from this operation is by source reduction reducing the volume of pallets burned through a recycling program. According to the application, Doe Run has initiated a successful pallet-recycling program, reducing the number of pallets that are disposed. Approximately 80 to 90 percent of incoming pallets are currently recycled. It is technically feasible to recycle pallets that are not damaged and to make repairs on pallets that are only marginally damaged.

Results of RBLC Search

There is no information in the RBLC database on CO control technologies at secondary lead smelters. The search was expanded to include sources at other type of non-ferrous metallurgical operations. There is CO information in the database on twelve furnaces of various types. Seven of the furnaces, primarily cupola-type furnaces, used thermal oxidation to control CO emissions with reported control efficiencies in the range of 98.7 to 99.7 percent. Two facilities identified burner control as their means of reduction with control efficiency of 98.7 to 99.7 percent. Two facilities identified burner control as the means to reduce CO emissions with no reported control efficiency. Three facilities reported no controls. Eleven of the twelve determinations were considered to be BACT, while the twelfth was listed as "Other".

There is no information in the RBLC database on pallet burners and no similar sources were identified. No control was specified in the RBLC database for CO emissions from wood-fired boilers.

There was no information in the RBLC database on CO determinations for LPG-fired emission boilers. The search was expanded to include natural gas-fired boilers less than 40 MMBtu/hr. This showed eight boilers with no specific controls or "normal" operations and three boilers using good combustion or operating practices.

CO BACT Selection

Combustion controls are the only technically feasible control technique for the LPG-fired emission sources; therefore, this is the selected technology for these emission sources.

A thermal oxidizer installed at Main Stack after the baghouse is technically feasible for controlling emissions from the blast furnace. The estimated capital cost of the thermal oxidizer, including a cooling chamber and SCR, is $18,857,017. The annualized

operating cost including capital recovery is $46,357,484. The CO emissions reduction expected is approximately 13,203 tons per year. The cost effectiveness is $3,511 per ton of CO removed. The high annualized operating cost is due to the large amount of propane needed to operate the thermal oxidizer. According the application, it will require 58,974,426 gallons of propane per year, which is approximately 19% of the annual propone usage at the State of Missouri for 2003. The combustion of propane will emit approximately 560 tons of NO_x per year. Therefore, while thermal oxidation is technically feasible for controlling CO emissions from the blast furnace, it is economically infeasible. Operational changes are selected as BACT for the blast furnace.
Source reduction and a change in the method of combustion (i.e., the use of enclosed combustion units) are both technically feasible for pallet burners and can be implemented simultaneously; therefore, these technologies are BACT for the pallet burner.

The following table summarizes the CO BACT selection.

Emission Sources	Control Technologies	Theoretical Control Eff.	Technically Feasible	Economically Feasible	BACT
LPG-Fired Operations	Thermal Oxidation (with or without heat recovery)	90-98%	No	N/A	No
	Catalytic Oxidation	90-95%	No	N/A	No
	Combustion Control (Oxy-Fuel Burners)	< 20%	Yes	N/A	Yes
Blast Furnace (Main Stack)	Thermal Oxidation (with or without heat recovery)	90-98%	Yes	No	No
	Catalytic Oxidation	90-95%	No	N/A	No
	Combustion Controls	< 20%	No	N/A	No
	Operational changes	Varies	Yes	N/A	Yes
Pallet Burners	Change in combustion method	90-95%	Yes	Yes	Yes
	Source Reduction	Varies	Yes	Yes	Yes

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (8) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Doe Run is an existing major source and potential emissions are above de minimis levels for PM_{10}, SO_x, NO_x, CO, and Lead.

APPLICABLE REQUIREMENTS

The Doe Run Company - Buick Resource Recycling Facility shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Submission of Emission Data, Emission Fees and Process Information,* 10 CSR 10-6.110
  The emission fee is the amount established by the Missouri Air Conservation Commission annually under Missouri Air Law 643.079(1). Submission of an Emissions Inventory Questionnaire (EIQ) is required April 1 for the previous year's emissions.

- *Operating Permits*, 10 CSR 10-6.065

- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170

- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220

- *Restriction of Emission of Odors*, 10 CSR 10-3.090

SPECIFIC REQUIREMENTS

- *Restriction of Emission of Particulate Matter From Industrial Processes*, 10 CSR 10-6.400

- *Restriction of Emissions of Lead From Specific Lead Smelter-Refinery Installations*, 10 CSR 10-6.120

- *New Source Performance Regulations*, 10 CSR 10-6.070 – *New Source Performance Standards (NSPS) for Secondary Lead Smelters*, 40 CFR Part 60, Subpart L.

- *Maximum Achievable Control Technology (MACT) Regulations*, 10 CSR 10-6.075, *National Emission Standards for Secondary Lead Smelting,* 40 CFR Part 63, Subpart X.

- *Restriction of Emission of Sulfur Compounds*, 10 CSR 10-6.260

- *Maximum Allowable Emissions of Particulate Matter From Fuel Burning Equipment Used for Indirect Heating,* 10 CSR 10-3.060

AMBIENT AIR QUALITY IMPACT ANALYSIS

The ambient air quality impact analysis (AAQIA) must be completed for any air contaminant that exceeds the *de minimis* emission levels outlined in 10 CSR 10-6.020 subsection (3)(A) Table 1. The following table lists the air contaminants, rates of emission and their associated *de minimis* levels:

Air Pollutants	De Minimis Level (tons/year)	Doe Run's Potential Emissions (tons/year)	AAQIA Necessary
PM_{10}	15.0	30.57	Yes
SO_x	40.0	3400.0	Yes
NO_x	40.0	54.72	Yes
CO	100.0	14790	Yes
Pb	0.6	12.55	Yes

Based upon emission estimates provided by Doe Run, PM_{10}, SO_x, NO_x, CO, and Pb exceed the *de minimis* levels, thereby triggering the requirement to perform a comprehensive air quality analysis.

The AAQIA was performed to determine the impact of PM_{10}, SO_x, NO_x, CO, and Pb emissions at or beyond the property boundary of the proposed Doe Run's facility. Additional impacts on visibility, growth, soils, plants and animals were also evaluated within the Class II area surrounding the facility. Please refer to the September 9, 2004 memorandums from Dawn Froning of the Air Quality Analysis Section, entitled, "*Ambient Air Quality Impact Analysis (AAQIA) for The Doe Run Company – Buick Resource Recycling Division, Prevention of Significant Deterioration (PSD) Modeling – 08/16/04 Submittal* " and also September 14, 2004 memorandum, entitled, "*Class I Ambient Air Quality Impact Analysis (AAQIA) for The Doe Run Company – Buick Resource Recycling Division – August 2004 Submittal*."

In response to EPA's comments regarding the SO2 increment analysis, the Air Quality Analysis Section has identified the baseline area, which is every section that contains a modeling receptor in excess of the significant concentration.

Baseline Area For SO_2 Increment Analysis			
County	**Township**	**Range**	**Sections**
Crawford	T35N	R2W	S7,18,19,20,28,29,30,32,33
Iron	T35N	R2W	S27,34
	T34N	R2W	S1,2,3,10,11,12,13,14,15,22,23,24,25,26,27,34,35,36
	T34N	R1W	S5,6,7,18,19,20,28,29,30,31,32,33
Dent	T34N	R3W	S10

	T34N	R2W	S4,5,6,7,8,9,16,17,20,21,28,29,32,33
Reynolds	T33N	R3W	S1
	T33N	R2W	S1,2,3,4,6,8,10,11,20
	T33N	R1W	S4,6
68 total sections			

The expansion of the existing baseline area for SO_2 has established an October 18, 2001 baseline date in area where increment consumption was not previously tracked. The baseline area and date for this permit action has been included in order to facilitate future rule making and subsequent federal register action.

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

________________________________ __________________

Fuad Wadud Date
Environmental Engineer

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated October 16, 2001, received October 18, 2003, designating The Doe Run Company - Buick Resource Recycling Facility as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Stack Test Reports provided by the applicant.
- Southeast Regional Office Site Survey, dated November 9, 2001.

Attachment A: Monthly SO_x Tracking Record

The Doe Run Company - Buick Resource Recycling Facility
Iron County, S14, T34N, R2W
Project Number: 2001-10-058
Installation ID: 093-0009
Permit Number:

This sheet covers the period from __________________ to ________________.
(month, year) (month, year)

Copy this sheet as needed

Column A	Column B	Column C	Column D	Column E
Emission Point(s)	Description	Amount Processed	SO_x Emission Factor*	(a) SO_x Emissions (tons)
EP08**	Main Stack - Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler			
EP10***	Blast Furnace Fugitive			
EP21-28, 33, & 34	LPG/Propane Combustion		0.10 x s*** lb/Mgal	
EP44	Dry Wood Fired Furnace		0.26 lb/ton	
EP71	Reverberatory Furnace – Captured Fugitive		20.0 lb/ton	
EP72	Rotary Furnace – Captured Fugitive		20.0 lb/ton	
(b) Total SO_x Emissions Calculated for this Month in Tons:				
(c) 12-Month SO_x Emissions Total From Previous Month's Attachment A, in Tons:				
(d) Monthly SO_x Emissions Total (b) from Previously year's Attachment A, In Tons:				
(e) Current 12-month Total of SO_x Emissions in Tons : [(b) + (c) - (d)]				

(a) [Column E] = [Column C] x [Column D] x 0.0005
(b) Summation of [Column E] in Tons;
(c) 12-Month SO_x emissions total (e) from last month's Attachment A, in Tons;
(d) Monthly SO_x emissions total (b) from previous year's Attachment A, in Tons;
(e) Calculate the new 12-month SO_2 emissions total. **A 12-Month SO_x emissions total (e) of less than 3400.0 tons indicates compliance.**

*Emission factors can be revised upon the Air Pollution Control Program's approval.
**Emissions of EP08: Main Stack will be determined by CEM.
***1% of the emission factor used for the main stack, which will be derived from the Stack Test.
***s = the sulfur content expressed in gr/100 cubic feet of gas vapor

Attachment B: Monthly CO Tracking Record

The Doe Run Company - Buick Resource Recycling Facility
Iron County, S14, T34N, R2W
Project Number: 2001-10-058
Installation ID: 093-0009
Permit Number:

This sheet covers the period from __________________ to ________________.
(month, year) (month, year)

Copy this sheet as needed

Column A	Column B	Column C	Column D	Column E
Emission Point(s)	Description	Amount Processed	CO Emission Factor*	(a) CO Emissions (tons)
EP08**	Main Stack - Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler			
EP21-28, 33, & 34	LPG/Propane Combustion		3.2 lb/Mgal	
EP44	Dry Wood Fired Furnace		6.24 lb/ton	
(b) Total CO Emissions Calculated for this Month in Tons:				
(c) 12-Month CO Emissions Total From Previous Month's Attachment B, in Tons:				
(d) Monthly CO Emissions Total (b) from Previously year's Attachment B, In Tons:				
(e) Current 12-month Total of CO Emissions in Tons : [(b) + (c) - (d)]				

(a) [Column E] = [Column C] x [Column D] x 0.0005
(b) Summation of [Column E] in Tons;
(c) 12-Month CO emissions total (e) from last month's Attachment B, in Tons;
(d) Monthly CO emissions total (b) from previous year's Attachment B, in Tons;
(e) Calculate the new 12-month CO emissions total. **A 12-Month CO emissions total (e) of less than 14790.0 tons indicates compliance.**

*Emission factors can be revised upon the Air Pollution Control Program's approval.
**Emissions of EP08: Main Stack will be determined by CEM.

Attachment C: Monthly NO_x Tracking Record

The Doe Run Company - Buick Resource Recycling Facility
Iron County, S14, T34N, R2W
Project Number: 2001-10-058
Installation ID: 093-0009
Permit Number:

This sheet covers the period from ________________ to ______________.
(month, year) (month, year)

Copy this sheet as needed

Column A	Column B	Column C	Column D	Column E
Emission Point(s)	Description	Amount Processed	NO_x Emission Factor*	(a) NO_x Emissions (tons)
EP08**	Main Stack - Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler			
EP21-28, 33, & 34	LPG/Propane Combustion		19.0 lb/Mgal	
EP44	Dry Wood Fired Furnace		5.1 lb/ton	
(b) Total NO_x Emissions Calculated for this Month in Tons:				
(c) 12-Month NO_x Emissions Total From Previous Month's Attachment C, in Tons:				
(d) Monthly NO_x Emissions Total (b) from Previously year's Attachment C, In Tons:				
(e) Current 12-month Total of NO_x Emissions in Tons : [(b) + (c) - (d)]				

(a) [Column E] = [Column C] x [Column D] x 0.0005
(b) Summation of [Column E] in Tons;
(c) 12-Month NO_x emissions total (e) from last month's Attachment C, in Tons;
(d) Monthly NO_x emissions total (b) from previous year's Attachment C, in Tons;
(e) Calculate the new 12-month NO_x emissions total. **A 12-Month NO_x emissions total (e) of less than 54.72 tons indicates compliance.**

*Emission factors can be revised upon the Air Pollution Control Program’s approval.
**Emission Factor of EP08: Main Stack will be determined from the Stack Test.

Attachment D: Monthly PM_{10} Tracking Record

The Doe Run Company - Buick Resource Recycling Facility
Iron County, S14, T34N, R2W
Project Number: 2001-10-058
Installation ID: 093-0009
Permit Number:

This sheet covers the period from __________________ to ________________.
(month, year) (month, year)

Copy this sheet as needed

Column A	Column B	Column C	Column D	Column E	Column F
Emission Point(s)	Description	Amount Processed	PM_{10} Emission Factor*	Control Efficiency (%)*	(a) PM_{10} Emissions (tons)
EP08**	Main Stack - Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler			N/A	
EP10	Blast Furnace Fugitive		0.0053 lb/ton	N/A	
EP11	Dross Plant Fugitive		0.0043 lb/ton	N/A	
EP12	Refinery Fugitive		0.0119 lb/ton	N/A	
EP13	Open Storage Fugitive		0.26 lb/ton	N/A	
EP16	BDC Scrubber		0.0248 lb/ton		
EP18	Sodium Sulfate Crystallizer		50.0 lb/ton	99.5	
EP19	Sodium carbonate surge bin baghouse		7.78 lb/ton	99.5	
EP19A	Sodium carbonate Transfer		0.0778 lb/ton	N/A	
EP20	Sodium carbonate silo baghouse		7.78 lb/ton	99.5	
EP21-28, 33, & 34	LPG/Propane Combustion		0.6 lb/Mgal	N/A	
EP31	Shredder Baghouse		0.787 lb/ton	99.8	
EP32	Laboratory Baghouse		0.01 lb/ton	N/A	
EP44	Dry Wood Fired Furnace		3.92 lb/ton	N/A	
EP57	CaS Silo		0.12 lb/ton	N/A	
EP58	Material Blender		0.02 lb/ton	50.0	
EP71	Reverb. Furnace – Captured		0.0053 lb/ton	99.0	
EP72	Rotary Furnace – Captured		0.0053 lb/ton	99.0	
EP73	Sweat Furnace – Captured		0.235 lb/ton	99.0	
EP74	Coke Delivery Route		0.1778 lb/vmt	95.96	
EP75	Battery Delivery Route		0.1938 lb/vmt	88.11	
EP76	Paste Transfer Route		0.202 lb/vmt	92.84	
EP77	Feed Transfer Route 1		0.256 lb/vmt	94.69	
EP78	Feed Transfer Route 2		0.2472 lb/vmt	94.69	
EP79	Feed Transfer Route 3		0.2472 lb/vmt	94.69	
(b) Total PM_{10} Emissions Calculated for this Month in Tons:					

(c) 12-Month PM_{10} Emissions Total From Previous Month's Attachment D, in Tons:	
(d) Monthly PM_{10} Emissions Total (b) from Previously year's Attachment D, In Tons:	
(e) Current 12-month Total of PM_{10} Emissions in Tons : [(b) + (c) - (d)]	

(a) [Column F] = [Column C] x [Column D] x [1 - Column E/100] x 0.0005
(b) Summation of [Column F] in Tons;
(c) 12-Month PM_{10} emissions total (e) from last month's Attachment D, in Tons;
(d) Monthly PM_{10} emissions total (b) from previous year's Attachment D, in Tons;
(e) Calculate the new 12-month PM_{10} emissions total. **A 12-Month PM_{10} emissions total (e) of less than 30.57 tons indicates compliance.**

*Emission factor and control efficiency can be revised upon the Air Pollution Control Program's approval.
**Emission Factor of EP08: Main Stack will be determined from the Stack Test. Since the emission factor will be derived with control efficiency taken into account, the control efficiency of baghouse at Main Stack can not to use for this Attachment.

Attachment E: Monthly Lead (Pb) Tracking Record

The Doe Run Company - Buick Resource Recycling Facility
Iron County, S14, T34N, R2W
Project Number: 2001-10-058
Installation ID: 093-0009
Permit Number:

This sheet covers the period from __________________ to ________________.
(month, year) (month, year)

Copy this sheet as needed

Column A	Column B	Column C	Column D	Column E	Column F
Emission Point(s)	Description	Amount Processed	Pb Emission Factor*	Control Efficiency (%)*	(a) Pb Emissions (tons)
EP08**	Main Stack - Furnaces and related burners that exhaust to the Main Stack, including the blast furnace, rotary melter, reverberatory furnace, and burners on the blast furnace tapping area and the settler			N/A	
EP10	Blast Furnace Fugitive		0.0082 lb/ton	N/A	
EP11	Dross Plant Fugitive		0.0043 lb/ton	N/A	
EP12	Refinery Fugitive		0.0115 lb/ton	N/A	
EP13	Open Storage Fugitive		0.025 lb/ton	N/A	
EP16	BDC Scrubber		0.021 lb/ton	N/A	
EP31	Shredder Baghouse		0.374 lb/ton	99.8	
EP71	Reverb. Furnace – Captured		0.0082 lb/ton	99.0	
EP72	Rotary Furnace – Captured		0.0082 lb/ton	99.0	
EP73	Sweat Furnace – Captured		0.11 lb/ton	99.0	
EP74	Coke Delivery Route		0.1016 lb/vmt	95.96	
EP75	Battery Delivery Route		0.1108 lb/vmt	88.11	
EP76	Paste Transfer Route		0.1155 lb/vmt	92.84	
EP77	Feed Transfer Route 1		0.1463 lb/vmt	94.69	
EP78	Feed Transfer Route 2		0.1463 lb/vmt	94.69	
EP79	Feed Transfer Route 3		0.1463 lb/vmt	94.69	
(b) Total Pb Emissions Calculated for this Month in Tons:					
(c) 12-Month Pb Emissions Total From Previous Month's Attachment E, in Tons:					
(d) Monthly Pb Emissions Total (b) from Previously year's Attachment E, In Tons:					
(e) Current 12-month Total of Pb Emissions in Tons : [(b) + (c) - (d)]					

(a) [Column F] = [Column C] x [Column D] x [1 - Column E/100] x 0.0005
(b) Summation of [Column F] in Tons;
(c) 12-Month Pb emissions total (e) from last month's Attachment E, in Tons;
(d) Monthly Pb emissions total (b) from previous year's Attachment E, in Tons;
(e) Calculate the new 12-month Pb emissions total. **A 12-Month Pb emissions total (e) of less than 12.55 tons indicates compliance.**

*Emission factor and control efficiency can be revised upon the Air Pollution Control Program’s approval.
**Emission Factor of EP08: Main Stack will be determined from the Stack Test. Since the emission factor will be derived with control efficiency taken into account, the control efficiency of baghouse at Main Stack can not to use for this Attachment.

Supplement Information For Attachments			
Emission Point(s)	**Description**	**Pollutant(s)**	**Emission Factor Units**
EP8	Main Stack	Pb & PM_{10}	Tons of Pb Produced w/o Sweat Furnace and Dust Agglomeration Furnace Production
		Sox, Nox, & CO	Tons of Pb Produced w/o Dust Agglomeration Furnace Production
EP10	Blast Furnace Fugitive	Pb & PM_{10}	Blast Furnace Portion of Tons of Pb Produced less Sweat Furnace (SF) and Dust Agglomeration Furnace (DAF) Production
		SO_x	Blast Furnace Percentage of Pb Production less SF and DAF Production Multiplied by Sox Emissions From Main Stack
EP11	Dross Plant Fugitives	Pb & PM_{10}	Tons of Pb Produced less Sweat Furnace and Dust Agglomeration Furnace
EP12	Refinery Fugitives	Pb & PM_{10}	Tons of Pb Produced less Sweat Furnace and Dust Agglomeration Furnace
EP13	Open Storage	Pb & PM_{10}	Tons stored in Open Storage
EP16	BDC Scrubber	Pb & PM_{10}	Tons of Pb Produced less Sweat Furnace and Dust Agglomeration Furnace
EP18	Na2SO4 Crystallizer	PM_{10}	Tons of Na_2SO_4 Product
EP19	Na2CO3 Baghouse Unloading	PM_{10}	Tons of Na_2CO_3 Unloaded
EP19A	Na2CO3 Transfer	PM_{10}	Tons of Na_2CO_3 Transferred
EP20	Na2CO3 Silo Baghouse	PM_{10}	Tons of Na_2CO_3 Load/Transfer
EP21-28, 33, & 34	LPG/Propane Combustion	PM_{10}, SO_x, NO_x, CO, & Pb	Mgal of propane burned
EP31	Shredder Baghouse	Pb & PM_{10}	Tons of Pb Produced less Sweat Furnace and Dust Agglomeration Furnace
EP32	Lab Baghouse	PM10	Tons of Total Pb Produced
EP44	Dry Wood Fired Furnace	PM_{10}, SO_x, NO_x, & CO	Tons of Pallets Burned
EP57	CaS Silo	PM_{10}	Tons Processed Through
EP58	Material Blender	PM_{10}	Tons Processed Through
EP71	Reverb Furnace - Captured Fugitive	Pb & PM_{10}	Reverbatory Furnace Portion of Tons of Pb Produced Less Sweat Furnace and Dust Agglomeration Furnace
		SO_x	Reverbatory Furnace Percentage of Pb Production Less SF and DAF Production Multiplied by Sox Emissions from Main Stack
EP72	Rotary Furnace - Captured Fugitive	Pb & PM_{10}	Rotary Furnace Portion of Tons of Pb Produced Less Sweat Furnace and Dust Agglomeration Furnace
		SO_x	Rotary Furnace Percentage of Pb Production Less SF and DAF Production Multiplied by Sox Emissions from Main Stack
EP73	Sweat Furnace - Captured	Pb & PM_{10}	Tons of Metal Charged in Sweat Furnace
EP74	Coke Delivery Route	Pb & PM_{10}	Vehicle Miles Traveled on Coke Delivery Route
EP75	Battery Delivery Route	Pb & PM_{10}	Vehicle Miles Traveled on Battery Delivery Route
EP76	Paste Transfer Route	Pb & PM_{10}	Vehicle Miles Traveled on Paste Transfer Route
EP77	Feed Transfer Route 1	Pb & PM_{10}	Vehicle Miles Traveled on Feed Transfer Route 1
EP78	Feed Transfer Route 2	Pb & PM_{10}	Vehicle Miles Traveled on Feed Transfer Route 2
EP79	Feed Transfer Route 3	Pb & PM_{10}	Vehicle Miles Traveled on Feed Transfer Route 3

MEMORANDUM

DATE: September 14, 2004

TO: Fuad Wadud, Environmental Engineer
Permit Section, APCP

THROUGH: Jeffry D. Bennett, P.E., Air Quality Modeling Unit Chief
Air Quality Analysis Section, APCP

FROM: Dawn Froning, Environmental Specialist III
Modeling Unit, AQAS

SUBJECT: Class I Ambient Air Quality Impact Analysis (AAQIA) for The Doe Run Company-Buick Resource Recovery Recycling Center-August 2004 Submittal

I. Introduction

The August 7, 1977 Clear Air Act deemed specific regions within the United States as having special national or regional value due to their natural, scenic, recreational, and/or historic worth. These areas were designated as mandatory Federal Class I areas and are afforded protection under the Prevention of Significant Deterioration (PSD) provisions of the Clean Air Act.

Current practice dictates that any source proposing to locate within 200 kilometers of a protected region must evaluate its impact on existing increment and visibility within the Class I area's property boundary. Additionally, the source must provide an evaluation of the nitrogen and sulfur deposition that is predicted to occur within the Class I area. Sources located at distances greater than 200 kilometers may also be required to perform a Class I study if meteorological conditions or the quantity of emissions results in concern over potential adverse impacts within a Class I area.

On September 12, 1989, the Doe Run Company-Buick Resource Recycling Division (Doe Run) received a PSD permit that allowed the facility to operate a secondary lead smelting operation at its existing Iron County location near Boss, Missouri. The 1989 PSD permit placed separate lead production limits upon the blast furnace, the reverberatory furnace, and the rotary melter on an annual basis. On October 18, 2001, the Department's Air Pollution Control Program received a permit application from Doe Run requesting an increase in its annual lead production rate from 143,650 tons per year to 175,000 tons per year. Additionally, the facility requested that the individual limits placed upon the refinery furnaces be removed in order to allow for more operational flexibility.

On August 16, 2004, the Department's Air Pollution Control Program received a revised AAQIA for Doe Run from Shell Engineering & Associates, the consulting firm representing the facility. The document entitled "Ambient Air Quality Impact Analysis for The Doe Run Company-Boss, Missouri" was submitted to address concerns raised by the Department's Air Pollution Control Program regarding emission rate calculations provided in the October 2001 permit application. The Class II portion of the AAQIA has undergone various updates since the receipt of the original permit application. The results contained within the text of this document were obtained at varying times in the history of this project. Although specific dates are not identified in this memorandum, all of the supporting documentation is contained within the files maintained by staff of the Air Quality Modeling Unit.

The following paragraphs describe the scope of the proposed project and the methodology used throughout the modeling study to show attainment of the appropriate National Ambient Air Quality Standards (NAAQS) and PSD increments. Additionally, updates made to the model input file by the Air Quality Modeling Unit have been noted. The alterations made during the course of the modeling study review had no impact on the conclusions reached and did not result in any additional recommendations.

Facility Description

Doe Run is a secondary lead smelter that currently receives lead dross, lead fume, lead bearing scrap, automotive batteries, and industrial batteries via truck and rail. Upon arrival, the raw materials undergo three major operations: preparation, smelting, and refining.

The preparation of the raw material varies and is dependent upon the type of material received. The automotive and industrial batteries are broken, drained of electrolyte, and aged prior to processing. The electrolyte is pumped to a rubber lined process tank for conversion into sodium sulfate while the remaining material is conveyed to a hammermill where it is milled to further reduce the size of the battery and to liberate any remaining battery components. After milling, the feed is washed in order to separate the battery paste from the oversize portions of the battery. The oversize portions of the battery will undergo a final separation process before the metal battery posts and grids are available for smelting in the rotary melter. The battery paste, on the other hand, must undergo a desulfurization process in order to produce the lead carbonate paste that will feed the reverberatory furnace.

Any lead bearing cable scraps that are received will be fed to the reclamation furnace where the nonmetal contaminants are driven off and the lead is separated from other metals with higher melting points in a process known as sweating. The lead is tapped into molds that are later used in the refining process.

The remaining lead feed is unloaded, sorted and placed in segregated storage piles. Iron scrap, lime, silica, lead bearing scrap, dross, and slag are blended and conveyed to a blast furnace. The makeup of the feed varies and is dependent upon the properties of the lead being produced.

Smelting occurs in three differing furnaces identified as a blast furnace, a reverberatory furnace, and a rotary melter. The blast furnace produces a high antimony lead (hard lead) whose feed is comprised of the raw material blend described in the previous paragraph. Lead oxides are reduced to elemental lead as the material blend moves through the furnace on a bed of coke. Slag produced from limestone and iron is separated from the molten lead and is shipped offsite for disposal. The lead obtained during this process is poured into transfer pots for additional processing in the refinery. Soft lead is produced in the reverberatory furnace as battery paste is continuously delivered through a screw feeder. Slag produced during this process is continuously tapped into a water cooler launder while the lead is periodically tapped and transferred to a dross kettle for further refining. The slag produced in the reverberatory furnace is recycled back into the system and will pass through the blast or reverberatory furnace.

The last furnace, the rotary melter, produces hard lead from the metal battery posts and grids obtained during the processing of the automotive and industrial batteries. Lead is smelted from the material as the sloped drum of the furnace rotates. Ash, slag, and dross are separated from the molten lead at the end of the drum and are reserved for additional smelting in the blast furnace. The molten lead is tapped and transferred to a dross kettle for additional refinement.

In the refinery area, the crude lead will be pumped from the dross kettles to refinery kettles where impurities such as copper, antimony, tin, and arsenic are removed. Once treated, the lead is transferred to cleanup kettles to remove any remaining antimony prior to casting.

The production increase will be achieved by increasing the amount of feed to the refinery operations and will not require the installation of new equipment.

Two areas within the State of Missouri have been designated as mandatory Federal Class I Areas under the 1977 Clean Air Act: Hercules Glades and the Mingo Wildlife Refuge. Based upon the location of Doe Run, an evaluation of facility's impact on the Mingo Wildlife Refuge was required. Given the size of the source, the feasibility of performing a Class I analysis on Hercules Glades was also considered, but deemed unnecessary. Factors impacting this decision included the prevailing wind direction, the movement of meteorological air masses across the state, and Doe Run's position/distance in relation to Hercules Glades.

The following paragraphs describe the procedures that were followed to show compliance with all applicable Class I area requirements within the Mingo Wildlife Refuge.

II. Model Selection

The modeling procedures used in this study follow the current air quality modeling guidelines contained in 40 CFR Part 51 Appendix W entitled "The Guideline on Air Quality Models." Version 5.711, Level 030625 of the CALPUFF modeling system was used to evaluate Doe Run's impact on available increment, total nitrogen deposition, total sulfur deposition, and visibility impairment within the Mingo Wildlife Refuge.

CALPUFF was adopted on April 15, 2003 by the U.S. Environmental Protection Agency (EPA) for assessing the long range transport of pollutants and the impact they might have within Class I areas. Unlike the Industrial Source Complex dispersion model, CALPUFF is a Lagrangian model that characterizes pollutant releases as a continuous series of puffs and can simulate point, area, or volume sources. Additionally, the model allows for the input of multiple sources, terrain elevations, structure effects, various grid receptors, wet and dry depletion calculations, urban or rural terrain, and averaging periods ranging from one hour to one year.

According to the Federal Land Manager's Air Quality Related Values Work Group (FLAG) recommendations, CALPUFF should be used to assess far field (greater than 50 kilometers) impacts from new or modified sources. Initially, CALPUFF is executed using the default model options outlined in the FLAG document. If model predictions indicate that adverse impacts are likely to occur, the applicant may take the analysis one step further to account for local conditions, including meteorology, that were not accounted for in the initial model study. Any alterations to the default model options must be approved by both the Federal Land Manager and the permit granting authority prior to the submittal of the model results.

III. Source Data

Under PSD guidelines, a facility must submit an air quality analysis for each pollutant it proposes to emit in excess of the *De Minimis* emission levels outlined in 10 CSR 10-6.020(3)(A) Table 1. The CALPUFF modeling system allows the user to input six chemical species: PM_{10}, NO_x, SO_2, sulfate (SO_4), nitrate (NO_3), and nitric acid (HNO_3). Emission rates for secondary pollutants such as SO_4, NO_3, and HNO_3 were not available for the Doe Run facility. However, the IWAQM Phase II summary report states that the MESOPUFF II chemistry module should sufficiently address the gas phase oxidation of NO_x and SO_2 to nitrates and sulfates. It is important to note that the document recognizes that the MESOPUFF II chemistry is not adequate in its treatment if aqueous phase chemistry and is likely to underestimate sulfate formation under cloudy or foggy conditions. However, CALPUFF is the best tool currently available for determining visibility impacts at distances greater than 50 kilometers and can serve as an indicator of potential adverse impacts.

During the review process, several questions regarding the emission calculations contained within the 1989 permit were raised, triggering concern that possible adverse impacts could be occurring at or near the Class I area. The source data utilized in the calculation of the Class I impacts was based upon the total amount of emissions released at the Doe Run facility on a short term basis. Table 1 entitled "The Doe Run Company-Buick Resource Recycling Center NAAQS

Sources” contains the emission rates used in the AAQIA for the Doe Run facility. It is important to note that an analysis of the net emissions increase in and of itself was not conducted.

Figure’s 1 and 1b entitled “The Doe Run Company-Buick Resource Recovery Recycling Center-Source Locations” graphically displays the location of each emissions release as declared in the model input file. If the emissions rates, release parameters or locations declared within the AAQIA are in error, or require revision, the Air Quality Modeling Unit must be notified as soon as possible. Significant alterations to the model input file will impact the model predictions and must be evaluated on a case by case basis to insure continued compliance with the air quality related values and increment standards.

IV. Variable Emission Rates/Modeled Emission Limits

In addition to allowing the user to define sources as point, area, or volume sources, the CALPUFF model will also accept variable emission rate factors. For example, the user may want to specify that emissions from a haul road only occur for eight hours during a twenty-four hour period. Variable emission rates were not applied to any of the sources located at the Doe Run facility.

V. Receptors

The Federal Land Manager provided the receptor grid that was utilized in the CALPUFF analysis. 698 discrete receptor locations were used to evaluate the impact of Doe Run within the Mingo Wildlife Refuge Figure 2 entitled “Mingo Wildlife Refuge Receptor Grid-The Doe Run Company-Buick Resource Recovery Recycling Center” contains a graphic display of the receptor grid utilized in the AAQIA.

VI. Meteorological Data

The CALMET meteorological model contained within the CALPUFF modeling system was used to develop a three-dimensional gridded modeling domain containing hourly wind and temperature fields. The CALMET meteorological processor produces a collection of atmospheric variables for each grid cell and time step specified by the user. These variables include wind direction, wind speed, temperature, atmospheric turbulence parameters, and vertical profiles. Because the meteorological variables produced by CALMET are output on a grid cell by grid cell basis, the grid resolution chosen by the user can directly impact the location at which maximum impacts are predicted to occur. During initial processing, CALMET develops an initial guess wind field that is adjusted for the kinematic effects of terrain, terrain blocking, and slope flows to produce a first guess wind field that will be “nudged” by hourly observational data. Additionally, the user has the option of inputting prognostic wind data obtained from the gridded output of the MM4 and MM5 meteorological model as the initial guess wind field prior to the application of adjustments for kinematic effects. The introduction of prognostic data should enhance the accuracy of the initial wind field provided the prognostic outputs have undergone a thorough performance evaluation.

During the second phase of processing, CALMET introduces observational data into the system using an objective analysis approach after the development of the first guess wind field. In regions where observational data is available, the wind field will be heavily influenced by the data collected at National Weather Service and local meteorological stations. In areas where no observational data is available, the final wind field relies on the first step wind field described above.

The Air Quality Modeling Unit developed a modeling domain designed to accept prognostic wind data from the 1990 MM4, 1992 MM5, and 1996 MM5 meteorological databases. The grid resolution utilized in the development of the prognostic model varied with 80-kilometer resolution for 1990 and 1992, and 36-kilometer resolution for 1996. The CALMET domain utilized a UTM coordinate system with eight vertical layers and a horizontal array consisting of 206 grid cells by 206 grid cells at 2.5-kilometer grid resolution. Each of the three years modeled included surface, upper air, and precipitation sites located throughout the modeling domain. The modeling domain is displayed in Figure 3 entitled “The Doe Run Company-Buick Resource Recovery Recycling Center-Surface and Upper Air Observational Network.” The CALMET simulation conducted by the Air Quality Modeling Unit was based upon the default options contained within the FLAG Phase II report and was used to demonstrate compliance in both the Class I.

VII. Building Downwash

Building downwash was calculated using the Building Profile Input Program (BPIP). The information needed to execute BPIP, are the heights and locations of structures, which may contribute to building downwash, and the stack locations in relation to these structures. BPIP serves two main functions. The first function of the program is to determine if a stack is being subjected to wake effects from a surrounding structure or structures. Flags are then set to indicate which stacks are affected by which structure wake effects. If a stack is influenced by a structure, then the second function of the program is executed. This function calculates the building heights and widths to be included in the model so that building downwash effects can be considered.

In order to determine if the building downwash calculations were applied correctly, the coordinates of each building corner are needed. No alterations were made to the building downwash values input into the CALPUFF modeling system.

VIII. Dispersion Options

The CALPUFF dispersion and transport model contained within the CALPUFF modeling system was used to develop hourly concentration and deposition fluxes for each of the 698 receptor locations described in Section V. Concentration and deposition fluxes are computed from a series of “puffs” that are advected into the atmosphere from emission release points that are input by the user.

The three-dimensional meteorological fields developed by CALMET were used to simulate the effects of meteorological conditions on the transport, transformation and deposition of pollutants for the years of 1990, 1992, and 1996. The modeling domains described for the meteorological model was also used in the CALPUFF analysis.

The MESOPUFF II chemistry module was chosen to account for nitrate chemistry and the oxidation of sulfur dioxide to sulfate. The Missouri Department of Natural Resources provided monthly background ozone concentrations to Shell Engineering & Associates for incorporation into the CALPUFF analysis. The use of monthly ozone observations should more accurately reflect the pollutant transformation processes that are occurring within the atmosphere during the simulation than a single background concentration based upon the default value of 80 parts per billion.

The assignment of a realistic background concentration for ammonia is also a required input into the CALPUFF modeling system. It is important to accurately assign the background ammonia concentration because the amount of ammonia input into the model directly impacts the estimation of particulate nitrate concentrations. Failure to identify an appropriate value could result in an overestimation or an underestimation of pollutant levels within the Class I area. A background concentration of 0.5 parts per billion for ammonia was also chosen for use in the CALPUFF analysis. The ammonia concentration is significantly lower than the default ten parts per billion contained in the FLAG Phase II report, however, previous discussions with the Federal Land Manager indicated that the use of the lower background concentration was acceptable. As such, no alteration to the ammonia background concentration was made.

With the exception of the ammonia background concentration, the CALPUFF simulation conducted by the Air Quality Modeling Unit was based upon the default options contained within the FLAG Phase II report.

IX. Class I Significant Impact Levels

In order to determine if a full impact model analysis and/or ambient air monitoring is necessary a facility must complete a preliminary model analysis. Typically, this analysis should only include the proposed source(s) or modification(s) so it can be determined if a significant modeled impact will take place. If the model predicts the high first high to be below the thresholds outlined in the Environmental Protection Agency's draft rulemaking contained in the Federal Register dated Tuesday, July 23, 1996, no further analysis is necessary and the modeling study can be deemed complete provided it follows the EPA's minimum modeling requirements. However, if these levels are exceeded, a cumulative analysis to determine compliance with the Class I increments must be conducted. This analysis is more rigorous than the significance determination and must include other increment consuming sources.

Again, it is important to note that the net emissions increase from the Doe Run facility was not modeled. All of the CALPOST outputs are based upon the total amount of emissions released due to the operations at the Doe Run facility. The following paragraphs describe the results obtained from the verification analysis conducted by the Department's Air Pollution Control Program on a pollutant by pollutant basis.

PM_{10}

Table 2 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center-PM_{10} Significant Impact Determination," summarizes the high first high concentrations as predicted by the CALPUFF model for PM_{10} from the facility. Based upon the results of the significance determination conducted by the Department's Air Pollution Control Program, the 24-hour and annual concentrations were 2.10E-02 and 9.03E-04 $\mu g/m^3$ respectively. The results of this analysis indicate that the CALPUFF concentrations are below the significance levels of 0.3 $\mu g/m^3$ and 0.2 $\mu g/m^3$ for the 24-hour and annual averaging periods indicating that no further analysis for PM_{10} is necessary.

NO_x

Table 3 entitled "The Doe Run Company Buick Resource Recovery Recycling Center-NO_x Significant Impact Determination," summarizes the high first high concentrations as predicted by the CALPUFF model for NO_x from the proposed facility. Based upon the results of the significance determination conducted by the Department's Air Pollution Control Program, the maximum annual concentration was 7.46E-04 $\mu g/m^3$. The results of this analysis indicate that the CALPUFF concentrations are below the significance level 0.1 $\mu g/m^3$ for the annual averaging period indicating that no further analysis for NO_x is necessary.

SO_2

Table 4 entitled "The Doe Run Company Buick Resource Recovery Recycling Center SO_2 Significant Impact Determination," summarizes the high first high concentrations as predicted by the CALPUFF model for SO_2 from the proposed facility. Based upon the results of the significance determination conducted by the Department's Air Pollution Control Program, the maximum 3-hour, 24-hour and annual concentrations were 4.01E+00, 1.55E+00 and 6.63E-02 $\mu g/m^3$ respectively.

The results of the SO_2 significance determination indicate that the significance levels are being exceeded for the 3- and 24-hour averaging times triggering a cumulative SO_2 analysis.

X. Cumulative SO_2 Analysis

The Arkansas Department of Environmental Quality, the Illinois Environmental Protection Agency, the State of Tennessee, the State of Kentucky, and the Department's Air Pollution Control Program supplied increment information that included increment affecting sources within 200 kilometers of the proposed source. Increment affecting sources can be defined as those sources that have reported a change in emissions because of a modification (including new and removed sources) that occurred after the baseline date.

In an effort to determine when the minor source baseline date had been established for the Mingo Wildlife Refuge, the Air Quality Modeling Unit conducted a series of CALPUFF analyses to determine if any of the following triggers were exceeded:

Significance Levels Outlined in the Federal Register
Visibility Impact > 5% on a 24-hour basis

If a Prevention of Significant Deterioration permit did not have a significant impact, or did not cause greater than 5% degradation in visibility, the Air Quality Modeling Unit determined that the minor source baseline date was not triggered for the Mingo Wildlife Refuge. If the significance levels were exceeded, or visibility degradation beyond 5% was predicted, the permit triggered the minor source baseline date.

Once the baseline date was established, all sources that received a permit after November 1999 within 50 kilometers were included in the Class I inventory for Missouri. This includes *De Minimis*, minor and major source and permits. Beyond 50 kilometers, minor and major source permits were included in the Class I inventory. All of the emission rates provided in the inventory were based upon permit limitations with no consideration of actual reported emissions.

The results of this analysis are contained in Table 5. The highest estimate must be used when determining compliance for annual impacts because the SO_2 standard is a long term deterministically based standard. The worst case annual impact occurred during the 1992 meteorological period with a maximum concentration of 4.23E-01 $\mu g/m^3$. For the 3-hour and 24-hour SO_2 impacts, the second highest impacts must be used to determine compliance with the increment standards. The worst case 3-hour and 24-hour impacts occurred during the 1990 and 1996 meteorological periods with maximum concentrations of 7.43E+00 $\mu g/m^3$ and 3.44 $\mu g/m^3$, receptively.

Based upon the SO_2 cumulative increment analysis, the standard is being met and no further analysis in regard to the increment is necessary.

XI. Class I Visibility Analysis

The main focus of the Class I visibility analysis is the determination of a facility's impact on existing haze concentrations. Due to resource limitations, the FLM's suggest that facilities undergo a generalized approach for assessing their visibility impacts by calculating extinction coefficients due to various pollutants emitted at the facility. The results obtained from the analysis are compared to the light extinction coefficient of the background air.

Visibility impairment occurs when light is scattered into and out of the line of sight and by light absorbed along the line of sight. To calculate degradation the sum of all absorption and light scattering pollutants is quantified using the light extinction coefficient. The FLAG Phase I report states that concern is generated when visibility impairment becomes perceptible to humans when compared to natural visibility conditions. As a guideline, any change in extinction from a new source or modification greater than 5% would cause concern and could trigger a more refined analysis. Impacts exceeding the 5% threshold are evaluated by the FLM on a case by case basis.

Table 6 entitled "The Doe Run Company-Buick Resource Recycling Center Change in Extinction," summarizes each day whose impact exceeds the 5% threshold. Based upon the results of the visibility analysis conducted by the Department's Air Pollution Control Program, the maximum change in extinction is 22.585% using the Method 2 CALPOST option. Time series plots for each quarter within the three year modeling period are contained in Appendix E.

Because the 5% level of concern is exceeded, the FLM should be contacted to determine an appropriate course of action.

XII. *S and N Deposition*

An estimation of atmospheric deposition of total sulfur and nitrogen within the Class I area is required by the FLM. The facility must demonstrate that the additional amount of total sulfur and nitrogen deposited within the Class I boundary is below the Deposition Analysis Threshold of 0.005 kg/ha/yr. This level does not reflect a concentration that has been found to harm the ecosystem of the Class I area, but is an indicator that concern is warranted. Any concentrations predicted to exceed this level would alert the FLM that additional analysis is necessary in order to determine if an adverse impact is likely.

Total Sulfur Deposition

Table 7 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center-Total Sulfur Deposition," summarizes the high first high concentrations as predicted by the CALPUFF model. The worst case annual impact occurred during the 1996 meteorological period with a maximum concentration of 5.655E-02 kg/ha/yr.

The results obtained from the analysis indicate that the CALPUFF concentrations exceed the significance level of 0.005 kg/ha/yr indicating that the FLM should be contacted to determine if further analysis for total sulfur deposition is necessary.

Total Nitrogen Deposition

Appendix F, Table 1 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center-Total Nitrogen Deposition," summarizes the high first high concentrations as predicted by the CALPUFF model. The worst case annual impact occurred during the 1996 meteorological period with a maximum concentration of 4.31E-03 kg/ha/yr.

The results obtained from the analysis indicate that the CALPUFF concentrations do not exceed the significance level of 0.005 kg/ha/yr indicating that no further analysis for total nitrogen deposition is necessary.

XIII. Recommendations

This portion of the AAQIA submitted by Doe Run is complete. The following recommendations should be incorporated into the PSD permit as special conditions. Failure to do so may invalidate the results obtained from the AAQIA.

1. The emission rate limitations contained in Appendix A, Table 1 should be enforced. Failure to meet these emission limitations on a daily basis will invalidate the AAQIA.
2. The FLM should be contacted to determine what action, if any, is required to address the visibility and deposition impacts at the Mingo Wildlife Refuge.

DF:bw

Attachments

c: Dawn Froning, Air Quality Analysis Section, APCP
Don Cripe, Operations Section, APCP
Richard Daye, Environmental Protection Agency Region VII
Bud Rolofson, U.S. Fish and Wildlife
Tim Allen, National Park Service

MEMORANDUM

DATE: September 9, 2004

TO: Fuad Wadud, Environmental Engineer
Permit Section, APCP

THROUGH: Jeffry D. Bennett, P.E., Air Quality Modeling Unit Chief
Air Quality Analysis Section, APCP

FROM: Dawn Froning, Environmental Specialist III
Air Quality Modeling Unit, AQAS

SUBJECT: Ambient Air Quality Impact Analysis (AAQIA) for The Doe Run Company-Buick Resource Recycling Division, Prevention of Significant Deterioration (PSD) Modeling—08/16/04 Submittal

I. Introduction

On September 12, 1989, the Doe Run Company-Buick Resource Recycling Division (Doe Run) received a PSD permit that allowed the facility to operate a secondary lead smelting operation at its existing Iron County location near Boss, Missouri. The 1989 PSD permit placed separate lead production limits upon the blast furnace, the reverberatory furnace, and the rotary melter on an annual basis. On October 18, 2001, the Department's Air Pollution Control Program received a permit application from Doe Run requesting an increase in its annual lead production rate from 143,650 tons per year to 175,000 tons per year. Additionally, the facility requested that the individual limits placed upon the refinery furnaces be removed in order to allow for more operational flexibility.

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The last furnace, the rotary melter, produces hard lead from the metal battery posts and grids obtained during the processing of the automotive and industrial batteries. Lead is smelted from the material as the sloped drum of the furnace rotates. Ash, slag, and dross are separated from the molten lead at the end of the drum and are reserved for additional smelting in the blast furnace. The molten lead is tapped and transferred to a dross kettle for additional refinement.

In the refinery area, the crude lead will be pumped from the dross kettles to refinery kettles where impurities such as copper, antimony, tin, and arsenic are removed. Once treated, the lead is transferred to cleanup kettles to remove any remaining antimony prior to casting.

The production increase will be achieved by increasing the amount of feed to the refinery operations and will not require the installation of new equipment.

II. Related Documents

The modeling file includes the modeling study submitted by Shell Engineering & Associates on behalf of Doe Run, a Model Review Log, correspondence, and the model inputs and outputs. All of the information is available in the modeling file for Doe Run dated October 2001.

III. Model Selection

The modeling procedures used in this study should follow current air quality modeling guidelines. Version three of the Industrial Source Complex Short Term (ISCST3) dispersion model dated 02035 was used to evaluate the 1-hour, 3-hour, 8-hour, 24-hour, and annual impacts of carbon monoxide (CO), particulate matter less than ten microns in diameter (PM_{10}), nitrogen oxides (NO_x), lead (Pb) and sulfur dioxide (SO_2) resulting from the operations at Doe Run.

The ISCST3 is a U.S. Environmental Protection Agency (EPA) approved model based upon the Gaussian plume equation and can be used to model point, area, volume, and open pit sources. The model allows for the input of multiple sources, terrain elevations, structure effects, various grid receptors, wet and dry depletion calculations, urban or rural terrain, and averaging periods ranging from one hour to one year.

IV. Source Data

Under PSD guidelines, a facility must submit an air quality analysis for each pollutant it proposes to emit in excess of the *De Minimis* emission levels outlined in 10 CSR 10-6.020(3)(A)

Table 1. Based upon Doe Run's emission calculations, CO, PM_{10}, NO_x, SO_2, and lead emissions will exceed these levels.

Due to the variable nature of emission sources, they can be classified as point, area, open-pit, or volume sources, in the ISCST3 dispersion model. The following paragraphs describe the emission classifications used in the AAQIA for Doe Run.

Point Source Emissions

The document entitled "Users Guide for the Industrial Source Complex Dispersion Models" states that the point source algorithm should be used to model emission releases from stacks and isolated vents. Appendix A, Table 1, entitled "The Doe Run Company-Buick Resource Recycling Center-Modeled Point Source Emission Rates" outlines the point source emissions based upon information contained within the model input file developed by Shell Engineering & Associates. It is important to note that no new point source releases will result from the modification at the Doe Run facility. In addition, the emission rates contained within Table 1 are based upon the projected increase in production on a short-term basis, not the overall potential emissions from each source.

None of the stacks listed in Appendix A are equipped with rain caps or vent horizontally.

Volume Source Emissions

In addition to modeling point source emissions, several fugitive dust emissions were classified as volume sources. The ISCST3 users guide states that "The ISC volume source algorithms are used to model releases from a variety of industrial sources, such as building roof monitors, multiple vents, and conveyor belts." Appendix A, Table 2 entitled "The Doe Run Company-Buick Resource Recycling Center-Modeled Volume Source Emission Rates" outlines the volume source emission rates based upon the model input file developed by Shell Engineering & Associates. It is important to note that no new volume source releases will result from the modification at the Doe Run facility. In addition, the emission rates contained within Table 2 are based upon the projected increase in production on a short-term basis, not the overall potential emissions from each source.

Area Source Emissions

Due to differences in the area and volume source algorithms, it has been determined that the area source algorithm best represents what is occurring when a truck passes over a haul road. The decision to model haul road emissions as an area source, is acceptable based upon the ISCST3 users guide which states that, "area source algorithms can be used to model low level or ground level releases with no plume rise." The guidance goes on to state that an initial vertical dimension can be included in the area source input card to account for "…mechanically generated emission sources, such as mobile sources. In these cases, the emissions may be turbulently mixed near the source by the process that is generating the emissions, and therefore occupy some initial depth." Appendix A, Table 3 entitled "The Doe Run Company-Buick Resource Recycling Center-Modeled Area Source Emission Rates" outlines the area source emission rates as contained in the model input file. It is important to note that no new area source releases will result from the modification at the Doe Run facility. In addition, the emission rates contained within Table 3 are based upon the projected increase in production on a short-term basis, not the overall potential emissions from each source. EP-37, resuspension, was originally modeled as a single, large area source. Discussions with the facility revealed that resuspension included haul road emissions as well as emissions generated from wind blown dust. At the request of the Department's Air Pollution Control Program, Shell Engineering & Associates modeled the haul road emissions based upon the path that the haul road actually takes as it passes through the facility property. The only other particulate area source within the facility is the coke storage pile, EP-13. The size of the storage pile is not expected to change as a result of the increased production at this facility, therefore the wind erosion component of the storage pile did not have a net emissions increase associated with it.

Due to model limitations, the ISCST3 dispersion model does not allow the user to characterize haul roads as a single emission source, so they must be modeled as several small sources. In order to determine the emission rate for each haul road, one must combine the individual emission rates. Please note that the emission rate contained in the model-input file is divided by the area of the source.

Variable Emission Rates/Modeled Emission Limits

In addition to allowing the user to define sources as point, area, or volume sources, the ISCST3 model will also accept variable emission rate factors. For example, the user may want to specify that emissions from a haul road only occur for eight hours during a twenty-four hour period. This can be accomplished using the hour of day statement in the model input file. Doe Run did not declare any hourly limitations in the model input file.

V. Receptors

Shell Engineering & Associates implemented a Cartesian grid with variable spacing to determine the area of maximum impact from the proposed emissions increase. Along the property boundary, receptors were placed at 50-meter intervals. The remainder of the grid consisted of variable grid spacing from 100- to 1000-meters. It should be noted that two differing grids were used to evaluate gaseous pollutant emissions and emissions resulting from operations where PM_{10} and Pb were being emitted. Appendix B, Figure's 1 and 2 entitled "The Doe Run Company-Buick Resource Recycling Center-Gaseous Pollutant Receptor Grid," and "The Doe Run Company-Buick Resource Recycling Center-PM_{10} & Pb Receptor Grid" contains a graphic display of the receptor grid utilized in the AAQIA dated August 16, 2004. An evaluation of the various receptor grids revealed that the receptor grids are sufficient to determine the extent of Doe Run's maximum impact.

In addition to determining the adequacy of the receptor grid spatially, an evaluation of terrain heights was conducted to ensure that the elevations contained in the model input reflect actual terrain features. Two quality assurance checks were conducted by staff from the Department's Air Pollution Control Program. Initially, receptor elevations for the receptor grid were obtained using the EPA's terrain processor, AERMAP. All elevations were based upon data contained in

7.5 minute topographic maps. These elevations were compared to those contained in the model file submitted by Shell Engineering & Associates and are visually displayed in Appendix B, Figure 3 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center - Terrain Elevations." No alterations were made to the terrain elevations.

Finally, the property boundary declared in the Doe Run modeling analysis must limit public access in a manner that precludes entrance by unauthorized individuals. Failure to preclude entry as described in the air quality analysis would result in inaccurate model results. Appendix B, Figure 4 entitled "The Doe Run Company-Buick Resource Recycling Center-Property Boundary" graphically displays the boundary input into the AAQIA.

VI. Meteorological Data

Five years of meteorological data were used and included the following years: 1997, 1998, 1999, 2000, and 2001. The meteorological data files were developed using surface and upper air data collected at the National Weather Service station located near Springfield, Missouri. The files were processed using the most current version of PCRAMMET.

VII. Building Downwash

Building downwash was calculated using the Building Profile Input Program (BPIP). The information needed to execute BPIP, are the heights and locations of structures, which may contribute to building downwash, and the stack locations in relation to these structures.
BPIP serves two main functions. The first function of the program is to determine if a stack is being subjected to wake effects from a surrounding structure or structures. Flags are then set to indicate which stacks are affected by which structure wake effects. If a stack is influenced by a structure, then the second function of the program is executed. This function calculates the building heights and widths to be included in the model so that building downwash effects can be considered.

In order to determine if the building downwash calculations were applied correctly, the coordinates of each building corner are needed. Appendix C, Figure's 1 and 1b entitled "The Doe Run Company-Buick Resource Recycling Center-Building/Stack Location Verification" depicts the proposed building/stack configuration of the new facility.

In some instances, building cavity wake zones extend off a facility's property. Currently, the ISCST3 does not calculate concentrations for these receptors. Because this could potentially impact the final results of the model output, the Department's Air Pollution Control Program requires a wake cavity evaluation using the EPA's SCREEN3 model and the Schulman-Scire wake cavity algorithms for all receptors the ISCST3 locates within the building wake cavity zones. None of the outputs generated for the AAQIA indicates the presence of cavity wake zones. As such, no additional cavity analyses are required.

VIII. Good Engineering Practice Stack Height

The Clean Air Act states that a stack should be high enough to ensure that its emissions do not result in excessive ground level pollutant concentrations in the area surrounding the stack due to downwash effects caused by the source itself, nearby structures, or complex terrain. It also states that the stack shall not exceed two and one-half times the height of the obstructing source unless a demonstration can be made that this is necessary. According to 40 CFR 51,l(ii), good engineering practice (GEP) stack height is the greater of 65 meters (measured from base of the stack) or the height of the nearby structure (measured from base of stack) plus 1.5 times the lesser dimension of the nearby structure. If neither of the above approaches are used to determine GEP stack height, a fluid model study can be conducted.
None of the stacks contained within the model input file exceed 65 meters.

IX. Significance Determination

As stated earlier, a facility that proposes to emit any pollutant above the thresholds outlined in 10 CSR 10-6.020 (3)(A) Table 1 must submit an ambient air quality impact analysis to the permit granting authority. In order to determine if a full impact model analysis and/or ambient air monitoring is necessary, a facility must complete a preliminary model analysis. This analysis should only include the proposed source(s) or modification(s) so it can be determined if a significant modeled impact will take place. Typically, if the model predicts the high first high to be below the thresholds outlined in 10 CSR 10-6.060 (11)(D) Table 4, no further analysis is necessary and the modeling study can be deemed complete provided it follows the EPA's minimum modeling requirements. However, in an effort to ensure compliance with the NAAQS, the Department's Air Pollution Control Program required Doe Run to submit additional model analyses whose impacts included all emission releases from the facility and other nearby sources. The results of the significance determination were used solely to determine if preconstruction monitoring would be necessary or if an increment evaluation was necessary.

The following paragraphs describe the results obtained from the verification analysis conducted by the Department's Air Pollution Control Program on a pollutant by pollutant basis.

CO

Appendix D, Table 1 entitled "The Doe Run Company-Buick Resource Recycling Center-CO Significant Impact Determination," summarizes the high first high concentrations as predicted by the ISCST3 dispersion model for CO. The worst case 8-hour impacts occurred during the 1999 meteorological period with a maximum concentration of 241.90 $\mu g/m^3$. The worst case 1-hour impacts occurred during the 1998 meteorological period with a maximum concentration of 692.55 $\mu g/m^3$. Both of these concentrations are below the significance levels of 500 $\mu g/m^3$ and 2000 $\mu g/m^3$ for the 8- and 1-hour averaging periods.

NO_x

Appendix D, Table 2 entitled “The Doe Run Company-Buick Resource Recycling Center-NO_x Significant Impact Determination,” summarizes the high first high concentrations as predicted by the ISCST3 dispersion model for NO_x. The worst case annual impact occurred during the 1999 meteorological period with a maximum concentration of 0.648 $\mu g/m^3$. This concentration is below the significance level of 1.0 $\mu g/m^3$ for the annual averaging period.

PM_{10}

Appendix D, Table 3 entitled “The Doe Run Company-Buick Resource Recycling Center-PM_{10} Significant Impact Determination,” summarizes the high first high concentrations as predicted by the ISCST3 dispersion model for PM_{10}. The worst case 24-hour impact occurred during the 2001 meteorological period with a maximum concentration of 4.50 $\mu g/m^3$. The worst case annual impact occurred during the 1999 meteorological period with a maximum concentration of 0.269 $\mu g/m^3$. Both of these concentrations are below the significance levels of 5.0 $\mu g/m^3$ and 1.0 $\mu g/m^3$ for the 24-hour and annual averaging periods.

SO_2

Appendix D, Table 4 entitled “The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Significant Impact Determination,” summarizes the high first high concentrations as predicted by the ISCST3 dispersion model for SO_2. The worst case 3-hour impacts occurred during the 2000 meteorological period with a maximum concentration of 82.32 $\mu g/m^3$. The worst case 24-hour impacts occurred during the 1998 meteorological period with a maximum concentration of 24.93 $\mu g/m^3$. Lastly, the worst case long term annual impact occurred during the 2000 meteorological period with a maximum concentration of 1.66 $\mu g/m^3$. All three concentrations exceed the significance levels of 25 $\mu g/m^3$, 5 $\mu g/m^3$, and 1 $\mu g/m^3$ for the 3-hour, 24-hour, and annual averaging periods, thereby triggering a full impact analysis for this pollutant.

The extent of each significant impact area is graphically displayed in Appendix D, Figure’s 1, 2, and 3 entitled, “The Doe Run Company-Buick Recovery Recycling Center Significant Impact Area Determination, Annual Averaging Period-SO_2 The Doe Run Company-Buick Recovery Recycling Center Significant Impact Area Determination, 24-hour Averaging Period-SO_2,” and “The Doe Run Company-Buick Recovery Recycling Center Significant Impact Area Determination, 3-Hour Averaging Period-SO_2” respectively.

Preconstruction Ambient Air Quality Monitoring

Based upon the significant impact analysis, a minimum of one year of preconstruction monitoring data was required for SO_2. Doe Run conducted preconstruction monitoring from December 7, 2001 until December 25, 2002, as initial discussions regarding the modification were ongoing. The monitoring sites selected remain acceptable for inclusion into the full impact analysis. Appendix E contains graphical displays of the SO_2 concentrations that were monitored at Doe Run and includes a graphical display of the monitor site in relation to the facility.

X. NAAQS Inventory

In order to complete the full impact analysis, Shell Engineering & Associates requested a NAAQS inventory for all facilities that could potentially impact the results obtained from the Doe Run facility. The Guideline on Air Quality Models suggests that all nearby sources be included in this inventory. Currently, the Department's Air Pollution Control Program defines nearby as any facility within 50 kilometers of the proposed sources significant impact area.

It is important to note that although SO_2 was the only pollutant that triggered a full impact analysis according to the PSD guidelines, all of the applicable criteria pollutants were evaluated for compliance with the NAAQS. During the review process, several questions regarding the emission calculations contained within the 1989 permit were raised, triggering concern that possible adverse impacts could be occurring. In addition, the State Implementation Plan (SIP) for Doe Run requires the facility to evaluate the ambient impact of lead to ensure that the region continues to remain in compliance with the NAAQS for lead.

The original interactive source inventory submitted to the contractor is contained in the modeling file for Doe Run. All of the emission release points associated with the Doe Run facility were provided by the permit engineer and forwarded to Shell Engineering & Associates for inclusion into the NAAQS evaluations. Appendix F, Table 1 entitled "The Doe Run Company-Buick Resource Recycling Center NAAQS Sources" contains the emission rates used in the AAQIA for the Doe Run facility.

It is important to note that the NAAQS inventory included in the AAQIA for Doe Run is significantly different from the model inputs used throughout the SIP demonstration for Doe Run. The recent alterations made by Shell Engineering & Associates were deemed more appropriate based upon information received by the facility. Appendix F, Table 2 entitled "The Doe Run Company-Buick Resource Recycling Center Lead Sip vs. NAAQS Sources" contains the emission rates contained within each of the model input files for Doe Run. EP-37, resuspension, was originally modeled as a single, large area source. Discussions with the facility revealed that resuspension included haul road emissions as well as emissions generated from wind blown dust. At the request of the Department's Air Pollution Control Program, Shell Engineering & Associates modeled the haul road emissions based upon the path that the haul road actually takes as it passes through the facility property. Secondly, emissions from EP-17 are included in the emissions from EP-31, the shredder baghouse. Lastly, EP-53, the slag/dross screen has been removed from service. Because the emission releases and limitations are being altered as a result of this permit application, Doe Run should update the SIP to reflect of the proposed changes.

In addition to modeling facility wide emissions and interactive sources, the Department's Air Pollution Control Program requested that Shell Engineering & Associates obtain information regarding Doe Run emission release points from the parent company that were not directly related to the Buick Resource Recovery Recycling Center. Appendix F, Table 3 entitled "The Doe Run Company-Mine and Glover Emission Sources" contains the emission rates included in the NAAQS analysis for The Doe Run Company collectively.

Occasionally erroneous data is contained in the emission inventories. The Department's Air Pollution Control Program and Shell Engineering & Associates worked in conjunction with one another to determine appropriate emission rates for several questionable sources. An evaluation of the "final" interactive sources indicated that all alterations to the inventory were approved by staff employed by the Department's Air Pollution Control Program.

All of the emission sources included in the NAAQS compliance determination are graphically displayed in Appendix F, Figure's 1-5.

XI. Increment Inventory

Because the major and minor source baseline dates were established in Iron County for SO_2, Doe Run was required to submit an increment analysis. The Department's Air Pollution Control Program supplied the contractor with an increment inventory that included all increment affecting sources within 50 kilometers of the proposed source. Increment affecting sources can be defined as those sources that have reported a change in emissions because of a modification (including new and removed sources) that occurred after the baseline date that was established by the 1989 PSD permit issued to The Doe Run Company-Buick Resource Recovery Recycling Center" on September 12, 1989. The increment inventory is included in the modeling file.

XII. NAAQS Results

A NAAQS compliance demonstration is required for all pollutants that exceed the significance levels outlined in 10 CSR 6.060 (11)(D) Table 4. As stated previously, the significance level for SO_2 was exceeded, thereby triggering a full impact analysis including an evaluation of compliance with the NAAQS. Unlike a significance determination, a NAAQS compliance demonstration must consider emissions from the proposed source and existing "interactive" sources that contribute to background pollutant concentrations. The modeled emission rates must reflect the maximum allowable operating conditions based upon federally enforceable emission limits and operating levels, for each pollutant, and averaging time.

Again, it is important to note that although SO_2 was the only pollutant that triggered a full impact analysis according to the PSD guidelines, all of the applicable criteria pollutants were evaluated for compliance with the NAAQS. The following paragraphs describe the results obtained from the verification analysis conducted by the Department's Air Pollution Control Program on a pollutant by pollutant basis.

NO_x

The results of this analysis are contained in Appendix G, Table 1 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center NO_x NAAQS." The highest estimate must be used when determining compliance because the NO_x standard is a long term deterministically based standard. The worst case annual impact occurred during the 1997 meteorological period with a maximum concentration of 318.62 $\mu g/m^3$. This estimate includes a "monitored" background concentration of 7.7 $\mu g/m^3$ that accounts for the impact of natural sources, nearby sources not accounted for in the model analysis, and potential unidentified sources. Based upon the NO_x NAAQS analysis, the standard is being exceeded at two receptors.

According to EPA guidance, Doe Run must demonstrate that they do not have a significant impact at any violating receptor regardless of where it is located. If it can be demonstrated that Doe Run has insignificant impacts at violating receptors (at the time of the predicted violation), approval of the NO_x analysis can be provided. Appendix G, Table 2 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center NO_x Exceedance Receptors vs. First High Impacts" summarizes the impact Doe Run has on each receptor in violation of the NO_x standard. On an annual basis, Doe Run did not have a significant impact at any violating receptors. As such, no further analysis is necessary for this averaging time.

The NO_x output generated from the ISCST3 dispersion model is graphically displayed in Appendix G, Figure 1 entitled, "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance Determination, Annual Averaging Period-NO_x." A review of the interactive source listing indicates that Georgia Pacific is likely to be contributing to the NO_x NAAQS violation. It should be noted that some of the elevated concentrations predicted by the model might be occurring at onsite receptors. Currently, property boundary receptors are not available for each facility within the inventory. This information is difficult to collect because facilities are not required to submit this information with their emission inventory questionnaire and permit applications do not typically include this level of detailed information.

SO_2

Appendix G, Table 3 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 NAAQS" summarizes the high first high annual, and high second high 3-hour and 24-hour concentrations as predicted by the ISCST3 dispersion model for SO_2. The highest estimate must be used when determining annual SO_2 compliance because the standard is a long term deterministically based standard. For the short-term portion of the standard, the highest second highest model estimate is appropriate for compliance purposes.

The worst case 3-hour impacts occurred during the 1997 meteorological period with a maximum concentration of 675.43 $\mu g/m^3$. The worst case 24-hour impacts also occurred during the 1997 meteorological period with a maximum concentration of 223.81 $\mu g/m^3$. Lastly, the worst case long term annual impact occurred during the 1999 meteorological period with a maximum concentration of 19.49 $\mu g/m^3$. All three concentrations include a background concentration of 36.64 $\mu g/m^3$, 28.79 $\mu g/m^3$, and 4.19 $\mu g/m^3$ for the 3-hour, 24-hour and annual averaging periods. The background concentrations account for the impact of natural sources, nearby sources not accounted for in the model analysis, and potential unidentified sources.

The SO_2 output generated from the ISCST3 dispersion model is graphically in Appendix G, Figure's 2, 3, and 4 entitled, "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, Annual Averaging Period-SO_2," "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, 24-hour Averaging Period-SO_2," and "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, 3-Hour Averaging Period-SO_2," respectively. Based upon the SO_2 NAAQS analysis, the standard is being met and no further analysis in regard to the NAAQS is necessary.

<u>PM$_{10}$</u>

To show compliance with the NAAQS for PM_{10} the facility must demonstrate that its impact will be below 150 $\mu g/m^3$ on a 24-hour basis and 50 $\mu g/m^3$ on an annual basis. The form of the NAAQS should be used when comparing modeled concentrations to the above thresholds. For a statistically based standard, such as PM_{10}, the highest sixth-highest estimate for the short term standard, and the highest annual average estimate for the long term standard are used to determine compliance.

