**Missouri Department of Natural Resources**
Air Pollution Control Program

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

<u>Superseding Condition</u>

1. The conditions of this permit supersede all special conditions found in the previously issued construction permit (Permit Number 0989-003) from the Air Pollution Control Program.

<u>Emission Limitations, Recordkeeping & Reporting</u>

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 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 | Control Efficiency (%) | 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 | N/A | 1688.4300 |
| | | $NO_x$ | Oxy-fuel firing | 75.00 | 0.8600 |
| | | CO | N/A | N/A | 7412.5900 |
| | | $PM_{10}$ | Baghouse | 99.70 | 6.7150 |
| | | Pb | Baghouse | 99.70 | 3.0320 |
| EP10 | Blast Furnace Fugitives | $SO_x$ | N/A | N/A | 5.7600 |
| | | $PM_{10}$ | N/A | N/A | 0.2210 |
| | | Pb | N/A | N/A | 0.0980 |
| EP11 | Dross Plant Fugitive | $PM_{10}$ | N/A | N/A | 0.0980 |
| | | Pb | N/A | N/A | 0.0980 |
| EP12 | Refinery Fugitive | $PM_{10}$ | N/A | N/A | 0.2620 |
| | | Pb | N/A | N/A | 0.2520 |
| EP16 | BDC Scrubber | $PM_{10}$ | Scrubber | 98.00 | 0.0340 |
| | | Pb | Scrubber | 98.00 | 0.0290 |
| EP18 | Na2SO4 Crystallizer | $PM_{10}$ | Baghouse | 99.50 | 1.7500 |
| EP19 | Na2CO3 Surge Bin Baghouse | $PM_{10}$ | Baghouse | 99.50 | 0.3110 |
| EP19A | Na2CO3 Transfer | $PM_{10}$ | N/A | N/A | 0.6220 |
| EP20 | Na2CO3 Silo Baghouse | $PM_{10}$ | Baghouse | 99.50 | 0.3110 |
| EP37 | Resuspention | Pb | Soil Remediation | 95.00 | 0.9310 |
| EP39A | Sweat Furnace – Fuel | $PM_{10}$ | Baghouse | 96.20 | 0.0020 |
| EP39B | Sweat Furnace – Metal Reclamation | $PM_{10}$ | Afterburner & Baghouse | 96.20 | 0.5890 |
| | | Pb | Afterburner & Baghouse | 98.40 | 0.0940 |
| EP39C | Sweat Furnace – Captured | $PM_{10}$ | Baghouse | 90.50 | 0.1000 |
| | | Pb | Baghouse | 98.40 | 0.0080 |
| EP57 | CaS Silo | $PM_{10}$ | N/A | N/A | 0.1080 |
| EP58 | Material Blender | $PM_{10}$ | Carbon Filter – Wet Material | 50.00 | 0.4000 |

SPECIAL CONDITIONS:

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

| | | | | | |
|---|---|---|---|---|---|
| EP63A | Main Stack – Propane (Dust Agg Center) | $PM_{10}$ | Baghouse | 96.20 | 0.0020 |
| EP63B | Main Stack – Dust Agg Furnace | $PM_{10}$ | Baghouse | 96.20 | 0.1870 |
| | | Pb | Baghouse | 96.20 | 0.0940 |
| EP64A | Sweat Furnace – Fuel | $PM_{10}$ | Baghouse | 96.20 | 0.0020 |
| EP64B | Sweat Furnace – Material Reclamation | $PM_{10}$ | Baghouse | 96.20 | 0.5890 |
| | | Pb | Baghouse | 98.40 | 0.0940 |
| EP64C | Sweat Furnace – Captured Fugitives | $PM_{10}$ | Baghouse | 90.50 | 0.1000 |
| | | Pb | Baghouse | 98.40 | 0.0080 |
| EP71 | Reverb Furnace - Captured | $PM_{10}$ | Baghouse | 99.00 | 0.0010 |
| | | Pb | Baghouse | 99.00 | 0.0010 |
| EP71 | Reverb Furnace - Captured | $SO_x$ | N/A | N/A | 8.3600 |
| EP72 | Rotary Furnace – Captured | $PM_{10}$ | Baghouse | 99.00 | 0.0010 |
| | | Pb | Baghouse | 99.00 | 0.0010 |
| EP72 | Rotary Furnace – Captured | $SO_x$ | N/A | N/A | 5.8600 |
| EP73 | Sweat Furnace - Captured | $PM_{10}$ | Baghouse | 99.00 | 0.0020 |
| | | Pb | Baghouse | 99.00 | 0.0010 |

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. The applicable test methods 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 $SO_x$.

SPECIAL CONDITIONS:

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

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.

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 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.

Additional Actions Required For Exceeding Maximum Emission Rate

14. If the performance testing required by Special Condition 10 of this permit indicate that any of the emission rates specified in Special Condition 9 are being exceeded, Doe Run must propose a plan to the APCP within thirty (30) days of submitting the performance test results. This plan must demonstrate how Doe Run will reduce the emission rates below or equal to those stated in Special Condition 9. Doe Run shall implement any such plan immediately upon its approval by the Director.

Continuous Emissions Monitoring

15. Doe Run shall install, calibrate, maintain, and operate a Continuous Emissions Monitoring System (CEMS), and record the output of the system, for measuring $SO_2$ emissions discharged into the atmosphere. The CEMS shall be placed in an appropriate location such that accurate readings are possible. $SO_2$ CEMS shall

SPECIAL CONDITIONS:

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

be used to demonstrate continuous compliance with the $SO_2$ BACT limit specified in Special Condition No. 2.

16. 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. The CEMS shall be placed in an appropriate location such that accurate readings are possible. CO CEMS shall be used to demonstrate continuous compliance with the CO BACT limit specified in Special Condition No. 3.

Best Achievable Control Technology

17. 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

| Emission Unit | Pollutant | BACT |
|---|---|---|
| Blast Furnace | $NO_x$ | Good Combustion practices |
| | PM | 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 |
| Blast Furnace Fugitive | PM | Operational change to Blast Furnace charging system |
| | Lead | Operational change to Blast Furnace charging system |
| Reverberatory Furnace | $NO_x$ | Oxy-fuel firing |
| | PM | 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 |
| Rotary Melter | $NO_x$ | Good Combustion practices |
| | PM | 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 |
| Refinery Kettles | $NO_x$ | Good Combustion practices |
| | PM | Hood Capture |
| | Lead | None |
| | CO | Good Combustion practices |
| | $SO_2$ | Low sulfur fuel |
| Refinery Kettles Fugitive | PM | Negative ventilation to Main Baghouse |

## SPECIAL CONDITIONS:

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

| | | |
|---|---|---|
| | Lead | Negative ventilation to Main Baghouse |
| Dross Plant Fugitives | PM | Hood and vent to reverberatory Fugitive baghouse |
| | Lead | Hood and vent to reverberatory Fugitive 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 | Enclosed and vent to baghouse |
| | CO | Good Combustion practices |
| | SO2 | Low sulfur fuel |
| Sodium Carbonate Baghouse Unloading | PM | Baghouse |
| Sodium Carbonate Transfer Fugitives | PM | Good Operating practices |
| Sodium Carbonate Silo Baghouse | PM | Enclosure and baghouse |
| BDC Boiler | $NO_x$ | Good Combustion practices |
| | PM | Good Combustion practices |
| | CO | Good Combustion practices |
| | SO2 | Low sulfur fuel |
| Shredder Baghouse | PM | Baghouse |
| | Lead | Baghouse |
| Lab Baghouse | PM | Baghouse |
| | Lead | Baghouse |
| Resuspension (Haul Roads) | PM | 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 | 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 | 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 | Baghouse |
| | Lead | Baghouse |
| | CO | Afterburner |
| | $SO_2$ | Low sulfur fuel |

SPECIAL CONDITIONS:

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

| | | |
|---|---|---|
| Sweat Furnaces Fugitives | PM | Baghouse |
| | Lead | Baghouse |
| Material Blender | PM | Wet Suppression |
| | Lead | Wet Suppression |

Baghouses – Operational & Recordkeeping Requirement

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

Table 3: Equipment Controlled by Baghouses

| 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. Each baghouse 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

SPECIAL CONDITIONS:

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

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 and drum filters 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).

19. Doe Run shall monitor and record the operating pressure drop across the baghouses at least once a day. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.

20. 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

21. The scrubbing system associated with the desulfurization area shall be maintained to achieve control efficiency of at least 98% for $PM_{10}$ and lead, and shall be in place and utilized at all times that the equipment in the desulfurization area is in use.

22. Doe Run shall monitor and record the operating pressure drop across each scrubber at least once every twenty four (24) hours. 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.

23. 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

SPECIAL CONDITIONS:

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

performance warranty.

24. 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.

Desulfurization Process

25. Doe Run shall install, operate and maintain a desulfurization process to remove sulfur from the raw materials to achieve a minimum reduction in $SO_x$ emissions of 75% from the secondary smelting process as proposed in the permit application for this project. In addition, Doe Run shall complete the following activities:
    A. Doe Run shall develop a Quality Assurance Project Plan (QAPP) to test and/or measure other parameters that will be sufficient to demonstrate compliance with the above required 75% reduction in $SO_x$ emissions from the secondary smelting process. At least 60 days before beginning the operation of the above desulfurization process, Doe Run shall submit this plan to the APCP for review and approval. Doe Run shall operate under the above proposed plan until such time as receiving APCP comments about revising the plan and/or upon receiving final APCP approval of the plan. The proposed QAPP must receive approval from the Director prior to conducting any testing required by the plan.

