Control Strategy in Support of the Revision to the Herculaneum, Missouri Lead SIP

Prepared For:

The Doe Run Company

Prepared By:

Shell Engineering & Associates, Inc.

2403 West Ash

Columbia MO, 65203

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1.0 Introduction

The Doe Run Company operates a primary lead smelter in Herculaneum, Missouri, located approximately 25 miles south of St. Louis, Missouri, adjacent to the Mississippi River. The city of Herculaneum was designated as non-attainment for lead in 1991. The Missouri Department of Natural Resources submitted a revised SIP in 1994, which failed to meet the quarterly lead National Ambient Air Quality Standard (NAAQS). An additional SIP revision was submitted in 2001, which established an attainment date of August 14, 2002. Following the August 2002 attainment date, lead monitoring in Herculaneum indicated that the lead NAAQS was met for ten consecutive quarters. However, measured lead concentrations at the Broad Street monitor site exceeded the lead standard for the first three quarters of 2005. Violations have also occurred in the 1st and 3rd quarters during 2006. Based on these violations of the lead NAAQS, the Missouri lead SIP must be revised so the Herculaneum area will be in attainment of the lead standard.

An integral part of developing the revision to the lead SIP is the development of the control strategy. The purpose of this document is to discuss the control strategy that will be implemented. A detailed description of the control strategy and emission reduction estimates has been provided in Section 2. The results of the control strategy modeling analysis have been provided in Section 3.

2.0 Control Strategy

The design value modeling analysis isolated Fifteen (15) areas in need of improvement:

1. Concentrate handling on the south end of the plant (10001A1,A2,B1)
2. Concentrate dumping at the unloader (10001B2)
3. Fume handling at the Pugger (20004)
4. Sinter Plant Fugitives (20005A-F,20006)
5. Blast Furnace Fugitives (30002)
6. Dross Kettle Heat Stacks (40004,5)
7. Dross Plant Fugitives (40006)
8. No. 7 Baghouse (40007)
9. Refinery Plant Fugitives (50006)
10. No. 8 Baghouse (50007)
11. No. 9 Baghouse (50008)
12. Kettle Setting Heat Stacks (50011-18)
13. Paved Outside Plant Haul Roads (70100-213)
14. Paved In-Plant Haul Routes (70250-553,650-669)
15. Unpaved Slag Haul Route East of Blast Furnace Building (70600-612)

The control strategy and controlled lead emissions have been summarized in Table 2-1. The emission reductions for each control have been discussed in the remainder of the section.

10001A1
Dump-Concentrate-Hopper

Uncontrolled Emissions
Daily Production Limit = 1800.00 Tons-Concentrate-Handled/day
Pb Emission Factor = 1.63E-03 lb-Pb/Tons-Concentrate-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1800.00 (Tons-Concentrate-Handled/day) * 1.63E-03 (lb-Pb/Tons-Concentrate-Handled) * 1 * 90 (day/qtr)=
264 lb-Pb/qtr

Operational Limit
Limit Operation to between the hours of 6a-10p (16 hours/day)

Control Strategy
Install enclosure around the hopper in order to minimize the wind speeds at the drop. Maintain a material moisture content above 6%, by weight (Average).

Estimated Control Efficiency = 90%

Controlled Emissions
Controlled Quarterly Lead Emissions =
264 (lb-Pb/qtr) * [100-90(%) / 100] =
26 lb-Pb/qtr

Emission Reduction = -237.65 lb-Pb/qtr

10001A2
Dump-Concentrate-Storage/Railcar

Uncontrolled Emissions
Daily Production Limit = 1800.00 Tons-Concentrate-Handled/day
Pb Emission Factor = 1.63E-03 lb-Pb/Tons-Concentrate-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1800.00 (Tons-Concentrate-Handled/day) * 1.63E-03 (lb-Pb/Tons-Concentrate-Handled) * 1 * 90 (day/qtr)=
264 lb-Pb/qtr

Operational Limit
Limit Operation to between the hours of 6a-10p (16 hours/day)

Control Strategy
Install a chute (or other mechanism) to reduce the drop distance to the railcar.
Maintain a material moisture content above 6%, by weight (Average).

Estimated Control Efficiency = 80%

Controlled Emissions
Controlled Quarterly Lead Emissions =
264 (lb-Pb/qtr) * [100-80(%) / 100] =
53 lb-Pb/qtr

Emission Reduction = -211.25 lb-Pb/qtr

10001B1
Load-Conc.-Railcar (Front End Loader) 1187 tpd = (1800*0.8)-23*11

Uncontrolled Emissions
Daily Production Limit = 1187.00 Tons-Concentrate-Handled/day
Pb Emission Factor = 1.63E-03 lb-Pb/Tons-Concentrate-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1187.00 (Tons-Concentrate-Handled/day) * 1.63E-03 (lb-Pb/Tons-Concentrate-Handled) * 1 * 90 (day/qtr)=
174 lb-Pb/qtr

Operational Limit
Limit Operation to between the hours of 6a-10p (16 hours/day)

Control Strategy
Maintain a material moisture content above 6%, by weight (Average).

Estimated Control Efficiency = 50%

Controlled Emissions
Controlled Quarterly Lead Emissions =
174 (lb-Pb/qtr) * [100-50(%) / 100] =
87 lb-Pb/qtr

Emission Reduction = -87 lb-Pb/qtr

10001B2
Dump-Conc. And Sec.-Unloader (80% Conc, 20% Sec)

Uncontrolled Emissions
Daily Production Limit = 1800.00 Tons-Concentrate-Handled/day
Pb Emission Factor = 1.63E-03 lb-Pb/Tons-Concentrate-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1800.00 (Tons-Concentrate-Handled/day) * 1.63E-03 (lb-Pb/Tons-Concentrate-Handled) * 1 * 90 (day/qtr)=
264 lb-Pb/qtr

Operational Limit
Limit Operation to between the hours of 6a-10p (16 hours/day)

Control Strategy
Install door on unloader entrance to ensure emissions generated when dumping occurs do not exit the unloading enclosure. The doors should remain closed when material is being dumped. Maintain a material moisture content above 6%, by weight (Average).

Estimated Control Efficiency = 90%

Controlled Emissions
Controlled Quarterly Lead Emissions =
264 (lb-Pb/qtr) * [100-90(%) / 100] =
26 lb-Pb/qtr

Emission Reduction = -237.65 lb-Pb/qtr

20004
Load-Fume-Railcar

Uncontrolled Emissions
Daily Production Limit = 13.00 Tons-Fume-Handled/day
Pb Emission Factor = 7.06E-03 lb-Pb/Tons-Fume-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
13.00 (Tons-Fume-Handled/day) * 7.06E-03 (lb-Pb/Tons-Fume-Handled) * 1 *
90 (day/qtr)=
8 lb-Pb/qtr

Operational Limit
None

Control Strategy
Install a chute (or other mechanism) to reduce the drop distance to the railcar.

Estimated Control Efficiency = 50%

Controlled Emissions
Controlled Quarterly Lead Emissions =
8 (lb-Pb/qtr) * [100-50(%) / 100] =
4.13 lb-Pb/qtr

Emission Reduction = -4.13 lb-Pb/qtr

20004B
Railcar Fume Unloading (At Storage)

Uncontrolled Emissions
Daily Production Limit = 13.00 Tons-Fume-Handled/day
Pb Emission Factor = 7.06E-03 lb-Pb/Tons-Fume-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
13.00 (Tons-Fume-Handled/day) * 7.06E-03 (lb-Pb/Tons-Fume-Handled) * 1 *
90 (day/qtr)=
8 lb-Pb/qtr

Operational Limit
Limit Operation to between the hours of 12p-6p (6 hours/day)

Control Strategy
None

20004C
Railcar Fume (South, Front End Loader)

Uncontrolled Emissions
Daily Production Limit = 13.00 Tons-Fume-Handled/day
Pb Emission Factor = 7.06E-03 lb-Pb/Tons-Fume-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
13.00 (Tons-Fume-Handled/day) * 7.06E-03 (lb-Pb/Tons-Fume-Handled) * 1 *
90 (day/qtr)=
8 lb-Pb/qtr

Operational Limit
Limit Operation to between the hours of 6a-10p (16 hours/day)

Control Strategy
None

20005A-F
Sinter Plant Mix Room Fugitives-Concentrate Handling

Uncontrolled Emissions
Daily Production Limit = 1800.00 Tons-Concentrate-Handled/day
Pb Emission Factor = 1.63E-03 lb-Pb/Tons-Concentrate-Handled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1800.00 (Tons-Concentrate-Handled/day) * 1.63E-03 (lb-Pb/Tons-Concentrate-Handled) * 1 * 90 (day/qtr)=
264 lb-Pb/qtr

Operational Limit
None

Control Strategy
Building enclosure improvements and continuous monitoring.

Estimated Control Efficiency = 90%

Controlled Emissions
Controlled Quarterly Lead Emissions =
264 (lb-Pb/qtr) * [100-90(%) / 100] =
26 lb-Pb/qtr

Emission Reduction = -237.65 lb-Pb/qtr

20006
Sinter Plant Building Fugitives

Uncontrolled Emissions
Daily Production Limit = 2160.00 Tons-Sinter-Produced/day
Pb Emission Factor = 3.40E-03 lb-Pb/Tons-Sinter-Produced
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
2160.00 (Tons-Sinter-Produced/day) * 3.40E-03 (lb-Pb/Tons-Sinter-Produced) * 1 * 90 (day/qtr)=
661 lb-Pb/qtr

Operational Limit
None

Control Strategy
Building enclosure improvements and continuous monitoring. Wheel tunnel enclosure and ventilation.

Estimated Control Efficiency = 94%

Controlled Emissions
Controlled Quarterly Lead Emissions =
661 (lb-Pb/qtr) * [100-94(%) / 100] =
40 lb-Pb/qtr

Emission Reduction = -621.30 lb-Pb/qtr

30002
Blast Furnace Fugitives

Uncontrolled Emissions
Daily Production Limit = 2160.00 Tons-Sinter-Produced/day
Pb Emission Factor = 4.10E-03 lb-Pb/Tons-Sinter-Produced
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
2160.00 (Tons-Sinter-Produced/day) * 4.10E-03 (lb-Pb/Tons-Sinter-Produced) * 1 * 90 (day/qtr)=
797 lb-Pb/qtr

Operational Limit
None

Control Strategy
Building enclosure improvements and continuous monitoring. Install tuyere controllers. Install an interlock and alarm system between the baghouse and tuyere controllers on the blast furnace. Improve blast furnace ventilation by relocating the blast furnace 140' closer to the ventilation source. Blast furnace doghouse ventilation improvements.

Estimated Control Efficiency = 97%

Controlled Emissions
Controlled Quarterly Lead Emissions =
797 (lb-Pb/qtr) * [100-97(%) / 100] =
24 lb-Pb/qtr

Emission Reduction = -773 lb-Pb/qtr

40004,5
Dross Kettle Heat Stacks

Uncontrolled Emissions
Daily Production Limit = 1260.00 Tons-Rough Lead-Produced/day
Pb Emission Factor = 5.19E-04 lb-Pb/Tons-Rough Lead-Produced
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1260.00 (Tons-Rough Lead-Produced/day) * 5.19E-04 (lb-Pb/Tons-Rough Lead-Produced) * 1 * 90 (day/qtr)=
59 lb-Pb/qtr

Operational Limit
None

Control Strategy
Installation of cameras to continuously monitor opacity from the kettle stacks

Estimated Control Efficiency = 50%

Controlled Emissions
Controlled Quarterly Lead Emissions =
59 (lb-Pb/qtr) * [100-50(%) / 100] =
29 lb-Pb/qtr

Emission Reduction = -29.43 lb-Pb/qtr

40006
Dross Plant Fugitives

Uncontrolled Emissions
Daily Production Limit = 1260.00 Tons-Rough Lead-Produced/day
Pb Emission Factor = 6.55E-03 lb-Pb/Tons-Rough Lead-Produced
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1260.00 (Tons-Rough Lead-Produced/day) * 6.55E-03 (lb-Pb/Tons-Rough Lead-Produced) * 1 * 90 (day/qtr)=
743 lb-Pb/qtr

Operational Limit
None

Control Strategy
Building enclosure improvements and continuous monitoring.

Estimated Control Efficiency = 90%

Controlled Emissions
Controlled Quarterly Lead Emissions =
743 (lb-Pb/qtr) * [100-90(%) / 100] =
74 lb-Pb/qtr

Emission Reduction = -668.49 lb-Pb/qtr

50006
Refinery Plant Fugitives

Uncontrolled Emissions
Daily Production Limit = 888.00 Tons-Refined Lead-Produced/day
Pb Emission Factor = 6.80E-03 lb-Pb/Tons-Refined Lead-Produced
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
888.00 (Tons-Refined Lead-Produced/day) * 6.80E-03 (lb-Pb/Tons-Refined Lead-Produced) * 1 * 90 (day/qtr)=
543 lb-Pb/qtr

Operational Limit
None

Control Strategy
Building enclosure improvements and continuous monitoring.

Estimated Control Efficiency = 90%

Controlled Emissions
Controlled Quarterly Lead Emissions =
543 (lb-Pb/qtr) * [100-90(%) / 100] =
54 lb-Pb/qtr

Emission Reduction = -489.11 lb-Pb/qtr

50011-18
Kettle Setting Heat Stacks

Uncontrolled Emissions
Daily Production Limit = 888.00 Tons-Refined Lead-Produced/day
Pb Emission Factor = 7.09E-04 lb-Pb/Tons-Refined Lead-Produced
No of Points = 8

Uncontrolled Quarterly Lead Emissions =
888.00 (Tons-Refined Lead-Produced/day) * 7.09E-04 (lb-Pb/Tons-Refined Lead-Produced) * 8 * 90 (day/qtr)=
453 lb-Pb/qtr

Operational Limit
None

Control Strategy
Installation of cameras to continuously monitor opacity from the kettle stacks

Estimated Control Efficiency = 50%

Controlled Emissions
Controlled Quarterly Lead Emissions =
453 (lb-Pb/qtr) * [100-50(%) / 100] =
227 lb-Pb/qtr

Emission Reduction = -226.65 lb-Pb/qtr

70100-122
Hwy 55 to Joachim Bridge Exit (Segment A-B)

Uncontrolled Emissions
Daily Production Limit = 155.30 Vehicle-Miles-Traveled/day
Pb Emission Factor = 3.45E-03 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
155.30 (Vehicle-Miles-Traveled/day) * 3.45E-03 (lb-Pb/Vehicle-Miles-Traveled) *
1 * 90 (day/qtr)=
48 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s).

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
48 (lb-Pb/qtr) * [100-95(%) / 100] =
2.41 lb-Pb/qtr

Emission Reduction = -45.75 lb-Pb/qtr

70150-213
Joachim Bridge Exit to Plant Entrance (Segment B-C)

Uncontrolled Emissions
Daily Production Limit = 425.13 Vehicle-Miles-Traveled/day
Pb Emission Factor = 1.24E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
425.13 (Vehicle-Miles-Traveled/day) * 1.24E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
473 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s).

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
473 (lb-Pb/qtr) * [100-95(%) / 100] =
24 lb-Pb/qtr

Emission Reduction = -449.51 lb-Pb/qtr

70250-252
Plant Entrance to NW Corner of Strip Mill Building (Segment C-D)

Uncontrolled Emissions
Daily Production Limit = 15.43 Vehicle-Miles-Traveled/day
Pb Emission Factor = 2.26E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
15.43 (Vehicle-Miles-Traveled/day) * 2.26E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
31 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
31 (lb-Pb/qtr) * [100-95(%) / 100] =
1.57 lb-Pb/qtr

Emission Reduction = -29.84 lb-Pb/qtr

70300
NW Corner of Strip Mill Building to Concentrate Hopper (Segment D-E)

Uncontrolled Emissions
Daily Production Limit = 1.37 Vehicle-Miles-Traveled/day
Pb Emission Factor = 3.97E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
1.37 (Vehicle-Miles-Traveled/day) * 3.97E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
4.91 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
4.91 (lb-Pb/qtr) * [100-95(%) / 100] =
0.25 lb-Pb/qtr

Emission Reduction = -4.66 lb-Pb/qtr

70350-358
Concetrate Hopper to SW Corner of Strip Mill Building (Segment E-F)

Uncontrolled Emissions
Daily Production Limit = 9.63 Vehicle-Miles-Traveled/day
Pb Emission Factor = 1.50E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
9.63 (Vehicle-Miles-Traveled/day) * 1.50E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
13 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
13 (lb-Pb/qtr) * [100-95(%) / 100] =
0.65 lb-Pb/qtr

Emission Reduction = -12.36 lb-Pb/qtr

70400-406
NW Corner of Strip Mill Building to SW Corner of Strip Mill Building (Segment D-F)

Uncontrolled Emissions
Daily Production Limit = 13.09 Vehicle-Miles-Traveled/day
Pb Emission Factor = 1.71E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
13.09 (Vehicle-Miles-Traveled/day) * 1.71E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
20 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
20 (lb-Pb/qtr) * [100-95(%) / 100] =
1.00 lb-Pb/qtr

Emission Reduction = -19.08 lb-Pb/qtr

70450-454
SW Corner of Strip Mill Building to North End of Slag Haul Road (Segment F-G)

Uncontrolled Emissions
Daily Production Limit = 7.13 Vehicle-Miles-Traveled/day
Pb Emission Factor = 2.47E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
7.13 (Vehicle-Miles-Traveled/day) * 2.47E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
16 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
16 (lb-Pb/qtr) * [100-95(%) / 100] =
0.79 lb-Pb/qtr

Emission Reduction = -15.06 lb-Pb/qtr

70500-513
North End of Slag Haul Road to Refinery Dock (Segment G-H)

Uncontrolled Emissions
Daily Production Limit = 20.88 Vehicle-Miles-Traveled/day
Pb Emission Factor = 3.01E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
20.88 (Vehicle-Miles-Traveled/day) * 3.01E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
57 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
57 (lb-Pb/qtr) * [100-95(%) / 100] =
2.83 lb-Pb/qtr

Emission Reduction = -53.78 lb-Pb/qtr

70550-553
South Slag Haul Road (Paved) (Segment G-K)

Uncontrolled Emissions
Daily Production Limit = 0.60 Vehicle-Miles-Traveled/day
Pb Emission Factor = 3.83E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
0.60 (Vehicle-Miles-Traveled/day) * 3.83E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
2.08 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
2.08 (lb-Pb/qtr) * [100-95(%) / 100] =
0.10 lb-Pb/qtr

Emission Reduction = -1.97 lb-Pb/qtr

70600-612
North End of Main Building to Refinery Dock (Unpaved) (Segment H-L)

Uncontrolled Emissions
Daily Production Limit = 2.68 Vehicle-Miles-Traveled/day
Pb Emission Factor = 1.13E+00 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
2.68 (Vehicle-Miles-Traveled/day) * 1.13E+00 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
272 lb-Pb/qtr

Operational Limit
None

Control Strategy
Documented Watering

Estimated Control Efficiency = 90%

Controlled Emissions
Controlled Quarterly Lead Emissions =
272 (lb-Pb/qtr) * [100-90(%) / 100] =
27 lb-Pb/qtr

Emission Reduction = -244.61 lb-Pb/qtr

70650-669
Sinter Plant to Sinter Storage (Segment I-J)

Uncontrolled Emissions
Daily Production Limit = 10.73 Vehicle-Miles-Traveled/day
Pb Emission Factor = 3.83E-02 lb-Pb/Vehicle-Miles-Traveled
No of Points = 1

Uncontrolled Quarterly Lead Emissions =
10.73 (Vehicle-Miles-Traveled/day) * 3.83E-02 (lb-Pb/Vehicle-Miles-Traveled) * 1 * 90 (day/qtr)=
37 lb-Pb/qtr

Operational Limit
None

Control Strategy
New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.

Estimated Control Efficiency = 95%

Controlled Emissions
Controlled Quarterly Lead Emissions =
37 (lb-Pb/qtr) * [100-95(%) / 100] =
1.85 lb-Pb/qtr

Emission Reduction = -35.14 lb-Pb/qtr

Table 2-1. Control Strategy

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
10001A1	Dump-Concentrate-Hopper	1800	6a-10p	16	90	Install enclosure around the hopper in order to minimize the wind speeds at the drop. Maintain a material moisture content above 6%, by weight (Average).	1.63E-03	Tons-Concentrate-Handled	1	2.31E-03
10001A2	Dump-Concentrate-Storage/Railcar	1800	6a-10p	16	80	Install a chute (or other mechanism) to reduce the drop distance to the railcar. Maintain a material moisture content above 6%, by weight (Average).	1.63E-03	Tons-Concentrate-Handled	1	4.62E-03
10001B1	Load-Conc.-Railcar (Front End Loader) 1187 tpd = (1800*0.8)-23*11	1187	6a-10p	16	50	Maintain a material moisture content above 6%, by weight (Average).	1.63E-03	Tons-Concentrate-Handled	1	7.62E-03

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
10001B2	Dump-Conc. And Sec.-Unloader (80% Conc, 20% Sec)	1800	6a-10p	16	90	Install door on unloader entrance to ensure emissions generated when dumping occurs do not exit the unloading enclosure. The doors should remain closed when material is being dumped. Maintain a material moisture content above 6%, by weight (Average).	1.63E-03	Tons-Concentrate-Handled	1	2.31E-03
10001C	Dump-Fume-Unloader	Removed-Fume now mixed w/ concentrate on south end								
20001A,B	Load-Sinter-Railcar/Dump-Sinter-Unloader	500		24			1.15E-05	Tons-Sinter-Handled	2	6.04E-05
20002,3	Load-Sinter-Truck/Dump-Sinter-Storage	500		24			1.15E-05	Tons-Sinter-Handled	2	6.04E-05
20004	Load-Fume-Railcar	13		24	50	Install a chute (or other mechanism) to reduce the drop distance to the railcar.	7.06E-03	Tons-Fume-Handled	1	2.41E-04
20004B	Railcar Fume Unloading (At Storage)	13	12p-6p	6			7.06E-03	Tons-Fume-Handled	1	1.93E-03

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
20004C	Railcar Fume (South, Front End Loader)	13	6a-10p	16			7.06E-03	Tons-Fume-Handled	1	7.23E-04
20005A-F	Sinter Plant Mix Room Fugitives-Concentrate Handling	1800		24	90	Building enclosure improvements and continuous monitoring.	1.63E-03	Tons-Concentrate-Handled	1	1.54E-03
	Sinter Plant Mix Room Fugitives-Sinter Handling	Removed-No sinter handling in the mix room								
	Sinter Plant Mix Room Fugitives-Fume Handling	13		24			7.06E-03	Tons-Fume-Handled	1	4.82E-04
20006	Sinter Plant Building Fugitives	2160		24	94	Building enclosure improvements and continuous monitoring. Wheel tunnel enclosure and ventilation.	3.40E-03	Tons-Sinter-Produced	1	2.31E-03
20007	Baghouse No. 3 Fugitives	2160		24			3.28E-05	Tons-Sinter-Produced	1	3.72E-04
30001	Main Stack	Limit = 794 lb/dy								**4.17E+00**

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
30002	Blast Furnace Fugitves	2160		24	97	Building enclosure improvements and continuous monitoring. Install tuyere controllers. Install an interlock and alarm system between the baghouse and tuyere controllers on the blast furnace. Improve blast furnace ventilation by relocating the blast furnace 140' closer to the ventilation source. Blast furnace doghouse ventilation improvements	4.10E-03	Tons-Sinter-Charged to the Blast Furnace	1	1.39E-03
30011-13	Baghouse No. 5 Vents	2160		24			1.70E-05	Tons-Sinter-Charged to the Blast Furnace	3	5.78E-04
40004,5	Dross Kettle Heat Stacks	1260		24	50	Installation of cameras to continuously monitor opacity from the kettle stacks	5.19E-04	Tons-Rough Lead-Produced	1	1.72E-03
40006	Dross Plant Fugitives	1260		24	90	Building enclosure improvements and continuous monitoring.	6.55E-03	Tons-Rough Lead-Produced	1	4.33E-03
50006	Refinery Plant Fugitives	888		24	90	Building enclosure improvements and continuous monitoring.	6.80E-03	Tons-Refined Lead-Produced	1	3.17E-03

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
50007	Baghouse No. 8	Limit = 8.2 lb/dy (Raise stack height 50' to 150' above base)								**4.31E-02**
50008	Baghouse No. 7+9 (Combined Stack)	Limit = 56.6 lb/dy (Raise stack height 50' to 150' above base)								**2.97E-01**
50011-18	Kettle Setting Heat Stacks	888		24	50	Installation of cameras to continuously monitor opacity from the kettle stacks	7.09E-04	Tons-Refined Lead-Produced	8	1.32E-02
60001,2	Strip Mill Heat Stacks	100.8		24			2.13E-04	Tons-Lead Strip-Produced	2	2.25E-04
60003	Strip Mill Baghouse	100.8		24			1.12E-05	Tons-Lead Strip-Produced	1	5.93E-06
60004	Low Alpha Baghouse	0.96		24			3.58E-01	Tons-Lead Bearing Material-Charged to the Low Alpha Furnace	1	1.80E-03
60005-8	Strip Mill Roof Vents	100.8		24			2.21E-03	Tons-Lead Strip-Produced	4	4.68E-03
70001	Fugitive Dross Handling	81.6		24			Varies	Tons-Material-Handled	1	

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
70007	Fugitive Slag Handling	57.6		24			Varies	Tons-Material-Handled	1	
70009	Fugitive Secondaries Handling	103.2		24			Varies	Tons-Material-Handled	1	
70002	Dross Storage Fugitive Wind Erosion			24			Varies	m2-hr	1	
70004	Conc. Storage Fugitive Wind Erosion			24			Varies	m2-hr	1	
70006	Sinter Storage Fugitive Wind Erosion			24			Varies	m2-hr	1	
70008A,B	Slag Storage Fugitive Wind Erosion			24			Varies	m2-hr	1	
70010	Sec Storage Fugitive Wind Erosion			24			Varies	m2-hr	1	
70100-122	Hwy 55 to Joachim Bridge Exit (Segment A-B)	155.30		24	95	New regenerative sweeper(s).	3.45E-03	Vehicle-Miles-Traveled	1	1.40E-04

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
70150-213	Joachim Bridge Exit to Plant Entrance (Segment B-C)	425.13		24	95	New regenerative sweeper(s).	1.24E-02	Vehicle-Miles-Traveled	1	1.38E-03
70250-252	Plant Entrance to NW Corner of Strip Mill Building (Segment C-D)	15.43		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	2.26E-02	Vehicle-Miles-Traveled	1	9.16E-05
70300	NW Corner of Strip Mill Building to Concentrate Hopper (Segment D-E)	1.37		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	3.97E-02	Vehicle-Miles-Traveled	1	1.43E-05
70350-358	Concetrate Hopper to SW Corner of Strip Mill Building (Segment E-F)	9.63		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-	1.50E-02	Vehicle-Miles-Traveled	1	3.79E-05

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
						plant roads.				
70400-406	NW Corner of Strip Mill Building to SW Corner of Strip Mill Building (Segment D-F)	13.09		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	1.71E-02	Vehicle-Miles-Traveled	1	5.86E-05
70450-454	SW Corner of Strip Mill Building to North End of Slag Haul Road (Segment F-G)	7.13		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	2.47E-02	Vehicle-Miles-Traveled	1	4.62E-05

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
70500-513	North End of Slag Haul Road to Refinery Dock (Segment G-H)	20.88		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	3.01E-02	Vehicle-Miles-Traveled	1	1.65E-04
70550-553	South Slag Haul Road (Paved) (Segment G-K)	0.60		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	3.83E-02	Vehicle-Miles-Traveled	1	6.06E-06
70600-612	North End of Main Building to Refinery Dock (Unpaved) (Segment H-L)	2.68		24	90	Documented Watering	1.13E+00	Vehicle-Miles-Traveled	1	1.59E-03

Source ID	Source Description	Daily Prod (Units/dy)	Op Limit	hr/dy	Control (%)	Control Description	Pb Emission Factor (lb/Unit)	Emission Factor Units	No. of Points	Pb Emission (g/s)
70650-669	Sinter Plant to Sinter Storage (Segment I-J)	10.73		24	95	New regenerative sweeper(s). Installation of concrete walls around in-plant haul routes to minimze the amount of material tracked out of the facility. Fixed water sprinkling system for in-plant roads.	3.83E-02	Vehicle-Miles-Traveled	1	1.08E-04
70700-703	South Slag Haul Road (Unpaved) (Segment K-M)	1.01		24			3.18E-01	Vehicle-Miles-Traveled	1	1.69E-03

3.0 Control Strategy Modeling Analysis

The model control options and meteorological data used in the control strategy analysis were identical to that used in the design value analysis. The dispersion parameters were also the same, except for the no. 7, 8 and 9 baghouse stack heights. Doe Run has agreed to raise the stacks heights from 100 feet to 150 feet for both stacks (baghouses 7 and 9 share a common stack).

The source emissions lead emissions utilized in the control strategy modeling analysis have been provided in Table 2-1.

The maximum predicted 3-month lead concentration for all modeled receptors during the nine quarter period was 1.4337 $\mu g/m^3$ and occurred on the western property boundary along Main Street. The maximum impact was at 729375 meters to the east and 4237698 meters to the north. The maximum impact occurred during the third quarter of 1997. A background lead concentration of 0.063 $\mu g/m^3$ was provided by the MDNR and was based on historical lead monitoring near the facility. Therefore, with background, the total estimated impact was 1.4967 $\mu g/m^3$ of lead.