STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT BOOK

PERMIT TO CONSTRUCT

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

Permit Number: 092006-007 Project Number: 2006-04-057

Owner: Doe Run Company

Owner's Address: 1801 Park 270 Drive, St Louis, MO 63146

Installation Name: Doe Run Company-BRRF

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

Location Information: Iron County, S14, T34N, R2W

Application for Authority to Construct was made for:

The addition of a new multiple hearth rotary furnace to process battery separators as a heat source for the reverbatory furnace and for metal recovery. The furnace installation includes further utilization of the existing reverbatory furnace dross bunker as an ash storage area with screw conveyors for ash removal from the hearth and a feed storage area for the battery separators. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required.*

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

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

SEP 26 2006

EFFECTIVE DATE

DIRECTOR OR DESIGNEE
DEPARTMENT OF NATURAL RESOURCES

MO 780-1204 (1-03)

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available not more than 60 days but at least 30 days in advance of this date. Also, you must notify the Department of Natural Resources Regional Office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of this permit and permit review shall be kept at the installation address and shall be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed Special Conditions as provided in RSMo 643.075. If you choose to appeal, the Air Pollution Control Program must receive your written declaration within 30 days of receipt of this permit.

If you choose not to appeal, this certificate, the project review, your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Department of Natural Resources has established the Outreach and Assistance Center to help in completing future applications or fielding complaints about the permitting process. You are invited to contact them at 1-800-361-4827 or (573) 526-6627, or in writing addressed to Outreach and Assistance Center, P.O. Box 176, Jefferson City, MO 65102-0176.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit at (573) 751-4817. If you prefer to write, please address your correspondence to the Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102-0176, attention Construction Permit Unit.

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."

Doe Run Company-Buick Resource Recovery Facility (BRRF)
Iron County, S14, T34N, R2W

Baghouse Conditions

1. Doe Run Company-BRRF shall control emissions from the multiple hearth rotary furnace using the main baghouse as specified in the permit application. The 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 quarter. Doe Run shall maintain all necessary spare parts to assure that an extended outage does not occur. Doe Run shall provide the department a quarterly report within 30 days of the end of each calendar quarter summarizing monitor setpoints, alarm incidents, and any corrective actions taken. This report shall be included with the current State Implementation Plan reporting. Replacement filters for the baghouse shall be kept on hand at all times. The bags shall be made of fibers appropriate for operating conditions expected to occur (i.e. temperature limits, acidic and alkali resistance, and abrasion resistance).

2. Doe Run Company-BRRF shall monitor and record the operating pressure drop across the baghouse at least once every 24 hours. The operating pressure drop shall be maintained within the design conditions specified by the manufacturer's performance warranty.

SPECIAL CONDITIONS:

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

3. Doe Run Company-BRRF shall maintain an operating and maintenance log for the baghouse 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.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW
Project Number: 2006-04-057
Installation ID Number: 093-0009
Permit Number:

Doe Run Company-BRRF
Highway KK
HC1 Box 1395
Boss, MO 65440

Complete: April 24, 2006
Reviewed: July 31, 2006

Parent Company:
Doe Run Company
1801 Park 270 Drive
St Louis, MO 63146

Iron County, S14, T34N, R2W

REVIEW SUMMARY

- Doe Run Company-BRRF has applied for authority to install a multi hearth rotary furnace and associated feed and ash removal equipment.

- Hazardous Air Pollutant (HAP) emissions are expected from the proposed equipment. HAPs of concern from this process are lead (Pb) and lead compounds.

- 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.

- A baghouse is being used to control the PM_{10} and Lead (Pb) emissions from the equipment in this permit.

- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of PM_{10} and Lead (PB) are below de minimis levels.

- This installation is located in 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 not performed since potential emissions of the application are below de minimis levels. The potential to emit of Pb is above the

112g threshold of 0.01 tons per year. However, the separators are simply being rerouted and the change is the addition of LPG combustion gas. LPG gas would not have an impact on the Pb modeling.

- Emissions' testing is not required for the equipment.

- A revision to the Part 70 Operating Permit application is required for this installation within 1 year of equipment startup.

- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

The Doe Run Company operates the Buick Resources Recycling Facility (BRRF) and is a major source with a Part 70 operating permit. They are an industry leader in lead recycling. Using innovative techniques, BRRF recycles, processes or reuses tons of material normally considered waste. In 2005, BRRF processed 13.5 million lead-acid batteries. In addition, to lead-acid batteries the division processed 950,000 pounds of lead bullets and shot, 16 million pounds of lead containing glass from approximately 800,000 cathode ray tubes, and 1.5 million pounds of lead based paint chips from abatement projects. Also, battery recycling yields a useful byproduct, sodium sulfate, which is used in laundry detergent, paper and glass manufacturing industries. Approximately, seventy five percent or more of the lead recycled at BRRF comes in the form of automotive and industrial batteries.

Batteries arrive at BRRF in Boss, Missouri by truck. They are unloaded and placed into a battery bunker. Approximately one-third of all batteries that are received still have an electrical charge on them, so the batteries are picked up by a loader and placed into a stainless steel shredder.

The whole battery is broken in the shredder, and the battery acid (weak sulfuric acid) is drained and collected into storage tanks. This acid is used later in the process. The shredded batteries are placed in a vibrating feeder that feeds a conveyor belt into the hammer mill. The hammer mill pounds the battery into smaller pieces.

Each lead acid battery contains a set of metal grids, lead posts, plastic components, separators, and a lead sulfate paste. The paste is removed by washing through sets of screens for further processing. After going through the hammer mill, the battery pieces enter into a hydro separator where water separates the heavier elements. All of the lead and metal components sink to the bottom and the floating items are skimmed off and sent to the recycling facilities.

The metallic portions of the batteries including grids, posts, other metallics and constituents are then melted in a rotary melter. Lead from the rotary melter and furnaces are mixed with other metals to produce alloys that are cast into products of various weights, shapes and sizes in the refinery. Lead alloys are combinations of lead metal that yield different physical and chemical properties. This finished lead is sent to

customers around the world.

While the lead components are being processed, the battery paste is de-sulfurized through a chemical reaction with sodium carbonate. 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. 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 sodium sulfate (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 carbonate material is removed by passing the material through a filter press. The remaining sodium sulfate solution is then crystallized to produce a high quality salt that is marketed to the laundry detergent, paper, and glass industries.

The remaining lead carbonate paste is heated at extremely high temperatures in a reverbatory furnace to produce pure lead and a high antimony product called reverbatory slag. Heating in a blast furnace to recover even more antimonial lead further processes the reverbatory slag. What remains is a small quantity of secondary slag, a glassy sand like material that encapsulates silica, calcium, iron and approximately less than two percent lead. This slag is treated prior to being transported offsite for disposal.

The following permits have been issued to Doe Run Company-BRRF from the Air Pollution Control Program.

Table 1: Permits Issued to Doe Run Company-BRRF.

Permit Number	Description
0179-018	Minor Source Permit
0989-003	Major Source Review
0792-016	Minor Source Permit
0493-006	Minor Source Permit
1093-010	Minor Source Permit
0693-013	Minor Source Permit
1093-003	Minor Source Permit
0989-003	Minor Source Permit
0989-003	Minor Source Permit – amendment increase in lead bullion
1095-009	Minor Source Permit- install pot furnace
Bank	Banking request completed 3/11/1996
	Temporary permit slag treatment process
1296-012	Minor Source Permit - oxide transfer system
0297-015	Minor Source Permit - slag treatment system
0997-006	Minor Source Permit - Metal reclamation sweat furnace
OP	Part 70 Operating Permit
102000-007	Minor Source Permit - Blast furnace production
012005-008	Secondary smelter Major Source Review

PROJECT DESCRIPTION

This project is the installation of a multiple hearth furnace (MHF) and the associated ductwork, feed, and ash removal equipment. Battery separators are the feed stock. The separators will be processed in the MHF furnace and the hot gas will be routed to the reverbatory furnace. The heat from combustion of the separators will generate approximately 7.5 million Btu/hr of heat input to the reverbatory furnace or approximately 5% of the total heat requirement. Alternately, the off gasses from the MHF will mix with the gases inside the reverbatory furnace and will then go to the cooling chamber, then through the main baghouse (CD-9) and out the main stack (Stack Number 8). The drying off gases, which contain the by-products from the LPG combustion, will by pass the reverbatory furnace and be routed directly to the cooling chamber. The ash generated in the MHF will be collected at the bottom of the furnace and will then be transferred by screw conveyor to an existing storage area where it will be mixed with a wet dross. The material will then be fed back through the blast furnace.