    B. For any performance testing required by the final approved QAPP,
        1) The owner/operator shall conduct any such performance test(s) within 180 days of the initial start-up date of the operation of the above desulfurization process or within 180 days after receiving APCP approval of the final QAPP if this time period is longer than 180 days after the initial start-up date of the process.
        2) Any such performance testing shall be conducted during periods of representative conditions for the specific process(s)/material(s) being tested and conducted at the maximum design rates for the process or within ten percent (10%) of this maximum rate, not to include periods of start-up, shutdown, or malfunction. However, if above testing is conducted at a rate which is less than 90 percent (%) of the maximum design rate, then the rate at which the testing

SPECIAL CONDITIONS:

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

was conducted shall become the new maximum allowable hourly usage rate for that process.

3) Two (2) copies of a written report of the performance test results must be submitted to the Director within 90 days of completion of the required performance 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 for each air pollutant tested.

4) The test report is to fully account for all operational and emission parameters addressed both in the permit conditions as well as in any other applicable state or federal rules/regulations.

C. Doe Run shall develop a record keeping system to record the results of any tests conducted or other parameters measured and shall also calculate and record the estimated emissions reduction from the secondary smelting process for $SO_x$. This record keeping system shall be used to demonstrate compliance with the required emission reductions established by Special Condition Number 24. Doe Run shall maintain all records required by this permit for not less than five (5) years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.

D. If two (2) consecutive series of test results or parameters measured should indicate a 75% reduction in $SO_x$ emissions from the secondary smelting process is not occurring, then Doe Run will immediately take steps to modify or amend this permit to account for this revised information.

E. The above time frames associated with this Special Condition may be extended upon request of Doe Run and approval by the Director.

Low-sulfur Coke

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

SPECIAL CONDITIONS:

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

27. 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

28. 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.

29. 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 or when sand or a similar material has been spread on plant haul road(s) to provide traction on ice or snow.

Replacement of BDC Boiler

30. Doe Run shall replace their existing BDC Boiler with a new waste heat boiler within 2 years of the issuance of this permit. The new waste heat boiler shall include low-$NO_x$ burners. If it is not practical to install a new waste heat boiler, low-$NO_x$ burners must be installed on the BDC boiler.

New Sources Performance Standards (NSPS)

31. 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)

32. 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

33. Doe Run shall preclude all public access to Doe Run's declared property boundary. Doe Run shall submit documentation to demonstrate preclusion to the Air Pollution Control Program for review and approval.

SPECIAL CONDITIONS:

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

Conditions Resulting from Ambient Air Quality Analyses

34. 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.

35. 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.

36. 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 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.

37. The State Implementation Plant (SIP) for the Doe Run facility should be updated to reflect the alterations that will occur as a result of the issuance of this PSD permit.

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 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 sulfite ($Na_2SO_4$).

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 from the installation 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 | $PM_{10}$ | Carbon Filter - 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 Control Technology Discussion**

Control Technologies for Process and Process Fugitive Emission Sources

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.

Resuspension (Haul Roads)

Fugitive emissions from resuspension (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, 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.

<u>Pallet Burner</u>

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 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 |
| Resuspension (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 are 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
- Resuspension
- 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 technically 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 stag 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.

Low-Nox Burners with Flue Gas Recirculation

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.



<u>Electric Boost</u>

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; 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, the BDC boiler is reaching the end of its practical life and Doe Run is reluctant to invest in air pollution controls for this boiler. Doe Run is in the process of evaluating installing a waste heat boiler that would take the place of the BDC boiler. If the waste heat boiler project moves forward, the BDC boiler would be shutdown. Doe Run anticipates completing its engineering evaluation of the waste heat boiler within 1 year of permit issuance. The new waste heat boiler would include low-$NO_x$ burners. Therefore, although low-$NO_x$ burners are economically feasible for the BDC boiler, Doe Run proposes to conduct annual tune-up of this boiler until the waste heat boiler is installed with low-$NO_x$ burners. If it is not practical to install a waste heat boiler, low-$NO_x$ burners will be installed on the BDC boiler within 2 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

<u>Thermal Oxidizer</u>

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**

Change in Combustion Method

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.

Source Reduction

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*."

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 | | 20.0 lb/ton | |
| 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 | |
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| (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.**

*Emissions of EP08: Main Stack will be determined by CEM.
**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 | |
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| (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.**

*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 | |
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| (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 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 | | 56.67 lb/ton | 99.7 | |
| 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 | 98.0 | |
| 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 | |
| EP37 | Resuspention | | | N/A | |
| EP39A | Sweat Furnace – Fuel | | 0.6 lb/Mgal | 96.2 | |
| EP39B | Sweat Furnace – Metal Reclamation | | 31.0 lb/tons | 96.2 | |
| EP39C | Sweat Furnace – Captured | | 2.115 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 | |
| EP63A | Main Stack – Propane (Dust Agg Center) | | 0.6 lb/Mgal | 96.2 | |
| EP63B | Main Stack – Dust Agg Furnace | | 1.823 lb/ton | 96.2 | |
| EP64A | Sweat Furnace – Fuel | | 0.6 lb/Mgal | 96.2 | |
| EP64B | Sweat Furnace – Material Reclamation | | 31.0 lb/ton | 96.2 | |
| EP64C | Sweat Furnace – Captured | | 2.115 lb/ton | 90.5 | |
| 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 [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 of EP08: Main Stack will be determined from the Stack Test

**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 | | 25.59 lb/ton | 99.7 | |
| 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 | 98.0 | |
| EP31 | Shredder Baghouse | | 0.374 lb/ton | 99.8 | |
| EP37 | Resuspention | | 1.33 lb/vmt | 95.0 | |
| EP39B | Sweat Furnace – Metal Reclamation | | 11.73 lb/tons | 98.4 | |
| EP39C | Sweat Furnace – Captured | | 0.99 lb/ton | 98.4 | |
| EP63B | Main Stack – Dust Agg Furnace | | 2.165 lb/ton | 98.4 | |
| EP64B | Sweat Furnace – Material Reclamation | | 11.73 lb/ton | 98.4 | |
| EP64C | Sweat Furnace – Captured | | 0.99 lb/ton | 98.4 | |
| 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 D, in Tons: | | | | | |
| (d) Monthly Pb Emissions Total (b) from Previously year's Attachment D, In Tons: | | | | | |

| | |
|---|---|
| (e) Current 12-month Total of Pb Emissions in Tons : [(b) + (c) - (d)] | |

(a) [Column F] = [Column C] x [Column D] x [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 D, in Tons;
(d) Monthly Pb emissions total (b) from previous year's Attachment D, 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 of EP08: Main Stack will be determined from the Stack Test.

Mr. Mike Sankovitch
General Manager
The Doe Run Company
Buick Resource Recycling Facility
HC1 Box 1395, Highway KK
Boss, MO 65440

RE: New Source Review Permit - Project Number: 2001-10-058

Dear Mr. Sankovitch:

Enclosed with this letter is your permit to construct. Please study it carefully. Also, note the special conditions, if any, on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files.

Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

If you have any questions regarding this permit, please do not hesitate to contact me at (573) 751-4817, or you may write to me at the Department of Natural Resources, Air Pollution Control Program, P.O. Box 176, Jefferson City, Missouri 65102.

Thank you,

AIR POLLUTION CONTROL PROGRAM

Kyra L. Moore
Permit Section Chief

KLM: fwl

Enclosures

c: Southeast Regional Office
PAMS File 2001-10-058

Permit Number:

| **MISSOURI DEPARTMENT OF NATURAL RESOURCES**<br>**FOLDER TRANSMITTAL ROUTING SHEET** | **Document #:**<br>**Division Log #:**<br>**Program Log #:** |
|---|---|

**DEADLINE: December 15, 2004** **Penalty for Missing Deadline: $**

THE DOE RUN COMPANY - BUICK RESOURCE RECYCLING FACILITY 2001-10-058

Originator: Fuad Wadud Telephone: 6-3835 Date:

Typist: Linda File Name: P:\APCP\Permits\Users\Fuad Wadud\Doe Run - Buick PSD\2001-10-058 The Doe Run

**FOR SIGNATURE APPROVAL OF:**

☐ DNR Director ☐ DNR Deputy Director ☐ Division Director ☐ Division Deputy Director X Other: Leanne J. Tippett

**PROGRAM APPROVAL:** Approved by: ______ Program: APCP Date:

Other Program Approval (Section/Unit): ______ Date:

Comments:

**ROUTE TO:**

☐ DIVISION DIRECTOR APPROVAL: ______ Date: ______

Comments:

☐ FINANCIAL REVIEW – DIVISION OF ADIMINSTRATIVE SUPPORT:

DAS Director: ______ Date: ______

☐ Fee Worksheet Received By: ______ Date: ______

Accounting: ______ Date: ______

Budget: ______ Date: ______

General Services: ______ Date: ______

Internal Audit: ______ Date: ______

Purchasing: ______ Date: ______

Comments:

☐ LEGAL REVIEW:

☐ General Counsel: ______ Date: ______

☐ AGO: ______ Date: ______

Comments:

☐ DEPARTMENT DIRECTOR APPROVAL: ______ Date: ______

Comments:

☐ NOTARIZATION NEEDED

INITIALS/DATE