

US EPA ARCHIVE DOCUMENT

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VII

KANSAS CITY, KANSAS 66101

IN THE MATTER OF:)
)
THE DOE RUN RESOURCES CORPORATION)
Herculaneum, Missouri)
)
Respondent.) Docket No. RCRA-7-2000-0018
) CERCLA-7-2000-0029
)
Proceedings under Section 7003 of the)
Resource Conservation and Recovery) **ADMINISTRATIVE ORDER**
Act as amended, 42 U.S.C. Section 6973;) **ON CONSENT**
Sections 104, 106, 107, 122 of the)
Comprehensive Environmental Response)
Compensation and Liability Act, as)
amended, 42 U.S.C. §§ 9604, 9606,)
9607, and 9622, and Section 260.530 RSMo.)
_____)

I. PRELIMINARY STATEMENT

1. This Administrative Order (“Order”) on Consent is entered into voluntarily by the United States Environmental Protection Agency (“EPA”), the Missouri Department of Natural Resources (“MDNR”) and The Doe Run Resources Corporation (“Doe Run” or “Respondent”). Respondent is a New York corporation in good standing doing business in Missouri. This Consent Order is issued pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency (“EPA”) by Section 7003(a) of the Solid Waste Disposal Act of 1976, commonly referred to as the Resource Conservation and Recovery Act, as amended by the Hazardous and Solid Waste Amendments of 1984 (hereinafter referred to as “RCRA”), 42 U.S.C. § 6973(a). The authorities vested in the Administrator pursuant to RCRA have been further

delegated to the EPA Regional Administrators by EPA Delegation Nos. 8-22-A, dated March 20, 1985, and 8-22-C, dated March 20, 1985. This Order is also issued under the authority vested in the President of the United States pursuant to Sections 104, 106, 107, and 122 of the Comprehensive Environmental Response, Compensation and Liability Act, as amended, 42 U.S.C. §§ 9604, 9606, 9607, and 9622 (hereinafter referred to as “CERCLA”) and delegated to the Administrator of the EPA on January 23, 1987, by Executive Order No. 12580, 52 Fed. Reg. 2923 (1987), and further delegated to the Regional Administrators on September 13, 1987, by EPA Delegation No. 14-14-C. This authority was subsequently delegated to the Director of the Superfund Division by EPA Region VII Delegation No. R7-14-14-C, dated January 1, 1995. The MDNR enters into this Order pursuant to Section 260.530, RSMo and pursuant to the authority provided to the states under Section 107 of CERCLA, 42 U.S. C. § 9607.

2. For purposes of entering into this Consent Order, Respondent agrees that EPA and MDNR have jurisdiction to issue this Consent Order and jurisdiction over the activities required by this Consent Order. Respondent’s participation in this Consent Order shall not constitute or be construed as an admission of liability or of the findings or determinations contained in this Consent Order. Respondent agrees to comply with and be bound by the terms of this Consent Order. Respondent consents to and agrees not to contest EPA’s or MDNR’s authority or jurisdiction to issue or to enforce this Consent Order. Respondent further agrees not to contest the basis or validity of this Consent Order or any of its terms.
3. EPA has notified the State of Missouri of the issuance of this Consent Order.

II. STATEMENT OF PURPOSE

4. This Consent Order concerns the Doe Run lead smelter at 881 Main Street in Herculaneum, Jefferson County, Missouri (hereinafter referred to as the “facility”) and residential yards, any day-care facilities, schoolyards, parks, and all other high use areas affected by the smelter operation as well as slag pile/surface water/sediment/groundwater areas affected by the smelter operation located in the characterization area described in the attached Statement of Work (SOW).

5. This Consent Order is entered into voluntarily by the EPA, the MDNR and the Doe Run Resources Corporation. This Order requires Respondent to conduct certain response actions as detailed in the SOW attached hereto as Appendix A to abate an imminent and substantial endangerment to the public health, welfare, or the environment that may be presented by (i) the actual or threatened release of hazardous substances at or from the facility, and/or (ii) the past or present handling, storage, treatment, transportation or deposition by Respondent of any solid waste or hazardous waste. This Order also concerns the (1) performance and oversight of a Human Health and Ecological Risk Assessment; (2) reimbursement by Respondent of costs incurred by the United States and the MDNR in connection with this Order; and (3) collection of sufficient data, samples and other information, in conjunction with the MDNR and U.S. Fish and Wildlife Service (USFWS), in their capacity as Natural Resource Trustees (collectively referred to as Trustees) to enable the completion of an injury determination and other appropriate natural resource damage assessment activities in accordance with 43 C.F.R. Part 11.

III. PARTIES BOUND

6. This Consent Order applies to and is binding upon EPA, MDNR, Respondent, and Respondent's successors and assigns. It is also binding upon all persons, contractors, and consultants acting under or for Respondent in performing work pursuant to this Order to the extent this Order addresses the work to be performed by such persons. The signatories to this Consent Order certify that they are authorized to execute and legally bind the parties they represent to this Consent Order.

7. Any change in ownership or corporate status of Respondent including, but not limited to, any transfer of assets or real or personal property, shall in no way alter Respondent's responsibilities under this Order. Respondent shall provide a copy of this Consent Order to any subsequent owners or successors thereof before ownership rights of stock or assets in a corporate acquisition are transferred.

8. Respondent shall provide a copy of this Consent Order to its contractors, subcontractors, laboratories, consultants and other representatives retained to conduct any work performed under this Order within ten (10) working days of the effective date of this Order or the date of retaining their services, whichever is later. Respondent shall condition any such contracts for work to be performed under this Consent Order upon satisfactory compliance with this Consent Order to the extent it is applicable to the work to be performed by such person. Respondent shall be responsible for any noncompliance with this Order and is responsible for ensuring that its contractors, subcontractors, laboratories, consultants, and other representatives comply with this Consent Order to the extent it is applicable to work to be performed by such persons.

IV. DEFINITIONS

9. Unless otherwise expressly provided herein, terms used in this Order which are defined in CERCLA or RCRA or in regulations promulgated under CERCLA or RCRA shall have the meaning assigned to them in said statutes or their implementing regulations. Whenever terms listed below are used in this Order, or in the exhibits or appendices attached hereto and incorporated hereunder, the following definitions shall apply:

A. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 et seq.

B. "Consent Order" or "Order" shall mean this Administrative Order on Consent and all appendices attached hereto. In the event of conflict between this Order and any appendix, the Order shall control.

C. "Day" shall mean a calendar day unless expressly stated to be a working day. "Working day" or "business day" shall mean a day other than a Saturday, Sunday, or federal or state holiday. In computing any period of time under this Order, where the last day would fall on a Saturday, Sunday, or federal or state holiday, the period shall run until the close of business of the next working day.

D. "Doe Run facility" shall mean the lead smelter located at 881 Main Street in Herculaneum, Missouri.

E. "EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

F. "Facility" shall mean the Doe Run lead smelter as defined in Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

G. "Hazardous Substances" shall have the same meaning as in Section 101(14) of CERCLA, 42 U.S.C. § 9604(14).

H. "Interest" shall mean interest at the current rate specified for interest on investments of the Hazardous Substance Superfund, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). "Hazardous Substance Superfund" shall mean the Hazardous Substance Superfund established by the Internal Revenue Code, 26 U.S.C. § 9507.

I. “MDNR” shall mean the Missouri Department of Natural Resources and any successor departments or agencies of the State.

J. “MDOH” shall mean the Missouri Department of Health and any successor departments or agencies of the State.

K. “National Contingency Plan” or “NCP” shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, including, but not limited to, any amendments thereto.

L. “RCRA” shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 et seq. (also known as the Resource Conservation and Recovery Act).

M. “Respondent” shall mean The Doe Run Resources Corporation.

N. “Site” shall have the same meaning as facility in Section 101(9) of CERCLA 42 U.S.C. §9601(9), and for purposes of this Consent Order shall reference the locations where hazardous substances from the Doe Run lead smelter have come to be located in the characterization area described in the attached Statement of Work. The Site boundaries are subject to change because additional investigation is ongoing. The Site will include additional areas where hazardous substances have come to be located as identified in the course of the continuing investigation as set forth in the Statement of Work.

O. “State” shall mean the state of Missouri.

P. “Statement of Work” or “SOW” shall mean the document incorporated herein as Appendix A of this Consent Order.

Q. “United States” shall mean the United States of America, including all of its departments, agencies and instrumentalities.

R. “Work” shall mean all work and other activities Respondent is required to perform under this Order including, but not limited to, the Statement of Work, Appendix A herein, and the following Sections of this Consent Order: Section IX, Work to Be Performed; and XXV, Additional Work.

V. FINDINGS OF FACT

CORPORATE STRUCTURE/DESCRIPTION

10. The Herculaneum, Missouri, lead smelter has been operating for over 100 years and is the largest smelter of its kind in the United States. The smelter is an active lead smelting facility, currently owned and operated by The Doe Run Resources Corporation (“Doe Run” or “Respondent”), a New York Corporation in good standing doing business in Missouri.

Respondent was formerly known as St. Joe Minerals Corporation. It is the successor by statutory merger to a corporation incorporated in New York that was originally known as the St. Joseph Lead Company. Either Respondent or a predecessor by statutory merger has been an operator of the smelter since its inception. From 1986 until 1994, Respondent, then known as St. Joe Minerals Corporation, was a partner in a general partnership known as The Doe Run Company, which owned and operated the smelter during those years.

11. The Doe Run lead smelter facility is approximately 52 acres in size and is located at 881 Main Street in Herculaneum, Jefferson County, Missouri. The facility consists of two main areas, the smelter plant and the slag pile. The facility is bordered on the east by the Mississippi River, on the west and north-northwest by residential areas, and on the south-southwest by the slag pile. A substantial portion of the slag pile is located in the floodplain wetlands of the Joachim Creek and Mississippi River.

12. The slag pile is at various locations approximately 40 to 50 feet high and covers 24 acres. The majority of the visible slag is a very fine material. There is no liner beneath the slag pile and until recently no run-off or run-on control measures were in place in the floodplain. In early 1999, Doe Run constructed a drainage diversion ditch along the north side of the slag pile to

divert any runoff from the area north of the pile. However, runoff in the ditch eventually enters Joachim Creek, as does precipitation falling directly onto the slag pile. There are no protective barriers to stop erosion during flood or storm events of slag material into nearby rivers. The Mississippi River and Joachim Creek bottomlands are flooded a few times per year related to snow melt and seasonal storms.

13. Wildlife tracks, such as deer and turkey tracks, have been seen in the slag material, as well as tracks from motorcycles and other recreational vehicles. A substantial portion of the slag pile is located in a special flood hazard area inundated by the 100-year flood. Aerial and ground view photographs of the slag pile taken by U.S. Fish and Wildlife Services personnel in March 1998 document flood waters of Joachim Creek in contact with the slag material. In 1993 during a major flood event, water reached several feet up the sides of the slag pile.

14. The slag material generated at the Herculaneum smelter is disposed of in a Metallic Minerals Waste Management Area that was permitted in 1992 under Missouri's Metallic Minerals Waste Management Act. According to the Missouri permit, the waste management area may occupy a total area of approximately 62 acres.

15. The primary hazardous constituents of the slag in the pile are the heavy metals-arsenic, cadmium, copper, lead, nickel, and zinc. According to Doe Run, the slag material contains approximately 12-14% zinc and 1.5-2.5% lead, among other constituents. Analytical results from a sample of Doe Run slag pile material collected in the floodplain of Joachim Creek by the USFWS show the following metal contaminant concentrations in milligrams per kilogram dry weight : total arsenic - 28, total cadmium - 32, total copper- 3,200, total lead-23,000, total nickel - 140, and total zinc 96,000.

SMELTING PROCESS DESCRIPTION

16. The major process operations at the Herculaneum facility include sintering, smelting and refining operations as follows:

Sintering Operations:

17. The Herculaneum facility receives lead concentrate by rail and by truck. Upon arrival at the facility the lead concentrate is dumped into a large feed hopper and mixed with fluxes and internally recycled lead-bearing materials such as baghouse fume. The main purpose of this mixing is to reduce the concentration of lead sulfide in the lead ore concentrate from approximately 80% to approximately 50% and to form the proper sinter feed mix. The resulting mixture is then tumbled to form pellets that are fed into the sinter machine.

18. The sinter machine consists of a slowly moving grate that passes under a line of gas-fired burners. The lead concentrate pellets are layered onto the sinter machine grate with the bottom layer of pellets ignited by the gas burners. The combustion zone is slowly moved from bottom to top by air pushed upward through the bed by large fans. Gases are stripped of all entrained dust and other impurities in the baghouses and then converted to commercial grade sulfuric acid in the acid plant. After the cakes of sinter are discharged from the sinter machine, the sinter is crushed and screened to a suitable size for the blast furnace.

Smelting Operations:

19. Lead-bearing sinter is the main ingredient in the feed for the blast furnace. Sinter is mixed with coke and continuously fed through the tops of the blast furnaces. As the feed descends into the shaft of the furnace, it passes through blasts of hot air and gases. Carbon contained in the coke reacts with the hot air forming chemically reducing gases, reducing the sinter to molten lead.

Flowing from the bottom of the blast furnace, the molten lead collects in special pots and is immediately transferred to the drossing department. At the same time, molten slag composed of reduction by-products is tapped from the furnace, granulated and returned to the sinter department as feedstock. Approximately 80% of the slag produced is reused as feedstock. The remaining 20% is sent to the slag storage pile when it is no longer of use as feedstock.

20. Once in the drossing department, the molten lead or lead bullion from the blast furnaces is allowed to cool while impurities are removed by additional processing. Copper, nickel and other impurities begin to freeze from the solution, forming a layer at the surface called "dross." The dross is skimmed from the surface and separately melted and fluxed in a gas-fired "dross" furnace. Following final decopperizing, the lead is pumped to the refinery.

Refining Operations:

21. The refining process starts with the molten lead bullion being processed in the dross furnace. The molten lead bullion is then poured into one or more of the 13 large kettles. Various metallurgical processes are used to remove zinc, copper, arsenides, and silver. Dross, skimmings of lighter metals and impurities, floats to the surface and is manually removed by a large crane operated dipper. Most of the dross is recycled through the sinter machine. A specialized vacuum causes the remaining small quantities of zinc to condense out, thus providing a very high purity lead product.

22. After the bullion has reached its specified level of purity, or has been alloyed to the proper specifications, it is pumped through heated casting lines to the casting areas. Two casting processes are used. Bullion may be form casted into 60 pound pigs, ½ one-half and 1 ton ingots, or it may be continuously cast into sheets that are approximately one inch thick. These sheets are

then processed through a rolling mill which reduces their thickness from one inch to approximately 0.025 inches. The 0.025" sheet is then cut into strips and wound into coils.

LEAD PARTICLES INTO THE AMBIENT AIR

23. Control of emissions of lead into the ambient air is addressed by the Clean Air Act, 42 U.S.C. 7401 et seq. and the Missouri Clean Air Act, Chapter 643, RSMO. Pursuant to Section 108 of the Clean Air Act, the EPA promulgated a National Ambient Air Quality Standard (NAAQS) for lead on October 5, 1978. The standard is 1.5 micrograms (*ug*) of lead per cubic meter (m^3) of air averaged over a calendar quarter (40 C.F.R. Section 50.12). In the promulgation of the lead standard, EPA reviewed studies showing a correlation between air lead levels and blood lead levels. As required by Section 110 of the Clean Air Act, 42 U.S.C. § 7410, the state of Missouri prepared a State Implementation Plan (SIP) for lead to attain and maintain the NAAQS and thus control the amount of lead emitted into the air. This plan was approved by the EPA on April 27, 1981.

24. As a result of the Clean Air Act Amendments of 1990, the area in the vicinity of the Doe Run Herculaneum lead smelter was designated, effective January 6, 1992, as nonattainment with respect to lead. A nonattainment area is any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary air quality standard for the pollutant.

25. In response to its nonattainment status and its failure to attain the NAAQS standard for lead, Missouri submitted a revised State Implementation Plan (SIP) for Doe Run Herculaneum in July 1993. Missouri supplemented the SIP revision in March and November 1994. EPA

approved the revised SIP on May 5, 1995 establishing June 30, 1995, as the date by which the area was to have attained the standard.

26. However, the area continued to fail to attain the lead standard following the June 30, 1995, attainment date. In accordance with the Clean Air Act, EPA published a “finding of failure to attain” in the Federal Register on August 15, 1997. This action required Missouri to submit a revised SIP to address the nonattainment within one year of the finding. Missouri failed to submit the required SIP revisions and therefore EPA published a “finding of failure to submit” in the Federal Register on July 28, 1999. The failure to submit finding initiated a 18 month sanctions clock for imposing the sanction provisions of the Act.

27. Inhalation of lead particles is a lead exposure route for Herculaneum residents. There are currently eight lead air monitors established in the vicinity of the Doe Run Herculaneum Lead Smelter. The purpose of the air monitors is to record the concentration of lead in the ambient air. Seven of the eight monitors are operated by Doe Run, while an eighth, which is co-located with the Doe Run Herculaneum (Dunklin) High School Monitor, is operated by the MDNR. Seven of the eight air monitors have operated since 1982. In 1992, an eighth monitor was located on Broad Street (“Broad Street monitor”), which is immediately west of the Doe Run facility and adjacent to a residential area. The Broad Street monitor, which has recorded violations of the lead standard in every calendar quarter since that monitor was established in 1992, recorded a quarterly average lead concentration of 11.6 ug/m³ in the first quarter of 1998, the highest concentration since the monitor was installed. The highest quarterly average lead concentration recorded at the Broad Street monitor in 1999 and 2000 were 6.75 ug/m³ and 4.32 ug/m³,

respectively. The Herculaneum (Dunklin) High School monitor operated by MDNR recorded a quarterly lead concentration of 1.7 ug/m³ in the second quarter of 2000.

COMMUNITY DESCRIPTION

28. The City of Herculaneum has an estimated population of 2,255 people. There are about 67 people residing within one-quarter mile of the Doe Run facility; 369 people residing between one-quarter and one-half mile of the facility; 2,044 people residing between the one half mile and one mile of the facility; 5,487 people residing between one and two miles of the facility; 10, 524 people residing between two and three miles of the facility; and 2,368 people residing between three and four miles of the facility.

29. Several homes along Main Street in Herculaneum, Missouri, are within 200 feet of the smelter facility, and at least four homes are within 200 feet of the slag pile. Herculaneum High School, 564 enrollment, is located within one-half mile of the facility. Herculaneum Elementary, 216 enrollment, and Senn-Thomas Middle School, 369 enrollment are located within one mile of the facility.

BLOOD LEAD LEVELS IN COMMUNITY RESIDENTS

30. Doe Run and the Jefferson County Health Department have documented elevated blood-lead levels in certain children who live in the vicinity of the smelter. The Centers for Disease Control and Prevention (CDC) recommends that any child with a blood lead level over 10 ug/dl receive the appropriate follow up attention.

31. In a 1992 Jefferson County Health Study of blood lead levels of 73 children within 1.5 miles of the smelter, 40 of the children showed blood lead levels greater than 10 ug/dl; 8 children showed blood lead levels greater than 20 ug/dl; and 2 children showed blood lead levels greater

than 30 ug/dl on initial testing. The average level of lead in the blood was 12 ug/dl for infants and toddlers living within 1.5 miles of the smelter.

32. From June 1992 to May 20, 1999, documented blood lead levels of 52 children in the vicinity of the smelter showed blood lead levels greater than 10 ug/dl in 15 children and greater than 20 ug/dl in 3 children.

LEAD PRESENCE IN SOIL

33. In 1992, the Jefferson County Health Department analyzed the surface soil at thirteen homes of children with greater than 15 ug/dl blood lead levels. Out of 13 homes where the blood lead levels of children were greater than 15 ug/dl, two had lead levels in the surface soil surrounding the home at greater than 3,000 ppm; three homes had levels ranging from 2000 - 2999 ppm lead; seven homes had levels ranging from 1000 - 1999 ppm lead; and, one home had lead below 999 ppm.

34. Various soil sampling projects conducted by Doe Run, its contractors, and the Missouri Department of Health have shown lead levels in surface soils of homes surrounding the smelter as high as 12,800 ppm. According to Doe Run's data, the average concentration of lead levels in residential soils within one-quarter mile from the smelter is 3,014 ppm. Natural background levels of lead in agricultural soils in this area (outside the influence of the smelter) should be in the range of 25 ppm to 40 ppm.

35. In 1991, Doe Run began a soil removal project in which lead contaminated soil from residential homes, lots, and city property near the smelter was excavated and replaced with new soil. The project began on August 19, 1991 and to date, approximately 117 residential properties have been remediated.

LEAD PRESENCE IN WATER

36. Over the past several years, USFWS personnel have monitored habitat quality along the Mississippi River. On or about February 11, 1999, the USFWS issued a Preliminary Screening Level Ecological Risk Assessment for Fish and Wildlife Habitats around the lead smelter.

According to USFWS direct toxicity modeling, there is an increased ecological risk of lead exposure for surface water, aquatic sediment, upland soil-invertebrates, upland soil-plants, birds, mammals and fish around the Site.

37. The area around the confluence of the Middle Mississippi River and Joachim Creek near the facility contains open water, seasonal wetlands and bottomland hardwood forest tracts. The river and creek bottomlands are flooded several times per year. The number and severity of floods depend upon snow melt and seasonal storms.

38. The habitats of Joachim Creek and the Middle Mississippi River support a variety of natural resources under the trusteeship of the MDNR and USFWS. MDNR's resources of concern include groundwater, which is a state only resource, and aquatic and terrestrial resources as well as their supporting ecosystems. USFWS is responsible for migratory birds and threatened and endangered species. A wide variety of migratory birds use these habitats during the breeding season and migration times. Migratory birds that use the habitat throughout much of the year are the red-tailed hawk, belted kingfisher and great blue herons. The facility is located within the habitat for the federally threatened and endangered bald eagle, which has been observed on-site, and the Indiana bat. The federally threatened and endangered pallid sturgeon has been identified in the Mississippi River adjacent to and downstream of the facility. Many of the natural resources

identified at this site are co-existing or contiguous natural resources, resulting in the trustees having co-trusteeship.

39. Beginning in 1989 and through 1998, USFWS collected several soil, surface water and sediment samples in and around Joachim Creek and the Mississippi River near the Doe Run smelter. In March 1998, flood plain substrate samples were collected and analyzed. The data range was 109 to 26,900 milligrams of lead per kilogram on a dry weight basis. Cadmium was detected as high as 115 milligrams of cadmium per kilogram on a dry weight basis, and zinc up to 99,900 milligrams of zinc per kilogram on a dry weight basis. These concentrations are above the State of Missouri averages for lead in soil at 20 mg/kg; cadmium in soil at <1 mg/kg and zinc in soil at 49 mg/kg.

40. The USFWS also collected sixteen aquatic sediment samples between 1989 and 1995 at various locations downstream of the Doe Run smelter facility in the main channels and channel borders for the Mississippi River and Joachim Creek. Arsenic, cadmium, copper, nickel, lead, and zinc were found in the sediment samples at levels which exceed National background averages for these metals in sediment. The highest concentrations of these metals are: arsenic at 15.3 ppm; cadmium at 40.2 ppm; copper at 1,060 ppm; nickel at 98.0 ppm; lead at 7,720 ppm; and zinc at 29,400 ppm. The National background averages for these metals in sediment are: arsenic at <7.2 ppm; cadmium at <2.0 ppm; copper at <37 ppm; nickel at <26.0 ppm; lead at <60.0 ppm; and zinc at <170 ppm.

41. From January through March 1998 USFWS collected eleven surface water samples from flowing flood plain ditches and flood water pools in the Joachim Creek flood plain near the Doe Run smelter. The data range was 10.4 to 13,300 micrograms lead per liter. Zinc was detected as

high as 310,000 micrograms per liter. The Ambient Water Quality Criteria standards for lead and zinc are .003 ppm and .110 ppm, respectively.

42. In November, 1997, USFWS collected four soil samples at a city park and baseball diamond located west of the smelter facility air stacks. The data range was 140 to 1000 milligrams lead per kilogram on a dry weight basis. The State of Missouri average background concentration for soil lead is about 20 milligrams per kilogram on a dry weight basis, which is the same level as the National Background Average for lead.

43. USFWS also collected fish, mammal and bird samples from species near the Doe Run smelter. Between 1992 and January 1998, USFWS collected nine whole fish samples from locations downstream of the smelter. The data showed elevated lead levels from 0.414 to 7.476 milligrams per kilogram on a wet weight basis, while fish samples collected from locations downstream of the shelter and fish samples collected from other areas had a range of lead from non-detect up to 0.297 milligrams of lead per kilogram on a wet weight basis.

44. In January 1998, USFWS collected three whole white-footed mice from locations along the shoreline of Joachim Creek adjacent to the smelter. The data showed elevated lead levels of 2.6 to 55 milligrams of lead per kilogram on a wet weight basis.

45. In 1997, USFWS collected the livers of 21 song birds at locations along the shoreline of Joachim Creek adjacent to the smelter. Five out of the 21 birds had liver lead values above the threshold diagnostic of clinical lead poisoning. Clinical poisoning is defined by impaired biological functions and can be life threatening. Eight of the remaining 16 birds showed elevated lead levels above the threshold diagnostic of subclinical lead poisoning. Subclinical lead poisoning is defined by having physiological effects.

46. On March 3, 1998, USFWS collected slag material from the Joachim Creek flood plain to evaluate its toxicity to aquatic life. USWFS conducted a 96 hour elutriate bioassay test on larval fathead minnow. The purpose of the test is to determine the adverse effects of the slag material when combined with water and its effect on the minnow. After 24 hours, 10 of the 20 organisms died. By 96 hours, 18 of the 20 organisms died.

47. Missouri designates Joachim Creek for the following uses: livestock and wildlife watering, protection of warm water aquatic life and human health-fish consumption, whole body contact recreation, boating, canoeing, fishing, and industrial use. Joachim Creek is used as a fishery.

48. The portion of the Mississippi River adjacent to and downstream of the facility is designated for the following uses: irrigation, livestock and wildlife watering, protection of warm water aquatic life and human health-fish consumption, boating and canoeing, drinking water supply and industrial. Commercial fishing does occur on the Mississippi River, downstream of the Doe Run smelter.

49. According to the National Wetlands Inventory maps, a large portion of the area containing the slag material is classified as a wetland and numerous additional wetlands are located along the banks of Joachim Creek and the Mississippi River downstream of the smelter.

50. On June 8, 1999 the United States Army Corps of Engineers determined that classified wetlands are present at both the current slag disposal site, and a proposed slag disposal site across Joachim Creek west of the current slag pile. The area set aside for future expansion of slag disposal is located northwest of the current active slag pile. This area encompasses approximately 40 acres and is expected to have a 20-25 year capacity (1,000,000 cubic yards). However, the

Corps of Engineers in its June 8, 1999, determination expressed its opposition to the expansion of the footprint of this material at both slag disposal sites.

DRINKING WATER EXPOSURE

51. Because of the proximity of the slag pile to the Mississippi River and Joachim Creek, the direction of the groundwater flow, and the fact that the Mississippi River and Joachim Creek are discharge areas, there is the potential for groundwater beneath the slag to become contaminated and to be discharged to these waters.

52. According to MDNR's Division of Geology and Land Survey, there are wells used for domestic water supply located within a 4 mile radius of the smelter. Within Herculaneum, most businesses and residences in the vicinity of the facility are on city water. Twelve wells are located within 1 mile of the site; 26 wells are located between one to two miles from the facility; 45 wells are located between two to three miles from the facility, and 119 wells are located between three to four miles from the facility. The nearest private drinking water well on record is located approximately one-third mile from the slag pile. The nearest public drinking water supply well on record is the City of Herculaneum well #3, located about one-third mile north of the slag pile. The City of Herculaneum has four other wells within four miles of the Herculaneum Lead Smelter site.

53. Groundwater quality has been monitored at the site of the slag storage area since July 1980. The majority of the wells are monitoring the alluvium; one well is monitoring the slag pile material. Not all of the wells are currently being analyzed. Wells 3,4,7,8, 9, 10, 13 and 14 are sampled and analyzed on a quarterly basis for dissolved lead, nickel, zinc, electrical conductivity, and pH. Samples also are analyzed on an annual basis for arsenic, barium, cadmium, chromium,

lead, mercury, selenium, and silver. There has been no total metals analysis of the groundwater samples collected. Figure 3 in Appendix A shows the location of all wells on a aerial photograph site map. Wells number 1 through 7 were installed in April 1980. The second group of wells was installed in 1984. Wells 4B and 14B were installed in January 1994 as replacements for the damaged wells 4 and 14.

54. Data collected from the nine wells near the slag pile over the past thirty quarters have found arsenic, barium, cadmium, chromium, lead, nickel, selenium, and zinc above background levels. Lead and cadmium have been detected in monitoring wells above their established Maximum Contaminant Levels (MCLs) for drinking water at 15 micrograms per liter (ug/L) and 5 ug/L, respectively.

55. MDNR initiated a Preliminary Assessment (PA) for the Herculaneum Lead Smelter Site in July, 1998. MDNR completed the assessment in March, 1999. The Preliminary Assessment supports the findings of the USFWS Ecological Screening Level Risk Assessment and recommends further investigation of the Doe Run smelter and slag facility. The PA concludes that a release of metals has occurred in groundwater beneath the slag and there has been a release of heavy metal contaminants, including lead and zinc, from the slag pile area into Joachim Creek and the Mississippi River. Surface water and sediment samples from Joachim Creek showed elevated levels of lead and zinc above background levels.

HEALTH EFFECTS AND RISK EXPOSURE ROUTES

56. **Lead** is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead usually adsorbs to soil particles. Small amounts of lead may enter water bodies when soil particles are displaced by rainwater. Lead may adsorb to soil particles in water for many years.

Movement of lead from soil particles into underground water or drinking water is unlikely unless the water is acidic or soft. Most lead absorbed by plants or consumed by animals passes through their bodies; however, the small amount absorbed can cause harmful effects. Lead is classified as a hazardous substance (certain compounds), hazardous waste constituent, and priority toxic pollutant by EPA.

57. The Agency for Toxic Substances and Disease Registry of the United States Department of Health and Human Services (ATSDR) has concluded that exposure to lead can have adverse health effects on multiple human organ systems. Exposure to lead can affect adults, but children less than six years old, and unborn children whose mothers are exposed to lead, are especially vulnerable to the effects of lead poisoning. In children, the ATSDR has concluded that lead can cause adverse effects on the central nervous system. Medical literature has reported an association between lead exposure and reduced intelligence quotient scores.

58. **Cadmium** is a bluish-white metal that occurs naturally in the earth's crust. Cadmium is not usually found in the environment as a metal. It is usually found as a mineral combined with other elements such as oxygen, chlorine, or sulfur. Small amounts of cadmium are found in zinc, copper, and lead ores. It is generally produced as a by-product of these metals, particularly zinc. Cadmium is highly corrosion resistant and is used as a protective coating for iron, steel and copper. Cadmium can enter the environment in several ways. It can be found on small particles in the air and can enter the soil and water from spills. Cadmium is insoluble in water but is soluble in acids. Cadmium does not break down in the environment but can change into different forms. Most cadmium stays where it enters the environment for a long time. Some of the cadmium that enters the water will bind to soil but some will remain in the water.

59. The ATSDR has concluded that breathing high levels of cadmium can severely damage the lungs and may cause death and that eating food or drinking water with very high levels of cadmium can severely irritate the stomach, leading to vomiting and diarrhea. The ATSDR has also concluded that long-term exposure to lower levels of cadmium by breathing it in the air, or ingesting it in food or water leads to a buildup of cadmium in the kidneys, which may damage the kidneys. Other potential effects to long-term exposures to low levels of cadmium are lung damage and fragile bones. The International Agency for Research on Cancer has determined that cadmium is carcinogenic in humans. The EPA has determined that cadmium is a probable human carcinogen through inhalation.

60. **Zinc** is one of the most common elements in the earth's crust. In its pure elemental (or metallic) form, zinc is a bluish-white shiny metal. Most zinc enters the environment as the result of human activities, such as mining, purifying of zinc, lead and cadmium ores, steel production, coal burning, and burning of wastes. Waste streams from zinc and other metal manufacturing and zinc chemical industries, domestic waste water, and run-off from soil containing zinc can discharge zinc into waterways.

61. Most of the zinc in bodies of water, such as lakes or rivers, settles on the bottom. However, a small amount may remain either dissolved in water or as fine suspended particles. The level of dissolved zinc in water may increase as the acidity of water increases. Some fish can collect zinc in their bodies if they live in water containing zinc. Most of the zinc in soil is bound to the soil and does not dissolve in water. However, depending on the characteristics of the soil, some zinc may reach groundwater. Zinc may be taken up by animals eating soil or drinking water

containing zinc. If other animals eat these animals, they will have increased amounts of zinc in their bodies.

62. The ATSDR has concluded that while zinc is an essential element in the human diet, exposure to too much zinc can be harmful. The ATSDR concluded that eating large amounts of zinc, even for a short time, can cause stomach cramps, nausea and vomiting. Eating large amounts of zinc for several months can cause anemia, damage to the pancreas, and lower levels of high density lipoprotein (HDL) cholesterol (also known as “the good cholesterol”). The ATSDR has also concluded that breathing large amounts of zinc dust or fumes can cause a specific short-term disease called metal fume fever.

VI. CONCLUSIONS OF LAW AND DETERMINATIONS

63. Based on the Findings of Fact set forth above, and the Administrative Record supporting this action, EPA has determined that:

64. The Respondent’s lead smelter is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9).

65. The metals contaminated slag pile, the lead air emissions and metals contaminated dust present at the facility, as identified in the Findings of Fact above, as well as arsenic, cadmium, copper, lead, nickel and zinc, are "hazardous substance(s)" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14). The metals contaminated slag pile located in and around the Respondent’s facility is also a “solid waste” as defined by Section 1004 (27) of RCRA, 42 U.S.C. § 6903(27).

66. The Respondent is a "person" as defined by and within the meaning of Sections 101(21) and 107(a) of CERCLA, 42 U.S.C. §§ 9601(21) and 9607(a), and Section 1004 (15) of RCRA, 42 U.S.C. §6903(15) .

67. The Respondent is liable under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), as the Respondent: (i) is the current owner and/or operator of the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of § 107(a)(1) of CERCLA, 42 U.S.C. § 9607(a)(1); and (ii) was the owner and/or operator of the facility at the time of disposal of hazardous substances at the facility, as defined by Section 101(20) of CERCLA, 42 U.S.C. § 9601(20), and within the meaning of Section 107(a)(2) of CERCLA, 42 U.S.C. § 9607(a)(2).

68. The presence of hazardous substances at the facility and the past, present or potential migration of hazardous substances from this facility constitute actual and/or threatened "releases" of hazardous substances as defined by Section 101(22) of CERCLA, 42 U.S.C. § 9601(22) and Section 260.500(9), RSMo.

69. The conditions present at the facility may present an imminent and substantial endangerment to the public health, welfare or the environment. These conditions include, but are not limited to, the following:

i. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants. This factor is present at the facility due to the concentrations of lead in the soil of residences near the smelter. Residential areas are within approximately 200 feet of the facility. A significant source of the lead in the soils is the historic airborne releases of lead particles from the Herculaneum smelter.

ii. Weather conditions may cause hazardous substances or pollutants or contaminants to migrate or be released. This factor is present due to the concentrations of lead in soils that could migrate or be released by windy or rainy conditions that occur at the facility.

70. The actual and/or threatened “releases” of hazardous substances from the facility may present an imminent and substantial endangerment to the public health, welfare, or the environment within the meaning of Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

71. The Respondent is a responsible party within the meaning of Sections 104, 107 and 122 of CERCLA, 42 U.S.C. §§ 9604, 9607 and 9622.

72. The presence of solid wastes and/or hazardous substances in the soil, surface and ground water and sediments in and around the facility resulted from the past or present handling, storage, treatment, transportation, and/or deposition of solid wastes and/or hazardous substances at the facility.

73. The Respondent has been, and is currently, contributing to such handling, storage, treatment, transportation and/or deposition of solid wastes and/or hazardous substances at the facility.

74. Present conditions at the facility may present an imminent and substantial endangerment to health or the environment, within the meaning of Section 7003 of RCRA, 42 U.S.C. § 6973.

75. The conditions present at the facility may constitute a threat to the public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the National Oil and Hazardous Substances Protection Contingency Plan (NCP).

76. Respondent is a “person” and a “person having control over a hazardous substance” within the meaning of Section 260.500(7) and (8), RSMo.

77. The contaminants identified above in paragraph 65 are “hazardous substances” as that term is defined in Section 260.500(5), RSMo.

78. The conditions described above in the Findings of Fact constitute a “hazardous substance emergency” as that term is defined in Section 260.500(6), RSMo.

79. The actions required by this Consent Order are necessary to protect the public health, welfare, or the environment, are in the public interest (42 U.S.C. § 9622(a)) and, if conducted as set forth in this Consent Order are not inconsistent with CERCLA, RCRA or the NCP.

VII. NOTICE TO STATE AND LOCAL AUTHORITIES

80. The state of Missouri and appropriate local authorities have been notified of the issuance of this Order pursuant to Section 7003(c) of RCRA, 42 U.S.C. § 6973(c) and Section 106(a) of CERCLA, 42 U.S.C. § 9606(a).

VIII. ORDER

81. Based on the foregoing, Findings of Fact, Conclusions of Law, Determinations and the Administrative Record for this matter, EPA and MDNR hereby orders that Respondent comply with the following provisions, including but not limited to the attached Statement of Work, all documents incorporated by reference into this Order, and all schedules and deadlines in this Order, attached to this Order, or incorporated by reference into this Order, and perform the following actions:

A. Designation of Contractors and Project Coordinators

i. Respondent shall notify EPA and MDNR of the name(s) and qualifications of any contractor or subcontractor retained to perform work under this Order at least ten (10) days prior to commencement of work by such contractor or subcontractor.

ii. EPA, after consultation with MDNR, retains the right to disapprove of any, or all, of the contractors and/or subcontractors retained by Respondent. If EPA, after consultation with MDNR, disapproves of a selected contractor or subcontractor Respondent shall retain a different contractor or subcontractor within forty-five (45) days following receipt of EPA's disapproval and shall notify EPA and MDNR of the identities of the replacement contractor(s) or subcontractor(s) and their qualifications within fifteen (15) days of their retention.

iii. Within five (5) days after the effective date of this Order, Respondent shall designate in writing a Project Coordinator and shall submit such person's name, address, telephone number, and qualifications to EPA and MDNR. Respondent's Project Coordinator shall be responsible for administration of all Respondent's actions required by this Order. To the greatest extent possible, Respondent's Project Coordinator shall be present on-site or readily available during site work. EPA, in consultation with MDNR, retains the right to disapprove of any Project Coordinator named by Respondent. If EPA disapproves of a proposed Project Coordinator, Respondent shall retain a different Project Coordinator and shall notify EPA and MDNR of that person's name, address, telephone number, and qualifications within forty-five (45) days following receipt of EPA's disapproval. Receipt by Respondent's Project Coordinator of any notice of communication from EPA or MDNR pertaining to this Order shall constitute receipt by Respondent.

iv. EPA and MDNR have designated the individuals listed below as their Project Coordinators under this Order. The Respondent shall direct all submissions required by this Order, except for the Natural Resource Damages deliverables, by certified or overnight mail or facsimile transmission to EPA's and MDNR's Project Coordinators. The Respondent shall direct

all Natural Resource Damages deliverables to MDNR's Natural Resource Damages Coordinator by certified or overnight mail or facsimile transmission. The Project Coordinators are as follows:

Tony Petruska
USEPA, Region VII
901 N 5th Street
Kansas City, Kansas 66101

Dave Mosby
MDNR, Superfund Section
P. O. Box 176
Jefferson City, Missouri 65102

Frances Klahr
Natural Resource Damages Coordinator
MDNR, Superfund Section
P.O. Box 176
Jefferson City, Missouri 65102

IX. WORK TO BE PERFORMED

82. Respondent shall perform, at a minimum, the work specified in the Statement of Work which is attached to and made a part of this Order. All activities required by this Order shall be conducted in accordance with CERCLA, RCRA, the NCP, 43 C.F.R. Part 11, and all applicable and appropriate EPA guidances, policies, and procedures, including any amendments or revisions to such guidance, policies, and procedures, except for any specific guidances that have been held by a court to be improper because said guidances should have been promulgated as a rule or regulation. EPA shall determine the applicability and appropriateness of its guidances, policies, and procedures. Respondent shall comply with any amendment or revision to EPA's guidance, policies, and procedures upon receipt of a notification from EPA stating that such amendments or revisions are applicable and appropriate for work remaining to be conducted pursuant to this Order.

A. Work Plan and Implementation

i. In accordance with the time lines specified in the Statement of Work (SOW), Respondent shall submit to EPA and MDNR for review and approval the Work Plans for performing the actions set forth in the attached SOW. The Work Plans shall provide a description of, and an expeditious, detailed schedule for the implementation of the actions required by this Order.

ii. EPA and MDNR may approve, disapprove, require revisions to, modify or develop the Work Plans in accordance with Section XIV (Agency Approvals/Submittals) of this Order.

iii. Once approved, approved with modifications, modified or developed by EPA and/or MDNR, the Work Plans, the schedules contained therein, and any subsequent modifications shall become a part of and shall be fully enforceable under this Order.

iv. Respondent shall implement the Work Plans as finally approved, modified or developed by EPA and MDNR in accordance with the schedules contained in the workplans.

v. Respondent shall notify EPA and MDNR at least ten (10) days prior to performing any on-site work pursuant to the Work Plans approved, modified or developed by EPA and MDNR.

vi. Respondent shall not commence or undertake any actions at the site without EPA's prior written approval.

B. Health and Safety Plan

i. In accordance with the time lines specified in the Statement of Work, Respondent shall submit for EPA and MDNR review and comment a Health and Safety Plan that

ensures the protection of the public health and safety during performance of on-site work required by this Order. This plan shall be prepared in accordance with EPA's current Standard Operating Safety Guide (November 1984, updated July 1988). In addition, this plan shall comply with all current applicable Occupational Safety and Health Administration (“OSHA”) regulations; Hazardous Waste Operations and Emergency Response regulations; both found at 29 C.F.R. Part 1910. The plan shall also include contingency planning in the event that the site is threatened by fire or other occurrences that may cause or contribute to the spread of contamination. Further, the plan shall include provisions designed to prevent unauthorized access to the site.

ii. Respondent shall incorporate all changes to the Health and Safety Plan recommended by EPA and MDNR, and implement the plan during the pendency of the work conducted pursuant to this Order.

C. Sampling and Analysis Plan/Quality Assurance Project Plan

i. All sampling and analyses performed pursuant to this Order shall conform to EPA direction, approval, and guidance regarding sampling, quality assurance/quality control (“QA/QC”), data validation, and chain of custody procedures; and shall be in accordance with the approved Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) as described in the SOW. Respondent shall ensure that each laboratory used to perform analyses participates in a QA/QC program that complies with appropriate EPA guidance. Respondent shall use the following documents as guidance for QA/QC and sampling: “Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures,” OSWER Directive Number 9360.4-01; “Environmental Response Team Standard Operating Procedures,” OSWER Directive Numbers 9360.4-02 through 9360.4-08, and “EPA

Requirements For Quality Assurance Project Plans For Environmental Data Operations”
(EPAQA/R-5).

ii. Upon request by EPA or MDNR, Respondent shall have the laboratory(s) being utilized by Respondent analyze samples submitted by EPA or MDNR for quality-assurance monitoring. Respondent shall identify in the Work Plan the quality assurance/quality control procedures to be followed by all sampling teams and laboratories performing data collection and/or analysis.

iii. Upon request by EPA or MDNR, Respondent shall allow EPA or its authorized representatives, MDNR and the Natural Resource Damages Project Coordinator to take split and/or duplicate samples of any samples collected by Respondent, its contractor(s), or anyone on behalf of Respondent while performing work under this Order. Respondent shall notify EPA and MDNR not less than ten (10) days in advance of any sample collection activity. EPA and MDNR and the Natural Resource Damages Project Coordinator shall have the right to take any additional samples that they deem necessary.

iv. Respondent shall submit to EPA, MDNR and the Natural Resource Damages Project Coordinator within two (2) business days of receipt by Respondent, analytical data for samples collected in connection with this Order.

D. Reporting

Respondent shall submit written progress reports to EPA and MDNR concerning all activities undertaken pursuant to this Order on a monthly basis after the effective date of this Order, unless otherwise directed by EPA's and MDNR's Project Coordinators. These reports shall describe all significant developments during the preceding reporting period including, but not

limited to: a description of the work performed and any problems encountered; analytical data received during the reporting period; and the developments anticipated during the next reporting period, including a schedule of work to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

E. Final Report

i. As required in the Statement of Work, Respondent shall submit for EPA and MDNR review and approval Final Reports summarizing the actions taken to comply with this Order. The Final Reports shall generally conform to, at a minimum, the guidelines set forth in OSWER Directive Number 9360.3-03, "Removal Response Reporting." The Final Reports shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with this Order, a listing of quantities and types of materials removed off-site or handled on-site, a discussion of response and disposal options considered for those materials, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the response action (e.g., manifests, invoices, bills, contracts and permits).

ii. The Final Reports shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

F. Access to Property and Information

i. Respondent shall obtain and provide access to the Site and to off-Site areas subject to or affected by the work required under this Order, and shall also provide access to all records and documentation in Respondent's possession or control that relate to the conditions at the Site and the activities conducted pursuant to this Order. Such access shall be provided to EPA and MDNR's employees, contractors, agents, consultants, designees and representatives. These individuals shall be permitted to move freely at the Site and appropriate off-site areas in order to conduct activities the project coordinators deem necessary. Nothing herein shall be interpreted as limiting or affecting EPA's right of entry or inspection authority under Federal law, or MDNR's right of entry or inspection authority under state and federal law.

ii. Where work under this Order is to be performed in areas owned by or in the possession of someone other than Respondent, Respondent shall use its best efforts to obtain all necessary access agreements within thirty (30) days after the effective date of this Order, or within thirty (30) days after notice that access is necessary at a property, or as otherwise specified by EPA's and MDNR's Project Coordinators. Respondent shall immediately notify EPA and MDNR in writing if, after using its best efforts, Respondent is unable to obtain such agreements. In the written notification, Respondent shall describe its efforts to obtain access. For this purpose, "best efforts" shall not include any action that is inconsistent with any applicable restriction on communication with members of any class that might be certified in a putative class action. EPA may then assist Respondent in gaining access, to the extent necessary to effectuate the response actions described herein, utilizing such means as EPA deems appropriate. EPA reserves the right

to seek from Respondent reimbursement for all costs incurred by the United States in obtaining access for Respondent.

G. Record Retention, Documentation, Availability of Information

i. Respondent shall preserve all documents and information relating to the actions performed under this Order, or relating to the solid wastes, hazardous wastes, and/or hazardous substances found on or released from the Site, for six (6) years following issuance of the Notice of Completion by EPA pursuant to Section XXIV of this Order. If during such six-year period EPA or MDNR requests in writing to review or copy any such documentation or information, Respondent shall provide the original or copies of such documents or information to EPA or MDNR within fifteen (15) days of receipt of the written request. At the end of this six-year period and sixty (60) days before any such document or information is destroyed, Respondent shall notify EPA and MDNR that such documents and information are available to EPA and MDNR for inspection, and upon EPA's or MDNR's request, Respondent shall provide the originals or copies of such documents and information to EPA and /or MDNR.

ii. Respondent may assert a business confidentiality claim pursuant to 40 C.F.R. § 2.203(b) and Section 260.430, RSMo. with respect to part or all of any information submitted to EPA and/or MDNR pursuant to this Order, provided such claim is allowed by applicable law.

iii. Respondent may assert that certain documents or records required to be submitted to EPA and/or MDNR pursuant to this Order are privileged under the attorney-client privilege or are considered attorney work product. If Respondent asserts such a privilege in lieu of providing documents, Respondent shall provide EPA and MDNR with the following: (a) the

title of the document or record; (b) the date of the document or record; (c) the name and title of the author of the document or record; (d) the name and title of each addressee and recipient; (e) a description of the subject matter of the document or record sufficient for purposes of identification of the document, except that no description so specific as to constitute a waiver of the privilege shall be required; and (f) an identification of the privilege claimed and the basis for assertion of the privilege. However, no document or record created or generated pursuant to the requirements of this Order shall be withheld on the grounds that it is privileged. Any document or record for which Respondent asserts such a privilege shall not be destroyed until Respondent receives a notification from EPA authorizing such destruction.

iv. EPA and/or MDNR may, at any time, challenge claims of business confidentiality or privilege through negotiations or otherwise as provided by law or the Federal Rules of Civil Procedure.

H. Off-Site Shipments

All hazardous substances, pollutants or contaminants removed off-site pursuant to this Order for treatment, storage or disposal shall be treated, stored or disposed of at a facility in compliance, as determined by EPA, with Section 121(d)(3) of CERCLA, 42 U.S.C. § 9621(d)(3) and the Amendment to the National Oil and Hazardous Substances Pollution Contingency Plan; Procedures for Planning and Implementing Off-Site Response Actions: Final Rule, 58 Fed. Reg. 49,200 (September 22, 1993), codified at 40 C.F.R. § 300.440. Upon request, EPA's On-Scene Coordinator (OSC) will provide information to Respondent on the acceptability of a facility under Section 121(d)(3) of CERCLA and the above rule. Unless impracticable, prior notification of

out-of-state waste shipments should be given consistent with EPA's OSWER Directive 9330.2-07.

X. COMPLIANCE WITH OTHER LAWS

83. Respondent shall perform all actions required pursuant to this Order in accordance with all applicable local, state, and Federal laws and regulations; except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 9621(e), and 40 C.F.R. § 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-site actions required pursuant to this Order shall, to the extent practicable as determined by EPA, after consultation with MDNR, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements ("ARARs") under Federal environmental, state environmental or facility siting laws (see "The Superfund Removal Procedures for Consideration of ARARs During Removal Actions," EPA's OSWER Directive No. 9360.3-02, August 1991). Respondent shall identify proposed state and federal ARARs in the Work Plan, and the ARARs are subject to EPA approval following consultation with MDNR.

XI. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

84. If any incident or change in the condition of the Site occurs during the implementation of activities conducted pursuant to this Order that causes or threatens to cause an additional release of hazardous substances from the Site or an endangerment to the public health, welfare or the environment, Respondent shall immediately take all appropriate action. Respondent shall take these actions in accordance with all applicable provisions of this Order, including but not limited to the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondent shall also immediately notify EPA's and MDNR's Project Coordinators or, in the event of his/her unavailability, shall notify the Regional Duty Officer, Superfund Division, EPA Region VII, (913) 281-0991, of the incident or

change in site conditions. Respondent shall submit a written report to EPA and MDNR within seven (7) days after each release, incident or change in site conditions setting forth the events that occurred and the measures taken or to be taken to mitigate any release or potential release or endangerment caused or threatened by the release or potential release and to prevent the reoccurrence of such a release or potential release. If Respondent fails to take action, EPA and/or MDNR may respond to the release or endangerment and reserves the right to pursue cost recovery.

85. The reporting requirements under this Section are in addition to, not in lieu of, the reporting requirements set forth in Section 103 of CERCLA, 42 U.S.C. § 9603, and Section 301 et seq., of the Emergency Planning and Community Right-To-Know Act of 1986 ("EPCRA"), 42 U.S.C. § 11001 et seq.

XII. AUTHORITY OF EPA'S AND MDNR'S PROJECT COORDINATORS

86. EPA's and MDNR's Project Coordinators shall be responsible for overseeing the proper and complete implementation of this Order. EPA's Project Coordinator shall have the authority vested in an OSC by 40 C.F.R. § 300.120 of the NCP, including the authority to halt, conduct or direct any action required by this Order, or to direct any other response action undertaken by EPA or Respondent at the site. The absence of EPA's Project Coordinator from the site shall not be cause for stoppage of work unless specifically directed by EPA's Project Coordinator.

87. EPA, MDNR and Respondent shall have the right to change their designated Project Coordinator. EPA and/or MDNR shall notify the Respondent, and Respondent shall notify EPA and MDNR within five (5) business days before such a change is made. Notification may initially

be made orally, but shall be followed promptly by written notice. Respondent's selection of a new Project Coordinator is subject to EPA and MDNR approval.

XIII. REIMBURSEMENT OF COSTS

88. Within thirty (30 days) after the effective date of the Order, Respondent shall pay \$25,013.04, in the manner detailed below, for reimbursement of past response costs paid by the United States. "Response costs" do not include the past or future reasonable costs of natural resource damage assessment incurred by the Federal and State Natural Resource Trustees. Past Response Costs are all costs, including, but not limited to, direct and indirect costs and interest, that the United States, its employees, agents, contractors, consultants, and other authorized representatives incurred and paid with regard to the Site prior to September 1, 2000. In addition, Respondent shall reimburse EPA for all Future Response Costs, not inconsistent with the NCP, incurred by the United States with respect to this Consent Order.

89. On a periodic basis, EPA shall submit to the Respondent an appropriate accounting of all Future Response Costs incurred by the U.S. Government at the Site with respect to this Consent Order. Future Response Costs shall include, but not be limited to, all direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Consent Order, compliance monitoring including the collection and analysis of samples, inspection of activities, visits to the Site, public outreach activities, verifying the Work, or otherwise implementing, overseeing, or enforcing this Order, and costs of performing any of Respondent's tasks which were conducted inadequately. Future Response Costs shall also include all costs, including direct and indirect costs, paid by the United States in connection with the Site between September 1, 2000, and the effective date of this AOC.

90. The Respondent shall, within thirty (30) days of receipt of each accounting, remit a certified or cashier's check to EPA for the amount of those future costs, made payable to the "EPA Hazardous Substance Superfund." Interest shall accrue from the date the payment is due at the rate determined by the Secretary of the Treasury (currently 5.30 percent per annum through September 30, 2000) on the unpaid balance until such costs and accrued interest have been paid in full. On October 1 of each subsequent fiscal year, any unpaid balance will begin accruing interest at the new rate determined by the Secretary of the Treasury. Interest will be compounded annually.

91. Respondent's check should identify the name of the Site, the EPA site identification number, the title and EPA Docket Number for this Consent Order, and be forwarded to:

U.S. Environmental Protection Agency
Superfund Accounting, Region VII
P. O. Box 360748M
Pittsburgh, Pennsylvania 15251

Respondent may dispute all or part of a bill for future response costs submitted under this Order, if Respondent alleges that EPA has made an accounting error, or if Respondent alleges that a cost item is inconsistent with the NCP. If any dispute over future response costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs into the Hazardous Substance Fund as specified above on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the EPA Project Coordinator. Respondent shall ensure that the prevailing party or parties in the dispute

shall receive the amount upon which they prevailed from the escrow funds plus interest within thirty (30) days after the dispute is resolved.

92. Within thirty (30) days after the effective date of the Order, Respondent shall pay \$3,569.20, in the manner detailed below, for reimbursement of past natural resource damage assessment costs paid by the State. Past natural resource damage assessment costs are all costs and interest, but not limited to, direct and indirect costs and interest, that the State, its employees, agents, contractors, consultants, and other authorized representatives incurred and paid with regard to the Site prior to July 1, 2000. In addition, Respondent shall reimburse MDNR for all future natural resource damage assessment costs, incurred by the State.

93. On a periodic basis, MDNR shall submit to the Respondent an appropriate accounting of all future natural resource damage assessment costs incurred by the State at the Site with respect to this Consent Order. Future natural resource damage assessment costs shall include, but not be limited to, all direct and indirect costs, that the State incurs in reviewing or developing plans, reports and other items pursuant to this Consent Order, compliance monitoring including the collection and analysis of samples, inspection of activities, visits to the Site, verifying the Work, or otherwise implementing, overseeing, or enforcing this Order, and costs of performing any of Respondent's natural resource damage assessment tasks which were conducted inadequately. Future natural resource damage assessment costs shall also include all costs including direct and indirect costs, paid by the State in connection with the Site between July 1, 2000, and the effective date of this AOC and all interest on the past natural resource damage assessment costs from December 1, 1998, to July 1, 2000.

94. The Respondent shall, within thirty (30) days of receipt of each accounting, remit a certified or cashier's check to MDNR for the amount of those future costs, made payable to the "Missouri Hazardous Waste Remedial Fund." Interest shall accrue from the date the payment is due at the rate determined by the Secretary of the Treasury (currently 5.30 per cent per annum through September 30, 2000) on the unpaid balance until such costs and accrued interest have been paid in full. On October 1 of each subsequent fiscal year, any unpaid balance will begin accruing interest at the new rate determined by the Secretary of the Treasury. Interest will be compounded annually.

95. Respondent's check should identify the name of the Site, the EPA site identification number, the title and EPA Docket Number for this Consent Order, and be forwarded to:

Missouri Department of Natural Resources
Attention: Chief Superfund Division
Hazardous Waste Management Program
P.O. Box 176
Jefferson City, Missouri 65102-0176

Respondent may dispute all or part of a bill for future natural resource damage assessment costs submitted under this Order, if Respondent alleges that MDNR has made an accounting error. If any dispute over future natural resource damage assessment costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondent shall pay the full amount of the uncontested costs into the Hazardous Waste Remedial Fund as specified above on or before the due date. Within the same time period, Respondent shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondent shall simultaneously transmit a copy of both checks to the MDNR Project Coordinator. Respondent shall ensure that the prevailing party or parties in the dispute shall

receive the amount upon which they prevailed from the escrow funds plus interest within thirty (30) days after the dispute is resolved.