The results from the Department's Air Pollution Control Program verification run were used to evaluate compliance with the PM_{10} standards and are contained in Appendix G, Table 4 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center PM_{10} NAAQS." These results indicated that several violations of the PM_{10} standard would occur with a maximum annual concentration of 197.49 $\mu g/m^3$ and a high sixth high 24-hour maximum of 1,284.96 $\mu g/m^3$. All concentrations include a background concentration of 48.0 $\mu g/m^3$, and 15.0 $\mu g/m^3$ for the 24-hour and annual averaging periods. The background concentrations account for the impact of natural sources, nearby sources not accounted for in the model analysis, and potential unidentified sources.

According to EPA guidance, Doe Run must demonstrate that they do not have a significant impact at any violating receptor regardless of where it is located. If it can be demonstrated that Doe Run has insignificant impacts at violating receptors (at the time of the predicted violation), approval of the PM_{10} analysis can be provided. Appendix G, Tables 5 and 6, entitled "The Doe Run Company-Buick Resource Recovery Recycling

Center PM_{10} Exceedance Receptors vs. First High Impacts-24-Hour" and "The Doe Run Company-Buick Resource Recovery Recycling Center PM_{10} Exceedance Receptors vs. First High Impacts-Annual" summarize the impact Doe Run has on each receptor in violation of the PM_{10} standard. On an annual and 24-hour basis, Doe Run did not have a significant impact at any violating receptors. As such, no further analysis is necessary for this averaging time.

The PM_{10} output generated from the ISCST3 dispersion model is graphically in Appendix G, Figure's 5 and 6 entitled, "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, Annual Averaging Period-PM_{10}" and "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, 24-hour Averaging Period-PM_{10}."

A large portion of the elevated PM_{10} concentrations occurred to the south southeast of the Doe Run facility in Iron County, Missouri. The maximum impacts appear to be the result of emissions from the existing Doe Run Company lead mines. A second area with elevated concentrations was to the north northeast of the proposed facility in Iron County, Missouri. Again, the maximum impacts appear to be the result of emissions from the existing Doe Run Company lead mines. A review of the model output indicates that a portion of the elevated concentrations may be occurring at onsite receptors. However, it is unlikely that all of the modeled exceedances are onsite and a more thorough investigation into the cause of the exceedances should be conducted. In SIP related discussions, staff have indicated that emission releases from the mines are likely to be overstated given the moisture content of the material and the fact that a large portion of crushing, screening, and other mining activities occurs underground. Doe Run should be required to perform additional PM_{10} model analyses and/or testing to determine what, if any adjustments should be made to the characterization of the emission releases associated with the facilities mining activities. A proposal should be provided to the Department's Air Pollution Control Program no later than 90 days after the issuance of the PSD permit. If NAAQS violations are still predicted upon completion of the mine study, the facility should submit a corrective action plan no later than 90 days after the discovery of the modeled violation.

<u>CO</u>

The results from the Department's Air Pollution Control Program verification run were used to evaluate compliance with the CO standards and are contained in Appendix G, Table 7 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center CO NAAQS." These results indicated that several violations of the CO standard would occur with a second high 1-hour concentration of 47606.70 $\mu g/m^3$ and a 8-hour maximum of 14948.67 $\mu g/m^3$. All concentrations include a background concentration of 8016.0 $\mu g/m^3$, and 4924.0 $\mu g/m^3$ for the 1-hour and 8-hour averaging periods. The background concentrations account for the impact of natural sources, nearby sources not accounted for in the model analysis, and potential unidentified sources.

According to EPA guidance, Doe Run must demonstrate that they do not have a significant impact at any violating receptor regardless of where it is located. If it can be demonstrated that Doe Run has insignificant impacts at violating receptors (at the time of the predicted violation), approval of the CO analysis can be provided. Appendix G, Tables 8 and 9, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center CO Exceedance Receptors vs. First High Impacts-1-Hour" and "The Doe Run Company-Buick Resource Recovery Recycling Center CO Exceedance Receptors vs. First High Impacts-8-Hour" summarize the impact Doe Run has on each receptor in violation of the CO standard.

On both a 1-hour and 8-hour, Doe Run did not have a significant impact at any violating receptors. As such, no further analysis is necessary for this averaging time.

The CO output generated from the ISCST3 dispersion model is graphically in Appendix G, Figure's 7 and 8 entitled, "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, 1-Hour Averaging Period-CO" and "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, 8-hour Averaging Period-CO."

All of the elevated CO concentrations occurred to the north of the Doe Run facility in Iron County, Missouri. It should be noted that some of the elevated concentrations predicted by the model might be occurring at onsite receptors. Currently, property boundary receptors are not available for each facility within the inventory. This information is difficult to collect because facilities are not required to submit this information with their emission inventory questionnaire and permit applications do not typically include this level of detailed information.

<u>Lead</u>

To show compliance with the NAAQS for lead the facility must demonstrate that its impact will be below 1.50 $\mu g/m^3$ on a quarterly basis. The form of the NAAQS should be used when comparing modeled concentrations to the above thresholds. For lead, the highest period average estimate for the long term standard is used to determine compliance.

The results from the Department's Air Pollution Control Program verification runs were used to evaluate compliance with the lead standard and are contained in Appendix G, Table 10 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Lead NAAQS." The results indicate that several violations of the lead standard are likely to occur with a maximum period concentration of 96.71 $\mu g/m^3$. All concentrations include a background concentration of 0.15 $\mu g/m^3$ on a quarterly basis. The background concentrations account for the impact of natural sources, nearby sources not accounted for in the model analysis, and potential unidentified sources.

Because there is not a significant impact threshold for lead, no further analysis for this pollutant was completed.

The lead output generated from the ISCST3 dispersion model is graphically in Appendix G, Figure 9 entitled, "The Doe Run Company-Buick Resource Recovery Recycling Center NAAQS Compliance, Worst Case Quarterly Averaging Period-Lead." A large portion of the elevated lead concentrations occurred to the south southeast of the Doe Run facility in Iron County, Missouri. The maximum impacts appear to be the result of emissions from the existing Doe Run Company lead mines. A second area with elevated concentrations was to the north northeast of the proposed facility in Iron County, Missouri. Again, the maximum impacts appear to be the result of emissions from the existing Doe Run Company lead mines. A review of the model output indicates that a portion of the elevated concentrations may be occurring at onsite receptors. However, it is unlikely that all of the modeled exceedances are onsite and a more thorough investigation into the cause of the exceedances should be conducted. In SIP related discussions, staff have indicated that emission releases from the mines are likely to be overstated given the moisture content of the material and the fact that a large portion of crushing, screening, and other mining activities occurs underground. Doe Run should be required to perform additional lead model analyses and/or testing to determine what, if any adjustments should be made to the characterization of the emission releases associated with the facilities mining activities. A proposal should be provided to the Department's Air Pollution Control Program no later than 90 days after the issuance of the PSD permit. If NAAQS violations are still predicted upon completion of the mine study, the facility should submit a corrective action plan no later than 90 days after the discovery of the modeled violation.

XIII. Increment Consumption

As stated previously, SO_2 is the only pollutant that triggered a full impact analysis based upon the net emissions increase. In addition to demonstrating compliance with the NAAQS for SO_2, Doe Run must demonstrate that they will not deteriorate the air quality beyond the limits outlined in 10 CSR 10-6-060 (11)(A) Table 1.

In addition to evaluating newly established baseline receptors for SO_2, Doe Run is required to evaluate its impact on existing increment receptors within Iron County. The following paragraphs describe the results obtained from the verification analysis conducted by the Department's Air Pollution Control Program on a pollutant by pollutant basis.

SO_2

The SO_2 baseline was established in 1989 with the issuance of PSD permit #0989-003 to the Doe Run Company-Buick Resource Recovery Recycling Center. Appendix H, Figure 1 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Increment Consumption Comparison of Increment Consuming Receptors", visually depicts the extent of the increment area based upon the 1989 permit versus the proposed net emissions increase requested in 2001. The proposed net emissions increase will expand the increment area for SO_2 in Iron County. For compliance purposes, the increment consumed at newly established receptors was based upon Doe Run's impact from the net emissions increase only. All sources that have received a permit since the establishment of the baseline date, and the entirety of the emissions from the Doe Run facility, were included in the increment evaluation for the existing increment receptors. It is important to note that portions of the newly established receptor locations are adjacent to existing increment consuming sources. As such, some overlap may exist between the newly established increment receptor locations and the existing increment receptor locations.

The results obtained from the existing baseline area evaluation are contained in Appendix H, Table 1 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Existing Receptors". The highest estimate must be used when determining compliance for annual impacts because the SO_2 standard is a long term deterministically based standard. The worst case annual impact occurred during the 2000 meteorological period with a maximum concentration of 7.16 $\mu g/m^3$. Appendix H, Figure 2, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Existing Baseline Receptors-Annual Impacts" graphically illustrates the results of this analysis. For the 3-Hour and 24-Hour SO_2 impacts, the second highest impacts must be used to determine compliance with the increment standards. The worst case 3-hour and 24-hour impacts occurred during the 2000 and 2001 meteorological periods with maximum concentrations of 342.50 $\mu g/m^3$ and 85.46 $\mu g/m^3$, receptively. Appendix H, Figures 3 and 4, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Existing Baseline Receptors-3-Hour Impacts" and "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Existing Baseline Receptors-24-Hour Impacts" graphically illustrates the results of these analyses.

The results obtained from the newly established baseline area evaluation are contained in Appendix H, Table 2 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Newly Established Receptors". The worst case annual impact occurred during the 2000 meteorological period with a maximum concentration of 1.66 $\mu g/m^3$. Appendix H, Figure 5, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Newly Established Receptors-Annual Impacts" graphically illustrates the results of this analysis. The worst case 3-hour and 24-hour impacts occurred during the 2000 and 1997 meteorological periods with maximum concentrations of 75.25 $\mu g/m^3$ and 18.98 $\mu g/m^3$, receptively. Appendix H, Figures 6 and 7, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Newly Established Baseline Receptors-3-Hour Impacts" and "The Doe Run Company-Buick Resource Recovery Recycling Center SO_2 Increment Consumption @ Newly Established Baseline Receptors-24-Hour Impacts" graphically illustrates the results of these analyses.

Because the 24-hour SO_2 impacts predicted by the ISCST3 dispersion model at existing baseline receptors is approaching the increment standard of 91 $\mu g/m^3$, post-construction monitoring will be required to ensure compliance with the SO_2 increment. Ambient air quality monitoring for SO_2 should be conducted on a continuous basis in all areas of maximum impact as identified by the ISCST3 dispersion model. Additionally, meteorological data should be collected in conjunction with the SO_2 monitor for culpability determinations during review of the monitoring data. At a minimum, two ambient air quality monitoring sites should be maintained. The duration and location of the monitoring study will be determined in conjunction with representatives from the facility.

The Air Quality Modeling Unit recommends that the construction permit contain a condition requiring the submittal of a Quality Assurance Project Plan (QAPP) no later than 90 days after the issuance of the PSD permit. The QAPP should describe the monitoring methodology, in detail, that will be used to determine ambient air quality impacts. The Department's Air Pollution Control Program will aid the facility in the development of the monitoring network including a determination on the number and location of monitoring sites, equipment, frequency and duration of sampling, and the minimum data reporting requirements. The QAPP must be approved by the Department's Air Pollution Control Program prior to the initiation of the monitoring program.

XIV. HAPs Modeling

A Risk Assessment Level (RAL) compliance demonstration is required for each pollutant in question as required by the permit granting authority. Under current Air Pollution Control guidelines, a facility must submit an air quality analysis for all emission points within a facility when a refined analysis is required. This requirement was introduced to ensure that the applicable RAL is not violated near a facility since background concentrations are not a required component of a refined HAPs analysis. Background concentrations are not currently required because they are virtually unknown from most HAPs, thereby, making a background assessment impossible.

The permit engineer did not require an evaluation of any HAPs.

XV. Additional Impact Analyses

In addition to performing an ambient air quality impact analysis, all PSD applicants must evaluate the impact the new source or modification will have on growth, soils, vegetation, and visibility impairment. The following paragraphs outline the procedures that were followed in an effort to address these additional impacts.

<u>Plants, Soils & Animals</u>

The maximum ambient concentrations emitted by a facility must be assessed in order to ensure that adverse impacts do not occur on plants, soils, and animals. Concentrations in excess of the screening levels outlined in the document entitled "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" would trigger the requirements of 40 CFR 52.21 (o) and (p). If predicted concentrations do not exceed the screening thresholds no further analysis is required.

The seven step process outlined in the above document was followed to screen Doe Run's impact on plants, soils and animals. Each step of the process is described in the following paragraphs.

Steps 1 & 2

Steps 1 and 2 in the screening process address airborne pollutants and how exposures to plant tissue can adversely impact growth or cause tissue damage. In Step 1, the impact each pollutant may have is estimated using air quality models. Step 2 in the process compares the predicted ambient concentration to screening thresholds that represent the minimum concentration at which tissue injury or adverse growth effects are realized.

Appendix I, Table 1 entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Screening Concentrations for Exposure to Ambient Air Concentrations" summarizes the results obtained from the ISCST3 dispersion model. None of the exposure thresholds was exceeded.

Steps 3 & 4

Steps 3 and 4 in the seven step screening process address the impact air pollution has on plants and animals once the material is deposited and consequently becomes available for uptake by plants. This screen assumes that all of the deposited material is soluble and available for uptake. For each trace element emitted by Doe Run, the concentration in the soil was calculated from the maximum annual average concentration predicted by the dispersion model. The results of this analysis are contained in Appendix I, Table 2, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Deposition of Trace Elements in Soil."

The next step in the process is to compare the increase in concentration in the soil to the existing endogenous concentration. This information is used as a supportive indicator for Step 6 and is not used to show compliance. Appendix I, Table 3, "The Doe Run Company-Buick Resource Recovery Recycling Center Increase Over Endogenous Soil Concentration" summarizes the results obtained form this analysis.

Step 5

In Step 5 the amount of the trace element that could potentially be taken up by plants is calculated and compared to the recommended plant to soil concentration ratio. Appendix I, Table 4, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Potential Concentrations in Plant Tissue" summarizes the results obtained from ISCST3 dispersion model. This analysis will be used to determine if all applicable thresholds are being met.

Step 6

The concentrations predicted in Step 3 and Step 5 are compared to the screening concentrations in Tables 3.4 and 3.7 in the screening document. The first table compares predicted impacts to the screening concentrations for exposure of vegetation to concentrations in the soil and plant tissues. The second table is used to evaluate the impact trace elements have on the dietary systems of animals and when dietary concentrations become toxic. All of the trace elements are below the screening thresholds. Appendix I, Table 5, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Screen for Adverse Impacts from Trace Elements" summarizes the results of this analysis.

Step 7

The last step in this process considers the effect of solubility on the ability of plants to uptake trace elements. All of the previous steps assumed that 100% of deposited material is available to a plant for uptake, however, this is not likely to occur in reality. This step is strictly a supportive indicator that looks at the possible effect that reduced solubility would have on predicted concentrations. Step 7 was not performed because the screening levels in Step 6 were not exceeded.

The screening procedures set forth by the EPA in the document entitled "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals" indicate that no adverse impact on plants, soils and animals is likely due to the operations at the proposed facility. However, recent information received by the EPA Region VII indicates that large NO_x emitters should take the soils analysis one step further to include the screening thresholds contained in the document entitled "Air Quality Criteria for Oxides of Nitrogen, Summary of Vegetation Impacts."

Preliminary investigations indicate that short term exposure to elevated NO_x concentrations alone can cause damage to some sensitive plant species and crops. Table 1 in the above referenced document outlines the minimum concentration to which sensitive, intermediate, and tolerate plants can be exposed to prior to receiving 5% injury to their foliage for various averaging times. Based upon this information, elevated NO_x concentrations over a short time frame can cause more damage than low NO_x concentrations over an extended period of time. Appendix I, Table 6, entitled "The Doe Run Company-Buick Resource Recovery Recycling Center Screen for Adverse Impacts from NO_x Emissions" summarizes the results of this analysis. The current version of the ISCST3 dispersion model does not allow the user to calculate concentrations less than one hour. As such, a comparison between the half-hour tolerance levels could not be made. However, all of the calculated NO_x concentrations fall below the criteria outlined in the guidance document for the remaining averaging times.

The guidance goes on to site recent studies that have indicated that synergy between two or more criteria pollutants can cause vegetative damage at lower concentrations than from a higher exposure to a single pollutant. Specifically mentioned in the documentation is the synergy that occurs between NO_x and SO_2 emissions. Comparison to a specific exposure level is not possible in this instance because the guidance document does not outline concentrations and exposure times where synergy may cause the most harmful impacts to plant foliage and crops. As such, a comparison between the maximum NO_x and SO_2 concentrations for a 4-hour and 3-hour exposure period were compared to a threshold of .1 parts per million (188 $\mu g/m^3$ of NO_x, 261 $\mu g/m^3$ of SO_2). Appendix I, Table 7 entitled "The Doe Run Company Screen for Adverse Impacts from Synergy between NO_x and SO_2" outlines the results obtained from the ISCST3 dispersion model. The NO_x and SO_2 impacts are less than half the .1 part per million threshold level. Due to the lack of information available regarding synergy between criteria pollutants and potential vegetative damage no conclusive impact could be assessed based upon the model results, however, given the low concentrations predicted it is unlikely that the net emissions increase will result in adverse impacts.

Class II Visibility Impacts

A Class II visibility analysis is required under the draft PSD guidelines and is separate from the Class I analysis required by the Federal Land Manager. The Class II visibility analysis must be conducted within the significant impact area of the source at locations that could be adversely impacted by a reduction in visibility such as scenic vistas, airports, etc.

VISCREEN was designed to evaluate single source emissions of soot, hygroscopic fine particles such at sulfates and nitrates, fine particles, coarse particles, nitrogen dioxide, and particles greater than ten micrograms per cubic meter. The model is a screening tool whose capabilities do not include chemical transformations of primary pollutants to secondary pollutants. As such, VISCREEN does not require SO_2 emissions as a model input because it is not able to calculate the secondary formation of sulfates from SO_2. Emission rates for secondary pollutants such as SO_4, NO_3, and HNO_3 were not available for the Doe Run facility and were not included in a VISCREEN analysis. Additionally, Doe Run did not have a significant impact for PM_{10} or NO_x; the remaining visibility impairing pollutants that VISCREEN was designed to evaluate. As such, an adverse impact on visibility at nearby sensitive areas was not conducted due to model limitations and a lack of reliable emission rate information with regard to secondary pollutants.

Growth

Based upon draft guidance from the EPA, the growth analysis should address the growth that comes about as the result of the proposed facility. This assessment should include an evaluation of air quality impacts related to any construction, commercial, industrial, or other growth that occurs.

Current growth estimates from the region indicate that both direct and indirect impacts on air quality are anticipated to be minimal based upon the analysis supplied by Shell Engineering & Associates. As such, the inclusion of secondary emissions was not considered in the AAQIA for Doe Run.

XVI. Class I Area Impact

Under PSD guidelines, certain scenic areas throughout the United States have been designated as regions that must be protected due to their natural, scenic, recreational, or historic value. These regions are defined as Class I areas. Any source proposing to locate within 200 kilometers of a protected region must evaluate its impact on existing increment and visibility within the Class I area's property boundary. Based upon the UTM coordinates supplied by Shell Engineering & Associates, Doe Run is within 200 kilometers of the Mingo Wildlife Refuge thereby triggering a Class I area impact analysis.

According to the Federal Land Manager's Air Quality Related Values Work Group (FLAG) recommendations, CALPUFF should be used to assess far field (greater than 50 kilometers) impacts on visibility from new or modified sources. Initially, CALPUFF should be used following the screening procedures outlined in the Interagency Workgroup on Air Quality Modeling Phase II report. This approach should yield a worst-case maximum impact estimate with a minimal amount of effort.

The Class I impact from the Doe Run facility will be addressed in a separate memorandum.

XVII. Recommendations

The Class II portion of the AAQIA submitted by Doe Run is complete. The following recommendations should be incorporated into the PSD permit as special conditions. Failure to do so may invalidate the results obtained from the AAQIA. Finalization of the AAQIA is dependent upon the results obtained from the Class I area impact analysis.

1. The point source emission rates contained in Appendix A Table 1 should not be exceeded.
2. The volume source emission rates contained in Appendix A Table 2 should not be exceeded.
3. The area source emission rates contained in Appendix A Table 3 should not be exceeded.
4. The property boundary declared in the Doe Run modeling analysis must preclude access in a manner that prohibits entrance by unauthorized individuals.
5. Ambient air quality monitoring for SO_2 should be conducted on a continuous basis in all areas of maximum impact as identified by the ISCST3 dispersion model. Meteorological data must be collocated with at least one SO_2 monitor for culpability determinations during review of the monitoring data. The number of ambient air quality monitoring sites and the duration of the study will be determined in conjunction the Department's Air Pollution Control Program.
6. A Quality Assurance Project Plan should be submitted to the Air Quality Monitoring Unit no later than 90 days after the issuance of the permit.
7. Doe Run should be required to perform additional lead and PM_{10} model analyses and/or testing to determine what, if any adjustments should be made to the characterization of the emission releases associated with the facilities mining activities. A proposal should be provided to the Department's Air Pollution Control Program no later than 90 days

after the issuance of the PSD permit. If NAAQS violations are still predicted upon completion of the mine study, the facility should submit a corrective action plan no later than 90 days after the discovery of the modeled violation.

8. The SIP for the Doe Run facility should be updated to reflect the alterations that will occur as a result of the issuance of the PSD permit.

DF:bw

Attachments

c: Dawn Froning, Air Quality Analysis Section, APCP
Don Cripe, Operations Section, APCP
Richard Daye, U.S. Environmental Protection Agency Region VII

Comments and Responses on the Prevention of Significant Deterioration New Source Review Permit Application for The Doe Run Company - Buick Resource Recycling Facility

This document responds to comments made to the draft PSD permit. The numbers referenced in the response reflect the draft permit Special Condition numbering.

The following comments were submitted to the Air Pollution Control Program by the Environmental Protection Agency (EPA).

Comment:
1) Special Condition No. 10 require Doe Run to demonstrate compliance with emission limits listed in condition 9 by using stack test methods. In addition to the test methods the permit should also specify the number of test runs that are averaged to determine compliance and minimum test times and sample volumes.

> *Air Pollution Control Program's Response:*
> Special Condition 10.F has been added to specify the number of test runs and minimum test times.

Comment:
2) Special Condition No. 15 requires a sulfur dioxide (SO_2) Continuous Emissions Monitoring System (CEMS) to demonstrate compliance with the SO_2 Best Available Control Limit (BACT) in Special Condition No. 2. Likewise, Special Condition No. 16 requires a CEM for measuring carbon monoxide (CO) to demonstrate compliance with the CO BACT limit in Special Condition No. 3. First, the permit does not require these CEMS to meet any performance specifications. Secondly, the permit expresses the BACT limits in tons emitted in any rolling twelve month period. However, SO_2 and CO CEMS will return concentration data not emissions data. Doe Run would also have to monitor flow to measure the tons emitted. The permit would also need provisions for estimating emissions when monitoring data is unavailable.

> *Air Pollution Control Program's Response:*
> Special Condition No. 15 and No. 16 were revised to add the requirement of monitoring flow. Doe Run will be required to use this information with the CEM data to determine compliance. When monitoring data is unavailable, Doe Run will estimate emissions from the emission factors derived from the stack test in Special Condition 10.

Comment:
3) The scrubbing system associated with the desulfurization area is required to achieve a control efficiency of at least 98 percent for PM_{10} and lead by Special

Condition No. 21. How will Doe Run verify compliance with the 98 percent efficiency? Is compliance with the emission rate in Table 1 considered proof of achieving the 98 percent efficiency? Is this permit condition redundant?

Air Pollution Control Program's Response:
The Air Pollution Control Program agrees with the above EPA comment regarding Special Condition No. 21. The special condition has been changed accordingly to avoid redundancy in the permit conditions.

Comment:
4) Special Condition No. 30 requires Doe Run to install low-NO_X burners. Low-NO_X burner is not defined. The permit needs to specify the emission limit you expect Doe Run to meet.

Air Pollution Control Program's Response:
The low-NO_x burner is not identified as BACT in this permit. The emission reduction from the installation of low-NO_x at the BDC Boiler is also not taken in account for the air quality analysis. Since Doe Run proposed to install a low-NO_x burner in their application, this special condition was initially placed in the draft permit. This special condition is removed to avoid any confusion.

Comment:
5) The steps that Doe Run takes to preclude public access should be submitted before issuing the permit instead of being required by Special Condition No. 33.

Air Pollution Control Program's Response:
Preclusion of public access is already included in the SIP for this facility. Special Condition No. 33 has been included in this permit for precautionary measure and to highlight the necessity of restricted public access.

Comment:
6) You need to decide and the permit needs to specify the extent of the ambient air quality monitoring required by Special Condition No. 34.

Air Pollution Control Program's Response:
Because the 24-hour SO_2 impacts predicted by the ISCST3 dispersion model at existing baseline receptors approached the increment standard of 91 $\mu g/m^3$, post-construction monitoring was required to ensure compliance with the SO_2 increment standard. Ambient air quality monitoring for SO_2 should be conducted on a continuous basis in all areas of maximum impact as identified by the ISCST3 dispersion model. Additionally, meteorological data should be

collected in conjunction with the SO_2 monitor for culpability determinations during review of the monitoring data. At a minimum, two ambient air quality monitoring sites should be maintained for period no less than one year. The location of the monitoring sites will be determined in conjunction with representatives from the facility.

Prior to the initiation of the monitoring program, a Quality Assurance Project Plan (QAPP) must be submitted to the Department's Air Pollution Control Program no later than 90 days after the issuance of the Prevention of Significant Deterioration permit. The QAPP should describe the monitoring methodology, in detail, that will be used to determine ambient air quality impacts.

After a period of one year, the Department's Air Pollution Control Program will review the data collected at the monitoring sites to determine if additional data samples are needed. If it is clear that the ambient impact is not approaching the increment standard, the Department will notify the Doe Run Company Buick Resource Recycling Center, in writing, that the ambient air collection effort can be discontinued.

Comment:

7) Both Special Condition No. 14 and 25D makes it unclear if Doe Run is required to comply with permit emission limits. Is it a violation of the permit if Doe Run exceed any of the emission rates specified in Special Condition No. 9 or is there no permit violation if Doe Run complies with the requirement to submit a plan. Is the permit violated if Doe Run does not achieve a 75 percent reduction in SO_x emissions from the secondary smelting process?

Air Pollution Control Program's Response:

Special Condition No. 14 and 25D were removed to avoid any confusion. Doe Run will be in violation of the permit if they exceed any emission limit. It will be the discretion of the Enforcement Unit to decide what necessary steps Doe Run needs to take to comply with the emission limits.

Comment:

8) We believe you have performed the SO_2 increment modeling consistent with the state rules. However, the issue of the correct baseline data raised in the Holcim permit still exists. Missouri may issue this permit with the increment analysis

Missouri performed but if subsequent modeling shows SO_2 increment violations then SO_2 mitigation will be required at that time.

Air Pollution Control Program's Response:
The department agrees with the comment. Additional wording has been added to the permit report to describe baseline area, which is every section that contains a modeling receptor in excess of the significance concentrations. The baseline date for this permit action has also been included in order to facilitate future rule making and subsequent federal register action. We must emphasize that the baseline area and date reported are for this project. Any future mitigation to correct area designations since the initiation of air quality increment areas may establish overlapping and additional areas. At that time, further analysis will be done to evaluate increment consumption at pre-existing baseline areas. The department agrees that it will address any additional mitigation necessary if additional mitigation is required. However, if modification is necessary, then it will be necessary for all affected permittees within the designated area and not just Doe Run.

Comment:
9) There is a typographical error in Special Condition No. 25 C. It refers to emission reductions established by Special Condition No. 24 but No. 24 does not have any emission reduction requirement.

Air Pollution Control Program's Response:
Special condition No. 25 has been removed to avoid redundancy in the permit conditions.

Comment:
10) Special Condition No. 37 should not be in the permit since this is a requirement on the Missouri Department of Natural Resources instead of Doe Run.

Air Pollution Control Program's Response:
The Department's Air Pollution Control Program concurs and Special Condition No. 37 has been removed.

Comment:
11) Consider writing the permit so monitoring is only required when the facility or equipment being monitored is in operation.

Air Pollution Control Program's Response:
The special conditions associated with monitoring have been revised to clarify that monitoring is only required when the facility or the equipment being monitored is in operation.

The following comments were submitted to the Air Pollution Control Program by The Doe Run Company - Buick Resource Recycling Facility.

Comment:

1) The permit title page and the supporting review document (page 14) refer to "the installation's total lead production limit to 175,000 per year." The emphasis of this permit is to move from production limitations to emission limitations as instituted by pages 2 and 3 of the permit. Doe Run requests the permit title page be adjusted as follows:

"Eliminating the annual lead production limits from the individual furnaces and imposing annual emission limitations based on the facility's lead production capacity of 175,000 tons per year. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, Construction Permits Required." Doe Run believes the agency should clarify that the facility is allowed, under this permit, to increase production above 175,000 tons per year if the plant maintains emissions below the applicable PSD Permit limitations.

> *Air Pollution Control Program's Response:*
> The annual emission limitations are based on the proposed lead production of 175,000 tons per year. Since the BACT analysis and the ambient air quality analysis are performed based on the emission limitations, the Air Pollution Control Program understands that Doe Run is allowed to produce above 175,000 tons per year if they can maintain emissions below the applicable PSD Permit limitations. However, the Air Pollution Control Program believes there is no need to reword the permit title page and the supporting review document. This response will serve a clarification on this issue.

Comment:

2) Table I under Special Condition 9, lists the maximum emission rates for each baghouse. In addition, the control efficiency used in the analysis to develop the maximum emission rate is also listed in Table I. We are requesting for clarity, by footnote or otherwise, the enforceable limit should be only the emission rate listed in Table 1.

> *Air Pollution Control Program's Response:*
> Control efficiencies in Table 1 have been removed to avoid any confusion. For permit reference, control efficiencies were listed in Table 5.

Comment:

3) Table 1 under Special Condition 9, contains a series of emission limits determined to be BACT for the Doe Run facility. Special Condition 10 requires compliance with emission rates listed in Table 1 by completing stack testing. Emissions from the main stack represent over 98 percent of the total facility SO_2 and CO emissions. The other emission points listed in Table 1 include mostly fugitive emissions sources and baghouses. Fugitive emissions cannot be measured by stack testing. The baghouses listed in Table 3 vent through the Main Baghouse or one of the four process fugitive baghouses (reverberatory, rotary melter, sweat or drum shredder) equipped with Triboflow meters, or are associated with sodium carbonate storage and sodium sulfate production operation. Therefore, Doe Run requests Special Condition 10 be revised to only require stack sampling on the main stack every two years and the other stacks be dropped from the testing requirement or otherwise only be initially tested after issuance of this PSD Permit.

> *Air Pollution Control Program's Response:*
> Special Condition 10 has been revised to require stack testing on the main stack every two years and initial testing of other stacks after the issuance of this permit.

Comment:
4) Table 1 under Special Condition 9, lists the control technology for EP58 to "Carbon Filter-Wet Material". Doe Run requests "Carbon Filter" be removed from the control technology description due to wet material being the implemented technology.

> *Air Pollution Control Program's Response:*
> The permit has been revised accordingly.

Comment:
5) Condition 14 requires that in the event of an exceedence monitored by stack testing, Doe Run must propose a plan to reduce emissions within 30 days of submitting the test results. Doe Run requests that an opportunity for a retesting be allowed. Doe Run also requests an opportunity to modify the permit as an alternative response to proposing a plan to reduce emissions.

Condition 25.D requires that in the event of two consecutive tests showing an exceedence of the desulfurization control efficiency limit, Doe Run must immediately take steps to modify the permit. Doe Run requests that an opportunity to reduce emissions or modify the permit be included in Special Condition 25. D.

> *Air Pollution Control Program's Response:*
> Special Conditions 14 and 25D have been removed from the draft permit. It will be the discretion of the Enforcement Unit to decide what necessary steps Doe Run will need to take to comply with the emission limits stated in Special Condition 9.

Comment:
6) Table 2 under Special Condition 17 lists control technologies established as BACT for the Doe Run Facility. For Blast Furnace and the Reverberatory Furnace SO2, the BACT listed is “Improvements to the battery paste desulfurization system and continued use of low sulfur coke.” Doe Run requests the BACT statement be adjusted to “Improvements to the battery paste desulfurization system and continued use of low sulfur coke and coal.”

Air Pollution Control Program’s Response:
The permit has been revised accordingly.

Comment:
7) Table 2 under Special Condition 17 lists control technologies established as BACT for the Doe Run Facility. For the Rotary Melter, Refinery Kettles, Sodium Sulfate Dryer Baghouse, BDC Boiler and Sweat Furnace SO2, the BACT listed is “Low sulfur fuel.” The processes are operated using propane, which does not contain grades of sulfur content. Doe Run requests the SO2 line items within Table 3 for these processes be adjusted to “Low sulfur fuel – propane”.

Air Pollution Control Program’s Response:
The permit has been revised accordingly.

Comment:
8) Table 2 under Special Condition 17 lists control technologies established as BACT for the Doe Run Facility. For Dross Plant Fugitives PM and Lead, the BACT listed is “Hood and vent to the Reverberatory fugitive baghouse.” Doe Run requests the BACT statement be adjusted to “Hood and vent to the Main Baghouse” to accurately describe current operations.

Air Pollution Control Program’s Response:
The permit has been revised accordingly.

Comment:
9) Table 2 under Special Condition 17 lists control technologies established as BACT for the Doe Run Facility. For Sodium Carbonate Silo Baghouse PM, the BACT listed is “Enclosure and Baghouse.” Doe Run requests the BACT statement be adjusted to “Sodium Carbonate Silo Baghouse” to accurately describe current operations, which does not require or include an enclosure.

Air Pollution Control Program’s Response:
The permit has been revised accordingly.

Comment:

10) Special Condition 18 requires each baghouse listed in Table 3 be equipped with a continuous particulate monitor such as a Triboflow. This requirement is based on 40 CFR Part 63, Subpart X, NESHAPs for Secondary Lead Smelting. This regulation is only required on lead emissions sources. Emission Point 18, 19 and 20 are not lead emission sources, rather these emission points are associated with the sodium sulfate production process. In addition, pressure drop indicators are installed on all baghouses listed in Table 3. Doe Run requests Special Condition 18 be revised to require continuous particulate monitors only on those sources associated with potential lead emissions, not on EP18, EP19 and EP20.

Air Pollution Control Program's Response:

The permit has been revised to incorporate Doe Run's request.

Comment:

11) Special Condition 18 requires "Replacement filters for the baghouse and drum filters shall be kept on hand at all times." Drum filters are not utilized at the Buick Facility, therefore Doe Run requests that the permit language be corrected to "Replacement filters for the baghouse shall be kept on hand at all times" in Special Condition 18.

Air Pollution Control Program's Response:

The permit has been revised to incorporate Doe Run's request.

Comment:

12) Special Condition 21 requires that the scrubbing system associated with the desulfurization area must achieve at least 98% control of PM_{10} and lead. This is a fugitive, not a process scrubber. The battery breaking/desulfurization area for which this system was designed has changed since the original PSD permit issuance. Significant levels of lead, particulate matter and acid mist are not associated with this area as with early operations. Alternatively, we suggest an 80% control efficiency, which is more typical and representative of low energy, low concentration input gas stream scrubber performance; if the agency feels compelled to include a number. It should be recognized that adjustment may be required after the initial testing occurs based on these specific facts. The value of including a high control efficiency factor is, from an environmental standpoint, marginal.

Air Pollution Control Program's Response:

Special condition 21 has already been revised based on EPA comment.

Comment:
13) Special Condition 25 requires the desulfurization process must achieve at least 75% control of SOx emissions. Doe Run does not believe this requirement is necessary, since the Main Stack is required to comply with both hourly and annual SOx emission limitations. As an alternative to this requirement, Doe Run proposes that the 75% removal efficiency be required facility-wide, rather than just for the desulfurization process. Sulfur is removed by the addition of soda ash in the production process, as well as through the front-end desulfurization process. Both of these controls are important in limiting SOx emissions, and are also part of the BACT analysis, therefore Doe Run requests the permit be revised accordingly.

> *Air Pollution Control Program's Response:*
> Special condition No. 25 has been removed to avoid redundancy in the permit conditions.

Comment:
14) Special Condition 25.A requires "At least 60 days before beginning the operation of the above desulfurization process, Doe Run shall submit this plan (QAPP) to the APCP for review and approval." Doe Run requests this statement be revised to state "Doe Run shall submit a QAPP to the APCP for review and approval within 90 days of the issuance of this PSD Permit" since the system is already operating.

> *Air Pollution Control Program's Response:*
> Special condition No. 25 has been removed to avoid redundancy in the permit conditions.

Comment:
15) Special Condition 25.C requires " This record keeping system shall be used to demonstrate compliance with the required emission reductions established by Special Condition 24." This statement should refer to Special Condition 25, not Special Condition 24.

> *Air Pollution Control Program's Response:*
> Special condition No. 25 has been removed to avoid redundancy in the permit conditions.

Comment:
16) Special Condition 29 requirements are associated with haul roads. Minimum temperature requirements should also be included in Special Condition 29. Doe Run

requests that Special Condition 29 be adjusted as follows: “Doe Run shall clean the paved haul road(s) twice per day by applying water flushing followed by vacuum sweeping, except on days when natural precipitation makes cleaning unnecessary, when minimum temperature conditions prevent safe and effective cleaning and/or when sand or a similar material has been spread on plant haul road(s) to provide traction on ice or snow.”

Air Pollution Control Program’s Response:
The permit has been revised accordingly.

Comment:
17) Special Condition 30 requires that the BDC Boiler must be replaced with a new waste heat boiler, and the third sentence indicates that installing low-NOx burners on the old boiler is also an option. The BACT analysis concludes that low NOx burners are economically feasible for the existing BDC boilers. Doe Run proposes to install them within a three year time frame of issuance of this permit. The BACT analysis also suggests that there may be a new waste heat boiler installed if found to be practical. Doe Run has investigated this option further and has determined that it is not practical. Firstly, the silicate separators that would be combusted in the waste heat system are expected to plug up the grate system in the boiler. Secondly, it would require external feedstocks to mix with internal sources and it is not certain that the available combustion feedstocks will be willing within the marketplace to pay the disposal fees required. Finally, it is probable the waste heat boiler will generate more emissions than would occur from simply changing to low-NOx burners. Doe Run requests that the waste heat boiler requirement be dropped in favor of the low-NOx burners.

Air Pollution Control Program’s Response:
The permit has been revised accordingly.

Comment:
19) Special Condition 34 requires ambient air quality monitoring for SO2 should be conducted. Upon request of the Missouri Department of Natural Resources, Doe Run completed a one-year evaluation of ambient air monitoring for SO2 recently. The monitoring site used for measuring the SO2 was certified as appropriate by the APCP and the data collected was submitted and approved by the APCP. This data indicated SO2 levels of less than 10% of the NAAQS. In an effort to ensure NAAQS compliance, Doe Run proposes to complete ambient air quality monitoring for SO2 on a continuous basis in the area of predicted maximum impact for a period of one year.

Air Pollution Control Program's Response:
Please see Response to EPA's Comment Number 6.

Comment:
20) Special Condition 37 requires that the State Implementation Plan (SIP) be updated to reflect the conditions of the new PSD permit. This condition should be removed from the permit, since Doe Run has no ability to alter the SIP. It is not possible for Doe Run to demonstrate compliance with this condition.

Air Pollution Control Program's Response:
The Department's Air Pollution Control Program concurs and Special Condition No. 37 will be removed.

Comment:
21) There are several differences in the final modeling input and corresponding emission factors compared to the emission factors used in Attachments A,C, and D. The modeling input was changed after the permit application to better reflect facility operations. We request that the permit be change to agree with the latest modeling. The main changes involved the modeling of each onsite haul road explicitly as opposed to lumping all roads together as one source in the middle of the plant and referred to as resuspension.

The revised fugitive emission rates, assumed to be 1 percent of the main stack emissions, are those used in the modeling as approved by the MDNR for use in the Buick SIP. For clarity and consistency, the emission factor used in Attachment A should be changed to read 0.4049 lb/ton which represents 1% of the emission factor used for the main stack. This is the emission factor used in the modeling.

Doe Run takes pride in their ability to improve efficiency in production and in controlling emissions. There is no mechanism in place to reduce the emission factors in Attachment A through E in the future as we continue to improve on our operations. We would like to be able to reduce the emission factors in the future without reopening the permit each time. This will give us more flexibility with future production levels as we continue to demonstrate compliance within these emission limits.

Air Pollution Control Program's Response:
The Attachments have been revised to incorporate Doe Run's request.

Comment:
22) Please note that Mr. Steve Arnold is now the General Manager of the Buick Resource Recycling Facility. Mr. Mike Sankovitch has taken another position within

Doe Run outside of our facility. Please address all future correspondence to Mr. Arnold.

Air Pollution Control Program's Response:
All future correspondence will be addressed to Mr. Steve Arnold.

Comment:
23) This permit is a facility-wide permit and will supersede the existing secondary plant permit written in 1989. It should also supersede the other permits listed in the table on pages 15 and 16.

Air Pollution Control Program's Response:
Special condition No. 1 has been revised to supersede all special conditions of previously issued construction permits.

Comment:
24) On page 25, to avoid future confusion, the Subtitle Resuspension (Haul Roads) should be changed to simply read Haul Roads.

Air Pollution Control Program's Response:
The permit has been revised accordingly.

Comment:
25) Units measured in tons in Attachments A,B,C, D and E are not defined. The following emissions definitions were used in the permit modeling inputs and therefore should be used in Attachments A though E.

Air Pollution Control Program's Response:
Supplemental information has been added with the Attachments to define the units for the emission factors.