A battery separator is that material that separates the positive plate from the negative plate in the internal portions of the battery container. It offers resistance to electronic conductivity for isolation of the electrodes. Separators are electronically insulating membranes whose ionic resistance is brought into the desired range by manipulating the membrane thickness and porosity. No single separator satisfies all the needs of the battery manufacturer as it is the application that determines which separator is most suitable. A wide range of separators will be the feed stock for the multi-hearth rotary furnace. A typical composition of separator from the DOE Run Facility is 27% Carbon, 10% lead (Pb), 22.7 % SiO_2, 5.0% O, 6.3% other elements.

No new emission points will be created. The emissions generated by this project will add to the emissions from EP-80 (Stack # 8) and EP-13 (dross/ash storage). The moisture content of the feed stock (battery separators) is approximately 29%. The first portion of the MHF will require LPG to dry the separators. Once dried they become the fuel source and are ignited in the remaining portion of the MHF. Presently the separators are transferred from the hydro separators via a screw to the battery bunker storage building. From there they are moved from the battery bunker storage area by front–end loader to the paste storage bunker in the paste storage building. All of these transfers occur within the Battery/Desulphurization/Crystallization buildings. The separators are then loaded from the battery paste storage bunker to an intermediate storage /processing area. The separators are next loaded by front-end loader from the intermediate storage area and returned to the paste storage area for blending with battery paste. The blended feed stock is then loaded to a dump truck for delivery to the reverbatory furnace feed building for further blending if needed and ultimate charging to the furnace. Separators may also be transferred to a secondary storage building.

After the multi-hearth is fabricated and put into operation, the separators will be introduced back in the circuit via a feed hopper for the multi-hearth furnace, rather than first being blended in the paste storage building. That is the only difference in handling of the separators prior to their introduction to the multi-hearth furnace. There will be no increased emissions from how the separators are introduced to the reverbatory furnace

versus how they will be introduced to the new multi-hearth furnace.

EMISSIONS/CONTROLS EVALUATION

The emission factors and control efficiencies used in this analysis were obtained from the Environmental Protection Agency (EPA) document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition, Background Report, Storage Battery Production section 12.15 and mass balance of lead (Pb) emissions provided by Doe Run. Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year.) The following table provides an emissions summary for this project.

Table 2: Emissions Summary (tons per year)

Pollutant	Regulatory *De Minimis* Levels	Existing Potential Emissions	Existing Actual Emissions (2004 EIQ)	Potential Emissions of the Application	New Installation Conditioned Potential
PM_{10}	15.0	Major	15.70	1.43	N/A
SOx	40.0	Major	3427.02	4.47	N/A
NOx	40.0	Major	37.51	1.55	N/A
VOC	40.0	N/A	7.01	2.68	N/A
CO	100.0	Major	11412.94	26.63	N/A
HAPs	10.0/25.0	Major	23.00	0.34	N/A
Lead (Pb)	0.6	Major	7.01	0.34	N/A

*N/A = Not Applicable; N/D = Not Determined

EP-80 (Stack # 8) and EP-13 dross/ash storage are the emission points of concern. The moisture-laden gases from the hearth are sent to the cooling chamber and the PM_{10} and lead (Pb) emissions are routed to the reverbatory furnace. The cooling chamber vents to a baghouse and then out the main Stack (# 8) and the dross would have vented to EP-13. The reverbatory furnace is routed to the cooling chamber, bag house and out the main stack. These emissions would have vented to the EP-80 and EP-13 in the present configuration. The change is the moisture-laden gases from lowering the moisture content by the LPG combustion (prior to combustion of the separators in the hearth) will be by passing the reverbatory furnace. The baghouse (CD9) located after the cooler is given a 99.7 collection efficiency for lead (Pb) and PM_{10}.

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of PM_{10} and lead (Pb) are below de minimis levels.

APPLICABLE REQUIREMENTS

Doe Run Company-BRRF 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

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, I recommend this permit be granted with special conditions.

Timothy Paul Hines
Environmental Engineer II

Date

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated April 10, 2006, received April 20, 2006, designating Doe Run Company as the owner and operator of the installation.
- U.S. EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition.
- Southeast Regional Office Site Survey dated May 11, 2006.

Mr. Jim Lanzafame
Environmental and Health Manager
Doe Run Company-BRRF
HC1 Box 1395
Boss, MO 65440

RE: New Source Review Permit - Project Number: 2006-04-057

Dear Mr. Jim Lanzafame:

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, MO 65102.

Thank you,

AIR POLLUTION CONTROL PROGRAM

Kendall B. Hale
New Source Review Unit Chief

KBH: thk

Enclosures

c: Southeast Regional Office
PAMS File 2006-04-057
Permit Number: