2000 REVISION

of the

STATE IMPLEMENTATION PLAN FOR LEAD

for the

DOE RUN RESOURCES CORPORATION

PRIMARY LEAD SMELTER

HERCULANEUM, MISSOURI

Adoption — December 7, 2000

Department of Natural Resources
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ABBREVIATIONS

APCP	Air Pollution Control Program
CAAA	Clean Air Act Amendments of 1990
CMB	Chemical Mass Balance Modeling
EPA	Environmental Protection Agency
ISCST	Industrial Source Complex Short Term (Dispersion Model)
MACT	Maximum Achievable Control Technology
MDNR	Missouri Department of Natural Resources
NAAQS	National Ambient Air Quality Standard
RACM	Reasonably Available Control Measures
RACT	Reasonably Available Control Technology
RFP	Reasonable Further Progress
SCE	Source Contribution Estimate
SIP	State Implementation Plan
$\mu g/m^3$	micrograms per cubic meter (concentration measure units)

ACKNOWLEDGMENTS

A great deal of cooperative effort went into developing this State Implementation Plan revision, and several individuals should be recognized. Doe Run contractors Andy Polcyn and Jim Burris (Advance Environmental Associates) and Tom Scheppers, P.E. (Aeromet Engineering, Inc.) conducted fugitive emissions testing and stack testing. Kurt Parker (TRC Environmental Corporation) developed that information and integrated it with production figures to develop an hourly emission inventory. Charles Shell and Joe Stolle (Shell Engineering) developed the dispersion model, and John Cooper (Cooper Environmental Services) developed the receptor model. The modeling was reviewed by Jeff Bennett, P.E. (Missouri Department of Natural Resources) and Richard Daye (U.S. Environmental Protection Agency). The project managers for this SIP were James Lanzafame (Doe Run Company), John Rustige, P.E. (Missouri Department of Natural Resources), and Aaron Worstell (U.S. Environmental Protection Agency). This SIP revision is a product of the commitment and professionalism and cooperation of these individuals.

1.0 Introduction

This document is intended to serve as Missouri's formal State Implementation Plan (SIP) submittal to revise the previous lead SIP for the Herculaneum, Missouri, nonattainment area. It includes the following elements required by the Clean Air Act Amendments of 1990 (CAAA):

- enforceable components of a control strategy (regulations, consent decree, and work practices manual) and a description of the enforcement methods to determine compliance with the plan,
- an analysis of Reasonably Available Control Technology (RACT) and Reasonably Available Control Measures (RACM),
- a discussion of Reasonable Further Progress (RFP) including control strategy construction deadlines,
- a contingency plan and set of contingency measures,
- a description of nonattainment boundaries,
- a summary of air quality data and trends and ambient monitoring sufficiency,
- a summary of the baseline and controlled emission inventory,
- an explanation of emission reductions expected from the installations of controls, and
- a discussion showing the ambient lead levels expected as a result of the control strategy demonstrating attainment of the National Ambient Air Quality Standard (NAAQS) for lead.

1.1 Plant Description

Doe Run Resources Corporation operates the Herculaneum smelter. The plant is located in the town of Herculaneum, Missouri, approximately 30 miles south of St. Louis on the Mississippi River. The smelter is the largest lead smelting facility in the nation and has the ability to produce over 250,000 tons of 99.999% pure lead each year. Over 80% of the lead is used in the production of lead-acid batteries. The rest of the lead is used in a multitude of products ranging from computers to eyeglasses.

1.2 Regulatory History

Pursuant to the requirements of the CAAA, the U.S. Environmental Protection Agency (EPA) promulgated a NAAQS for lead on October 5, 1978, of 1.5 micrograms per cubic meter ($\mu g/m^3$) averaged over a calendar quarter. In response to this standard, the state of Missouri prepared lead SIPs for various geographic areas, including the area near the Herculaneum smelter.

As a result of ambient air monitoring, pursuant to the CAAA, the area within the city limits of Herculaneum, Missouri, was designated as nonattainment for lead. In 1993 Missouri revised the SIP to address continuing violations of the NAAQS in Herculaneum. This SIP revision was approved by EPA with a goal of achieving the lead standard by June 30, 1995. This revised plan required the company to build air-filtering systems, enclose buildings, and improve material handling. It also required implementation of additional controls if the NAAQS for lead was not met. Since air monitoring showed continued violations of the lead standard, Doe Run was asked to implement all of the additional contingency controls identified in the 1993 SIP.

Following this effort, EPA issued a letter to Governor Carnahan's office on August 27, 1996, notifying Missouri that a " failure to attain " determination was made at the Doe Run/Herculaneum smelter. A proposed " failure to attain " notice was published in the Federal Register on March 5, 1997, and explained the requirements of section 179 (d) of the Act.

Efforts to improve air quality continued during this time. Doe Run installed new high efficiency filter bags in the baghouses and addressed many other emission sources. At the same time, the current SIP revision effort was begun. Early in the revision process a decision was made to use a receptor modeling approach to enhance the dispersion modeling effort and to advance the understanding of the problem. All parties recognized the significant effort and time commitment resulting from this decision.

Many tasks were required to develop the methods necessary for preparing this SIP and associated control strategy. These tasks included gathering emissions and meteorological data, developing chemical profiles of emissions and ambient samples, developing independent dispersion and receptor modeling approaches and a plan for reconciling the models, preparing initial engineering designs and cost estimates for emission reduction strategies, evaluating the effectiveness of individual controls, and developing a chosen set of controls and an associated demonstration of attainment of the standard.

The models used in this study are EPA approved models. The attainment demonstration dispersion modeling study used maximum throughputs for all processes to show that even under these conditions the area would attain the standard. This is a conservative approach because it is not likely that the maximum throughputs will ever be reached, particularly in all processes at once. Consequently, this conservatism is reflected in the attainment demonstration results presented as part of this SIP revision.

Because of the complicated nature of this project, particularly with respect to the development of the receptor model, the SIP revision was not submitted to EPA within the regulatory timeframe. On July 28, 1999, EPA published in the Federal Register a notice of failure to submit. This failure to submit finding was expected because of the extended time required to develop the receptor model. The failure to submit finding started the mandatory sanctions clock.

The control strategy in this document is intended to be a complete and approveable SIP revision. The modeling described in this document shows that the chosen SIP controls will be sufficient to attain and maintain the NAAQS in the Herculaneum nonattainment area. The attainment deadline for the Herculaneum nonattainment area is August 14, 2002. The SIP controls are scheduled to be installed and operational by July 31, 2002.

1.3 Continued Efforts to Reduce Emissions

As outlined in the previous section, Doe Run has continued to aggressively pursue emission controls since the 1993 SIP submission. These projects include:

1.3.1 Blast Furnace/Dross Plant Improvements

- Teflon membrane bags were installed in all of # 5 baghouse to reduce pressure drop failures and improve filtering performance.
- A separate baghouse (baghouse #6) was installed to ventilate the Dross plant production area.
- Replacement siding/roofing was improved on the Dross Plant building.
- On two of the furnaces automated tuyere air controls were installed. These controls help the furnace to operate more cleanly and with fewer process upsets.
- Ductwork was constructed to ventilate a portion of the Blast Furnace roof area.
- Areas of blast furnace and dross plant siding and roofing have been repaired and replaced.
- Additional ventilation was installed over the feed transfer points on the furnaces.
- Passive filters were also installed in previously open vents above the furnace.
- A dross wetting screw was installed to reduce fugitives from drossing operations.

1.3.2 Sinter Plant Projects

- Modifications were made to the updraft fans in the sinter plant to draw air from inside the building rather than outside the building.
- Ventilation was added to other transfer points in the feed system.
- The cooler baghouse was segregated into two compartments to facilitate maintenance.
- The fans on # 3 baghouse were replaced to allow for future increase in sinter plant ventilation needs.
- The bags in # 3 baghouse were replaced with all Teflon membrane bags to reduce pressure drop and improve filtering performance.
- The cell structure in # 3 baghouse was reinforced in anticipation of greater pressure differential due to increased ventilation needs in the future.

1.3.3 Other Emission Reduction Projects

- Additional asphalt pavement was placed in the plant to reduce fugitive road dust emissions.
- Rotary valves were installed in # 5 baghouse cells to improve performance.
- A high efficiency dry street sweeper was purchased to sweep streets/roadways during freezing conditions.
- The old main chimney was replaced with a new one with greater capacity and height.
- Additional bottom dump railcars were purchased and put into service to reduce handling of materials.

- A truck tire wash station was installed to reduce the amount of dust tracked off on truck tires.

2.0 Description of Nonattainment Area

2.1 EPA Description

EPA designated the geographic area inside the city limits of Herculaneum, Missouri, as nonattainment for lead in 56 Federal Register 6694, November 6, 1991, effective January 6, 1992. This designation was based on ambient monitoring data that indicated violations of the lead NAAQS. Air monitoring has shown that lead concentrations have been decreasing over time as a result of Doe Run's emission control efforts to date. The actual geography that continues to show exceedences of the NAAQS has been significantly reduced. Figure 2 shows the locations of the ambient monitors, and the number of calendar quarters that each has shown attainment of the NAAQS.

2.2 Location and Topography

Herculaneum is located on the west bank of the Mississippi River about thirty miles south of St. Louis. Figure 1 is a map showing the location of Herculaneum, Missouri. Joachim Creek empties into the Mississippi at the south end of the plant. The plant is located east and south of the town; however, residential homes are located within about four hundred yards of the plant. According to the 1990 census Herculaneum has a population of 2,365. The terrain generally rises to the west away from the river, and a river bluff is located on the north side of the plant. Figure 2 is a composite topographic map showing the local topography. This figure also shows the location of the plant, local buildings, and the locations of the ambient air monitoring stations. Figure 3 is a composite aerial photo showing the same information.

2.3 Meteorology

2.3.1 Wind

During daylight hours wind speeds can vary considerably up to 4.0 meters per second and greater. Nighttime winds are generally light and variable, up to 2.5 meters per second or greater. During Northwestern weather front events, winds can achieve significant speeds, up to 8.0 meters per second from the northwest.

Topographical influences to wind speed and direction are likely. The tall bluffs just north of the plant likely affect winds from the south and east. The rising terrain to the west of the plant likely affects winds from the east.

FIGURE 1: Location of Herculaneum, Missouri

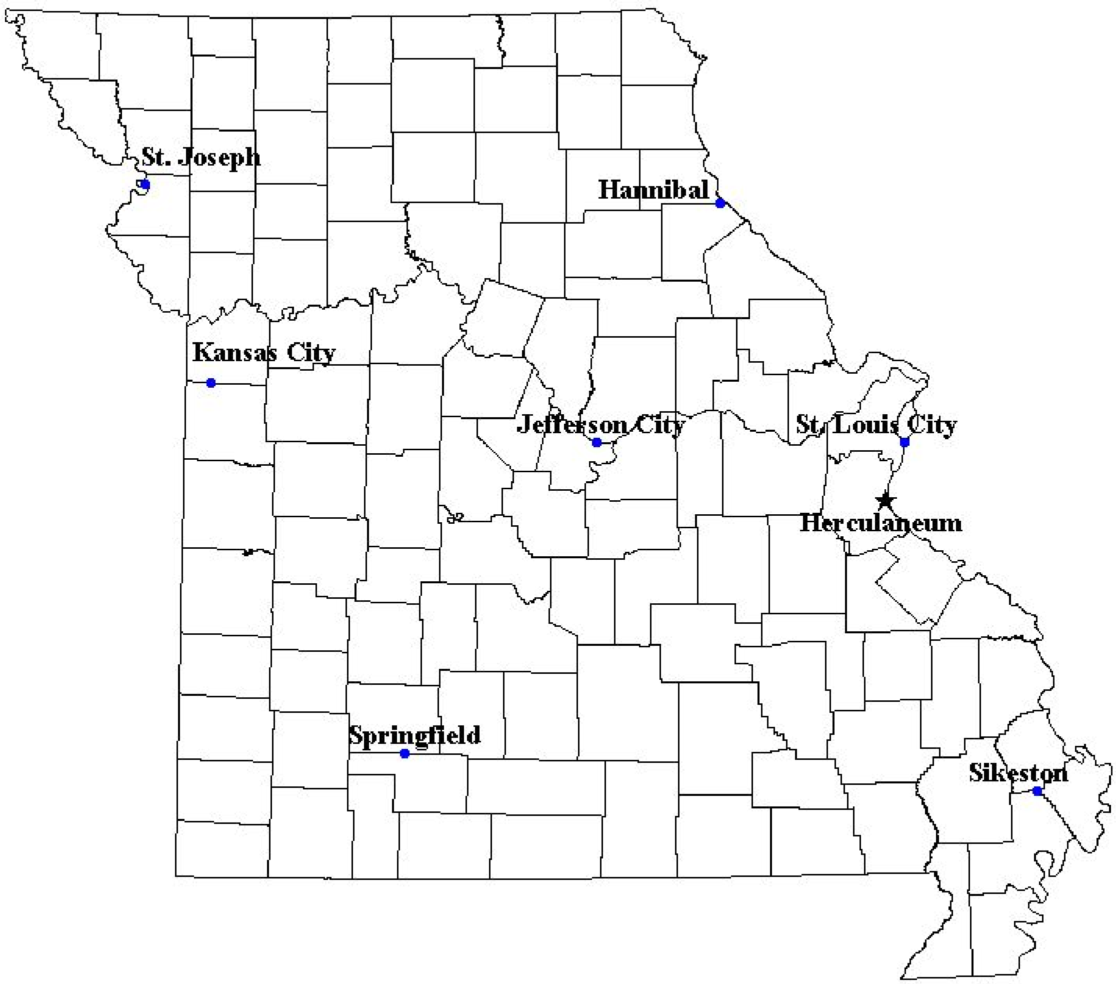
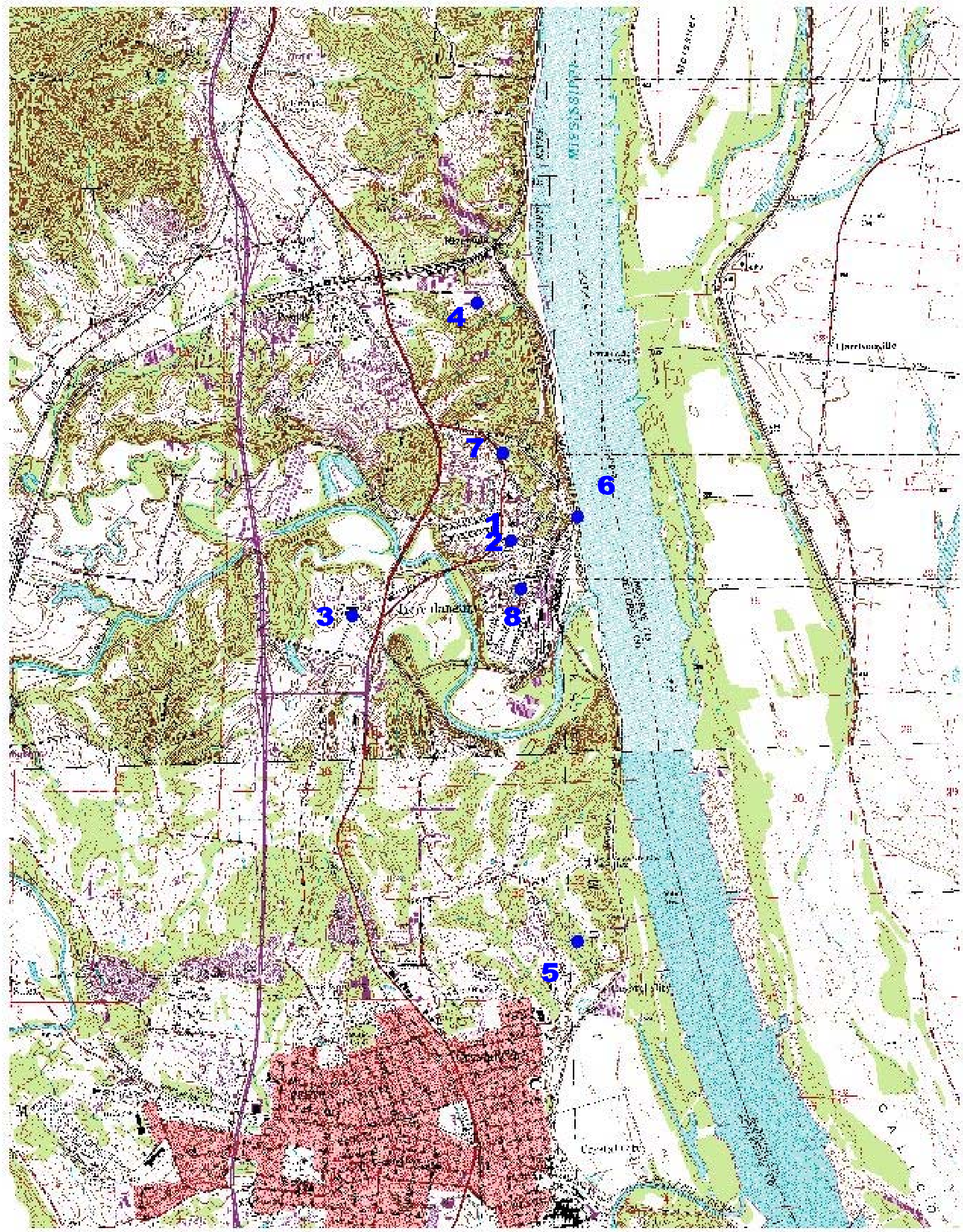
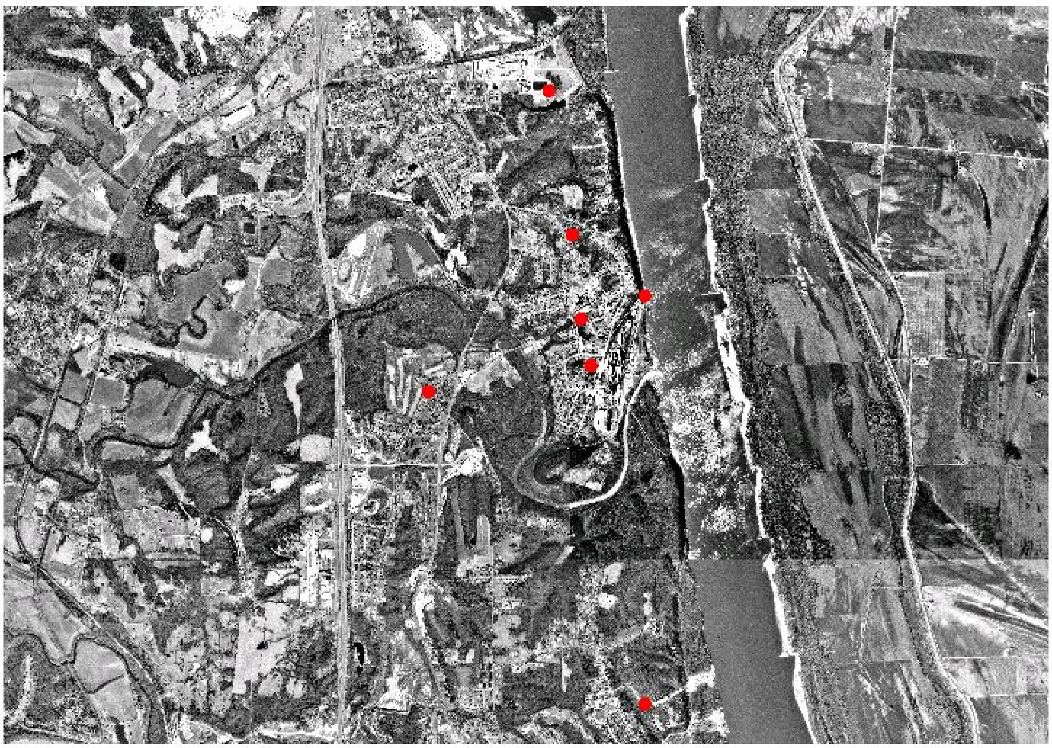


FIGURE 2: Composite Topographic Map



Key	Monitoring Site	Consecutive Quarters of Attainment	Key	Monitoring Site	Consecutive Quarters of Attainment
1	Dunklin (S)	0	5	Ursaline	35
2	Dunklin (H)	14	6	Bluff	15
3	Golf	33	7	Sherman	25
4	North	35	8	Broad Street	0

FIGURE 3: Composite Aerial Photo



2.3.2 Precipitation and Temperature

Herculaneum, Missouri, averages about 37.5 inches of precipitation per year, mostly as rain. Snow falls occasionally during the winter months. Temperatures in Herculaneum range from average lows of 20 degrees Fahrenheit in January to average highs of 89 degrees Fahrenheit in August.

2.4 Summary of Air Quality Data

Doe Run operates seven ambient air monitors in the nonattainment area and Missouri Department of Natural Resources (MDNR) operates one. Monitor locations are given in Figures 2 and 3.

The monitors take 24-hour samples on a schedule of at least every six days. Some monitoring has been conducted on a more frequent basis. The daily lead values collected in each calendar quarter are then averaged to generate the reported quarterly averages. Historic lead values are presented in Table 1.

The data shows that air quality has generally improved over the years as a result of emission control efforts. This trend is most evident at the more distant monitoring stations. The six historical monitoring stations have shown attainment of the lead NAAQS for 13 consecutive quarters. Possibly, 14 quarters exist, except for the 14th quarter, where Doe Run collected more samples at the Dunklin site than the co-located state operated monitor. In this quarter Doe Run's monitor continued to show attainment, but the state operated monitor shows a violation of the NAAQS. Regarding the Broad Street monitor, this same downward trend is not evident. The standard has regularly been violated at the Broad Street location. This is significant because this is the monitor that typically indicates the highest ambient concentrations.

Daily monitoring data was used for dispersion model validation.

TABLE 1

LEAD AMBIENT AIR QUALITY DATA – VICINITY OF HERCULANEUM SMELTER
CALENDAR QUARTERLY VALUES
in micrograms of lead per cubic meter of air (μg/m^3)

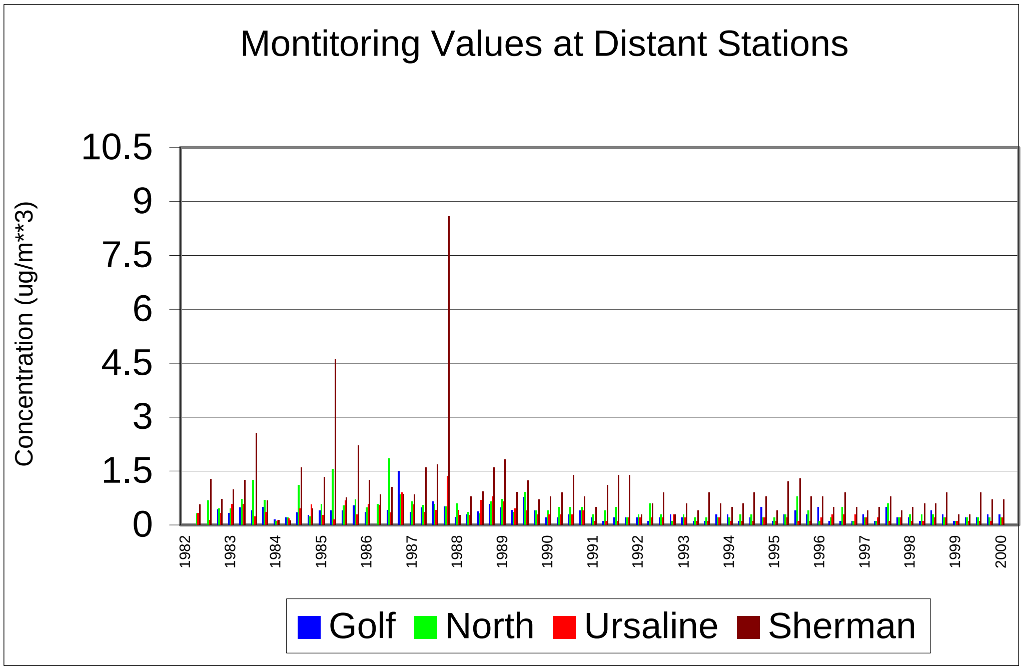
DATE	Dunklin (S)	Dunklin (H)	Golf	North	Ursuline	Bluff	Sherman	Broad St.
1982								
1st								
2nd								
3rd	0.8	**1.8**		0.3	0.3	0.7	0.6	
4th		**3.8**		0.7	0.1	**2.6**	1.3	
1983								
1st		1.1	0.4	0.5	0.3	1.4	0.7	

2nd		**1.9**	0.3	0.4	0.6	**1.9**	1.0	
3rd		**1.6**	0.5	0.7	0.6	**1.6**	1.3	
4th		**4.3**	0.4	1.3	0.3	**6.7**	**2.6**	
1984								
1st		1.0	0.5	0.7	0.4	0.7	0.7	
2nd		0.1	0.2	0.1	0.1	0.2	0.1	
3rd		0.6	0.2	0.2	0.2	0.2	0.1	
4th		1.3	0.3	1.1	0.4	**2.4**	**1.6**	
1985								
1st	0.1	0.5	0.3	0.3	0.6	0.8	0.5	
2nd		**1.9**	0.4	0.6	0.3	2.5	1.3	
3rd	**2.4**	**4.3**	0.4	**1.6**	0.2	**4.1**	**4.6**	
4th	**1.6**	**1.8**	0.4	0.5	0.7	0.9	0.8	
1986								
1st	**1.9**	2.4	0.5	0.7	0.3	**5.7**	**2.2**	
2nd	**1.6**	1.5	0.4	0.5	0.6	1.1	1.3	
3rd	1.0	1.7		0.6	0.6	**2.9**	0.9	
4th	**3.3**	3.5	0.4	**1.8**	0.4	1.2	1.1	
1987								
1st	1.0	1.1	**1.5**	0.9	0.9	**2.4**	0.9	
2nd	**2.0**	**2.7**	0.4	0.7	0.6	**2.9**	0.9	
3rd	**1.5**	**1.9**	0.5	0.6	0.4	**2.0**	1.6	
4th	0.8	**1.9**	0.7	0.6	0.4	**3.5**	1.7	
1988								
1st	**2.5**	**3.7**	0.5	0.5	1.4	**7.4**	**8.6**	
2nd	**1.8**	1.4	0.2	0.6	0.4	**3.5**	0.3	
3rd	1.4	**1.5**	0.3	0.4	0.3	0.9	0.8	
4th	1.2	**1.5**	0.4	0.3	0.7	**2.2**	0.9	
1989								
1st	**1.5**	1.2	0.6	0.7	0.8	**2.1**	**1.6**	
2nd	1.4	**1.6**	0.5	0.7	0.7	**2.3**	**1.8**	
3rd	0.6	1.1	0.4	0.4	0.4	**1.5**	0.9	
4th	**1.6**	1.3	0.8	0.9	0.4	**1.9**	1.2	
1990								
1st	0.9	0.9	0.4	0.4	0.3	**2.2**	0.7	
2nd	**2.0**	**1.6**	0.2	0.4	0.3	0.8	0.8	
3rd	**1.6**	1.2	0.2	0.5	0.3	1.1	0.9	
4th	**2.2**	**1.9**	0.3	0.5	0.3	**2.3**	1.4	
1991								
1st	**1.9**	1.4	0.4	0.5	0.4	1.3	0.8	
2nd	0.8	0.7	0.2	0.3	0.1	0.4	0.5	
3rd	**1.8**	1.4	0.1	0.4	0.1	1.2	1.1	
4th	**2.3**	**1.7**	0.2	0.5	0.1	0.8	1.4	
1992								
1st	0.7	0.7	0.2	0.2	0.2	**1.9**	1.4	
2nd	1.0	1.3	0.2	0.3	0.2	1.0	0.3	
3rd	1.3	**2.0**	0.1	0.6	0.2	1.0	0.6	

4th	**2.2**	**2.5**	0.2	0.3	0.2	1.3	0.9	**5.5**
1993								
1st	0.3	0.3	0.3	0.1	0.3	0.6	0.3	**3.7**
2nd	**1.8**	**1.7**	0.2	0.3	0.2	1.3	0.6	**5.5**
3rd	0.7	0.6	0.1	0.2	0.1	0.8	0.4	**2.1**
4th	0.8	0.6	0.1	0.2	0.1	**1.8**	0.9	**2.3**
1994								
1st	0.5	0.4	0.3	0.2	0.2	0.8	0.6	**3.5**
2nd	0.6	0.7	0.3	0.2	0.1	**2.1**	0.5	**3.7**
3rd	**1.8**	1.3	0.1	0.3	0.1	0.9	0.6	**3.9**
4th	**2.1**	1.4	0.2	0.3	0.1	1.1	0.9	**3.1**
1995								
1st	0.7	0.6	0.5	0.2	0.2	**1.5**	0.8	**6.5**
2nd	1.0	0.7	0.1	0.2	0.1	1.0	0.4	**2.5**
3rd	1.4	1.2	0.3	0.3	0.2	1.0	1.2	**4.1**
4th	**1.9**	**1.7**	0.4	0.8	0.1	**1.6**	1.3	**6.3**
1996								
1st	**2.3**	**1.9**	0.3	0.4	0.1	1.4	0.8	**2.3**
2nd	**1.6**	1.2	0.5	0.1	0.2	**2.4**	0.8	**5.7**
3rd	0.8	0.6	0.1	0.2	0.3	0.7	0.5	**4.0**
4th	**1.7**	**1.8**	0.1	0.5	0.3	1.4	0.9	**1.6**
1997								
1st	0.8	0.7	0.1	0.1	0.3	1.4	0.5	**4.0**
2nd	1.4	1.3	0.3	0.2	0.2	0.5	0.4	**6.8**
3rd	1.3	1.1	0.1	0.1	0.2	0.8	0.5	**1.6**
4th	**1.5**	1.3	0.5	0.6	0.1	1.3	0.8	**8.5**
1998								
1st	1.3	1.1	0.2	0.2	0.2	1.2	0.4	**11.6**
2nd	**1.5**	1.4	0.2	0.3	0.1	0.6	0.5	**4.1**
3rd	0.9	0.8	0.1	0.3	0.1	1.1	0.6	**3.9**
4th	1.3	1.4	0.4	0.3	0.2	1.1	0.6	**5.4**
1999								
1st	1.2	1.3	0.3	0.2	0.2	0.5	0.9	**6.8**
2nd	0.7	1.4	0.1	0.1	0.1	0.5	0.3	**4.1**
3rd	0.7	0.4	0.2	0.2	0.1	0.5	0.3	**2.9**
4th	1.2	1.0	0.2	0.2	0.1	1.2	0.9	**4.2**
2000								
1st	**1.7**	1.2	0.3	0.2	0.1	0.9	0.7	**4.3**
2nd	**2.0**	1.4	0.3	0.2	0.2	1.2	0.7	**4.9**
3rd								
4th								

This data is also presented in graphical form in Figures 4 and 5 below.

FIGURE 4:



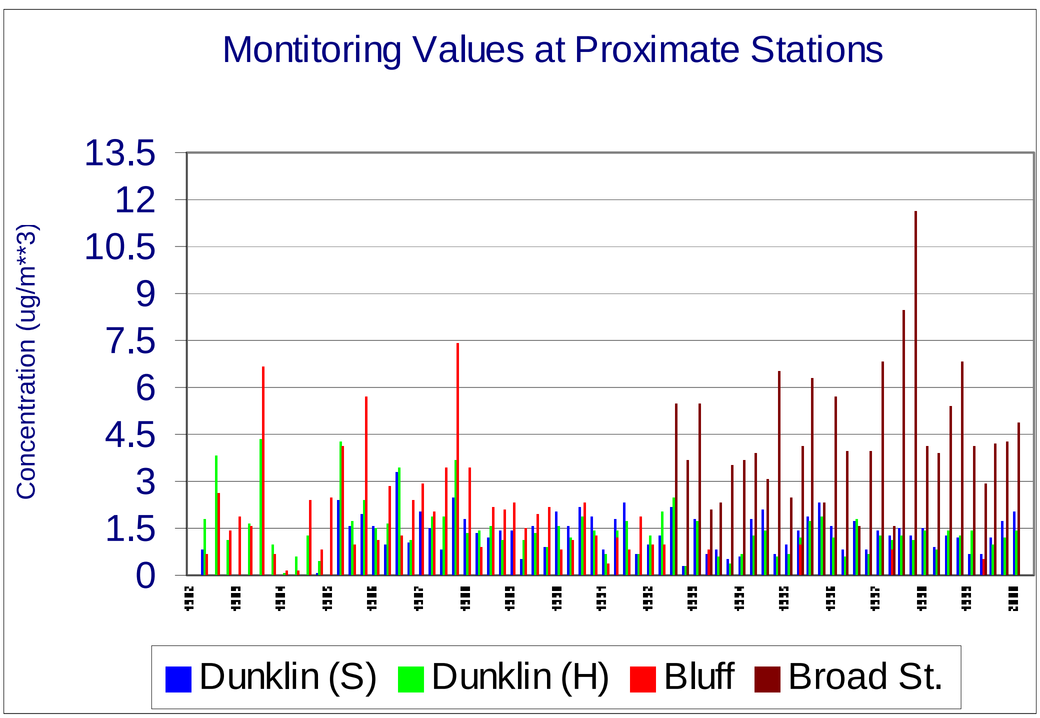


FIGURE 5:

3.0 Development of Predictive and Culpability Models

3.1 Modeling Introduction

Previous Herculaneum SIP revisions have relied solely on the use of predictive dispersion models. These models were used to develop the previous SIP control strategies. As it turned out, the strategies reduced ambient lead concentrations significantly, but the standard was not achieved. This is in part due to inadequate model performance.

To avoid this pitfall during the early planning stages of this SIP revision, both EPA and the Air Pollution Control Program (APCP) staff researched the feasibility of using a receptor model to improve dispersion model performance. In addition, a much more detailed inventory and local meteorological data were developed to further improve the performance of the dispersion model.

The dispersion model (ISCST3) and the receptor model (CMB7) function in two completely different ways. The dispersion model estimates the combined ambient impact of sources by simulating Gaussian dispersion of emission plumes. Emission rates, wind speed and direction, atmospheric mixing heights, terrain, plume rise from stack emission, initial dispersion characteristics of fugitive sources, and particle size and density are all factors that the model considers when estimating ambient impacts. In contrast, the receptor model is a “best fit” statistical model that provides a set of “most probable” source contributions. It does this by comparing the characteristics (in this case elemental concentrations) of emission sources with those found in the ambient environment.

The participants in this study are confident in the results of the modeling study. However, both models do have limitations. For the dispersion model, there are two areas of relative weakness. It was very difficult to determine source characterizations, especially emission rates for fugitive sources, particle size and density, initial sigma values for volume sources, and the fact that the model is a steady state model. Steady state models do not consider calm or light wind conditions as well as puff type models. For the receptor model the weakness arises from the fact that there is a great deal of similarity in chemistry between sources, and so much material in the plant is recycled that it is difficult to resolve certain sources. Also, some of the elements have very low concentrations that approached the analytical detection limits which may contribute to uncertainties in the estimates of individual source contributions.

Initially, Doe Run conducted a receptor modeling feasibility study which concluded that there were enough differences in the sources that the receptor model would be feasible. Both EPA and APCP concluded that this tool would be brought to bear for this study. Doe Run developed a modeling protocol (*Dispersion Modeling and Reconciliation Protocol,* TRC Environmental, October 19, 1998). The protocol outlined a process by which both models would be reconciled. The receptor model would be used to improve the inputs to the dispersion model. This would increase the measure of confidence that the models were performing well and, therefore, better predict the effectiveness of imposed emission controls.

Results of the dispersion model were compared to daily and quarterly monitoring values. Several changes to the inputs of the dispersion model were made. These changes were supported in some cases by ambient monitoring comparisons and in some cases by the receptor modeling. Examples of input improvements include revising particle sizes and densities and the initial dispersion characteristics of fugitive sources. This process was conducted with a great deal of cooperation between Doe Run's modeling contractor and agency reviewers. In many cases the agencies conducted model sensitivity runs and evaluated model improvements.

The receptor and dispersion models showed a great deal of agreement, particularly about what sources were the primary contributors and, therefore, worthy of consideration of control. After several reconciliation attempts it was determined that the two models would not reconcile in a quantifiable way. The dispersion model, however, was performing well. It was decided that the attainment demonstration would be based on the results of the dispersion model. This baseline dispersion model is often referred to as the actual value modeling.

Emission controls strategies were briefly evaluated in the model. Emission sources in the design value modeling were changed to reflect the various control projects. The attainment demonstration is the result of this effort.

3.2 Chemical Mass Balance (CMB) Modeling

3.2.1 Overview

A CMB receptor modeling approach for apportioning ambient lead concentrations was evaluated for its ability to resolve and quantify source contributions. This method is based on direct measurement of the chemical composition of ambient total suspended particulate mass in an area of interest. The relative apportionment of these chemical species between potential sources is based on a statistical comparison of a chemical profile or "fingerprint" of each source with the chemical profile of an ambient particulate sample.

With this "fingerprinting" approach, impacts are based on retrospective measurements of samples selected from a specific period of potential impact. Results represented the most probable quantitative source impacts for each specific sample selected. Source profiles were developed for all the major emission sources. The sources for which profiles were developed represent approximately 99% of the emission inventory.

Cooper Environmental Services conducted the CMB study (*Source Apportionment of Herculaneum Ambient Lead Concentrations by Chemical Mass Balance Receptor Modeling,* Cooper Environmental Services, August 25, 2000). This report provides a much more detailed presentation of this effort.

3.2.2 Application

A CMB model receptor model (EPA version 7.0) was used to provide the most probable source contribution estimates (SCEs) for major source categories as defined by common chemistry of a source's particulate emissions. This modeling was performed in a manner consistent with EPA's *Protocol for Applying and Validating the CMB Model* (EPA, 1987). The primary objective of the CMB model application in Herculaneum was to provide the most accurate SCEs to ambient measured lead concentrations. A secondary objective was to use these SCEs and the measured lead concentrations to evaluate the performance of the dispersion model and to improve its application to the Herculaneum airshed. In this way, control strategies and future ambient lead concentrations would be based on the most reliable application of the dispersion model to this airshed.

An effort was made to reconcile the receptor modeling with the dispersion modeling. Details of this study were outlined in the reconciliation report prepared by Cooper Environmental (*Reconciliation and Verification of ISCST Dispersion Model Lead Apportionment for Herculaneum, Missouri,* Cooper Environmental Services, August 9, 2000)

3.2.3 Observations

It was clear from species analysis of the ambient filters that there were clear differences in the relative ambient chemistry at the different monitoring sites. One of the most significant differences is associated with percent copper and copper to zinc ratios. Copper represents only 3.4 % of the explained lead mass at the Broad Street site but almost 27% of the lead measured at the Bluffs site. In addition, the average copper concentration for the Bluffs selected samples is greater than that for the Broad Street selected samples. The zinc to copper ratio at the Broad Street site is 4.7, 3.1 at the High School, and 0.5 at the Bluffs. The concentration of cadmium at the High School and Bluffs is about ten fold lower than at the Broad Street monitor, but the ratio to lead is only slightly lower than at the Broad Street monitor.

Data from three of the seven ambient monitoring sites were used for this modeling study. The three sites that were included were Broad Street, High School, and Bluff. The Broad Street monitor is the monitor that typically measures the highest ambient lead concentrations. Filter samples from these sites during relatively high impact days were selected for inclusion into the receptor study. The Broad Street modeled days accounted for 55% of the lead measured during the CMB study period and included 17 of the 19 highest measured lead concentration days.

Two different modelers modeled each ambient sample data set independently. The final selected model results met almost all of the model applicability criteria. The model statistics were all within the EPA recommended range of 0.8 to 1.0 for R square and 0 to 4 for Chi square. The average number of degrees of freedom at the Broad Street site was 15, which is threefold greater than the EPA recommended minimum of 5. The average percent lead mass explained at the Broad Street monitor was 103%. This CMB application met the implicit model assumptions and applicability criteria. Evaluating their consistency with the dispersion model results, ambient chemistry, variability of ambient chemistry and meteorology provided additional validation for these results.

3.2.4 Results

The blast furnace source was determined to be the largest source of lead at the Broad Street monitor where it was responsible for 59% of the lead measured during the CMB study period. The refinery was responsible for 20% of the measured lead, while the sinter and dross plants were responsible for 9% and 7%, respectively.

The refinery was responsible for 37% of the lead measured at the High School monitor. The blast furnace was responsible for 30%, the dross plant 14%, road dust 9%, the trestle 8%, and the sinter plant 3%. These results were generally consistent with the ambient chemistry and meteorology. However, because of unusually high sodium and calcium concentrations on some of the filters, the road dust impacts at the High School on days with lower lead concentrations may be biased.

The blast furnace source was the largest source category at the Bluffs monitor, contributing 42% of the lead measured during the study period. The dross plant was responsible for 36% of the measured lead while the refinery contributed 8%, road dust 6% and lead concentrate 5%. A previously unknown source of copper influenced the modeling to some degree. This source may be associated with the dry dross storage area and suspended dust from the handling of this material. The influence was most significant on days with low lead concentrations and is not expected to have a large impact on the results at this monitor. However, it is likely that the reported average dross impacts at this site are biased high while the blast furnace impacts are likely biased low.

The receptor and dispersion model reconciliation showed good agreement between the Broad Street CMB apportioned impacts from the blast furnace and refinery source groups. However, there were significant differences in the predicted impacts from the dross and sinter plants. The CMB model predicted an average sinter plant lead impact of 1.2 ±0.7 $\mu g/m^3$ (7.9%) while the dispersion model predicted an impact of only 0.2 ±0.1 $\mu g/m^3$ (1.3%) for the model reconciliation period. In the case of the dross plant the CMB average SCE was 1.1 ±0.4 $\mu g/m^3$ (7.2%) and the dispersion model predicted impact was 3.0 ±0.9 $\mu g/m^3$ (13.2%).

3.3 Dispersion Modeling

The development of a control strategy for lead emissions requires the use of a predictive dispersion model. Emission rates and characteristics and meteorological data are used by the model to estimate ambient air concentrations.

The development of the dispersion model required several tasks including the development of an emission inventory (*Doe Run Lead Emission Inventory Herculaneum*

Smelter Herculaneum, Missouri, TRC Environmental, June 20, 2000), and a meteorological database.

3.3.1 Model Input Development

3.3.1.1 Model Selection

In support of the revision of the lead SIP for the Herculaneum nonattainment area, a dispersion modeling methodology was developed to predict ambient lead concentrations. The dispersion model chosen was the EPA Gaussian plume model, ISCST3 (version 99155), which is EPA's primary model for point and volume sources in a relatively flat terrain. This model can account for building downwash, urban or rural dispersion, flat or elevated terrain, and averaging periods form one hour to one year.

A modeling protocol (*Dispersion Modeling and Reconciliation Protocol,* TRC Environmental October 19, 1998) was developed that incorporated results from receptor modeling and included model reconciliation goals. Although these quantitative goals were not met, the results showed good general agreement.

3.3.1.2 Meteorological Data

A meteorological database, suitable for use in the ISCST3 Dispersion Model, was compiled by collecting surface wind, stability, and temperature data at a local meteorological station. This station was constructed at the direction of MDNR and EPA solely for gathering meteorological data to be used for the development of this SIP. The station is located on Doe Run's property just to the northeast of the major operations in the plant. In addition, contemporaneous mixing heights were calculated from upper air data collected at the Lincoln, Illinois, station. This data was prepared for the modeling study, which was from October 1998 through April 1999.

3.3.1.3 Emission Inventory

A considerable effort was made to develop a quality emission inventory. The development of this inventory is documented in the emission inventory report (*Doe Run Lead Emission Inventory Herculaneum Smelter Herculaneum, Missouri,* TRC Environmental, June 20, 2000). An emission inventory protocol (*Protocol: Facility Emission Inventory & Measurement Program Herculaneum Smelter Herculaneum, Missouri,* TRC Environmental, May 28, 1998) was developed and followed in the development of this inventory. As defined in this protocol, the overall purpose of the emission inventory was to quantify the relationship between lead emissions from particular sources and the activities that produce those emissions. This was accomplished by completing source measurements made in the field, while collecting concurrent documentation of process parameters and variables thought to affect the emission rates.

The following series of emission test reports detail this effort:

- *Determination of Lead Emissions from the #3 Kettle Heater Exhaust,* Aeromet Engineering, Inc., March 1999.
- *Determination of Lead Emissions from the #4 Kettle Heater Exhaust,* Aeromet Engineering, Inc., April 1999.
- *Determination of Lead Emissions from the Aerovent Fan Exhaust,* Aeromet Engineering, Inc., April 1999.
- *Determination of Metals Emissions from the Main Stack Exhaust, All Processes,* Aeromet Engineering, Inc., May 1999
- *Determination of Metals Emissions from the Main Stack Exhaust, Blast Furnace Only,* Aeromet Engineering, Inc., May 1999
- *Characterization of Blast Furnace Charging Shuttle Feeder Vent Emissions at the Doe Run Company's Primary Lead Division Facility Herculaneum, Missouri,* Advance Environmental Associates, L.L.C., July 1999
- *Results of Test Program for Characterizing Fugitive Particulate Matter and Lead Emissions from Railcar Unloading Operations at the #1 Trestle Building*, Advance Environmental Associates, L.L.C., July 1999
- *Report on Refinery Roof Monitor Emissions Testing at the Doe Run Company's Primary Lead Division Facility Herculaneum, Missouri,* Advance Environmental Associates, L.L.C., September 1999

Using these emission to activity relationships emission factors were developed. Through these emission factor relationships it was possible to quantify lead emission rates from each source in the facility for each hour of operation. In some cases, where field measurements were not feasible or where emissions were thought to be less significant, the emission inventory relied on published emission factors. There were also occasions that the protocol was not strictly followed. In these cases technical decisions were weighed in the field, and EPA and APCP staff present were consulted.

There were essentially five basic steps used to develop this inventory. First all sources were identified through review of previous lead studies and a thorough on-site examination of the facility. For each source identified, an activity was identified that was thought to relate directly with emissions. During the study period, Doe Run collected and organized a set of detailed process logs that could be used to document particular activities in the plant. In most cases this information was recorded on shift logs. An on-site measurement campaign was performed during the six-month study period. During these campaigns, point source and fugitive sampling was conducted for the selected sources and the critical source parameters were measured. Laboratory analyses of all source samples were performed by an independent laboratory. The final step was the computation of emissions on an hourly, daily, and monthly basis. This information was compiled in spreadsheet form and put in tables for use in the modeling effort.

This hour-by-hour inventory of lead emission rates for all of the lead sources at the Herculaneum facility was used to provide input to the ISCST3 model. These rates were estimated using predictive equations developed from the actual measurement of sources at the Herculaneum facility.

3.3.1.4 Actual Value Modeling

Actual value modeling was conducted covering the study period. This modeling used the hour-by-hour emission inventory, the local meteorological database, and actual stack heights. The results of initial actual value modeling were compared to actual daily measured values at the three monitoring stations used in the receptor modeling study (Broad Street, High School, and Bluff). This required the use of flagpole heights at the model receptor locations to simulate the height of the probe inlets on the air monitors.

Upon comparison several concerns were raised and there were many performance problems with the initial dispersion modeling runs. The concentrations at the Broad Street monitor were underpredicted with the use of dry depletion algorithms. Among these was the apparent sensitivity of particle size and density with estimated ambient concentrations. Another issue examined at length was the initial dispersion characteristics of the fugitive volume sources. Sensitivities included the use of different depths for the calculation of volumes used in the dry depletion parameters. Additional sensitivities were conducted with receptors around the monitoring locations to help define concentration gradients near the sites. The elevated terrain option was used for this modeling, and building downwash was accounted for using the BPIP software routine.

During the modeling performance evaluation, comparisons with the quarterly averages for the study period, as well as daily and special CMB reconciliation period averages were evaluated. This comparison led to conclusions about the impact of different sources on the overall lead concentration at each monitor. The blast furnace fugitives were quickly identified as a major contributor to the overall lead concentration at each monitor. The contribution from the blast furnace was much higher in the ISCST3 modeling as compared to the CMB analysis. This lead to the conclusion that more analysis would be required to evaluate the impacts of blast furnace fugitives. A careful evaluation of the wind conditions on several reconciliation days showed that during low wind speeds (<5mph) the ISCST3 model was significantly overpredicting the contribution from blast furnace fugitives. In addition, during higher wind speed conditions, the model was underpredicting as compared to the CMB. Also, it was noted that during low wind speed conditions fewer fugitive emissions left the lower level of the blast furnace building, favoring emissions that occurred through the top of the building due to heat flux. This observation precipitated the insertion of wind speed scalars for the blast furnace fugitive sources. After several sets of sensitivity runs, one set of scalars was identified as the best in terms of model performance. The scalars were used to reduce emissions during periods of low wind speed and increased them during high wind speeds

The results of the actual value modeling were evaluated against performance with the monitoring sites and against the CMB predictions. The CMB model did not reconcile with the dispersion model, but the performance of each modeling exercise added confidence to the results of the dispersion model. The results of the dispersion model compare favorably with the monitored value. In particular, the predicted concentrations at the Broad Street monitor have the best correlation. On a day-to-day basis, the model does well in determining days with very high and very low concentrations. The uncertainties in the emission inventory, the meteorological measurements, and the model algorithms themselves cause the daily-predicted concentrations to vary from the measured values. On a quarterly basis, however, the overall average concentration predicts well, and it has been determined that the model is a good tool to assess control strategy effectiveness.

3.3.1.5 Design Value / Attainment Demonstration Modeling

The emission rate equations developed in the Emission Inventory were used to develop a "Design Value" emission inventory. This inventory represents maximum emission rates that reflect the highest production rates of each activity. A design value modeling report was prepared by Shell Engineering that further details this effort (*Design Value Modeling Report for the Doe Run Company – Smelting Division,* Shell Engineering & Associates, Inc., September 11, 2000).

Controls were then applied to these maximum emission rates to develop the control strategy inventory. The attainment demonstration modeling used eight full quarters of meteorological data (April 1997 through March 1999). This data was developed from the on-site met station.

The receptor network was quite extensive with receptors placed at 50 meter spacing at the property boundary, 100 meter spacing to approximately 1000 meters, and 200 meter spacing from 2 kilometers out to 5 kilometers. The 100-meter spacing portion of the network contains all the highest concentrations in the control strategy analysis. The control strategy modeling utilized "Good Engineering Practice" (GEP) stack height for the main stack.

Several sources in the actual value modeling will be physically removed or sealed as a result of the control strategy. These sources include three Charge Belt Roof Vents, three dross Aerovents, three sections of roof monitor on the north side of the refinery building, three sections of roof monitor in the south side of the refinery building, and two refinery building Aerovents. All of the individual blast furnace building fugitive sources were combined into one source to reflect the total enclosure of the blast furnace building. There were five other new sources added to the modeling to reflect other changes in plant layout and control equipment. These sources included two new stacks that will service the three new baghouses. One new baghouse will service the dross and blast furnace building fugitives, one will service the refinery building fugitives, and the last will be used to vent gases from the control of emissions directly from several of the kettle surfaces in the refinery. The other two additional sources are the dross and refinery building fugitives. In the control strategy modeling the building fugitives were modeled as the entire volume of the building because these fugitive could be emitted from any part of the building.

To evaluate naturally occurring lead in the atmosphere, distant sources of lead, and sources of lead not directly accounted for in the emission inventory, a background concentration was developed for the attainment demonstration. This evaluation examined measured concentrations at three monitors (Ursuline, Bluff, and Broad Street) when wind directions from the on-site meteorological station were determined to have "no plant" impact. The measured results on these types of days (47 days total) were averaged yielding a background estimate of 0.130 $\mu g/m^3$.

The attainment demonstration shows that the NAAQS for lead will be attained. The maximum predicted concentration, including background, is 1.456 $\mu g/m^3$. In general, there are two areas of concentrations over 1.0 $\mu g/m^3$, one near the Broad Street monitor and one along an area directly east of the plant.

Based on the results of the modeling and review, it is concluded that the lead NAAQS will be attained. Further details of the review of this modeling effort can be found in a September 15, 2000, memo (*Doe Run – Herculaneum State Implementation Plan Dispersion Modeling Review,* From Jeff Bennett, P.E. To John Rustige, P.E., September 15, 2000) and a November 22, 2000, memo (*Doe Run Herculaneum State Implementation Plan Dispersion Modeling Revisions,* From Jeff Bennett, P.E. To John Rustige, P.E., November 22, 2000) outlining the technical review of the modeling.

4.0 Control Strategy / Reasonable Further Progress

Appropriate capture and control efficiencies were applied to each emission source in the attainment demonstration modeling. This section is intended to provide a summary of the selected controls projects and their construction deadlines. Table 2 shows the individual source controls outlining the associated capture/control efficiency of each lead emission source.

Table 2
Summary of Attainment Demonstration Modeling and Control Efficiencies

Source / #	Throughput (Tons per Hour)	Capture/ Control Efficiency	Time Restriction
Unloading / 10001A,B,D	100	N/A	6 AM-6 PM
Fume Unloading / 10001C	1.67*	N/A	2 PM-4 PM
Sinter Trestle / 20001T	12.4	N/A	N/A
Sinter Storage / 20001S	12.4	N/A	N/A
Sinter Unloading / 20002	8.57	N/A	N/A
Sinter Unloading / 20003	8.57	N/A	N/A
Fume Loading / 20004	0.139*	N/A	N/A
Sinter Mix Room Conc./ 20005	191	N/A	N/A
Sinter Mix Room Fume/ 20005	3.5	N/A	N/A
Sinter Mix Room Sinter/ 20005	12.4	N/A	N/A
Main Stack	491	N/A	N/A
Blast Furnace Fug / 30002	116	99.8%	N/A
#5 Baghouse Vents / 30011-13	116	N/A	N/A
Dross Fugitives / 40001	52.5	99.8%	N/A
#7 Baghouse / 40001A	116 / 52.5	99.5%	N/A
Dross Heat Stacks / 40004-5	52.5	N/A	N/A
Refinery Fugitives	37	98.6%	N/A
#9 Baghouse / 50001A	37	99.5%	N/A
#8 Baghouse / 50001B	37	99.5%	N/A
Refinery Heat Stacks / 50011-18	37	N/A	N/A
Strip Mill Heat Stacks / 60001-2	4.2	N/A	N/A
Strip Mill Baghouse / 60003	4.2	N/A	N/A
Low Alpha Baghouse / 60004	0.04	N/A	N/A
Strip Mill Vents / 60005-8	4.2	N/A	N/A
Road A 18 Wheel / 70020-27	9.99 VMT	50%	N/A
Road A Automobile / 70020-27	1.19 VMT	50%	N/A
Road A Front End / 70020-27	1.79 VMT	50%	N/A
Road B1 Automobile / 70040-55	1.29 VMT	50%	N/A
Road B1 MOXY / 70040-55	30.70 VMT	50%	N/A
Road B2 Automobile / 70060-64	0.39 VMT	50%	N/A
Road B2 MOXY / 70060-64	0.26 VMT	50%	N/A
Road C MOXY / 70070-79	2.96 VMT	50%	N/A

Road D Automobile / 70080-85	3.42 VMT	50%	N/A
Road D Front End / 70080-85	2.30 VMT	50%	N/A

The selected control strategy is comprised of many individual projects. Each project has several phases including:

- Engineering – this includes preliminary design, selection of engineering contractors, contracts, basic engineering, plan preparation, and detailed engineering;
- Procurement – this includes receiving expenditure appropriations, requests for quotations, selection of quotations, contracts, fabrication, and delivery; and
- Construction, Permitting, Shakedown – this includes requests for quotations, selection of contractors, contracts, local permits, site preparation, equipment construction, completion of mechanical, completion of electrical, completion of insulation and painting, start-up and testing, normal operations, and complete shakedown.

Several of the control strategies must be staged in a certain progression for various reasons. For instance, buildings cannot be enclosed prior to adequate ventilation because of worker health concerns. While every attempt will be made to work simultaneously on these projects, some staggering will be necessary. Other timing considerations include equipment limitations, fabrication and delivery times, weather, permitting, and so on.

At this time, the schedule for each emission control project is very aggressive and represents the best possible estimate for construction time on each project. This schedule was developed taking into account the CAAA requirements as well as the practical considerations normally associated with similar construction projects.

The result of all this planning is an ambitious schedule that provides for implementation of the control measures as expeditiously as practicable, and prior to the attainment date.

4.1 Railcar Unloading

Emissions from this source occur as material is dumped from the railcar through a grate into an enclosed hopper. This activity occurs only during the day shift. The attainment demonstration modeling was conducted to reflect unloading events occurring only during the 6:00 AM to 6:00 PM timeframe. This source activity will, therefore, be limited to these hours of operation in the Consent Judgement.

This hours-of-operation limitation will be required after July 31, 2001, to meet the timing of the first set of construction projects.

4.2 Fume Unloading

Baghouse fume is sometimes loaded and dumped at the railcar unloader. This activity occurs about once per month. This intermittent activity is difficult to characterize when modeling because these activities do not occur within a predictable schedule. The attainment demonstration modeling characterized this activity using a 300 ton per quarter throughput. This throughput was then scaled to an hourly emission rate occurring during one hour per day. Because a specific hour was modeled each day, this activity will be limited to occur only between the 2:00 PM to 4:00 PM timeframe. Again, this limit will be included in the Consent Judgement.

This hours-of-operation limitation will be required after July 31, 2001, to meet the timing of the first set of construction projects.

4.3 Blast Furnace and Dross Plant Fugitives

Blast Furnace fugitive emissions were found to be quite significant, both by the dispersion and receptor models. This source includes the overall emissions from the building that escape uncontrolled. These emissions are generated by activities in the blast furnace building.

The building will be fully enclosed by a combination of siding, roofing, and doors. This includes the enclosing of the charge belt roof vents. It also includes removing or sealing the existing Aerovent fans from the roof. This will contain the emissions from the interior activities. The individual feed floors on the furnace feed floor elevation will be isolated from one another.

In addition, the CV-14 conveyor belt area is to be enclosed and ventilated with approximately 64,000 standard cubic feet per minute of air. New ventilation will also be installed to service the dross area. These ventilation gases, approximately 150,000 standard cubic feet per minute, will be drawn from near the roof of the dross building. These ventilation gases will be routed to a new baghouse (Baghouse Number 7) for control. The baghouse was credited with a 99.5% emission control efficiency. For modeling purposes, however, emissions from this source were based on a 0.0005 grains per dry standard cubic foot emission rate. Gases from Number 7 baghouse will be combined with gases from Number 9 baghouse and routed to a new 100 foot tall, 15 foot diameter stack.

In addition to the enclosure and ventilation projects, the method of handling dross in the dross plant is being modified to minimize handling and process them in a more direct mode to the conveyor system.

Controlling these fugitive emissions is estimated to cost $4,400,000 in capital expense.

The Consent Judgement will include strict enclosure and ventilation requirements including a requirement that Doe Run demonstrate air in-draft at all of the building openings. An initial compliance test will be required as well as continuing compliance by the methods set out in the Primary Lead MACT. The Consent Judgement also has baghouse performance standards, ventilation recordkeeping, and baghouse failure alarm requirements. The combination of all these efforts results in an estimation that 99.3 % of the fugitive emissions will be controlled.

This project is scheduled to be completed by July 31, 2002.

4.4 Refinery Department Projects

Refinery fugitive emissions were also found to be quite significant emission sources. The receptor model, in particular, indicated that this source was a primary contributor especially to the area north of the plant. This source includes the overall emissions from the refinery building that escape uncontrolled. These emissions are generated by all of the activities that occur in the refinery building.

The refinery department control projects will consist of the following changes: approximately 30,000 standard cubic feet per minute of kettle ventilation will be added to kettles number 9 through 11; the building siding will be repaired and improved, and the roof monitor will be removed or enclosed; the two Aerovents at the south end of the building will be removed and sealed; and in addition to the new kettle ventilation, approximately 250,000 standard cubic feet of air in new ventilation will be provided in the refinery building roof area.

These ventilation gases will be routed to baghouses for control. The kettle ventilation gases will be serviced by baghouse Number 8. These gases will be routed to a new 100 foot tall, 2.62 meter diameter stack. The Refinery Building ventilation gases will be routed to Number 9 baghouse. These gases will be combined with gases from Number 7 baghouse and routed to the new 100 foot tall, 15 foot diameter stack. Both baghouses have been credited with 99.5% control. For modeling purposes emission rates from these stacks was based on a 0.0005 grains per dry standard cubic foot emission rate.

In addition to the enclosure and ventilation projects, the method of handling refinery drosses is to be modified to minimize handling and process them in a more direct mode to the conveyor system.

Controlling these refinery fugitive emissions is estimated to cost $4,180,000 in capital expense.

The Consent Judgement will include strict enclosure and ventilation requirements including a requirement that Doe Run demonstrate air in-draft at all of the building openings. An initial compliance test will be required as well as continuing compliance by the methods set out in the Primary Lead MACT. The Consent Judgement also has baghouse performance standards, ventilation recordkeeping, and baghouse failure alarm requirements. The combination of all these efforts results in an estimation that 99.3 % of the fugitive emissions will be controlled.

This project is scheduled to be completed by July 31, 2001.

4.5 Roads

Emissions from these sources are created by vehicles on primary traffic routes causing dust on the road surface to become airborne. Two measures will be taken to reduce these impacts.

First, the current road water system will be a required element in the Consent Judgement. And second, the Consent Judgement will specify a road-sweeping schedule for the vacuum sweeper. This will include a requirement to vacuum road areas normally controlled by wetting during freezing conditions when sprinkling is not possible. The combined control efficiency of these measures is 50%.

The road controls will be required upon execution of the Consent Judgement, which is expected in December of 2000.

5.0 RACT Analysis

The CAAA requires that implementation plans for non-attainment areas provided for all RACM including emissions reductions obtained through the adoption of RACT.

EPA defines RACT as the lowest emission limitation that a particular source can meet by the application of control technology that is reasonably available considering technological and economic feasibility.

The technology feasibility of applying an emission reduction method to a particular source considers the source's process and operating procedures, raw materials, and physical plant layout. The process, operating procedures, and raw materials used by the source can affect the feasibility of carrying out process changes that reduce emissions and the selection of add-on emission control equipment. The operation of and longevity of control equipment can be significantly influenced by the raw materials used and the process to which it is applied. The feasibility of modifying processes or applying control equipment is also influenced by the physical layout of a particular plant. The space available in which to carry out such changes may limit the choices of control. Furthermore, control measures that are not proven effective or reliable in a commercial application would not be considered reasonably available.

Determinations of technological feasibility also consider adverse impacts on other resources. If a control technology increases pollution of bodies of water, creates additional solid waste disposal, or exacerbates worker exposure problems; the technology may not be considered reasonably available.

In general, economic feasibility considers the cost of reducing emissions and the difference in costs between the particular source for which RACT/RACM is being determined and other similar sources that have implemented emissions reductions. In practice however, economic feasibility is closely tied to technological feasibility, in that, a control measure would not be considered technologically (nor economically) feasible if the control measure was not proven reliable in a commercial application, bearing commercial economic considerations. In addition, if a control measure did not achieve a sufficient amount of emission reduction, technological (and economic) feasibility questions are not useful to pursue. The use of a Cost Effectiveness comparison, where Cost Effectiveness simply divides annualized cost by emissions reduced, can be a useful tool in comparing control measures for a *single given source*. Economic comparisons between sources and between commercial installations involve so many variables that any conclusions drawn from them are of informational quality at best.

Determinations of RACT/RACM must also consider the attainment needs of the area. RACT/RACM does not require that all available measures be implemented, only that attainment of the NAAQS be demonstrated.

In the previous SIP (1993) Doe Run prepared a RACT/RACM evaluation, and the plant has not changed significantly. All RACT/RACM measures were implemented as part of the previous SIP. In addition, 40 CFR Part 63 Subpart TTT, the Federal Maximum Achievable Control Technology (MACT) standard for Primary Lead Smelters, now applies to this facility. MACT standards typically require measures beyond that required for RACT.

Table 3 summarizes the results of a current analysis of RACT/RACM:

TABLE 3
Doe Run Herculaneum
RACT/RACM Analysis

Description of Measure	Explanation	Used in Control Strategy
Pave, vegetate or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads	All primary traffic routes inside the plant have been paved. Unpaved areas are used only for material storage.	Yes
Require dust control plans for construction or land clearing projects	Such sources have not been identified in the emission inventory or modeling study. Nearly all of the land near the active areas of the plant has been cleared and much of it is paved. These types of sources are not addressed in the control strategy. Doe Run will address these types of issues on a case-by-case basis after the SIP controls are implemented	No
Require haul trucks to be covered	This measure is currently standard practice and will be incorporated in the work practice manual.	Yes
Provide for traffic rerouting around or rapid cleanup of temporary sources of dust on paved roads	Currently Doe Run operates a vacuum sweeper that operates on an aggressive schedule. This facilitates quick cleanups of spills of any lead-bearing dust on the paved areas in the plant. The work practice manual will address the issue of driving through spills.	Yes
Develop traffic reduction plans for unpaved roads	All primary traffic routes inside the plant have been paved. Unpaved areas are used only for material storage.	Yes
Develop traffic reduction plans for unpaved roads	Areas in the plant that are currently not paved remain unpaved because they are not routinely used, and serve only as material storage areas.	No
Limit use of recreational vehicles on open land	Recreational vehicles are not permitted in the Doe Run, Herculaneum plant	Yes

Require improved material specifications for and reduction of usage of skid control sand or salt	Use of these materials is very limited in the Doe Run, Herculaneum plant. These materials do not contain appreciable amounts of lead and, therefore, its control is not applicable to the control strategy	No
Require curbing and pave or stabilize shoulders of paved roads	All primary traffic routes inside the plant have been paved. Shoulders of roads in the plant have not been identified as sources of lead-bearing dust.	No
Pave or chemically stabilize unpaved roads	All primary traffic routes inside the plant have been paved. Unpaved areas are used only for material storage.	Yes
Pave or chemically stabilize unpaved parking areas	All primary traffic routes inside the plant have been paved. Parking areas are paved.	Yes
Require dust control measures for material storage piles	Most of the lead-bearing storage piles are located inside buildings. Covering outdoor storage piles is not feasible because of the size of these piles and because the modeling has shown the impacts from these sources to be relatively small.	No
Provide stormwater drainage to prevent water erosion onto paved roads	Much of the paved areas feed a stormwater collection system to minimize erosion and treat the runoff. Erosion of lead-bearing material onto paved roads, and subsequent re-entrainment of the dust has not been identified as a significant contributor of lead emissions in the plant.	Yes
Require revegetation, chemical stabilization, or other abatement of wind erodible soil	The emission inventory and dispersion modeling do not show wind erosion events as significant contributors of lead emissions at the Doe Run, Herculaneum facility.	No
Rely upon the soil conservation requirements to reduce emissions from agricultural operations	No agricultural operations involving soil disturbance occur at the Doe Run, Herculaneum plant.	No

6.0 Contingency Measures

Pursuant to Section 172 of the CAAA, a set of contingency measures has been prepared that could be implemented if required by a finding of the EPA Regional Administrator that a) the nonattainment area has failed to make RFP, b) there is a failure to implement a control strategy to attain the NAAQS by the statutory deadline, or c) monitoring shows that the nonattainment area has failed to attain the NAAQS by the statutory deadline.

The modeling was revisited and reviewed to determine what contingency controls could be both effective and permanent. Several contingency measures have been identified.

The attainment date is August 14, 2002, so for the third calendar quarter of 2002, or in any quarter thereafter, an exceedance of the NAAQS is monitored, the contingency controls will be implemented. Projects 1 through 5 will be implemented within 6 months. Project 6 will be implemented within 9 months.

Contingency Measures:

1. Modify Cooler BH dilution air intake.

2. Modify roof monitor in the Sinter Plant Mixing Room (SPMR) with passive filters.

3. Enclose railcar fume loading station at # 5 Baghouse.

4. Enclose North end of the railcar unloader.

5. Enclose North end of # 1 trestle.

6. Modify sinter machine inlet to # 3 Baghouse.

In addition to these projects Doe Run has agreed to a production curtailment scheme. If the area fails to attain the NAAQS standard after the above controls are installed, then a production curtailment scheme will be imposed. The detailed provisions for this curtailment scheme is set out in the Consent Judgement. Doe Run will be given three options. The first option is to reduce non-main stack emissions by 20%. The second option will be to limit production to 50,000 tons of refined lead produced. And the third option involves controlling non-main stack emissions by something less than 20%, and limiting production. This third option uses a formula to establish the new production limit given the amount of additional controls.

Doe Run will complete all of the planning and engineering work for the contingency measures on or before July 1, 2002. On or before July 1, 2002, Doe Run will also maintain current bids on the materials necessary to implement each of the contingency measures.

If Doe Run identifies and demonstrates to APCP's and EPA's satisfaction alternative control measures that would achieve equal or greater air quality improvements than the contingency measures outlined above, Doe Run may substitute any such controls. Changes to the contingency measures will require a public hearing since this type of change would require a formal SIP revision.

7.0 Enforcement Documents

There are three documents that make the SIP controls state enforceable. These are the lead rule (10 CSR 10-6.120), the Consent Judgement, and the Work Practice Manual.

The lead rule provides emission limits and references the Work Practice Manual, thereby making this document enforceable. The public hearing for the amendment to the lead rule was held at the October 26, 2000 Missouri Air Conservation Commission meeting (October 26, 2000). The adoption meeting is scheduled for December 7, 2000. The order of rulemaking will then be published in the Missouri Register on February 15, 2001, and published in the Code of State Regulations on February 28, 2001. Upon publication in the Code of State Regulations, the APCP plans to formally submit this to EPA under separate cover. The effective date of the rule will then be on March 30, 2001.

The Consent Judgement is a comprehensive document that will be entered into Jefferson County Court. This document establishes the responsibilities of the parties, and addresses the following major topics: 1.) Emission control project schedules and associated performance criteria, 2.) Stack testing, 3.) Process throughput and hours-of-operation limitations, 4.) Recordkeeping requirements, 5.) Contingency measures, 6.) Stipulated penalties, and 7.) Dispute Resolution.

The Work Practice Manual is meant to function as a guide to plant operators. The manual explains how to minimize emissions by specifying the way certain plant functions are conducted.

Upon approval of the SIP, these enforceable conditions will become elements of the SIP and federally enforceable.

7.1 10 CSR 10-6.120 Restriction of Emissions of Lead From Specific Lead Smelter-Refinery Installations.

Title 10 – DEPARTMENT OF NATURAL RESOURCES

Division 10 – Air Conservation Commission

Chapter 6 – Air Quality Standards, Definitions, Sampling and Reference Methods and Air Pollution Control Regulations for the Entire State of Missouri

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

PURPOSE: This rule establishes maximum allowable rates of emissions of lead from stacks in specific lead-smelter installations, except where New Source Performance Standards apply (as provided in 10 CSR 10-6.070). It also provides for the operation and maintenance of equipment and procedures specific to controlling lead emissions to the ambient air, both from stacks and from the fugitive emissions that escape stack collection systems at these installations.

(1) General Provisions.

(A) Application. This rule shall apply to existing installations in Missouri engaged in specific smelting and refining for the production of lead.

(B) Operation and Maintenance of Lead Emissions Control Equipment and Procedures. The owner or operator of any specific lead smelter shall operate and maintain all lead emissions control equipment and perform all procedures as required by this rule.

(C) Methods of Measurement of Lead Emissions.

1. The method of determining the concentration of visible emissions from stack sources shall be as specified in 10 CSR 10-6.030(9).

2. The method of measuring lead in stack gases shall be the sampling method as specified in 10 CSR 10-6.030(12).

3. The method of quantifying the determination of compliance with the emission limitations from stacks in this rule shall be as follows:

A. Three (3)-stack samplings shall be planned to be conducted for any one (1) stack within a twenty-four (24)-hour period in accordance with paragraph (1)(C)2. If this cannot be done due to weather, operating or other preventative conditions that develop during the twenty-four (24)-hour period, then the remaining samplings may be conducted in a reasonable time determined by the director following the twenty-four (24)-hour period;

B. Each stack sample shall have a sampling time of at least one (1) hour;

C. The process(es) producing the emissions to that stack being tested shall be operating at a minimum of ninety percent (90%) of capacity of the process(es) for the full duration of the samplings; and

D. The emission rate to be used for compliance determination shall be quantified by using the following formula:

Ec = T avg lbs per hour x 24 hours = lbs per 24 hours

Where:

Ec = 24-hour emission rate extrapolated from stack sampling results used for compliance determination; and

T avg = Summation of hourly emission rates of three (3) stack sampling results, divided by three (3) for the average hourly rate.

4. The method of measuring lead in the ambient atmosphere shall be the reference method as specified in 10 CSR 10-6.040(4)(G).

(D) Operational Malfunction.

1. The owner or operator shall maintain a file which identifies the date and time of any significant malfunction of plant process operations or of emission control equipment which results in increased lead emissions. The file also shall contain a description of any corrective action taken, including the date and time. 10 CSR 10-6.050 Start-Up, Shutdown and Malfunction Conditions shall apply.

2. All of these files relating to operational malfunction shall be retained for a minimum of two (2) years and, upon request, shall be made available to the director.

(2) Provisions Pertaining to Limitations of Lead Emissions from Specific Installations.

(A) Doe Run Primary Lead Smelter-Refinery at Glover, Missouri.

1. This installation shall limit lead emissions into the atmosphere to the allowable amount as shown in Table IA.

Table IA

Stack Names	**Emissions Limitation (lbs per 24 hours)**
Main	184.2
Ventilation Baghouse	125.4
Blast Furnace	82.3

2. Fugitive lead emissions from lead production processes.

A. This installation shall limit production of lead from processes that emit lead to the ambient air to the allowable amount as shown in Table IB and Table IC.

Table IB

Process Name	**Throughput**

Process Name	Throughput (tons per calendar quarter)
Sinter Plant—Material across Sinter Machine	202,000
Blast Furnace—Lead Bearing Material	75,000

Table IC

Process Name	Throughput (tons per day)
Sinter Plant—Material across Sinter Machine	3120

B. Record Keeping. The operator shall keep records of daily process throughput corresponding with the processes in Table IB in subparagraph (2)(A)2.A. These records shall be maintained on-site for at least three (3) years and made available upon request of the director.

(B) Doe Run Primary Lead Smelter-Refinery in Herculaneum, Missouri. This installation shall limit lead emissions into the atmosphere to the allowable amount as shown in Table II.

Table II

Stack Name	Emissions Limitation (lbs per 24 hours)
Main Stack	794.0
Number 7 &9 Baghouse Stack	56.6
Number 8 Baghouse Stack	8.2

(C) Doe Run Lead Smelter-Refinery near Buick, Missouri. The following applies to Doe Run's 1998 and ongoing lead producing operations at this installation.

1. Lead emissions from stacks. This installation shall limit lead emissions into the atmosphere to the allowable amount as shown in Table III.

Table III

Stack Name	Emissions Limitation (lbs per 24 hours)
Main Stack	540.0

2. Fugitive lead emissions from lead production processes. This installation shall limit production from processes that emit lead to the ambient air to the allowable amount as shown in Table IV.

Table IV

Process Name	Throughput (tons per day)	
Blast Furnace	1000	Charge
Reverb Furnace	360	Charge
Rotary Melt	240	Charge
Refinery	648	Lead Cast

3. Record keeping. The operator shall keep records of daily process throughput corresponding with the processes in Table IV in subparagraph (2)(C)2. of this rule. These records shall be maintained on-site for at least three (3) years and made available upon the request of the director.

(3) Provisions Pertaining to Limitations of Lead Emissions From Other Than Stacks at All Installations.

(A) The owner or operator shall control fugitive emissions of lead from all process and area sources at an installation by measures described in a work practice manual identified in subsection (3)(B). It shall be a violation of this rule to fail to adhere to the requirements of these work practices.

(B) Work Practice Manual.

1. The owner or operator shall prepare, submit for approval and then implement a process and area-specific work practice manual that will apply to locations of fugitive lead emissions at the installation.

2. The manual shall be the method of determining compliance with the provisions of this section. Failure to adhere to the work practices in the manual shall be a violation of this rule.

3. Any change to the manual proposed by the owner or operator following the initial approval shall be requested in writing to the director. Any proposed change shall demonstrate that the change in the work practice will not lessen the effectiveness of the fugitive emission reductions for the work practice involved. Written approval by the director is required before any change becomes effective in the manual.

4. If the director determines a change in the work practice manual is necessary, the director will notify the owner or operator of that installation. The owner or operator shall revise the manual to reflect these changes and submit the revised manual within thirty (30) days of receipt of notification. These changes shall become effective following written approval of the revised manual by the director.

(C) Recordkeeping.

1. The operator shall keep records and files generated by the work practice manual's implementation.

2. The work practice manual shall contain the requirement that records of inspections made by the operator of fugitive emissions control equipment such as hoods, air ducts and exhaust fans be maintained by the operator.

3. Records shall be kept for a minimum of two (2) years at the installation and shall be made available upon request of the director for purposes of determining compliance.

AUTHORITY: sections 643.050, RSMo Supp. 1999 and 643.055, RSMo Supp. 1999. Original rule filed Aug. 4, 1988, effective Dec. 29, 1988. Amended: Filed Sept. 5, 1990, effective March 14, 1991. Amended: Filed March 4, 1993, effective Oct. 10, 1993. Amended: Filed Aug. 3, 1993, effective April 9, 1994. Amended: Filed Feb. 16, 1994, effective Aug. 28, 1994. Amended:Filed Nov. 14, 1995, effective June 30, 1996. Amended: Filed March 16, 1998, effective Oct. 30, 1998. Amended: Filed August 11, 2000.

PUBLIC ENTITY COST: This proposed amendment will cost $1,770 in FY2001. For the years after FY2001, the annualized aggregate cost is $7,080 for the life of the rule.

PRIVATE ENTITY COST: This proposed amendment will cost $30,129,680 for calendar years 1995 through 2002. For the years after 2002, the annualized aggregate cost is $913,600 for the life of the rule.

FISCAL NOTE
PUBLIC ENTITY COST

I. RULE NUMBER

Title: 10 – Department of Natural Resources

Division: 10 – Air Conservation Commission

Chapter: 6 – Air Quality Standards, Definitions, Sampling and Reference Methods and Air Pollution Control Regulations for the Entire State of Missouri

Type of Rulemaking: Proposed Amendment

Rule Number and Name: 10 CSR 10-6.120 Restriction of Emissions of Lead From Primary Lead Smelter-Refinery Installations

II. SUMMARY OF FISCAL IMPACT

Affected Agency or Political Subdivision	Estimated Cost of Compliance in the Aggregate
MDNR – Air Pollution Control Program & Southeast Regional Office	$7,080 Total Annual Aggregate Costs

III. WORKSHEET

Missouri Department of Natural Resources	FY 2001	FY 2002
Air Pollution Control Program, Environmental Engineer III	(3 mos)	
Base Wages $45,156 x 0.05 FTE =	$ 564	$2,258
Expense and Equipment $8,114 x 0.05 =	$ 101	$ 406
Fringe Benefits $45,156 x 26.4% x 0.05 =	$ 149	$ 596
Indirect Benefits 24.83% x (Wages + Ex.&Eq. + Fringe) =	$ 202	$ 809
Southeast Regional Office, Environmental Specialist III		
Base Wages $31,992 x 0.05 FTE =	$ 400	$1,600
Expense and Equipment $7,801 x 0.05 =	$ 98	$ 390
Fringe Benefits $31,992 x 26.4% x 0.05 =	$ 106	$ 422
Indirect Benefits 24.83% x (Wages + Ex.&Eq. + Fringe) =	$ 150	$ 599
TOTAL	$1,770	$7,080

Total Aggregate Cost Per Year is $7,080 for the life of the rule.

IV. ASSUMPTIONS

1. The time required for additional inspection and recordkeeping review is approximately 2.5 weeks for each position or 0.05 FTE.

2. Salary figures are based on the merit system pay plan for the years considered.

3. The fringe benefit calculations, expense and equipment calculations, and the indirect benefit calculations were based upon information provided by the Missouri Department of Natural Resources Accounting Program

4. Cost of living and inflation are not included in the estimates and all costs are based on year 2000 dollars.

FISCAL NOTE
PRIVATE ENTITY COST

I. RULE NUMBER

Title: 10 - Department of Natural Resources

Division: 10 – Air Conservation Commission

Chapter: 6 – Air Quality Standards, Definitions, Sampling and Reference Methods and Air Pollution Control Regulations for the Entire State of Missouri

Type of Rulemaking: Proposed Amendment

Rule Number and Name: 10 CSR 10-6.120 Restriction of Emissions of Lead From Primary Lead Smelter-Refinery Installations

II. SUMMARY OF FISCAL IMPACT

Estimate of the number of entities by class which would likely be affected by the adoption of the proposed rule:	Classification by types of the business entities which would likely be affected:	Estimate in the aggregate as to the cost of compliance with the rule by the affected entities:
1	Primary Lead Smelter	$30,129,680 for years 1995 through 2002,and $913,600 for years 2003 and beyond

III. WORKSHEET

		1995-1999	2000	2001	2002	2003
SIP Capital Costs		$16,680,250	$2,565,000	$3,886,000	$3,886,000	
Operating & Maintenance Costs	New Blast Furnace / Dross Furnace Area Baghouse			$ 252,000	$ 504,000	$504,000
	Refinery Building Filters & Alloy Kettle Ventilation			$ 64,800	$ 129,600	$129,600
	CV-10 & Trestle Baghouse and Enclosure			$ 42,000	$ 84,000	$ 84,000
	Dust Handling System for Dross Plant and Refinery			$ 63,000	$ 126,000	$126,000
Record Keeping			$ 8,000	$ 15,000	$ 10,000	$ 10,000
Additional SIP Operating Costs		$ 1,668,025	$ 26,000	$ 60,000	$ 60,000	$ 60,000
TOTAL		**$18,348,280**	**$2,599,000**	**$4,382,800**	**$4,799,600**	**$913,600**

The total costs presented in this table represent all of the costs associated with the State Implementation Plan (SIP) Revision. Since the majority of the emission control projects are physically associated with the main stack, all of the emission reduction costs are included.

The total costs for 1995 through 1999 include emission controls installed at the Doe Run facility prior to the requirements of this rule. These projects included paving, filter bag and fan upgrades in baghouses, a street sweeper purchase, truck tire wash station, main stack replacement, several building enclosure and ventilation projects, and air injection controls for the blast furnace. Doe Run has already incurred these costs, but they are included here for completeness.

Additional SIP Operating Costs are the personnel and utility (electricity) costs associated with manning and operating the SIP controls. The cost estimated for 2003 is associated only with the operation and maintenance of the control equipment. Total Aggregate Cost Per Year is $913,600 for years 2003 and beyond for the life of the rule.

IV. ASSUMPTIONS

1. The cost data was provided by the Doe Run Company. It includes the cost of installing, operating, and maintaining the air pollution control devices associated with the State Implementation Plan control strategy. It also includes the cost of record keeping.

2. The life of the rule cannot be reasonably estimated. The smelter has been in operation for over 100 years, and there is no indication of plans to halt operation.

3. Inflation is not included in this estimate, and all costs are calculated in year 2000 dollars.

7.2 Consent Judgment

IN THE

CIRCUIT COURT OF JEFFERSON COUNTY

STATE OF MISSOURI

STATE OF MISSOURI ex rel. Jeremiah W. (Jay) Nixon, the Missouri Department of Natural Resources, and the Missouri Air Conservation Commission Plaintiff	)	
v.	)	Case No.___________
The Doe Run Resources Company	)	
Defendant.	)	

CONSENT JUDGEMENT

Come Now The Doe Run Resources Corporation (Doe Run), Jeremiah W. (Jay) Nixon, the Attorney General of Missouri, the Missouri Department of Natural Resources (MDNR), and the Missouri Air Conservation Commission (Commission), and state as follows:

1. The state of Missouri, through its Attorney General, the MDNR, and the Commission, for, and in consideration, of Doe Run's agreement to complete the implementation of control strategies upon the time schedules as more fully set forth in the Consent Judgement below, and Doe Run for and in consideration of the state of Missouri's agreement to accept the implementation of said control strategies as sufficient, under current information and belief, to attain the federal and Missouri ambient air quality standard for lead and to accept the time table for completion of such control strategies as being as expeditious as practicable.

2. To this end, MDNR and the Commission are preparing a State Implementation Plan (SIP) revision to demonstrate attainment and maintenance of the national ambient air quality standard for lead in Herculaneum, Jefferson County, Missouri. As part of the SIP revision, a lead emissions reduction program at Doe Run's Herculaneum, Missouri, facility is required. MDNR, the Attorney General, the Commission, and Doe Run agree that the Court may enter the Judgement set forth below, to be binding on the parties, providing for a lead emission reduction program, which Doe Run hereby agrees to undertake and complete

on the schedule set forth in the Judgement. The parties, by their signatures hereto, acknowledge that they have read and understand the terms of this Judgement and agree to be bound thereby.

This matter coming before the Court on the petition filed by the plaintiff state of Missouri, the Court having jurisdiction over the subject matter and the parties pursuant to §643.151, RSMo; and being fully advised in the premises;

IT IS THEREFORE ORDERED, ADJUDGED, AND DECREED that Doe Run undertake and complete, at its Herculaneum, Missouri, facility, the following lead emission reduction program, on the schedule set forth below. These control measures and the associated schedules are the reasonably available control measures to be implemented to attain the national ambient air quality standard for lead (as required by Section 172(c) of the Clean Air Act Amendments of 1990).

A. Projects Required as SIP Control Measures:

1. Refinery Department Modifications

a. On or before July 31, 2001, and at all times thereafter, Doe Run shall install siding and roofing, engineered as a permanent total enclosure, to minimize the escape of uncontrolled air and lead-bearing particles from the Refinery Building. The existing Refinery Building roof monitor shall be removed and/or enclosed. The two existing roof ventilation fans (Aerovents) on the South end of the Refinery Building roof shall be removed or sealed. Doe Run's Work Practices Manual (Exhibit B, which, by this reference is incorporated herein) shall outline the procedure for keeping building doors closed, except to allow for entering and exiting the building.

b. On or before July 31, 2001, and at all times thereafter, Doe Run shall install and operate a new ventilation system for kettles Number 9 through Number 11. On or before July 31, 2001, a new baghouse (Number 8 Baghouse) shall be installed and operated to service the kettle surface ventilation gases (kettles Number 9 through Number 11), the existing surface kettle ventilation gases (kettles Number 0 through Number 3), and the CV-10 conveyor area. This system shall be designed with a ventilation rate of 80,000 standard cubic feet per minute. Number 8 Baghouse shall be designed to meet a total suspended particulate specification of 0.022 grains per dry standard cubic foot of air and utilize Teflon membrane filter bags. The gases from Number 8 Baghouse shall be routed to a new 100-foot stack. The rate of ventilation shall be continuously measured at a point immediately before the gases enter Number 8 Baghouse, and the ventilation system shall be operated at all times except during Number 8 Baghouse maintenance, when all kettles that the ventilation serves are empty, or during other periods non-representative of normal operations. Alternatively, Doe Run shall develop a calculation for the relationship of fan amperage to ventilation rates and continuously record fan amperage. MDNR shall be given reasonable notice and opportunity to oversee the development of this calculation and approve it prior to its use.

c. On or before July 31, 2001, and at all times thereafter, the Refinery Building shall be ventilated to control fugitive emissions of lead from the building. This system shall be designed with a ventilation rate of 250,000 standard cubic feet of air per minute, and utilize Teflon membrane filter bags. The ventilation of the Refinery Building after enclosure shall be designed to maintain an in-draft at all Refinery Building openings under normal operating conditions. Doe Run shall conduct an initial in-draft compliance test and maintain records that demonstrate continued compliance with this in-draft requirement. The initial test and compliance monitoring shall be conducted in a manner consistent with the Primary Lead Smelter Maximum Achievable Control Technology Standard (40 CFR, Part 63, Subpart TTT). On or before July 31, 2001, a new baghouse (Number 9 Baghouse) shall be installed and operated to service the Refinery Building ventilation gas stream. Number 9 Baghouse shall be designed to meet a total suspended particulate specification of 0.022 grains per dry standard cubic foot of air and utilize Teflon membrane filter bags. The gases from Number 9 Baghouse shall be routed to a new 100-foot stack. The rate of ventilation shall be continuously measured at a point immediately before the gases enter Number 9 Baghouse, and the ventilation system shall be operated at all times except during Number 9 Baghouse maintenance or during other periods nonrepresentative of normal operations. Alternatively, Doe Run shall develop a calculation for the relationship of fan amperage to ventilation rates and continuously record fan amperage. MDNR shall be given reasonable notice and opportunity to oversee the development of this calculation and approve it prior to its use.

d. On or before July 31, 2001, and at all times thereafter, continuous particulate monitors such as Triboflows or MDNR approved equivalents shall be installed and operated to monitor gases exiting Number 8 and Number 9 Baghouses. These continuous particulate monitors shall be designed to alert operators when particulate levels in the gases exiting the new baghouses are above those measured during normal bag-cleaning cycles. The output signals from these monitors shall be recorded during any lead emission stack tests. The setpoint of these alarms shall be set immediately after comprehensive inspections of Number 8 and Number 9 Baghouses. Doe Run shall give MDNR reasonable notice of the planned inspections so that MDNR inspectors have the opportunity to oversee these inspections. The alarms shall be operated and properly maintained such that they are individually out of service for no more than 48 hours per each calendar quarter. Doe Run shall maintain all necessary spare parts to assure that an extended alarm outage does not occur. Doe Run shall provide MDNR with a quarterly report within 30 days of the end of each calendar quarter summarizing the operations of Number 8 and Number 9 Baghouses, including ventilation rates, low flow or down-time episodes, alarm setpoints, alarm incidents, and any corrective actions taken during these events.

2. Dross plant and Refinery Dross system

a. On or before July 31, 2001, and at all times thereafter, Doe Run shall install and operate a new dross handling system, designed to minimize the handling of dross materials. The dross shall be water quenched and screw conveyed directly to a holding hopper prior to the conveyor belt transfer system.

3. Blast Furnace and Dross Plant Projects

a. On or before July 31, 2002, Doe Run shall install siding and roofing, engineered as a permanent total enclosure, to minimize the escape of uncontrolled air and lead-bearing particles from the Dross and Blast Furnace Building. The existing charge belt roof vents shall be removed and/or enclosed. The three existing roof ventilation fans (Aerovents) in the roof above the Dross area shall be removed and/or sealed. The individual feed floors and the furnace feed floor elevation shall be isolated from each other by the construction of permanent walls and doors. Doe Run's Work Practices Manual (Exhibit B) shall outline the procedure for keeping building doors closed, except to allow for entering and exiting the building.

b. On or before July 31, 2002, and at all times thereafter, Doe Run shall enclose and ventilate the CV-14 conveyor belt area. A ventilation system shall be designed such that additional ventilation rates of 100,000 and 150,000 standard cubic feet per minute shall serve the CV-14 conveyor belt area and Dross Plant roof area, respectively. The ventilation of the Blast Furnace and Dross Plant Buildings after enclosure shall be designed to maintain an in-draft at all building openings under normal operating conditions. Doe Run shall conduct an initial in-draft compliance test and maintain records that demonstrate continued compliance with this in-draft requirement. The initial test and compliance monitoring shall be conducted in a manner consistent with the Primary Lead Smelter Maximum Achievable Control Technology Standard (40 CFR Part 63 Subpart TTT). On or before July 31, 2002, a new baghouse (Number 7 Baghouse) shall be installed and operated to service these ventilation gases. Number 7 Baghouse shall be designed to meet a total suspended particulate specification of 0.022 grains per dry standard cubic foot of air and utilize Teflon membrane filter bags. The gases from Number 7 Baghouse shall be routed to a new 100-foot stack. The rates of ventilation shall be continuously measured at a point immediately before the gases from the CV-14 conveyor area and Dross Plant roof areas combine. Alternatively, Doe Run shall develop a calculation for the relationship of fan amperage to ventilation rates and continuously record fan amperage. MDNR shall be given reasonable notice and opportunity to oversee the development of this calculation and approve it prior to its use. The ventilation system shall be operated at all times except during Number 7 Baghouse maintenance or during other periods non-representative of normal operations.

c. Doe Run shall continue to operate the existing ventilation system serving CV-14 conveyor belt area that was designed with a ventilation rate of 64,000 standard cubic feet per minute. Number 6 Baghouse shall continue to service this gas stream. On or before July 31, 2002, the ventilation rates of the existing CV-14 ventilation system shall be continuously measured at a point immediately before the gases enter Number 6 Baghouse. Alternatively, Doe Run shall develop a calculation for the relationship of fan amperage to ventilation rates and continuously record fan amperage. MDNR shall be given reasonable notice and opportunity to oversee the development of this calculation and approve it prior to its use.

4. The requirements of 40 CFR Part 63 Subpart TTT shall be maintained, particularly the building in-draft requirements. With the exception of the other specific monitoring and recordkeeping requirements set out in this Judgement, only those requirements of 40 CFR Part 63 Subpart TTT that apply to the State Implementation Plan controls outlined in this document shall be enforceable under this document. Upon state adoption of 40 CFR Part 63 Subpart TTT, all references in this Judgement to this Subpart shall be replaced with the state regulation that incorporates the federal regulation by reference, specifically, 10 CSR 10-6.075 (4)(TTT).

5. Existing Road Dust Controls

a. Doe Run shall continue to wash roadways with fire-hoses in the plant according to procedures outlined in the Work Practice Manual (Exhibit B). When the ambient temperature is below 39 F, the procedure may be suspended. Doe Run shall continue to operate the existing street sweeping program. Weather permitting the sweeper shall be operated 6 hours per day, Monday through Friday, on all paved roadways within and around the plant. The sweeper shall be operated on those roadways typically controlled by fire-hosing when the ambient temperature does not permit fire-hosing and where those areas are accessible to the sweeper.

B. Enforcement Measures:

1. Stack Testing:

Compliance with the emission rates specified in 10 CSR 10-6.120 shall be demonstrated to MDNR by Doe Run, through tests conducted at Doe Run's expense in accordance with approved EPA methods. Lead emission rates shall be determined in accordance with 40 CFR Part 63, Subpart TTT by Doe Run and approved by MDNR, on a pounds per 24 hour basis. Testing shall be conducted in accordance with 40 CFR 63.1543 (d) and (e). Upon state adoption of 40 CFR Part 63, Subpart TTT, lead emission rates shall be determined in accordance with 10 CSR 10-6.075 (4)(TTT), on a pound per 24-hour basis. Doe Run shall notify MDNR of the proposed test dates and provide a copy of the test protocol to MDNR at least 30 days before testing. Test reports, including raw data, shall be submitted to MDNR within 60 working days of the completion of the test report.

2. Notification of Completion Dates:

Doe Run shall provide MDNR with written notification of completion of each project specified in Section A within 30 days of completion.

3. Limitation of Hours of Operation:

On or before July 31, 2001, and at all times thereafter, the rail car unloader shall be operated only between the hours of 6 AM and 6 PM. On or before July 31, 2001, and at all times thereafter, the rail car unloader shall unload baghouse fume only between the hours of 2 PM and 4 PM.

4. Process Weight Limits:

a. Sinter plant production shall be limited to 283,920 tons of finished sinter per each calendar quarter.

b. Blast furnace production shall be limited to 114,005 tons of lead contained in lead-bearing material charged per each calendar quarter.

c. Refinery production shall be limited to 80,808 tons of lead metal cast per each calendar quarter.

5. Work Practice Manual:

Doe Run shall, to the extent consistent with this Judgement and 10 CSR 10-6.120, adhere to the "Work Practice Manual" (Exhibit B).

6. Record-Keeping:

Doe run shall maintain the following records for MDNR review for a minimum of 5 years following the recording of information.

a. Doe Run shall maintain a file that states for each quarter, i.) Sinter machine throughput, ii.) Blast furnace throughput, and iii.) Refined lead produced.

b. Doe Run shall maintain a file of the date, time, findings, and corrective actions taken for all baghouse inspections scheduled in the Work Practice Manual, Exhibit B.

c. Doe Run shall maintain a file that records any upset operating conditions or material spills that affect lead emissions.

Pending resolution of any enforcement action initiated by MDNR, Doe Run shall maintain all pertinent records indefinitely.

7. At a minimum, and Doe Run shall continue the ambient air monitoring for lead at Station 3-Dunklin High School, Station 5- Bluff, and Station 7- Broad Street in accordance with the every sixth day national monitoring schedule. Any deviations from the every sixth day monitoring schedule must be approved by MDNR and EPA. Doe Run shall continue to collect meteorological data from the local meteorological station in accordance with the meteorological monitoring protocol until EPA has formally redesignated the Herculaneum Nonattainment Area as an attainment area for lead.

8. On or before July 31, 2001, and at all times thereafter, Doe Run shall install a fence to preclude public access. A map showing the fencing is attached as Exhibit A, which, by this reference is incorporated herein.

C. Projects required as Contingency Control Measures

If the air quality data for the third calendar quarter of 2002, or any quarter thereafter, exceeds the 1.5 µg Pb/m3 quarterly average lead standard, MDNR shall notify Doe Run of such exceedence. In addition, in the event Doe Run fails to make reasonable further progress, which term is defined as failure to install or implement any of the above-control strategies on the schedule set forth herein, Doe Run shall begin implementation of the contingency measures. Doe Run shall begin implementation of contingency measures upon receipt of MDNR's notice, according to the following schedule:

Projects 1 through 5 will be implemented within 6 months of receipt of the notice. Project 6 will be implemented within 9 months of receipt of the notice.

Contingency Measures:

1. Modify Cooler BH dilution air intake.
2. Modify roof monitor in the Sinter Plant Mixing Room (SPMR) with passive filters.
3. Enclose railcar fume loading station at Number 5 Baghouse.
4. Enclose North end of the railcar unloader.
5. Enclose North end of Number 1 trestle.
6. Modify sinter machine inlet to Number 3 Baghouse.

In the event that there is a second violation of the quarterly lead standard following implementation of the contingency measures listed above, Doe Run shall comply with one of the following:

1. The aggregate actual quarterly emissions from all fugitive and stack lead emission sources at the facility, except from the main stack, shall not exceed 80% of the aggregate estimated quarterly emissions from these same sources which were used to develop the SIP control strategy. The main stack is the existing 550 foot stack through which process gas streams are emitted to the atmosphere. The actual emissions shall be determined using the most current facility throughputs, and test data. The most accurate emission factors may be used where test data are not available;
2. Production of finished lead shall be limited to 50,000 short tons per quarter; or
3. Finished lead production, in tons per quarter, shall be limited to the following:

$$P = 50{,}000 + (500 \times (1\text{-}A/E) \times 100)$$

Where P is finished lead production in short tons per quarter; A is the aggregate actual quarterly emissions from all fugitive and stack lead emission sources at the facility except from the main stack, in tons; E is the aggregate estimated quarterly emissions from all fugitive an stack lead emission sources at the facility, except from the main stack, in tons; and, where A/E cannot be less than 0.8 or more than 1.0.

This production limitation requirement shall commence on the first day of the calendar quarter following receipt by EPA or MDNR of the monitoring data indicating the second violation of the quarterly lead standard. Within 60 days of completion of each calendar quarter in which Doe Run is required to comply with the production limitation provision, Doe Run shall submit a report indicating whether the requirements of the production limitation for the previous quarter were met. This report shall include finished lead production, the most current test data and emission factors applicable to sources at the facility, sample calculations which clearly demonstrate how emission reductions were calculated, and applicable operating data, such as material throughputs. The requirement to submit this report shall continue as long as Doe Run is required to limit production.

For those items identified above, Doe Run shall complete engineering on said projects no latter than July 1, 2002. Bids for said projects will be then be solicited and reviewed annually starting in July of 2003.

Doe Run reserves the right to petition MDNR for approval to change the order of the contingency projects.

If Doe Run identifies and demonstrates to MDNR's satisfaction alternative control measure(s) that would achieve equal or greater air quality improvements than the Contingency Measure(s) identified above, MDNR agrees that Doe run may substitute the new control(s) for the contingency measure(s) identified above. Any substitute contingency measure shall be implemented under the same time frame as the original measure, unless both parties agree to a modified contingency schedule. Any alternative contingency measures must be submitted to EPA as a SIP revision pursuant to Section 110(l) of the Clean Air Act Amendments of 1990.

D. Stipulated Penalties

1. If Doe run fails to complete construction of the control measures set out in this Judgement by the dates specified, Doe Run shall pay stipulated penalties according to the following schedule. The penalties set forth below are per day penalties which are to be assessed beginning with the first day after the scheduled deadline date.

Period of Noncompliance	Penalty per Day of Violation
First through 30th day of noncompliance	-0-
31st through 60th day of noncompliance	$100.00
60th through 90th day of noncompliance	$250.00
Beyond 91st day of noncompliance	$500.00

2. If Doe Run fails to comply with any other requirement of this Judgement, Doe Run shall pay stipulated penalties according to the following schedule. The penalties set forth below are per day penalties which are to be assessed beginning with the first day of violation after the scheduled deadline date.

Period of Noncompliance	Penalty per Day of Violation

First through 30th day of noncompliance	-0-
31st through 60th day of noncompliance	$100.00
60th through 90th day of noncompliance	$250.00
Beyond 91st day of noncompliance	$500.00

3. The penalties set forth above are per day penalties which are to be assessed beginning with the first day of violation after the scheduled deadline date. All penalties shall be paid within 45 days of the date of notification of noncompliance unless Doe Run challenges the penalty pursuant to the Dispute Resolution procedure outlined in Section E. If the penalty is challenged, it shall not be paid until 30 days after the Commission's determination that Doe Run owes the stipulated penalty, and Doe Run has failed to use, or has exhausted, its rights to review the Commission's Decision.

4. Stipulated penalties shall continue to accrue during the formal Dispute Resolution process or any appeal. In the event Doe Run prevails, stipulated penalties shall not be due or owed.

5. All penalties shall be paid by certified check made payable to the Jefferson County Treasurer as Trustee for the Jefferson County School Fund, and delivered to the Attorney General of Missouri, P.O. Box 899, Jefferson City, Missouri 65102-0899, Attention: Shelley A. Woods, Assistant Attorney General, or Designee.

6. The penalties set forth herein shall not apply in the event of a force majeure, as defined in this section. For the purposes of this Judgement, force majeure shall be defined as any event arising from causes beyond the control of Doe Run and of any entity controlled by Doe Run that delays or interferes with the performance of any obligation under this Judgement notwithstanding Doe Run's best efforts to avoid such an event. The requirement that Doe Run exercise "best efforts to avoid such an event" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event (1) as it is occurring, and (2) following the potential force majeure event such that the adverse effect or delay is minimized to the greatest extent practicable. Examples of events that are not force majeure events include, but are not limited to, increased costs or expenses of any work to be performed under this Judgement.

7. If any event occurs that is likely to delay or interfere with the performance of an obligation under this Judgement, whether or not caused by a force majeure event, Doe Run shall notify MDNR by telephone within 5 working days of Doe Run becoming knowledgeable of such event, if Doe Run knows that the event is likely to delay or interfere with performance of an obligation under this Judgement. Within 10 business days thereafter, Doe Run shall provide in writing the reasons for the event; the anticipated duration; all actions taken or to be taken to minimize its effects; a schedule for implementation of any measures to be taken to mitigate the event; and a statement as to whether, in the opinion of Doe Run, such an event may cause or contribute to the endangerment of public health, public welfare, or the environment. Failure to comply with the substance of the above requirements shall preclude Doe Run from asserting any claim of force majeure.

8. If MDNR agrees that the delay or anticipated delay is attributable to a force majeure, then the time for performance of any obligation under this Judgement that is directly affected by the force majeure event shall be extended for a period of time not to exceed the actual duration of the delay caused by the force majeure event.

9. If MDNR does not agree that the delay or noncompliance has been or will be caused by a force majeure event, or does not agree with Doe Run on the length of any time extension, the issue shall be subject to the Dispute Resolution procedures set forth in Section E of this Judgement. In any such proceeding, to qualify for force majeure defense Doe Run shall have the burden of demonstrating by a preponderance of the evidence that the delay or noncompliance has been or will be caused by a force majeure event, that its duration was or will be warranted under the circumstances, that Doe Run exercised or is exercising due diligence by using its best efforts to avoid and mitigate its effects, and that Doe Run complied with the requirements of Paragraph 7 above. Should Doe Run carry the burden set forth in this Paragraph 9, the delay or noncompliance at issue shall be deemed not to be a violation of the affected obligation of this Judgement.

10. MDNR agrees it will only seek the stipulated penalties set forth herein for any alleged or actual noncompliance by Doe Run with any terms or requirements of this Judgement, of the Work Practices Manual, or of 10 CSR 10-6.120(2)(B), and MDNR will not seek civil penalties pursuant section 643.151,

RSMo. MDNR reserves any other remedies it may have to enforce the terms of this Judgement, including filing a Motion for Contempt, or for violations of any other provision of law for any such noncompliance. Notwithstanding any other provision of this Judgement, in the event EPA assesses a stipulated penalty under the Administrative Order on Consent, EPA Docket Numbers RCRA-7-2000-0018 and CERCLA-7-2000-0029, entered into by EPA, MDNR, and Doe Run on or about October 12, 2000, for a violation that would also constitute a violation under this Judgement, MDNR will not seek a stipulated penalty under this Judgement.

11. Upon the request of Doe Run, MDNR may in its unreviewable discretion impose a lesser penalty or no penalty at all for violations subject to stipulated penalties.

E. Dispute Resolution

Any dispute, which arises with respect to the meaning, application or implementation of this Consent Judgement, shall in the first instance be the subject of informal negotiations between Doe Run and MDNR. Notice of a dispute shall be given by the party alleging the dispute, shall be addressed in writing to the MDNR Director, and copied to the opposing party. Such notice shall state the specific grounds for the dispute, including any supporting documentation, and the relief requested.

The MDNR and Doe Run shall have thirty (30) days from the receipt of the notice of the dispute to resolve the dispute. If agreement is reached, the resolution shall be reduced to writing and this Judgement modified, if appropriate. If the MDNR and Doe Run are unable to reach complete agreement within the thirty-day period and this period is not extended in writing by mutual agreement of the parties, the matter will be submitted to the Court.

The parties will then be entitled to judicial review pursuant to Section 536.140, RSMo. The filing of a notice of dispute shall not automatically suspend or postpone any parties' obligations under this Consent Judgement with respect to the disputed issue. This provision shall not be construed to prevent either party from requesting a stay of the party's obligations under this Consent Judgement, which request shall be filed at the same time as the notice of dispute.

F. Modifications

This Consent Judgement may be modified or amended only by written agreement between the parties, which shall be approved by this Court.

G. Termination

This Consent Judgement shall terminate upon the completion of the work set out herein, the payment of penalties due and upon approval by EPA of the next control strategy revision, which may be redesignation and approval of a maintenance plan.

The Doe Run Corporation

BY:______________________________ DATE:____________________

MISSOURI DEPARTMENT OF NATURAL RESOURCES

BY:______________________________ DATE:____________________

Steven Mahfood, Director

MISSOURI AIR CONSERVATION COMMISSION

BY:______________________________ DATE:____________________

David Zimmerman, Chairperson

ATTORNEY GENERAL OF MISSOURI

Jeremiah W. (Jay) Nixon, Attorney General

BY:______________________________ DATE:____________________

Shelley A. Woods, Assistant Attorney General

ENTERED THIS th Day of 2000

Judge

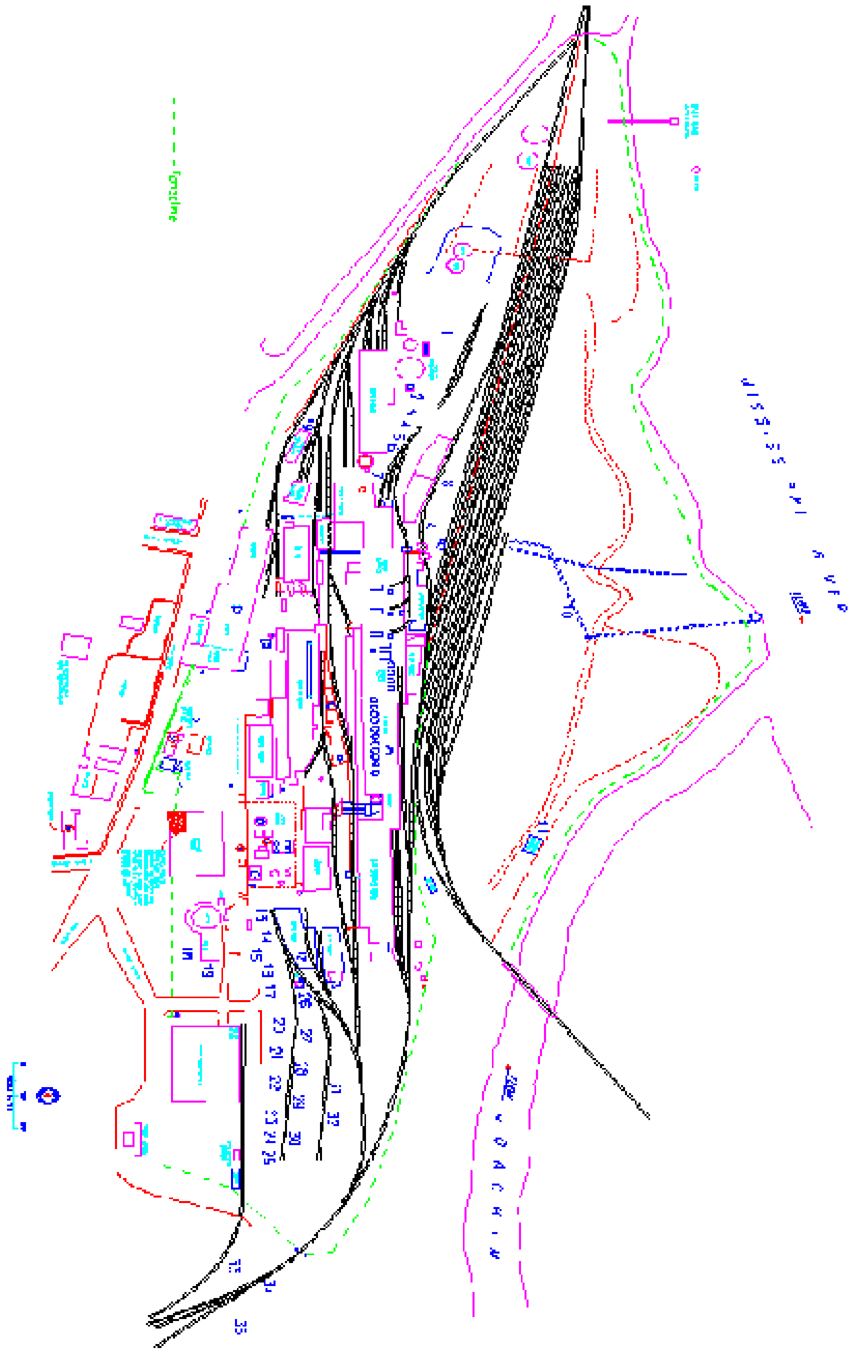


Exhibit A: Fencing Map

7.3 Manual of Work Practices

DRAFT

The Doe Run Company

Herculaneum Smelter

Herculaneum, Missouri

WORK PRACTICE MANUAL

January 1991

Use and Maintenance of this manual is a requirement of Missouri 10 CSR 10-6.120 (3)(B)

Revised 2000 (with the 2000 Lead SIP Revision)

Note: Revisions to manual are shown underlined for revision date shown on same page.

WORK PRACTICE MANUAL
DRAFT
Herculaneum Smelter

Table of Contents

WORK PRACTICE MANUAL
HERCULANEUM SMELTER

APPENDICES

WORK PRACTICE MANUAL
HERCULANEUM SMELTER

PURPOSE, USE AND CHANGE

1. This manual is written to comply with the Missouri Air Conservation Rule 10 CSR 10-6.120 that states at (3)(A):

2. The owner or operator shall prepare, submit for approval, and then implement a process and area-specific work practice manual that will apply to locations of fugitive lead emissions at the installation;

and at (3)(B)2.:

The manual shall be the method of determining compliance with the provisions of this subsection. Failure to adhere to the work practices in the manual shall be a violation of this rule.

3. Any change to the work practices in the manual requires prior written approval from the DNR director before any change becomes effective and goes into practice.

ACTION TO PREVENT EXCESS PROCESS EMISSIONS

-Utilizing Emissions Predictor Profile Operating Procedures (OP) and Decision Trees (DT)

A	Sinter Hood - Decision Tree	A-1
B	Sinter plant - Waste gas Inlet Temperature to # 3 Baghouse	B-1
C	Blast Furnace/# 5 Baghouse - Waste Gas Inlet Temperature to # 5 Baghouse	C-1
	Dumping to Trestle Bins - Decision Tree Use	C-2

4. Definitions:

Accumulated materials: lead bearing particulate that has the potential to become easily reentrained.

Hose down: to wet or reduce accumulated materials.

Wetting: sufficient water to be used to insure no visible emission immediately following hosedown.

150 Sinter Plant

1. A simplified crushing circuit will be installed in 1991 in the sinter plant, resulting in a reduction in the number of physical pieces of equipment, reduced number of transfer points and improved ventilation through more efficient baghouses versus the previous wet scrubbers.

The new sinter plant crushing circuit will be ventilated by the new sinter plant baghouse.

2.

a. The following areas will be hosed down on a per shift basis to wet or reduce accumulated material:

Location	Elevation, ft. (*)
-- sinter machine main floor	55
-- claw breaker floor	40
-- CV-40 floor area	40
-- Live roll floor area	19
-- bottom floor of sinter plant	0

b. The following areas are scheduled for hose down on a per day basis to wet or reduce accumulated material:

-- wind box floor area	45
-- crusher baghouse floor	40

(*) In a. and b. elevations are Relative to the bottom floor elevation of 0 feet.

3. Hose down will only be performed when weather conditions permit so as not to create slipping hazards due to ice formation or glazing of surfaces. These conditions can exist when the temperature is less than 35 F or whenever the application of water results in the formation of ice, which could result in injury to personnel.

152 Blast Furnace

1.

a. The blast furnace feed floor operator will hose down feed floor areas north and south of the charging slots on a per shift basis to wet or reduce accumulated material.

b. The floor area in front of the blasting furnaces (blast furnace crane bay) is to be hosed down on a daily basis to wet or reduce accumulated material.

c. The area underneath the CV-13 conveyor will be hosed down on a weekly basis to wet or reduce accumulated material.

2. Hose down will only be performed when weather conditions permit so as not to create slipping hazards due to ice formation or glazing of surfaces. These conditions can exist when the temperature is less than 35 F or whenever the application of water results in the formation of ice, which could result in injury to personnel.

3. At least 3 pots will be used in lead pot rotation during normal furnace operations.

4. Record keeping for the blast furnace shall include:

a: for hosedown of area underneath CV-13 belt the date, the shift work performed on (eg. Day, evening, night) and foreman supervising the shift (eg. John Smith).

155 Strip Mill

1. Strip mill floor will be vacuumed at least once a week to wet or reduce accumulated material.

2. Record keeping for the strip mill shall include:
   a: for vacuuming of the strip mill floor area the date, the shift work performed on (eg. day, evening, night) and foreman supervising the shift (eg. John Smith).

156 Refinery

1. Refinery dock floor will be vacuumed at least once a month to reduce accumulated materials.

2. Refinery department will hose down the kettle floor at least once a week to wet or reduce accumulated material.

3. Hose down will only be performed when weather conditions permit so as not to create slipping hazards due to ice formation or glazing of surfaces. These conditions can exist when the temperature is less than 35 F or whenever the application of water results in the formation of ice, which could result in injury to personnel.

4. Recording keeping for the Refinery shall include:
   a: for hose down of the kettle floor area the date, the shift work performed on (eg. day, evening, night) and foreman supervising the shift (eg. John Smith).

   b: for vacuuming of the refinery lead dock area the date, the shift work performed on (eg. day, evening, night) and foreman supervising the shift (eg. John Smith).

162 Baghouse

1. The #3 and #5 baghouse will use the redler conveyor to move captured dust back to the sinter plant for recycle.

2. The ground floor in the # 3 and # 5 baghouse will be hosed down on a per shift basis to wet or reduce accumulated material.

3. Hose down will only be performed when weather conditions permit so as not to create slipping hazards due to ice formation or glazing of surfaces. These conditions can exist when the temperature is less than 35 F or whenever the application of water results in the formation of ice, which could result in injury to personnel.

166 Yard

1. Water truck, hose washing and/or dry sweeper truck will wet and sweep those areas of plant that are accessible by the equipment on a daily basis (Monday through Friday schedule). See Appendix E, plant layout with water/sweeper truck routes.

2. Yard/transportation department is responsible for hosing down the area between the blast furnace blower room and the trestle on a weekly basis.

3. Transportation will wet finished sinter cars with a fire hose prior to unloading sinter to stock.

4. Truck watering and hosedown of plant areas may be suspended during any period when the temperature is less than 35 F, or whenever the application of water results in the formation of ice which could result in injury to plant personnel.

5. Record keeping for the yard shall include:
   a: for wash down of the area between blast furnace blower room and trestle the date, the shift work performed on (eg. day, evening, night) and foreman supervising the shift (eg. John Smith).

6. Chemically stabilize concentrate storage piles once every 6 months between applications (eg., once during theÿperiods Jul-Dec and Jan-Jun). Complete first stabilization by 12/31/93.

(WPM Nos. 7. and 8. are smelter option item nos. 5. and 6. from the Consent Order in the 1993 Lead SIP Revision for Herculaneum. Should Doe Run opt for "paving" in one or both item nos. 5. and 6. from the consent order, then WPM item nos. 7. and 8. would not require chemical stabilization and the new paved areas would be included in WPM 1. above for the work practice of watering and sweeping.)

7. ~~Chemically stabilize the unpaved portion of road from Station Street to the existing paving east. Unpaved portion of road is located just north of the Strip Mill Building. Stabilization to be conducted at a minimum of once every six (6) (e.g., once during the periods Jul-Dec and Jan-Jun).~~

   Doe Run has paved this area under item 7 and chemical stabilization is no longer required.

8. Chemically stabilize the river yard access road at a minimum of once every six (6) months between applications (e.g., once during the periods Jul-Dec and Jan-Jun).

9. Temporary sources of dust on paved surfaces outside the plant due to spillage of materials will be addressed so as to limit the reentrainment of those materials. Clean up to consist of those materials being loaded into transfer vehicles by either hand shoveling or should the need arise mechanized equipment. Final clean up will incorporate the use of floor sweep compound which

will should adhere to the smaller particles, making them easier to remove.

Construction guidelines
For Capital Construction Projects

1. Prevention of fugitive dust shall be a consideration in the planning of construction projects.

2. Where feasible old building components will be cleaned by either vacuum or water hose prior to removal. Additional power washing may be preformed, once the component has been removed to an area where electrical shock or shorting of existing equipment can be avoided.

3. Where feasible both the in house water truck and sweeper truck shall be used during construction projects to address dirt stirred up by trucks.

4. Water hoses/water sprays shall be used to address potential dust emissions during excavation should the specific conditions warrant their use.

5. Excavation materials shall be managed to minimize dust blowing (for example, wetting with water hoses, surface treatment with dust binder, establishment of vegetation, trapping).

Record Keeping - General

1. Records will be maintained of regularly scheduled quarterly inspections made by the environmental department of fugitive emissions control equipment such as hoods, air ducts and exhaust fans. See Appendix D for diagrams.

2. For records during periods of suspension of any work practices entry will be made in the weekly/monthly record after the date "Weather suspension", "Equipment repair/maint", "Operations suspension", etc.

3. Records will be maintained of monthly audits conducted by the environmental department with those departments who conduct work practice controls contained in this manual on a daily or more frequent basis. The purpose of the audit is to certify that the requirements of the WPM are being followed.

SUSPENSION OF WORK PRACTICES

A. Adverse Weather

The work practices that use the application of water as described herein may be suspended whenever the application of water results in the formation of ice which could result in injury to plant personnel.

B. Equipment Maintenance and Repair

Sweeping and application of water may also be suspended during those periods necessary to perform maintenance and repairs of equipment essential to the respective activity. Any maintenance and repair work shall be completed as soon as possible, and upon completion, the respective activity shall be immediately resumed in accordance with the stated practice.

C. Suspension of Production Operations

In the event that department production operations are suspended and shutdown; sweeping and watering applications in the department may be suspended for the duration of the such period until normal operations are resumed.

VENTILATION SURVEY

A. The plant ventilation systems list in the appendices will be given a volume survey each calendar quarter.

B. Volumes recorded will be compared with previous quarters to determine need for attention.

C. Ventilation Systems:

Name/Location	Approx. rate, acfm
1. New smooth rolls baghouse	11,000
2. CV-10 Grizzly	9,000
3. CV-10/CV-11/CV-12 vent	8,000
4. CV-13 and CV-14 vent	6,000
5. Scale belt vent	11,000
6. Crow's nest vent	14,000
8. "D" kettle fluxing vent	12,000
9. Blast fce front end vent	25,000

D. Systems air flow Diagrams - See Appendix D

Appendix A

SINTER HOOD
DECISION TREE USE

SITUATION	ACTION STEP
Observe "Blue Haze" S02 gas	Sinter machine operator Adjust FA-6 & FA-7
Problem remains with: FA-6 & FA-7 Adjustment Dilution dsmprt eill oprn sy 450 F	Sinter machine operator *Shuts down FA-6 *Cuts back FA-5/FA-4 Dampers and contacts #3 Baghouse /Acid plant Operator *Baghouse operator confirms: 2" Draft Cells on line Need to shake bags Acid plant operator checks % Acid plant is running
#3 Baghouse temperature reaches 475 F	#6 & #7 fans shutdown at #3 baghouse.
u:/casberry/mydocuments/data/mact/sinterhood.xls	Revised 9/14/2000

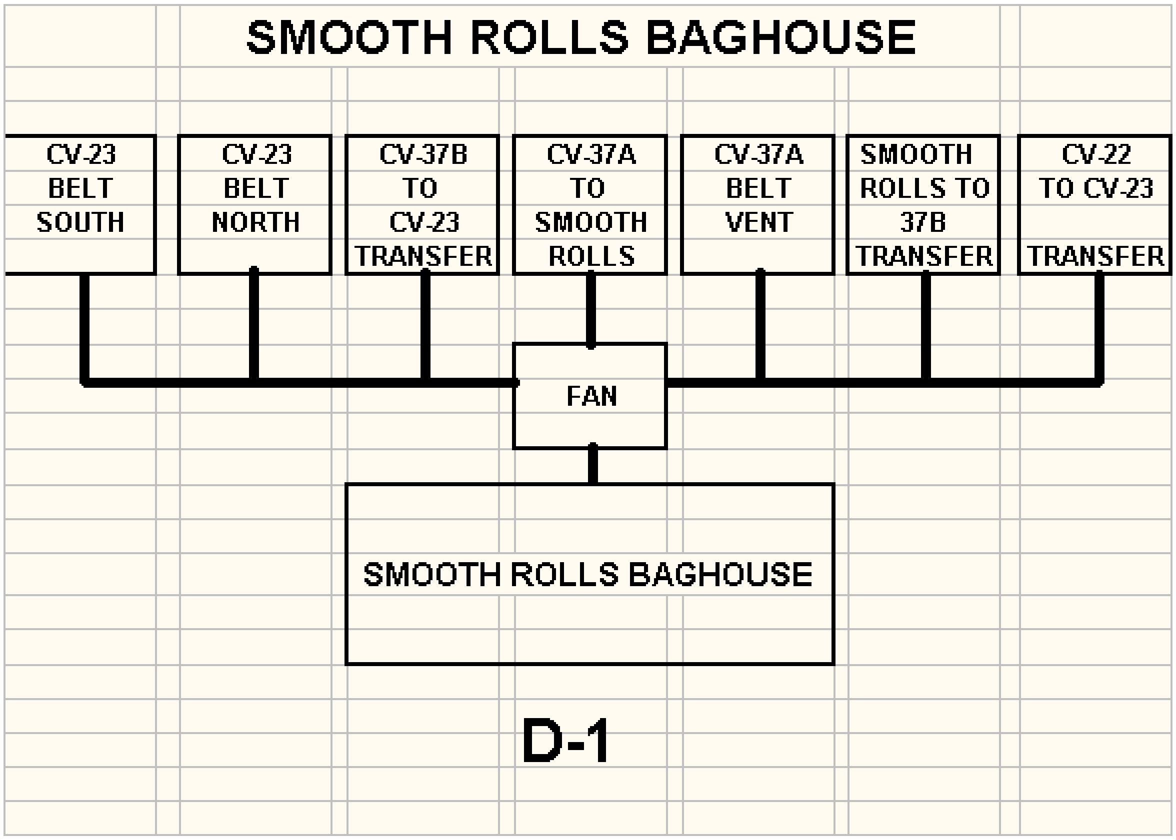
Appendix B

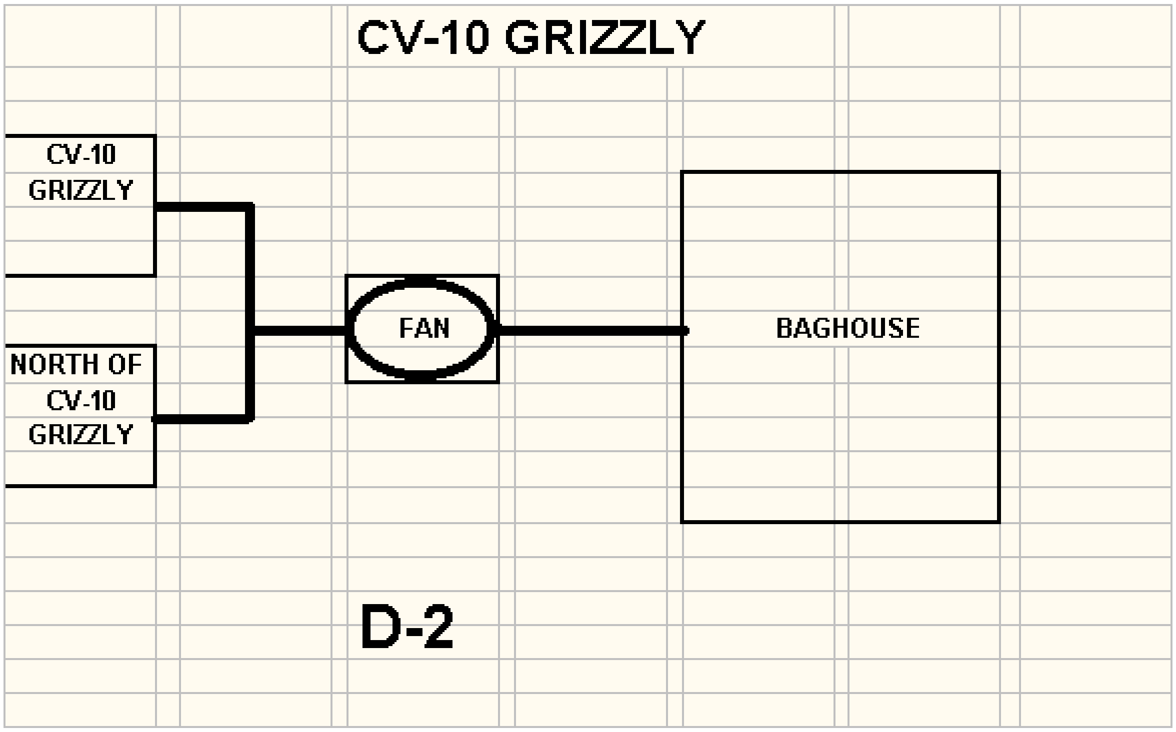
EMISSIONS PREDICTOR PROFILE OPERATING PROCEDURES	
BLAST FURNACE/# 3 BAGHOUSE	
WASTE GAS INLET TEMPERATURE TO # 3 BAGHOUSE	
SITUATION	**ACTION STEP**
Optimum operating range (up to 230 F)	Only are vented by #3 baghouse is Sinter plant
Caution operating temperature range (235 F-245 F) 450 F Dilution damper opens In 10' X 14' trail 450 F indicated that temperature has moved towards potential problem situation	Sinter Plant Control Room Operator * increase monitoring frequency of inlet Temperature * Notify Preparation Group Leader if Unavailable, Plant Coordinator * Red light will come on in the upper right hand corner of the circular chart instrument.
Reactive operating temperature range (248 F) Temperature has moved into danger area.	* Notify Sinter Plant group leader * Notify Plant Coordinator *Fan will automatically shut down at 475 F *A second red light will come on in the upper right hand corner of the circular chart instrument.
u:/casberry/mydocuments/data/mact/#3baghouse.xls	Revised 9/14/2000

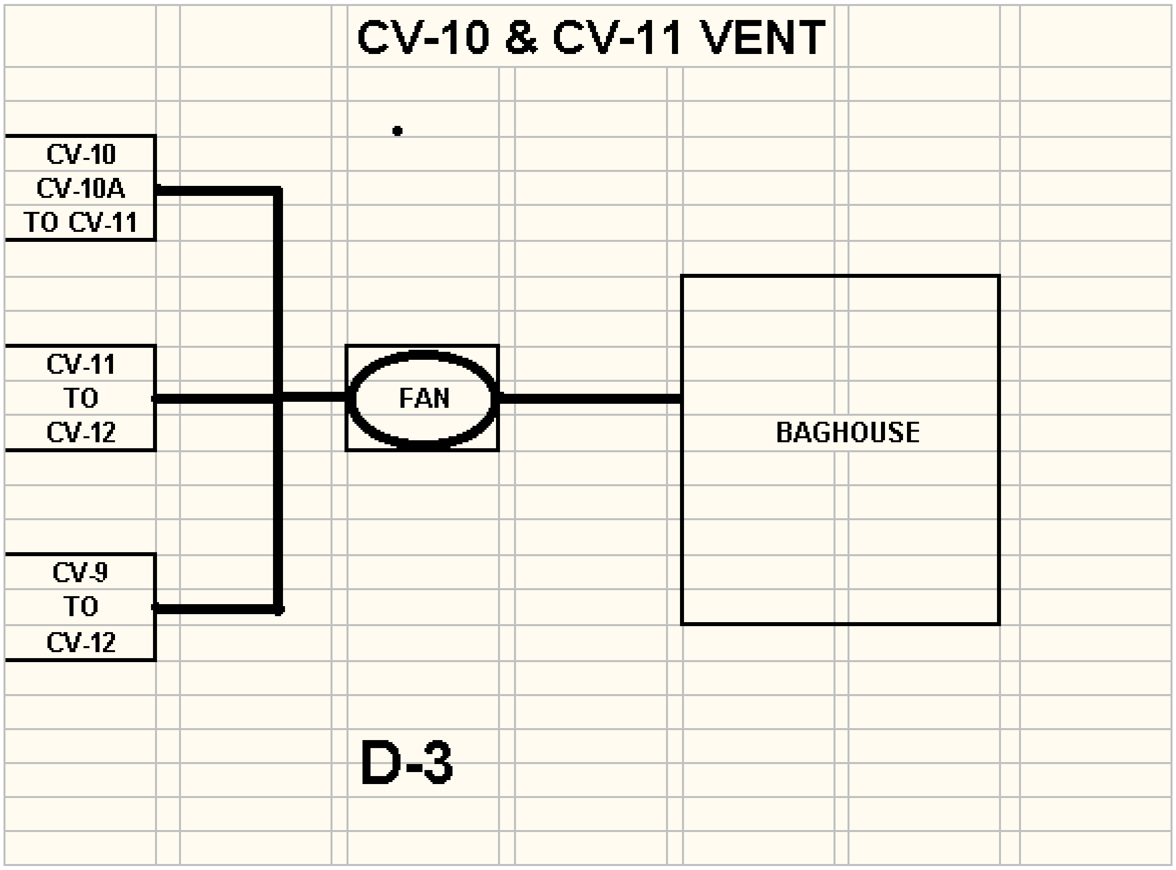
Appendix C

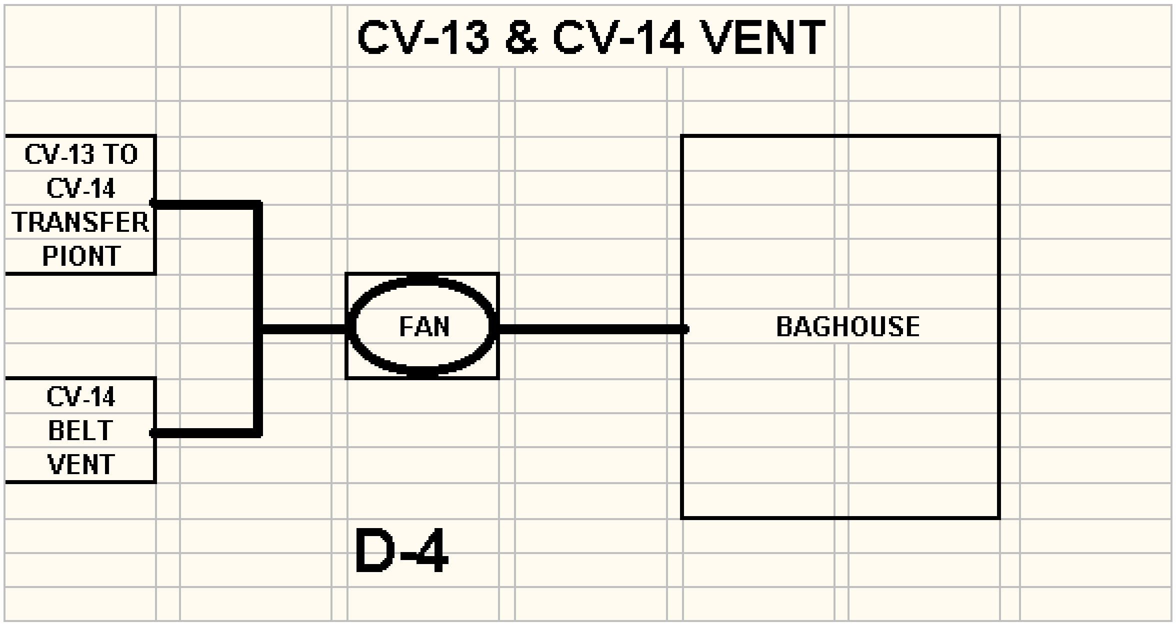
EMISSIONS PREDICTOR PROFILE OPERATING PROCEDURES	
BLAST FURNACE/#5 BAGHOUSE	
WASTE GAS INLET TEMPERATURE TO #5 BAGHOUSE	
SITUATION	**ACTION STEP**
Optimum operating range (up to 189 F)	The acceptable operating range
Caution operating temperature range (190 F-224 F) Indicates warning that temperature has moved toward potential problem situation	#5 baghouse operator * increase monitoring frequency of inlet Temperature * Notify Process Groupleader of temperature condition *Dilution air dampers will open (250 F) *Check for compliance
Fan shut down range 175 F (Above 265 F) Temperature very close to point where baghouse fans will automatically shut down to protect baghouse.	#5 Baghouse Operator * Notify Process group leader * Notify Sinter Plant group leader * Notify Plant Coordinator *Fan will automatically shut down at 275 F
u:/casberry/mydocuments/data/mact/#5baghouse.xls	Revised 9/14/2000

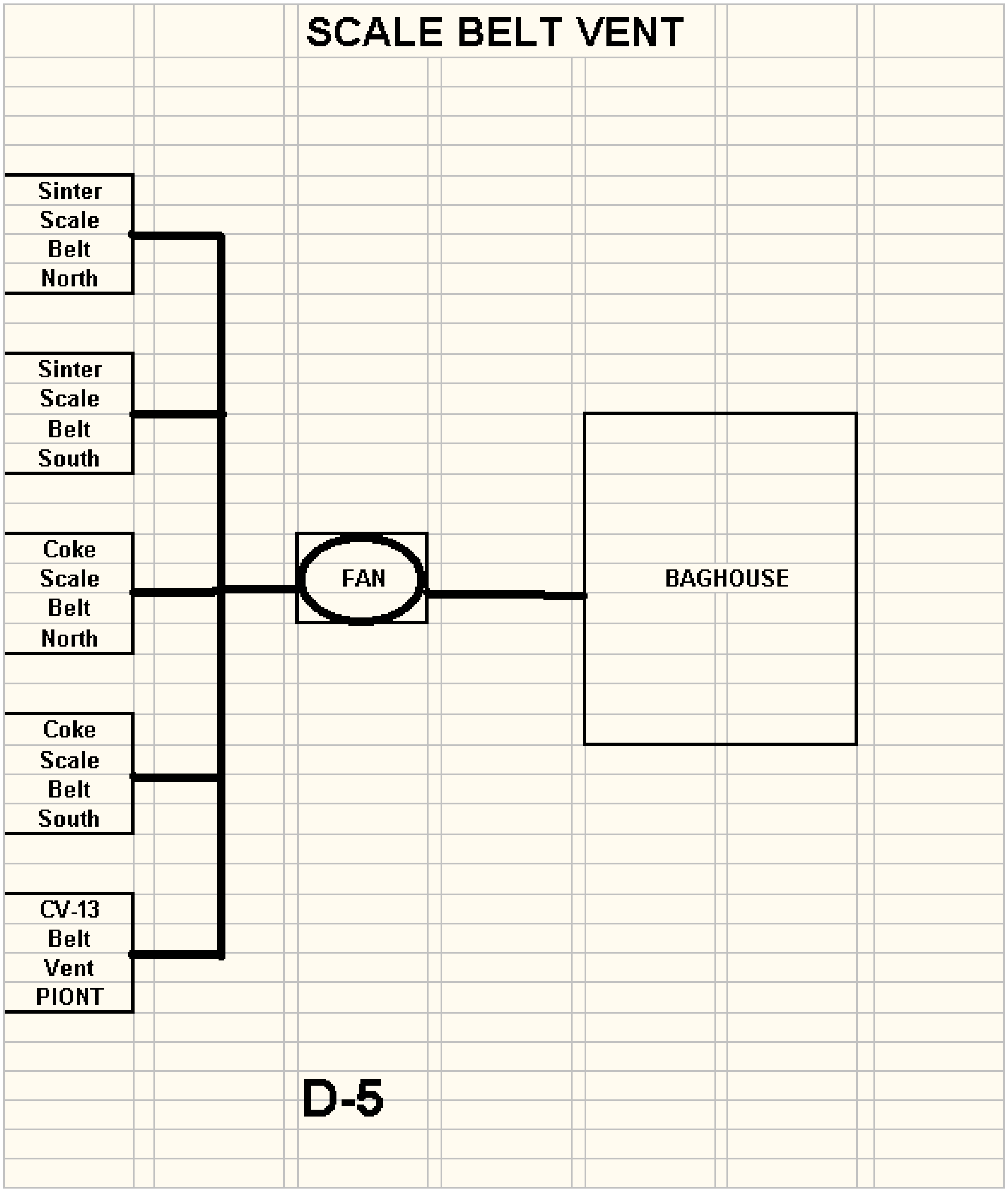
Appendix D

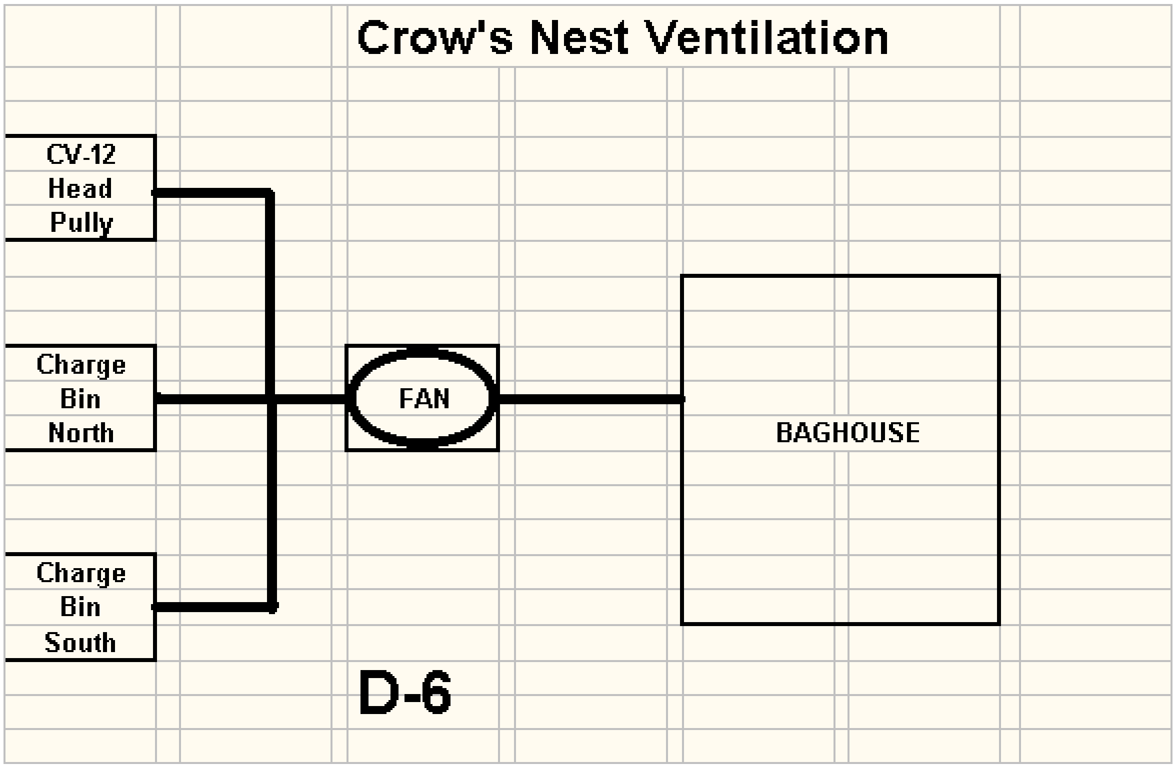

SMOOTH ROLLS BAGHOUSE
CV-23 BELT SOUTH
CV-23 BELT NORTH
CV-37B TO CV-23 TRANSFER
CV-37A TO SMOOTH ROLLS
CV-37A BELT VENT
SMOOTH ROLLS TO 37B TRANSFER
CV-22 TO CV-23 TRANSFER
FAN
SMOOTH ROLLS BAGHOUSE
D-1

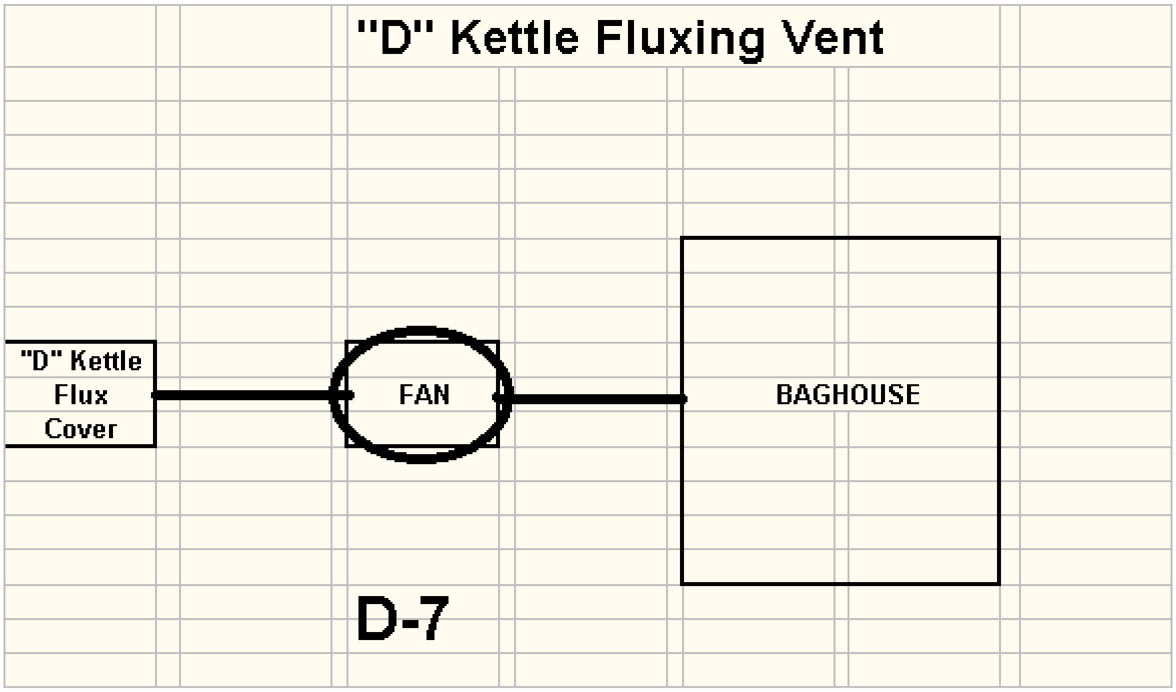

CV-10 GRIZZLY
CV-10 GRIZZLY
NORTH OF CV-10 GRIZZLY
FAN
BAGHOUSE
D-2

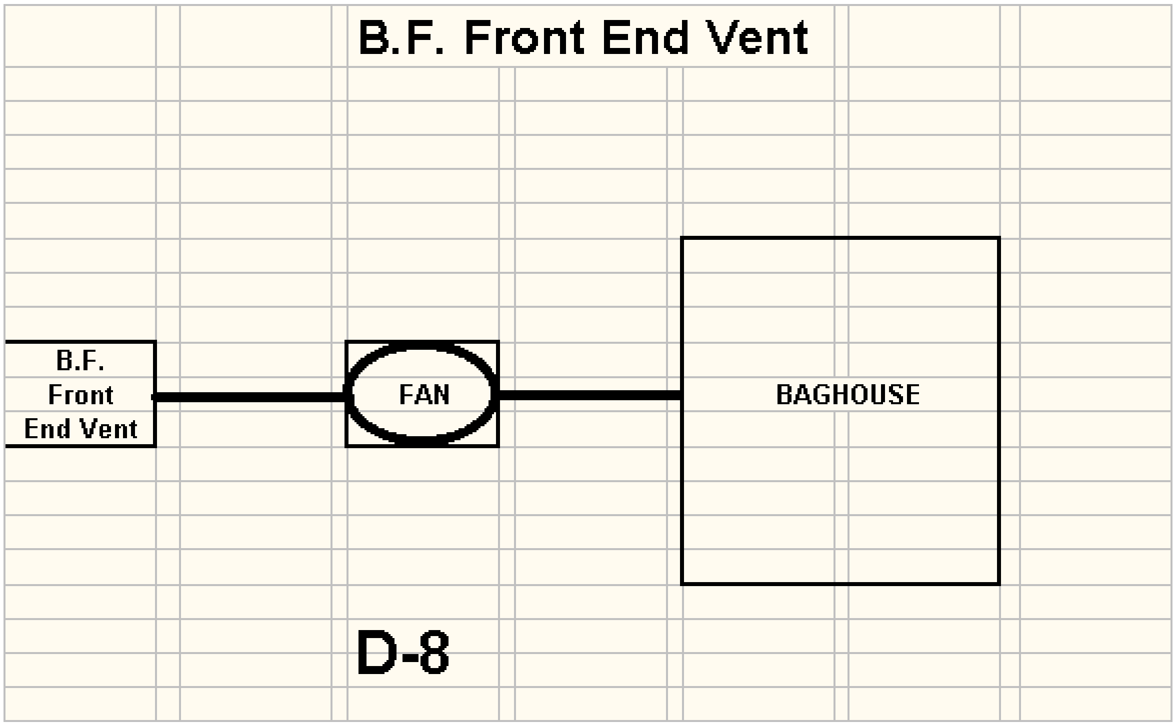

CV-10 & CV-11 VENT
CV-10
CV-10A
TO CV-11
CV-11
TO
CV-12
FAN
BAGHOUSE
CV-9
TO
CV-12
D-3


CV-13 & CV-14 VENT
CV-13 TO
CV-14
TRANSFER
PIONT
CV-14
BELT
VENT
FAN
BAGHOUSE
D-4

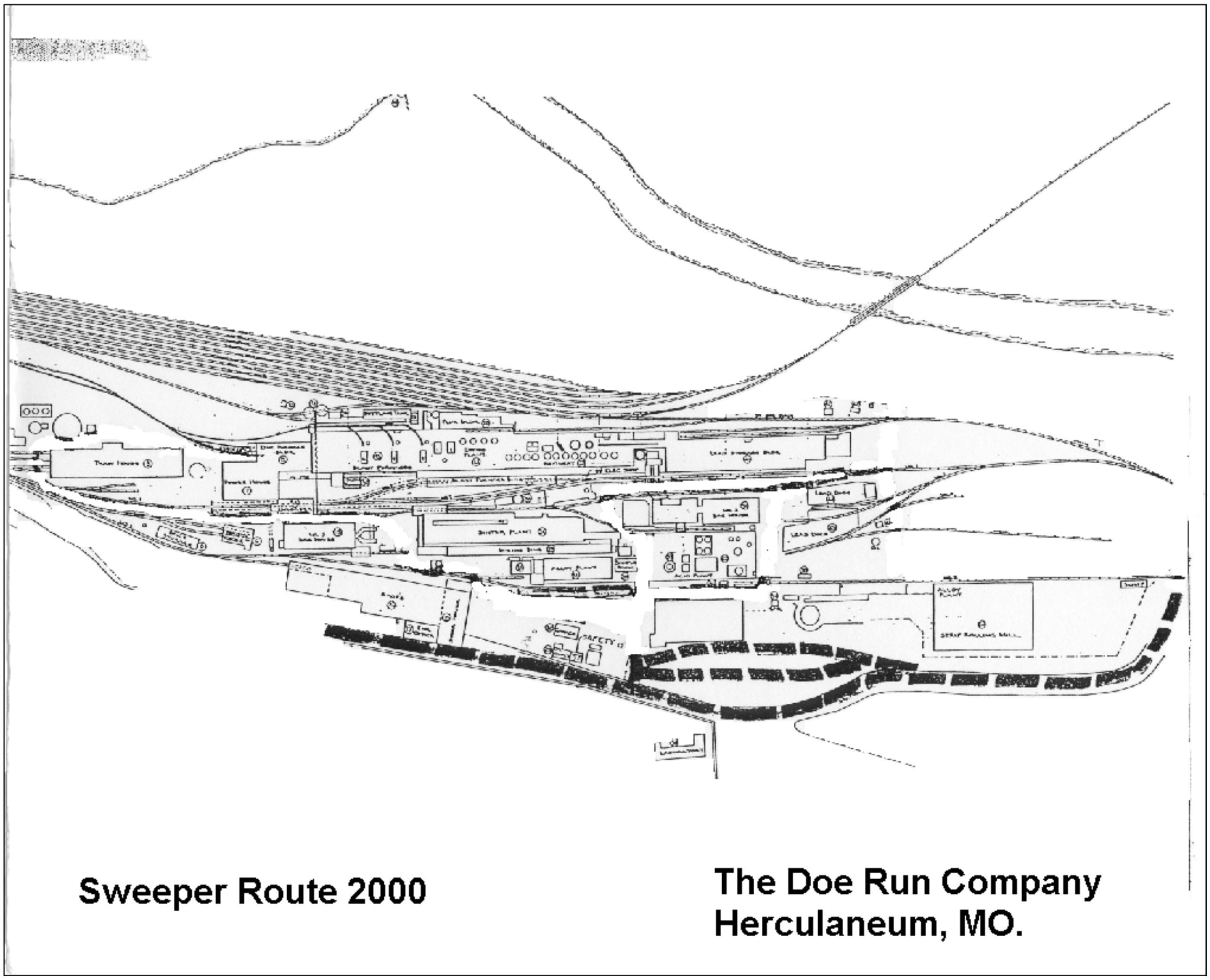

SCALE BELT VENT
Sinter Scale Belt North
Sinter Scale Belt South
Coke Scale Belt North
Coke Scale Belt South
CV-13 Belt Vent PIONT
FAN
BAGHOUSE
D-5

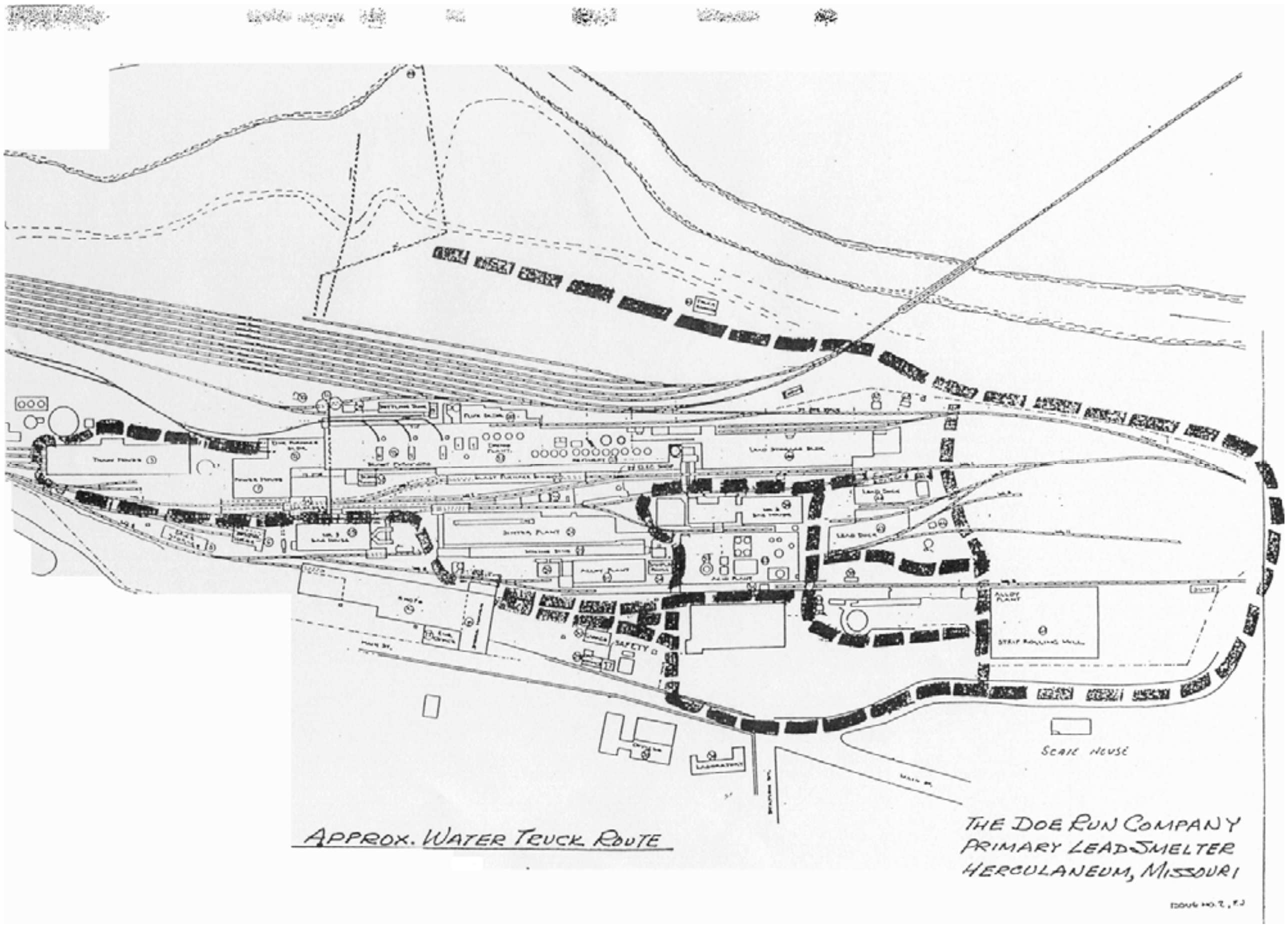

Crow's Nest Ventilation
CV-12
Head
Pully
Charge
Bin
North
Charge
Bin
South
FAN
BAGHOUSE
D-6


"D" Kettle Fluxing Vent
"D" Kettle Flux Cover
FAN
BAGHOUSE
D-7

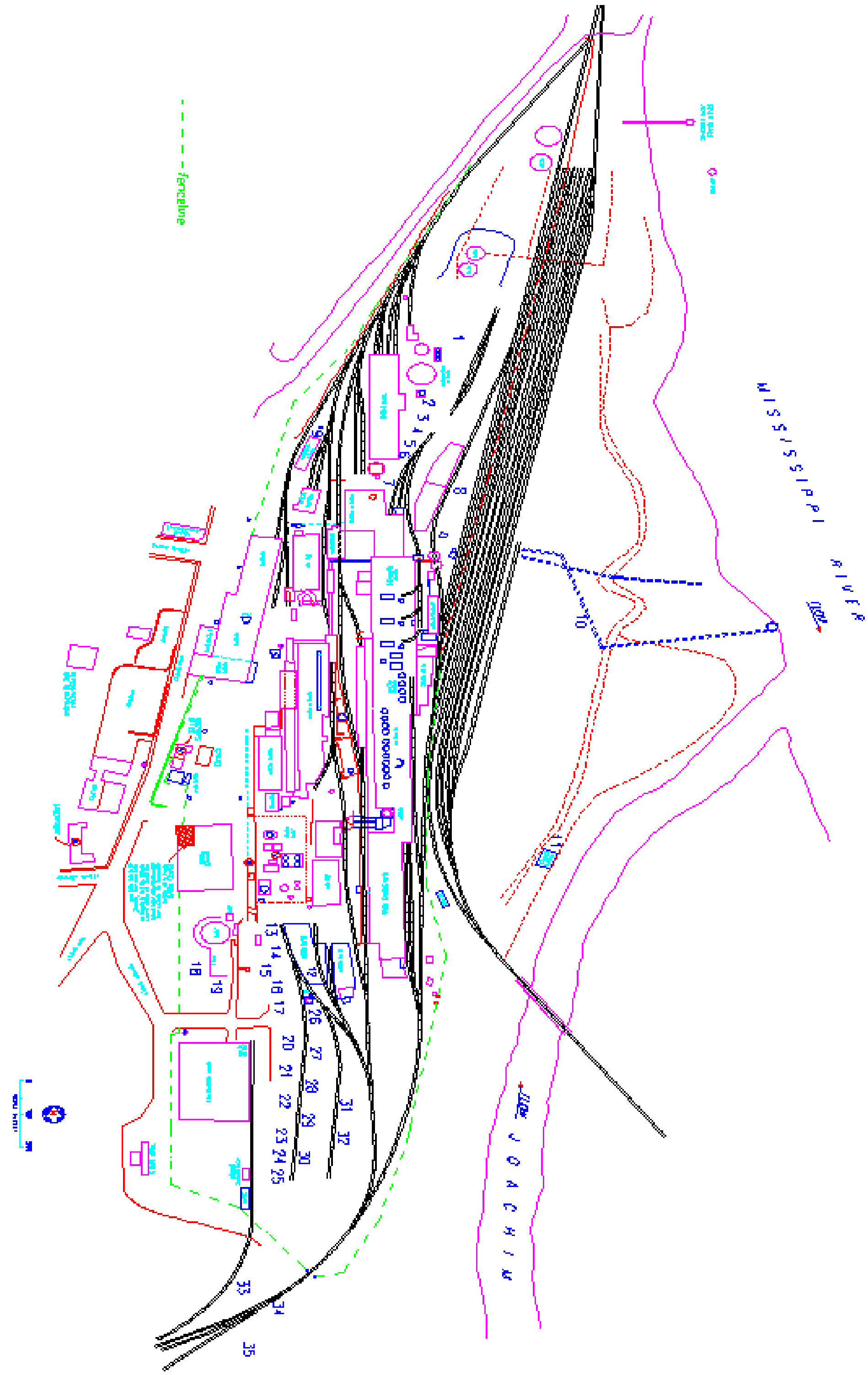

B.F. Front End Vent
B.F.
Front
End Vent
FAN
BAGHOUSE
D-8

Appendix E


Sweeper Route 2000
The Doe Run Company
Herculaneum, MO.


SCALE HOUSE
APPROX. WATER TRUCK ROUTE
THE DOE RUN COMPANY
PRIMARY LEAD SMELTER
HERCULANEUM, MISSOURI

Appendix F


fenceline
MISSISSIPPI RIVER
JOACHIM

8.0 REFERENCES

The following references are technical documents, and are part of the public record. These documents are available from both MDNR and EPA Region VII for review.

- *Protocol: Facility Emission Inventory & Measurement Program Herculaneum Smelter Herculaneum, Missouri,* TRC Environmental, May 28, 1998

- *Dispersion Modeling and Reconciliation Protocol,* TRC Environmental October 19, 1998

- *Determination of Lead Emissions from the #3 Kettle Heater Exhaust,* Aeromet Engineering, Inc., March 1999.

- *Determination of Lead Emissions from the #4 Kettle Heater Exhaust,* Aeromet Engineering, Inc., April 1999.

- *Determination of Lead Emissions from the Aerovent Fan Exhaust,* Aeromet Engineering, Inc., April 1999.

- *Determination of Metals Emissions from the Main Stack Exhaust, All Processes,* Aeromet Engineering, Inc., May 1999

- *Determination of Metals Emissions from the Main Stack Exhaust, Blast Furnace Only,* Aeromet Engineering, Inc., May 1999

- *Characterization of Blast Furnace Charging Shuttle Feeder Vent Emissions at the Doe Run Company's Primary Lead Division Facility Herculaneum, Missouri,* Advance Environmental Associates, L.L.C., July 1999

- *Results of Test Program for Characterizing Fugitive Particulate Matter and Lead Emissions from Railcar Unloading Operations at the #1 Trestle Building*, Advance Environmental Associates, L.L.C., July 1999

- *Report on Refinery Roof Monitor Emissions Testing at the Doe Run Company's Primary Lead Division Facility Herculaneum, Missouri,* Advance Environmental Associates, L.L.C., September 1999

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