XIV. AGENCY APPROVALS/SUBMITTALS

96. The EPA, in consultation with MDNR, may approve, disapprove, require revisions to or modify any document, plan or submission required under this Order, except that no revision may be required without the consent of Respondent if such revision would require the performance of work inconsistent with the Statement of Work and no submission by Respondent may be disapproved on the basis that it fails to require performance of additional work not required by the Statement of Work, except as provided in Section XXV herein. If EPA, after consultation with MDNR, requires revisions, Respondent shall submit a revised version of the submission within thirty (30) days of receipt of EPA's notification of the required revisions. The EPA, after consultation with MDNR, may, at its sole discretion, unilaterally modify a submission upon EPA's first review or after Respondent has revised and resubmitted a document. Once approved, modified by EPA after consultation with MDNR, or approved with modifications, Respondent shall commence work and implement any approved workplan in accordance with the schedule and provisions contained therein. Any EPA-approved report, workplan, specification, or schedule shall, upon approval, be incorporated into and shall become enforceable under, this Order. Prior to this written approval, no workplan, report, specification, or schedule shall be construed as approved and final. Oral advice, suggestions, or comments given by EPA or MDNR representatives will not constitute an official approval, nor shall any oral approval or oral assurance of approval be considered binding. All submittals shall be directed to EPA's and MDNR's Project Coordinators, identified in Section VIII (Order).

97. Notwithstanding any other provision of this Order, the MDNR, in consultation with the Department of Interior (DOI), will approve, disapprove, require revisions to or modify any document, plan or submission relating to natural resource damages under this Order. If MDNR, after consultation with DOI, requires revisions, the same time schedule as outlined in paragraph 96 shall apply.

XV. ENFORCEMENT: PENALTIES FOR NONCOMPLIANCE

98. Pursuant to Section 106(b) of CERCLA, 42 U.S.C. § 9606(b), any person who, without sufficient cause, willfully violates, or fails or refuses to comply with, this Order may, in addition to an action brought in the appropriate United States district court to enforce this Order, be fined not more than \$27,500 for each day that such violation occurs or such failure to comply continues. In addition, Respondent may be subject to civil penalties under Section 7003(b) of RCRA, 42 U.S.C. § 6973(b), of \$5,500 per day for each day that Respondent, without sufficient cause, willfully violates or fails or refuses to comply with this Order.

99. Pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(C)(3), any person who is liable for a release or threat of release of a hazardous substance and who fails without sufficient cause to provide properly the actions specified in this Order may be liable to the United States for punitive damages in an amount at least equal to, and not more than three times, the amount of any costs incurred as a result of such failure to take proper action.

XVI. ENFORCEMENT AND RESERVATIONS

100. The United States reserves the right to bring an action against Respondent pursuant to, among other authorities, Section 7003 of RCRA, 42 U.S.C. § 6973 and Section 107 of CERCLA, 42 U.S.C. § 9607, for recovery of any response costs incurred by the United States in connection with the Site and not reimbursed by Respondent pursuant to this Order. Respondent reserves all defenses to such an action.

101. Notwithstanding any other provision of this Order, EPA reserves the right to perform its own studies, complete the work (or any portion of the work) required by this Order, and seek reimbursement from Respondent for its costs, or seek appropriate relief. Respondent reserves all defenses to any such action, except as provided in paragraph 2 herein.

102. Nothing in this Order shall preclude EPA from taking any additional enforcement actions, including modification of this Order or issuance of additional orders, and/or additional actions as EPA may deem necessary, or from requiring Respondent in the future to perform additional activities pursuant to RCRA, CERCLA, or any other applicable law. Such additional enforcement actions may include, but are not necessarily limited to: further actions taken pursuant to Section 3008(a) of RCRA, 42 U.S.C. § 6928(a), to assess civil penalties and/or seek injunctive relief; actions taken pursuant to Section 3008(h) of RCRA, 42 U.S.C. § 6928(h), to compel corrective action at the facility; further actions under Section 7003 of RCRA to address conditions that may present an imminent and substantial endangerment to human health or the environment caused by any future releases of solid waste or hazardous waste from the facility; and further actions under Section 106 of CERCLA to address conditions that may present an imminent and substantial endangerment to the public health, welfare, or the environment caused by any actual and/or

threatened releases of hazardous substances from the facility. Respondent reserves all defenses to any such actions or claims.

103. Notwithstanding any provision of this Order, the United States hereby reserves all of its information gathering, inspection and all enforcement authorities and rights under RCRA, CERCLA, and any other applicable statutes or regulations. The United States expressly reserves all rights it has to issue additional orders or to take other action it deems necessary or appropriate with respect to:

- a. any other areas of the Site which the United States deems a threat to human health or the environment; and
- b. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damages assessments.

104. The MDNR reserves the right to bring an action against Respondent pursuant to, among other authorities, Section 107 of CERCLA, 42 U.S.C. § 9607 and/or § 260.530, RSMo, for recovery of any response costs incurred by the State of Missouri in connection with the Site and not reimbursed by Respondent pursuant to this Order. Respondent reserves all defenses to any actions brought to enforce such rights.

105. Notwithstanding any other provision of this Order, MDNR reserves the right to perform its own studies, complete the work (or any portion of the work) required by this Order, and seek reimbursement from Respondent for its costs, or seek appropriate relief. Respondent reserves all defenses to any such action, except as provided in paragraph 2 herein.

106. Nothing in this Order shall preclude MDNR from taking any additional enforcement actions, including modification of this Order or issuance of additional orders, and/or additional

actions as MDNR may deem necessary, or from requiring Respondent in the future to perform additional activities pursuant to CERCLA, Section 260.500, et seq., RSMo, or any other applicable law, including, but not limited to, the payment of any natural resource damages incurred by the State. Respondent reserves all defenses to any such action.

107. Notwithstanding any provision of this Order, the MDNR hereby reserves all of its information gathering, inspection and all enforcement authorities and rights under CERCLA, Section 260.500, et seq., RSMo, and any other applicable statutes or regulations. The MDNR expressly reserves all rights it has to issue additional orders or to take other action it deems necessary or appropriate with respect to:

a. any other areas of the Site which the State deems a threat to human health or the environment; and

b. liability for damages for injury to, destruction of, loss of natural resources, and for the costs of any natural resource damages assessments. Respondent reserves all defenses to any action brought to enforce such rights.

108. Nothing in this Order shall constitute or be construed as a release from any claim, cause of action or demand at law or in equity against any person for any liability arising out of or relating in any way to the facility.

109. If a court issues an order that invalidates any provisions of this Order or finds that Respondent has sufficient cause not to comply with one or more provisions of this Order, Respondent shall remain bound to comply with all provisions of this Order not invalidated by such court's order.

XVII. FORCE MAJEURE

110. Respondent agrees to perform all requirements under this Order within the time limits established under this Order, unless the performance is delayed by a force majeure. For purposes of this Order, a force majeure is defined as any event arising from causes not foreseeable and beyond the control of Respondent or of any entity controlled by Respondent, including but not limited to its consultants, contractors, subcontractors or agents, that delays or prevents performance of any obligation under this Order despite Respondent's best efforts to fulfill the obligation. Force majeure does not include financial inability to complete the work, unanticipated or increased costs of performance, normal precipitation events, changed economic circumstances or failure to obtain federal, state or local permits. Force majeure does include the inability to perform any work because such work would be inconsistent with any order entered by any court in the course of a putative or certified class action brought by or on behalf of residents of the geographic area that is the subject of this Order.

111. Respondent shall immediately notify EPA and MDNR orally, and shall also notify EPA and MDNR in writing within five (5) days after Respondent becomes aware of events that constitute a force majeure. Such notice shall: identify the event causing the delay or anticipated delay; estimate the anticipated length of delay, including necessary demobilization and re-mobilization; state the measures taken or to be taken to minimize the delay; and estimate the timetable for implementation of the measures. Such notice shall be reviewed by EPA and MDNR and EPA, in consultation with MDNR, will determine whether the delay has been or will be caused by a force majeure.

112. Respondent shall exercise best efforts to avoid and minimize any delay caused by a force majeure. Failure to comply with the notice provision of this section shall waive any claim of force majeure by the Respondent.

113. If EPA determines a delay in performance of a requirement under this Order is or was attributable to a force majeure, the time period for performance of that requirement shall be extended as deemed necessary by EPA, after consultation with MDNR . Such an extension shall not alter Respondent's obligation to perform or complete other tasks required by the Order which are not directly affected by the force majeure.

XVIII. STIPULATED PENALTIES

114. For each day that Respondent fails to produce a deliverable in accordance with the attached Statement of Work, or fails to conduct the activities specified in an approved plan pursuant to this Order, or otherwise is in violation of, or fails to perform in accordance with the requirements of this Order, Respondent shall be liable for stipulated penalties, as set forth below.

115. Penalties begin to accrue on the day that performance is due or a violation (or noncompliance, or failure or refusal to perform) of this Order occurs, and extends through the period of noncompliance. EPA will provide written notice that stipulated penalties are accruing for failure to perform or violations of this Order. Payment shall be due within thirty (30) days from the date of Respondent's receipt of a demand letter from EPA.

116. Respondent may dispute whether penalties are due by invoking the dispute resolution procedures under the terms of Section XXVIII of this Order. Respondent shall pay interest on the unpaid penalties due, which shall begin to accrue at the end of the thirty days from the date of Respondent's receipt of a demand letter from EPA at the rate established by the Department of

Treasury pursuant to 30 U.S.C. ' 3717. Respondent shall further pay a handling charge of one percent (1%) to be assessed at the end of each thirty-one (31) day period and a six percent (6%) per annum penalty charge to be assessed if the penalty is not paid in full within 90 days after it is due.

117. Respondent shall make all payments by forwarding a certified or cashier's check to:

U.S. Environmental Protection Agency
Superfund Accounting Region VII
P.O. Box 360748M
Pittsburgh, Pennsylvania 15251

Checks must identify the name of the site, the location of the site, and EPA docket number of this Order. A copy of the check and transmittal letter shall be forwarded to EPA's Project Coordinator.

118. For failure to develop and submit in a timely manner an original version of the following plans required pursuant to this Order, or for failure to submit a timely and adequate revised version of the following plans, stipulated penalties shall accrue in the amount of two hundred fifty dollars (\$250) per day per violation:

1. Community Soil Cleanup Plan
2. Community Blood Lead Plan
3. Control Strategy, Control Strategy Implementation Schedule, and Reasonably Available Control Technology Analysis
4. Long Term Monitoring and Maintenance Plan
5. Interim Slag Pile Runoff Control Plan
6. Slag Pile/Surface Water/Sediment Sampling and Analysis Plan

7. Slag Pile /Surface Water/Sediment Assessment Report
8. Slag Pile Evaluation Report
9. Work plan for conducting an Ecological Risk Assessment
10. Groundwater Monitoring Plan
11. Phase 2 Groundwater Monitoring Plan (if required)
12. Surface Water and Sediment Evaluation Report
13. Submission of sample results and investigations previously conducted
14. Other Areas Evaluation Report
15. Activity Specific Sampling and Analysis Plans
16. Quality Assurance Project Plan
17. Natural Resource Damages Assessment Pre-Assessment Report and
Natural Resource Damage Assessment Plan

119. For the following activities, stipulated penalties shall accrue in the amount of one thousand two hundred fifty dollars (\$1,250) per day per violation:

1. Failure to fully conduct or implement an approved plan which was developed and approved pursuant to this Order.
2. Failure to install and operate the air emission controls specified in the Control Strategy.
3. Failure to implement air emission contingency measures.

120. The stipulated penalties provisions do not preclude EPA or the MDNR from pursuing any other remedies or sanctions which are available to EPA or the MDNR because of Respondent's failure to comply with this Order including, but not limited to, conduct of all or part of the actions

by EPA or MDNR. EPA will not attempt to recover more than \$27,500 per day for stipulated penalties and statutory monetary penalties for the same violation. Payment of stipulated penalties does not alter Respondent's obligation to complete performance under this Order.

XIX. OTHER CLAIMS

121. By issuance of this Order, the United States, EPA, and the MDNR, assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondent.

Neither the United States nor EPA nor the MDNR shall be deemed a party to any contract entered into by Respondent or its directors, officers, employees, agents, successors, representatives, assigns, contractors or consultants in carrying out actions pursuant to this Order.

122. Nothing in this Order constitutes a satisfaction of or release from any claim or cause of action against the Respondent or any person not a party to this Order, for any liability such person may have under CERCLA, RCRA, or other statutes, or the common law, including but not limited to any claims of the United States or MDNR for costs, damages and interest under Sections 106(a) and 107(a) of CERCLA, 42 U.S.C. §§ 9606(a) and 9607(a).

123. This Order does not constitute a preauthorization of funds under Section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2). The Respondent waives any claim to payment under Sections 106(b), 111, and 112 of CERCLA, 42 U.S.C. §§ 9606(b), 9611, and 9612, against the United States or the Hazardous Substance Superfund arising out of any action performed under this Order.

124. No action or decision by EPA pursuant to this Order shall give rise to any right to judicial review except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h).

XX. COVENANT NOT TO SUE

125. Except as otherwise specifically provided in this Order, upon issuance of the EPA notice referred to in Section XXIV - Notice of Completion, EPA and MDNR covenant not to sue Respondent for judicial imposition of damages or civil penalties or to take administrative action against

126. Respondent for any failure to perform response actions agreed to in this Order except as otherwise reserved herein.

127. Except as otherwise specifically provided in this Order, in consideration and upon Respondent's payment of the response costs specified in Section XIII of this Order, EPA and MDNR covenant not to sue or to take administrative action against Respondent under Section 107(a) of CERCLA for recovery of past response costs or future response costs incurred by the United States or MDNR in connection with this response action or this Order. This covenant not to sue shall take effect upon the receipt by EPA and MDNR of the payments required by Section XIII - Reimbursement of Costs.

128. These covenants not to sue are conditioned upon the complete and satisfactory performance by Respondent of its obligations under this Order. These covenants not to sue extend only to Respondent and do not extend to any other person.

XXI. CONTRIBUTION PROTECTION

129. With regard to claims for contribution against Respondent for matters addressed in this Order, the Parties hereto agree that the Respondent is entitled to protection from contribution actions or claims to the extent provided by Section 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C. Sections 9613(f)(2) and 9622(h)(4). Nothing in this Order precludes the United States,

MDNR or the Respondent from asserting any claims, causes of action or demands against any persons not parties to this Order for indemnification, contribution, or cost recovery.

XXII. INDEMNIFICATION

130. Respondent agrees to indemnify, save and hold harmless the United States, its officials, agents, contractors, subcontractors, employees and representatives and MDNR, its officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action: (A) arising from, or on account of , acts or omissions of Respondent, Respondent's officers, heirs, directors, employees, agents, contractors, subcontractors, receivers, trustees, successors or assigns, in carrying out actions pursuant to this Order; and (B) for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between Respondent, and any persons for performance of work on or relating to the Site, including claims on account of construction delays. In addition, Respondent agrees to pay the United States and MDNR all costs incurred by the United States and MDNR, including litigation costs arising from or on account of claims made against the United States or MDNR based on any of the acts or omissions referred to in the preceding paragraph.

XXIII. MODIFICATIONS

131. Minor modifications to any plan or schedule may be made in writing by EPA's Project Coordinator, following consultation with MDNR's Project Coordinator and Respondent's Project Coordinator. The remainder of the Order, or any portion of the Order, including the attached Statement of Work may only be modified in writing by signature of the delegated EPA Region VII and MDNR signatory or their designee and by signature of the parties.

132. If Respondent seeks permission to deviate from any approved plan or schedule (or the Statement of Work), Respondent's Project Coordinator shall submit a written request to EPA and MDNR for approval outlining the proposed modification and its basis. Should Respondent experience extraordinary negative economic circumstances, Respondent's Project Coordinator may submit a written request to EPA and MDNR seeking an adjustment to schedules in implementation due to such circumstances. Upon Respondent's showing of extraordinary negative economic circumstances, EPA and MDNR may, at their sole discretion, make adjustments to schedules in implementation due to such circumstances. EPA and MDNR's decision regarding such a request for an adjustment to schedules in implementation due to extraordinary negative economic circumstances, shall not be subject to dispute resolution.

133. No informal advice, guidance, suggestion or comment by EPA or MDNR regarding reports, plans, specifications, schedules, or any other writing submitted by Respondent shall relieve the Respondent of its obligation to obtain such formal approval as may be required by this Order, and to comply with all requirements of this Order unless and until this Order is formally modified.

XXIV. NOTICE OF COMPLETION

134. When EPA, following consultation with MDNR, determines, after EPA's review of the Final Reports, that all actions and requirements have been fully performed in accordance with this Order, with the exception of any continuing obligations such as the record retention requirements of the Order or the resampling requirements of the attached Statement of Work or the Natural Resource Damages portion of the Order and attached Statement of Work, EPA will provide a Notice of Completion to Respondent. If EPA, after consultation with MDNR, determines that

any work has not been completed in accordance with this Order, EPA, in consultation with MDNR, will notify Respondent in writing, providing a list of the deficiencies and a schedule for completing the work. If appropriate, the EPA notification may require Respondent to modify a work plan to correct such deficiencies in accordance with the schedule contained in EPA's notice. Any required modified work plan is subject to EPA and MDNR approval. Respondent shall implement any such modified work plan as finally approved, modified or developed by EPA, in consultation with MDNR, complete the work, and submit a modified Final Report in accordance with the schedule set forth in the EPA notice. Failure by Respondent to implement an EPA approved, modified or developed work plan and complete the work shall be a violation of this Order.

XXV. ADDITIONAL WORK

135. If EPA, following consultation with MDNR, determines that additional work actions not included in an approved plan are necessary to protect areas affected by the Doe Run smelter operation, EPA will notify Respondent of that determination. Respondent shall confirm its willingness to perform the additional work in writing to EPA within thirty (30) days of receipt of the EPA request or Respondent shall invoke the dispute resolution provisions of Paragraph XXVII of this Order. If EPA, following consultation with MDNR, determines that additional work actions not included in an approved plan are necessary to address an emergency condition, Respondent shall confirm its willingness to perform the additional work in writing to EPA within seven (7) days of receipt of the EPA request or Respondent shall invoke the dispute resolution provisions of Paragraph XXVII of this Order. Subject to EPA resolution of any dispute, Respondent shall implement the additional tasks which EPA determines are necessary. Unless

otherwise stated by EPA, or unless Respondent invokes dispute resolution, within thirty (30) days of receipt of notice from EPA that additional work is necessary to protect the aforementioned areas, Respondent shall submit for approval by EPA and MDNR a work plan for the additional work. This work plan shall conform to the applicable requirements of Section IX of this Order. Upon EPA's approval of the work plan, or EPA's modification or development of the work plan, in consultation with MDNR, pursuant to Section XIV (Agency Approvals/Submittals) of this Order, Respondent shall implement the plan for additional work in accordance with the provisions and schedules contained therein. EPA reserves the right to conduct the work itself at any point, to seek reimbursement from Respondent, and/or to seek any other appropriate relief.

Notwithstanding any other language of this Order, the provisions of this paragraph 134 shall not apply with respect to any additional work EPA contends might be necessary in connection with Section III, Air Emissions, of the Statement of Work. There shall be no additional work or requirements imposed with respect to air emissions pursuant to this Order without the consent of Respondent as additional control and contingency measures are already included in Section III of the Statement of Work.

XXVI. PUBLIC COMMENT/PARTICIPATION

136. This Consent Order shall be subject to a public comment period of at least thirty (30) days during which the EPA will make this Consent Order and Administrative Record available for public comment. The EPA and MDNR may withdraw their consent to this Order if comments received during this period disclose facts or considerations which indicate that this Order is inappropriate, improper or inadequate. If, on the basis of such comments, the EPA or MDNR

determines to withdraw its consent to this Order, it will provide the Respondent with a written notice of such determination.

137. EPA, MDNR, and the Natural Resource Trustees will provide the public an opportunity to review and comment on any or all approved plans, final selected response or corrective measures pursuant to the SOW, or other natural resource damage activities required by law or regulations.

138. Following the public comment period, EPA, MDNR, and the Natural Resource Trustees will determine any appropriate changes to the plans, final selected response or corrective measures, or other natural resource damage activities as a result of the public participation and notify Respondent pursuant to Section IX of any additional work.

139. Final Acceptance by EPA of Section XIII (Reimbursement of Costs) of this Order shall be subject to Section 122(i) of CERCLA, 42 U.S.C. Section 9622(i), which requires EPA to publish notice of the proposed settlement in the Federal Register, to provide persons who are not parties to the proposed settlement an opportunity to comment, solely, on the cost recovery component of the settlement, and to consider comments filed in determining whether to consent to the proposed settlement. After consideration of any comments submitted during the thirty (30) day public comment period held pursuant to Section 122(i) of CERCLA, EPA may withhold consent to all or part of Section XIII of this Order if comments received disclose facts or considerations which indicate that Section XIII of this Order is inappropriate, improper or inadequate. Otherwise, Section XIII shall become effective when EPA issues notice to Respondent.

XXVII. DISPUTE RESOLUTION

140. If the Respondent disagrees, in whole or in part, with any disapproval or other decision or directive made by the EPA or MDNR pursuant to this Order concerning the attached Statement of Work, or the Respondent disputes whether stipulated penalties are due or the Respondent disputes all or part of a bill for reimbursement of costs, the Respondent shall notify the EPA and MDNR in writing of the objections and the basis therefore within ten (10) days of the receipt of such disapproval, decision, or directive. The written notice shall set forth the specific points of the dispute, the position which the Respondent maintains should be adopted as consistent with the requirements of this Order, and the factual and legal basis for its position. The EPA, the MDNR, and the Respondent shall then have an additional fourteen (14) days from the receipt by the EPA and MDNR of the Respondent's objections to attempt to resolve the dispute. If an agreement is reached, it shall be reduced to writing, signed by the parties, and incorporated into this Order.

141. If the parties are unable to reach an agreement, each party within thirty (30) days will submit a statement of the dispute to the Director of Air, RCRA, and Toxics Division, EPA Region VII, who shall provide a written decision of the matter. If the parties are unable to reach an agreement on a natural resource damage issue, each party within thirty (30) days will submit a statement of the dispute to the Director of the Department of Natural Resources, who shall provide a written decision of the matter. Such written decisions shall be incorporated into and become an enforceable provision of this Order.

142. The existence of a dispute as defined herein and the EPA's or MDNR's consideration of such matters as placed in dispute shall not excuse, toll, or suspend any compliance obligation or deadline required pursuant to this Order during the pendency of the dispute resolution process.

143. Notwithstanding any other provision of this Order, no action or decision by the EPA or MDNR, including, but not limited to, decisions of the Director of Air, RCRA, and Toxics Division, EPA Region VII, or the Director of the Missouri Department of Natural Resources pursuant to this Order, shall constitute final agency action, giving rise to any rights of judicial review, prior to EPA's initiation of judicial action to compel the Respondent's compliance with the requirements of this Order.

XXVIII. SEVERABILITY

144. If a court issues an order that invalidates any provision of this Order or finds that Respondent has sufficient cause not to comply with one or more provisions of this Order, Respondent shall remain bound to comply with all provisions of this Order not invalidated or determined to be subject to a sufficient cause defense by the court's order.

XXIX. EFFECTIVE DATE AND COMPUTATION OF TIME

145. This Order shall become effective upon receipt of this Order by Respondent as evidenced by the date on the certified mail return receipt. All times for performance of ordered activities shall be calculated from this effective date.

XXX. TERMINATION

146. The provisions of this Order shall remain in full force and effect until all actions required by this Order have been completed and EPA has notified the Respondent in writing, that the actions required by this Order over which EPA has jurisdiction have been completed. Respondent

shall notify EPA and MDNR in writing at such time as it believes that all such actions have been completed. The EPA , in consultation with MDNR, shall have sole discretion in determining whether or not all such actions over which EPA has jurisdiction have in fact been completed. Failure to complete all activities required hereunder as directed by EPA shall be deemed a violation of this Order. The EPA's provision of written notice to Respondent pursuant to this paragraph shall not be construed as a waiver of any of EPA's or MDNR's rights to take further enforcement actions under RCRA, CERCLA or any other laws.

147. The provisions of this Order shall remain in full force and effect until all actions required by this Order have been completed and MDNR has notified the Respondent in writing, that the actions required by this Order over which MDNR has jurisdiction have been completed. The MDNR shall have sole discretion in determining whether or not all such actions over which MDNR has jurisdiction have in fact been completed. Failure to complete all activities required hereunder as directed by MDNR shall be deemed a violation of this Order. The MDNR's provision of written notice to Respondent pursuant to this paragraph shall not be construed as a waiver of any of EPA's or MDNR's rights to take further enforcement actions under RCRA, CERCLA or any other laws.

IT IS SO ORDERED

Date

Dennis Grams, P.E.
Regional Administrator
Environmental Protection Agency
Region VII

For the United States Environmental Protection Agency
Region VII:

Date

Julie L. Murray
Assistant Regional Counsel

The UNDERSIGNED PARTIES enter into this Administrative Order on Consent,
Docket No. _____

Relating to The Doe Run Resources Corporation facility
in Herculaneum, Missouri

For the Missouri Department
of Natural Resources:

Date

Name
Title

Date

Name
Title

For The Doe Run Resources Corporation:

Date

Name
Title

Statement of Work - Appendix A

I. Community Soils -

1. Within 120 days of the effective date of the AOC, Doe Run shall submit a Community Soil Cleanup Plan. The Community Soil Cleanup Plan shall meet the following requirements:

A. Investigation/Characterization:

a. A Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP) shall be completed that describes sampling and quality assurance/quality control activities. (See Section VI for SAP/QAPP requirements).

b. A Health and Safety Plan (HASP) as described in the Order shall be prepared that ensures the protection of the public health and safety during performance of on-site work required by the Order.

c. Within six months of EPA and MDNR approval of the SAP/QAPP, Doe Run shall determine the extent of surface soil contamination in residential yards, day-care facilities, areas in schoolyards frequented by children, parks, and all other high use areas affected by the smelter operation beyond a 0.4 mile radius of the smelter, but within a one mile radius of the smelter on non-company owned property on the Missouri side of the Mississippi River.

d. Should the results of the characterization conducted in item c above indicate that surface soil contamination exists beyond the limits specified therein, EPA or MDNR shall provide Doe Run notification that such contamination exists. Within six months of notification by EPA or MDNR, Doe Run shall determine the extent of surface soil contamination in residential yards, day-care facilities, areas in schoolyards frequented by children, parks, and all other high use areas affected by the smelter operation beyond a one mile radius of the smelter, but within a one and one-half mile radius of the smelter on non-company owned property on the Missouri side of the Mississippi River. The criteria set forth in Section 1.B shall be used to decide whether or not to expand the characterization area.

e. Within eighteen months of approval of the SAP/QAPP, Doe Run shall complete transect sampling to determine

potential areas of contamination caused by smelter operations beyond the one and one-half mile radius of the smelter. The primary goal of this sampling is to determine the extent of lead contamination extending from the smelter facility at residential properties. Initially, sampling will be conducted outward from the one and one-half mile perimeter of the smelter facility smokestack in the areas with the highest density of residential properties. The location of the samples shall be representative of the lead contamination at residential properties and must be sufficient to estimate the number of residential properties likely contaminated beyond one and one-half miles of the smelter. The first transects will be selected along axes parallel or near parallel to the prevailing downwind directions. Proposed sampling transects should be identified on a map submitted in the Sampling and Analysis Plan.

f. Should the results of the characterization conducted in item e above indicate that surface soil contamination exists beyond one and one-half mile radius from the smelter, within thirty-six months of the effective date of the AOC, Doe Run shall fully determine the extent of surface soil contamination in residential yards, day-care facilities, areas in schoolyards frequented by children under six years old, parks, and all other high use areas affected by the smelter operation regardless of distance from the smelter on non-company owned property on the Missouri side of the Mississippi River. The criteria set forth in Section 1.B shall be used to decide whether or not to expand the characterization area.

B. Criteria

a. The criteria for deciding whether or not to expand the characterization areas as described in section A above, shall be based upon surface soil concentrations of lead, zinc, and cadmium at the perimeter of the characterization area exceeding risk-based action levels calculated using the Integrated Exposure Uptake Biokinetic (IEUBK) model discussed below. However, until such time as the risk-based action levels are determined, all decisions regarding expanding the characterization area shall be based upon an action level for lead in soil of 400 milligrams per kilogram (mg/kg).

C. Sampling

a. Doe Run shall conduct sampling in accordance with the Community Soil Cleanup Plan approved by EPA and MDNR.

b. All surface samples shall consist of the upper one inch of soil.

c. The lead content of soils shall be characterized by collecting at least four composite samples at each property. At least one composite shall be collected from the front, at least one from the back, and at least one from each side of the property. For each composite, surface soils shall be collected on 50 foot centers away from the drip line of structures. The agencies recommend sampling using an x-ray fluorescence meter. Confirmatory laboratory sampling at a rate of 10% shall be included.

d. In addition to the samples identified in c above, composite samples shall be taken and analyzed for lead content at the drip line of each structure where a child under six years old with elevated blood lead resides.

e. Samples shall be taken and analyzed for lead content in gardens and areas of heavy use by children (i.e. swing sets, unpaved driveways, and sand boxes). At least one sample shall be collected in each garden and child heavy use area identified.

f. The confirmatory samples identified in item c. above shall also be analyzed for cadmium, and arsenic content.

g. The confirmatory samples identified in item c above shall also be analyzed for zinc and nickel content. EPA and MDNR may direct Doe Run to cease the analysis of the confirmatory samples for zinc and/or nickel content if the levels of zinc and nickel in the initial confirmatory samples are consistently below MDNR's any use soil levels.

h. A field sheet with sample results at each location per residential yard shall be provided to the residence and the lead agency within ten working days of receipt of the sample results. Confirmatory laboratory sample results shall also be provided to the agencies within ten working days of receipt of the sample results.

Summary data from the soil characterization shall be forwarded to EPA, MDNR, and the Missouri Department of Health (MDOH).

i. Copies of past documentation which describes and summarizes past residential yard cleanup activities shall be included.

D. Risk Assessment

a. Within ninety days of completion of soil investigation/characterization described in subsection A.c and A.d above, Doe Run shall submit a workplan for completion of a human health risk assessment and an Integrated Exposure Uptake Biokinetic model (IEUBK). A cleanup level for lead shall be established by EPA, MDNR, and MDOH for all areas, based on the IEUBK model using site specific or default values where appropriate. EPA, MDNR, and MDOH shall designate, after consultation with Doe Run all site specific or default values to be used in the model and risk assessment. During consultation with Doe Run, the agencies (EPA, MDNR, and MDOH) may consider justification presented by Doe Run in determining values to be used in the model and risk assessment to the extent allowed by applicable guidance and policy. High use areas shall have separate exposure assumption scenarios for each class of property.

b. Until such time that a lead cleanup level is established based upon the IEUBK, a soil cleanup level of 400 mg/kg shall be used.

E. Soil Replacement

a. Within eighteen months of the execution of the AOC, Doe Run shall complete the replacement of soils at all residential and high use properties not owned by Doe Run within 0.4 miles of the smelter that have not been previously replaced.

b. Doe Run shall complete soil replacement at the properties owned by Doe Run within 0.4 miles of the smelter as part of the "other properties" cleanup schedule contained in paragraph E.d below.

c. Within eighteen months of the AOC, for those properties located outside of the 0.4 mile area, but within the one and one-half mile characterization area, Doe Run shall replace soil at all properties where

children under six years old who have a blood lead level of 10 ug/dl or higher (as determined by the blood lead screening in Section II below) reside. In addition, for each home with children who have a blood lead level of 10 ug/dl or higher, sampling for all sources of lead shall be conducted. The resident will be informed of the results. Doe Run may, as a public service, remove, replace, remediate, or stabilize those sources. Areas with soil lead concentrations exceeding 400 ppm lead shall be presumed to make a significant contribution to the under six year old children's blood lead levels and will be replaced.

d. Doe Run shall replace soils at all other properties exceeding the soil cleanup levels as a result of smelter operation, but not included in paragraphs E.a, and E.c above at the rate of at least 60 residential yards or high child-use areas per year, commencing 18 months after the effective date of this agreement. Properties with soil lead concentrations over 2,500 mg/kg shall be replaced first. Beginning two years after execution of the AOC, EPA or MDNR may seek to adjust the rate of soil replacement specified in this paragraph. EPA or MDNR may seek such an adjustment to the rate of soil replacement if the time period projected to replace all soils is deemed excessive. Such an adjustment shall be addressed through a revision to this Order, or another action brought by EPA or MDNR.

e. For properties identified in paragraphs E.a, E.b, E.c and E.d, all soil less than one-foot deep exceeding the cleanup level shall be excavated and replaced with clean soil. Doe Run shall confirm the lead concentration levels in the excavated surface prior to covering with clean soil. Clean soil used to replace the excavated soil shall have a lead concentration that does not exceed 240 mg/kg.

f. Doe Run shall include procedures for dust control or suppression during soil removal, stormwater runoff control during soil removal, and restoration (replacement of trees, shrubs, fences).

g. For the purposes of all excavation required under the AOC, Doe Run shall confirm with XRF the concentration in the excavated surface prior to replacement. If contamination over 1,000 ppm lead remains in soil at a depth of one foot, a construction

fence marker shall be placed in the excavation as a marker barrier to digging below that level.

h. Doe Run shall determine if the lead in the excavated soil exceeds 5.0 mg/L using the Toxicity Characteristic Leaching Procedure (TCLP). For soils not exceeding the TCLP, the soil shall be stockpiled at the south end of town on company property. The management of the soil and its use will be described within the Interim Slag Pile Runoff Control Plan, Slag Pile/Surface Water/Sediment Sampling and Analysis Plan, Slag Pile/Surface Water/Sediment Assessment Report, and Slag Pile Response Options Evaluation Report described in Section IV of this Statement of Work. Soils exceeding the 5.0 mg/L shall be managed in compliance with the Resource Conservation and Recovery Act, Missouri Hazardous Waste Management Law, and CERCLA requirements.

i. Residential properties that received soil replacement by Doe Run between 1990 and 1999 shall be sampled for recontamination within four years of execution of the AOC. By July 31, 2001, Doe Run shall submit a long-term monitoring and maintenance plan for lead deposition in the area. The purpose of this plan shall be to identify recontaminated areas and prevent these areas from becoming health concerns. The monitoring and maintenance plan shall include dispersion modeling of the plant emissions to determine lead deposition rates and likely areas of recontamination.

II. Community Blood Lead Levels -

1. Within ninety days of the effective date of the AOC, Doe Run shall submit a Community Blood Lead Plan.

A. The Community Blood Lead Plan shall have the following components:

a. A plan for public meetings and availability sessions to initiate public outreach.

b. A plan for blood lead screenings for children.

c. A plan for the distribution of literature on health affects of lead exposure through the air and soil, mine wastes, smelting activity, and lead paint to citizens of Herculaneum and the surrounding area.

d. Procedures shall be identified to coordinate community relations activities and blood-lead screening with the DOH and the lead agency.

2. For all homes visited, no matter whether a child was tested or present, the Respondents shall provide EPA-approved educational material.

Each August, following the initial community blood lead screening program, every household whose soil lead has not been replaced which is within the area determined to be affected by smelter operations shall receive a letter with the EPA/MDNR/DOH approved education program material. In addition, a letter will be provided inviting new residents, new parents, or others with children under six years old who did not participate or want a retest with an invitation for a blood lead test. The response following the test shall be the same as after the initial program.

III. Air Emissions -

1. The control strategy elements of SIP development shall be completed consistent with EPA/MDNR direction and in accordance with the following schedule:

A. By January 1, 2001, Doe Run shall submit a Reasonably Available Control Technology analysis and control strategy, including an implementation schedule.

B. By January 1, 2001, Doe Run shall submit a schedule for implementation of each of the additional control measures described below. This schedule shall include an estimate of the time needed to install each additional control measure. The Additional Control Measures are:

1. Modify the cooler baghouse dilution air inlet. This project will consist of installing a damper and associated ductwork to the sinter plant Mixing Room roof area. Whenever dilution air is called for in the cooler baghouse, this damper will activate and pull air from the sinter plant's mixing room building;
2. Modify the Sinter Plant Mix Room roof monitor. This project will modify the roof monitor through a combination of sealing off and passive filters;
3. Enclose the Railcar Fume Loading at the #5 baghouse. This Project will include erecting an enclosure around the railcar loading area to reduce air movement through this area during fume loading;
4. Enclose the north end of the railcar unloader. This project will include enclosing the north end of the unloader with sheeting and a roll-up door to reduce the tunnel effect in the area during the period materials are being unloaded;
5. Enclose the north end of the #1 trestle. This project will include enclosing the north end of the #1 trestle with sheeting and a roll-up door to reduce the tunnel effect in the area during the period materials are being unloaded, and;
6. Modify the sinter machine gas off-take to allow an increase in the #3 baghouse fan capacity for better ventilation in the sinter machine.

C. The implementation schedule for both the control strategy and additional control measures must be approved by EPA and MDNR. Within the deadlines given above, Doe Run shall revise the control strategy and implementation schedules if directed to do so by EPA and/or MDNR.

D. By July 31, 2002, Doe Run shall implement the control strategy, including installation and operation of control equipment. Nothing in this action shall prohibit Doe Run from preparing the engineering, ordering equipment, installing, and beginning the operation of the controls specified in the control strategy or additional control measures prior to the dates specified herein. By July 31, 2002, Doe Run shall complete planning and engineering work for the additional control measures and maintain current bids on the materials necessary to implement each of the additional control measures.

E. Within 90 days of implementation of the control strategy, tests of all stacks at the facility, which are estimated to emit more than one percent of the total plant lead emissions, shall be conducted to determine the hourly lead emission rate. The tests shall be conducted in accordance with methods approved by MDNR or EPA. At least thirty day notice shall be provided to EPA and MDNR prior to testing. All test reports shall be submitted to EPA and MDNR within 60 days of completion of the tests.

F. Beginning October 1, 2002, Doe Run shall initiate implementation of the additional control measures described in paragraph B above. Doe Run shall initiate implementation of one additional control measure each calendar quarter until all additional control measures identified on the additional control measures list are implemented. Each additional control measure shall be implemented within the schedule approved under paragraph C above except as described in paragraph H.1 below.

G. In the event there is a violation of the lead standard (1.5 ug/m³ quarterly arithmetic mean) subsequent to any time after June 30, 2002, EPA and/or MDNR will notify Doe Run of such a violation of the standard.

H. Upon receipt of notice from EPA and/or MDNR that there is a violation of the quarterly lead standard, Doe Run shall implement the following contingency measures:

1. In the event that there is a violation of the quarterly lead standard prior to implementation of all additional control measures under the schedule specified in paragraph F above, within 60 days, Doe Run shall initiate implementation of all remaining control measures on the additional control

measures list described in paragraph B above which have not yet been implemented. Doe Run shall complete implementation of the additional control measures identified in paragraphs B.1 through B.5 above within the two calendar quarters following the calendar quarter in which the violation occurred. Doe Run shall complete implementation of the additional control measure identified in paragraph B.6 above within three calendar quarters following the calendar quarter in which the violation occurred.

a. In the event that there is a second violation of the quarterly lead standard following implementation of the additional control measures identified in paragraphs B.1 through B.5 pursuant to paragraph H.1 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 control strategy referred to in paragraph A above. For purposes of this Statement of Work, 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:

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

Where P is finished lead production in short tons per quarter;

Where 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;

Where E is the aggregate estimated quarterly emissions from all fugitive and 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.

b. The requirement to comply with paragraph H.1.a 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.

2. In the event that there is a violation of the quarterly lead standard which occurs after implementation of all additional controls under the schedule specified in paragraph F above, Doe Run shall comply with the requirements of paragraph H.1.a above. The requirement to comply with paragraph H.1.a shall commence on the first day of the calendar quarter following receipt by Doe Run of the notice from EPA and/or MDNR that there is a violation of the quarterly lead standard referred to in paragraph G.

3. Doe Run shall continue to operate the facility in compliance with paragraph H.1.a above until such time that EPA or MDNR establishes alternative requirements through a modification to this Order, a modification to the State Implementation Plan, or an approved Maintenance Plan as part of a redesignation of the Herculaneum area to an attainment area for lead.

5. Within 60 days of completion of each calendar quarter in which Doe Run is required to comply with paragraph H.1.a above, Doe Run shall submit a report indicating whether or not the requirements of H.1.a were met for the previous quarter. 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 demonstrates how emission reductions were calculated, and applicable operating data, such as material throughput. The requirement to submit this report shall continue as long as Doe Run is required to operate the facility in accordance with paragraph H.1.a.

I. Nothing in this Statement of Work shall limit or preclude EPA or MDNR from taking action prescribed by the Clean Air Act regarding the National Ambient Air Quality Standards.

IV. Slag Pile/Surface Water/Sediment/Groundwater -

1. Within sixty days of the effective date of the AOC, Doe Run shall submit an Interim Slag Pile Runoff Control Plan which shall at a minimum include the following:

A. A list and evaluation of short-term measures to control runoff and erosion of particulate slag from the site. Doe Run shall consider as interim measures, at a minimum: increased security to keep unauthorized people off of the pile; the use of hay bales, silt fences, or interceptor trenches; stormwater retention; and, berming. In evaluating the short-term measures, Doe Run shall focus on assessing the rate, extent, magnitude of nearby contamination, potential for integration into a long-term plan for control of the site, effectiveness, implement ability, and cost.

B. Doe Run shall implement the short term controls selected by EPA and MDNR within 120 days after agency approval of the Interim Slag Pile Runoff Control Plan.

2. Within 120 days of the effective date of the AOC, Doe Run shall submit a Slag Pile/Surface Water/Sediment Sampling and Analysis Plan (SAP). The purpose of this Plan shall be to collect sufficient data to identify the source and transport pathways of contaminants, as well as provide a basis for characterizing the exposure risks and injury posed by the contaminants and evaluating potential management options.

A. As part of the Slag Pile/Surface Water/Sediment SAP, Doe Run shall include plans to:

a. Conduct an evaluation of available soil, sediment, surface water, groundwater and biological data related to the slag pile, Joachim Creek and the nearby Mississippi River and floodplain. The results of the data evaluation shall be utilized to identify data gaps and guide future sampling and analysis efforts.

b. Prepare a conceptual site model (CSM) for the slag pile assessment area that includes a description of potential contaminant sources, pathways, and exposures/receptors.

c. Identify and characterize the composition of the slag materials including potential contaminants, metals content, particle sizes, relationships between particle size and metals content, metal speciation and any differences based on the age of the slag.

d. Identify and characterize the transport mechanisms, pathways, and deposition areas for metals originating from the slag pile. Systematic monitoring of the flood plain around the slag pile shall be conducted to map deposition areas. This evaluation shall be conducted under normal flow and flood conditions in both Joachim Creek and the Mississippi River. This evaluation shall also be conducted to characterize at least two rain events to assess the drainage from the pile as well as the patterns in sheet flow on the floodplain.

e. Identify and characterize all surface water discharge points into Joachim Creek within 1 ½ miles upstream of the confluence with the Mississippi River. Representative sediment and surface water samples shall be collected at these discharge points. Representative samples shall also be collected at the confluence of Joachim Creek and the Mississippi River.

f. Identify and sample surface water, sediment, soil and groundwater from background and reference locations, as appropriate, to support the CSM. Background locations should identify and assess conditions from natural sources in the regional geology, soils and atmosphere. Reference locations should assess regional conditions that have resulted from anthropogenic sources not associated with the smelter or its operation.

g. Prepare a habitat map of Joachim Creek and its floodplain, as defined in Executive Order 11988 3 CFR 117 (1978); as amended by Executive Order 12148, 3 CFR 412(1980), up to 1 ½ miles upstream of the confluence with the Mississippi River. Use field surveys and other appropriate means to characterize the baseline ecological conditions, including the identification of a reference area. Field survey techniques such as the index of biotic integrity (IBI) rapid bioassessment protocol (RBP) floristic indices, and habitat suitability indices (HSIs) may be appropriate, depending on site specific features.

h. Prepare a plan to sample whole fish and fish fillets from Joachim Creek and nearby in the Mississippi River. The approach shall investigate the complete exposure pathways that are identified in the CSM, and include selection criteria for fish species to collect as well as appropriate sample locations and seasonal conditions.

B. Within 210 days of agency approval of the Slag Pile/Surface Water/Sediment SAP, Doe Run shall complete the sampling described in the plan above. A Slag Pile/Surface Water/Sediment Assessment Report describing the sampling and analysis shall be developed within the time frame approved by the agencies, as documented in the approved SAP.

3. Within 150 days of agency approval of the Slag Pile/Surface Water/Sediment Assessment Report(as described above), Ecological Risk Assessment Report and Natural Resource Damage Assessment (NRDA) Pre-assessment Report (as described below), Doe Run shall submit a Slag Pile Response Options Evaluation Report. This Report shall be similar to an Engineering Evaluation and Cost Analysis Report or Corrective Measures Study. In this Slag Pile Response Options Evaluation Report, Doe Run shall assess viable options for relocating the slag pile, as well as reassess final closure along with implementing interim measures to manage releases from the pile while it is still in operation. In developing this document, Doe Run shall evaluate the following:

A: Relocating the Slag Pile -

a. The relocation of slag from the floodplain to a more suitable site and restoration of the site.

B: Interim Measures -

a. Construction of a levee surrounding the pile;

b. Stabilization involving regrading the pile to reduce slopes to a minimum of a 4:1 ratio;

c. A berm or rip rap cover around the circumference of the pile to protect it from high velocity flood events;

d. Trenches and settling ponds to capture all of the runoff from the pile;

e. A geo-textile membrane with rip-rap placed around the sides of the pile; and

f. Maintaining the pile in its existing footprint, i.e. no lateral expansion.

C: Final Closure -

a. Total coverage of the pile, with the addition of a geo-textile liner beneath the cap.

- b. Use of biosolids to form a growing media on the slag pile. Biosolids may include combinations of composted sewage sludge, composted livestock manure or poultry house litter, paper mill waste, sawdust, etc.
- c. Chemical stabilization of the pile using phosphoric acid, apatite, and/or lime.
- d. Establishing vegetation on the pile. Note, Doe Run shall demonstrate that metal toxicity is not being transferred to the food chain through the established vegetated cover.
- e. Other chemical stabilization techniques involving solidification, such as mixing the slag with pozzolonic cement or fly ash.
- f. Re-smelting of the slag.
- g. Each option evaluated shall include a schedule for termination of the placement of slag on the existing slag pile, floodplain and/or wetlands.
- h. A description of how short term activities will be consistent with the long-term actions on the pile, i.e., how facets of the long-term plan such as possible covers can be implemented as soon as areas of the pile are constructed to final contours. Doe Run shall evaluate and discuss how these actions will be implemented while the remainder of the pile is still actively receiving slag.
- i. A preliminary habitat restoration plan for returning the functions, uses and services provided by the floodplain wetlands that are currently being used to store slag and for floodplain wetlands altered by any restoration processes; and, a compensation plan for those functions, uses and services that are not able to be restored due to physical loss and/or chemical contamination.

D: Operation and Maintenance (O&M):

- a. A long-term operation & maintenance program shall be evaluated if any slag remains in the pile upon completion of the activities required by the AOC, which includes inspections, repairs and preventative measures that must occur routinely to ensure the integrity of the closure.

b. In addition, Doe Run shall consider operation and maintenance (O&M) needs in response to incidents that will likely occur over the lifetime of the facility, including major earthquakes and major floods.

4. Within 120 days of the effective date of the AOC, Doe Run shall submit a workplan for conducting an Ecological Risk Assessment (ERA) for the slag pile area, including both aquatic and terrestrial environments (including upland organisms, aquatic receptors, and, avian and mammalian species utilizing the aquatic resources). Doe Run shall utilize current EPA guidance for conducting the ERA, including the Ecological Risk Assessment Guidance for Superfund, June 1997. A Biological Technical Assistance Group (BTAG) shall be formed, consisting of EPA, MDNR, MDOH, Missouri Department of Conservation and USF&W. The workplan will be subject to BTAG review and approval. Prior to workplan preparation, Doe Run shall conduct a workplan scoping meeting with the BTAG and any other agencies deemed appropriate. The scoping meeting will be held to discuss data collection requirements, schedules, and tasks to be included in the workplan. The BTAG shall designate, after consultation with Doe Run, all values and assumptions to be used in the ERA. During consultation with Doe Run, the BTAG may consider justification presented by Doe Run in determining all values and assumptions to be used in the ERA to the extent allowed by applicable guidance and accepted practices. The results of the ERA shall be considered during preparation of the Slag Pile Response Options Evaluation Report to ensure that ecological risks are understood and properly managed when evaluating response options. The Ecological Risk Assessment Report will be submitted concurrently with the Slag Pile Surface Water/Sediment Assessment Report and NRDA Pre-Assessment Report within the time frame outlined in the approved SAP.

5. Groundwater Monitoring

A. Phase 1:

a. Within 120 days of the effective date of the AOC, Doe Run shall submit a Groundwater Monitoring Plan meeting the following requirements:

1. Doe Run shall prepare a Current Conditions report which provides a summary of background and previous groundwater investigations related to impacts from the slag pile area, a description of the nature and extent of contamination, and an evaluation of the extent to which previous groundwater sampling, well construction, sample

preservation and sample analyses were consistent with EPA protocol and guidance including the Groundwater Monitoring Technical Enforcement Guidance Document 1986, RCRA Ground-Water Monitoring Draft Technical Guidance 1992, and RCRA Facility Investigation Guidance Manual.

2. All future groundwater sampling, well construction, sample preservation and sample analysis shall be consistent with the EPA protocol and guidance documents described above.

3. For monitoring well purging prior to future well sampling, Doe Run shall propose when enough volume of water has been purged by extracting ground water from the well at low rates using a pump. The rate at which ground water is extracted from the well during purging ideally should be less than approximately 0.2 to 0.3 liters per minute (L/min). Purging should continue until measurements of turbidity in in-line or downhole analyses of ground water have stabilized within approximately 10% over at least two measurements (over two successive measurements made three minutes apart).

4. Documentation that the proper screen slot size and filter pack was used during well installation needs to be provided. If this was not done, Doe Run shall install additional wells with proper screen and filter pack combination.

5. Doe Run shall sample existing site monitoring wells and agreed upon residential wells within 1 mile of the slag piles using proper development and sampling techniques.

6. All ground water samples shall be analyzed for total metals and any additional analyses determined to be necessary based on former waste handling activities conducted in the slag pile area. This shall be done on a quarterly basis for one year. If Doe Run wishes to analyze the water samples for dissolved metals, in addition to the total metals analysis, for comparison of the two data sets, it may do so; however, only total metals analysis is required.

7. Pumping data for the City of Herculaneum wells shall be obtained and compared to water level

information from the deep monitoring well #8 to see if there is a hydraulic connection.

8. Installation of at least one additional background well in the alluvial aquifer for comparison to the existing alluvial aquifer wells installed adjacent to the slag pile shall be required. The background location shall be free from impact from the slag or other operations conducted at the Facility. The need for additional background wells in the alluvial aquifer, or deeper water-bearing zones, will be evaluated as part of the current conditions report and following two rounds of quarterly groundwater monitoring of existing site monitoring wells.

9. A schedule for future groundwater monitoring well sampling. The groundwater data collected in the future shall be sufficient to define the extent, origin, direction, and rate of movement of contaminant plumes on site and off-site. Data shall include time and location of sampling, media sampled, concentrations found, conditions during sampling, and the identity of the individuals performing the sampling and analysis.

10. A SAP/QAPP will be incorporated into the Groundwater Monitoring Plan.

b. Within ninety days of agency approval of the Groundwater Monitoring Plan, Doe Run shall implement quarterly monitoring.

1. Doe Run shall provide the agencies the opportunity to split samples by giving the lead agency 30 days notice prior to each sampling round.

2. Doe Run shall provide the agencies a Groundwater Analysis Report within 45 days of completion of each quarterly sampling event. The Groundwater Analysis Report shall include analyses and summary of all groundwater investigations and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g. quality assurance procedures have been followed) and quantity to define the nature and extent of contamination, the potential threat to human health and/or the

environment, and to support the response options evaluated for groundwater. The Groundwater Analysis Report shall include an analysis of all groundwater investigation data collected, a determination of the type and extent, both horizontal and vertical, of contamination resulting from the operations of the slag pile, including sources and migration pathways. The Report shall include a description of the extent of contamination (qualitative/quantitative) in relation to background levels indicative of the area, as well as indicate the level of certainty of its conclusions.

B. Phase 2:

a. If EPA or MDNR determines that the results of Phase 1 activities shows that the current number, location, or depth of monitoring wells installed to monitor impacts from the slag pile area is insufficient to adequately monitor and characterize the contamination plumes found or that the levels of contaminants of concern found in groundwater are above MCLs, SMCLs, or alternate concentration limits approved by the agencies, the lead agency shall notify Doe Run that a Phase 2 Groundwater Monitoring Plan shall be submitted within 120 days of written notification. Doe Run shall prepare a Phase 2 Groundwater Monitoring plan that includes the following possible activities:

1. Doe Run shall propose the number, location, and depth of additional wells to be installed in aquifers beneath the areas impacted by the slag pile operation to more completely characterize the groundwater flow regime at the site and to identify conduits within the bedrock beneath the slag.

b. Within an agreed upon time period, Doe Run shall implement the first round of quarterly monitoring following standard procedures and guidance described above.

1. Doe Run shall provide the agencies the opportunity to split samples by giving the lead agency 30 days notice prior to each sampling round.

2. Doe Run shall provide the agencies a Phase 2 Groundwater Analysis Semi-annual Report within 45

days of completion of two quarterly sampling events.

C. If EPA or MDNR determines that the results of Phase 2, groundwater contamination associated with the operation of the slag pile area exceeds MCLs, SMCLs, and/or an agency-approved alternate concentration limit, or if groundwater contamination is found to be a substantial source of metal loading to surface water, Doe Run shall prepare an evaluation for groundwater response alternatives and associated cost analysis of each response alternative. This evaluation shall be in accordance with EPA objectives similar to those of a RCRA Corrective Measures Study (CMS) or an Engineering Evaluation/Cost Analysis (EE/CA) report. The evaluation report shall analyze the results of the groundwater investigations completed in the areas impacted by the slag pile operation to identify, screen and develop the alternative or alternatives for extraction, containment, treatment and/or other responses to the contamination based on the objectives established for the corrective action considered. The evaluation of response options will be due within 270 days of agency approval of the Phase 2 Groundwater Analysis Report.

6. Within 150 days of agency approval of the Slag Pile/Surface Water/Sediment Assessment Report, Ecological Risk Assessment Report and NRDA Pre-Assessment Report, Doe Run shall submit a Surface Water and Sediment Response Options Evaluation Report. This Report shall be similar to an Engineering Evaluation and Cost Analysis Report or Corrective Measures Study of alternatives for responding to the surface water and sediment contamination.

7. Within 120 days of the effective date of the AOC, Doe Run shall submit a Natural Resource Damage Assessment (NRDA) plan. In conjunction with the ERA described above, Doe Run shall gather sufficient data, samples and other information, in cooperation with the Natural Resource Trustees, necessary for a NRDA of the affected area. Said NRDA shall be conducted cooperatively and consistent with CERCLA, the NCP, and the NRDA regulations promulgated by the U.S. Department of the Interior, 43 C.F.R. Part 11. Doe Run shall have the opportunity to suggest, and present justification for, alternative procedures, values, and assumptions to be used in the NRDA. The Natural Resource Trustees shall consider said alternatives to the extent allowed by law, regulation, applicable guidance and accepted practices. However, approval of said alternatives remains within the authority and discretion of the Natural Resource Trustees.

The goal of the NRDA will be to develop an environmental project or projects to address past, interim and future losses of natural resources as defined under CERCLA.

Throughout the response activities to be undertaken pursuant to the AOC, Doe Run will meet with the Natural Resource Trustees to discuss project planning options, decisions, and special concerns associated with the site in order to incorporate, to the extent practical, restoration, replacement, rehabilitation or acquisition of the equivalent of the injured natural resources, with response activities.

A NRDA Pre-assessment Report will be submitted concurrently with the Slag Pile Surface Water/Sediment/Groundwater Assessment Report and Ecological Risk Assessment Report within the time frame outlined in the approved SAP

V. Other Issues -

1. Within 180 days of the effective date of the AOC, Doe Run shall submit a copy of all sample results and investigations previously conducted at the following areas:
 - A. The older slag pile near the acid plant;
 - B. Stormwater runoff from the facility unrelated to the slag pile;
 - C. Discharges from the wastewater treatment facility;
 - D. Other groundwater contamination sources such as areas where solvents or fuels may have been used;
 - E. The interim slag storage areas;
 - F. The staging areas for shipping;
 - G. Other processing areas such as solvent use areas, and acid production facilities,
2. Within 180 days of the effective date of the AOC, Doe Run shall identify all potential receptors for smelter contamination including receptors across the river in Illinois all well as off-site fish and wildlife habitats.
3. Within one year of the effective date of this Order, Doe Run shall submit an Other Areas Evaluation Report evaluating the sample results and investigations previously conducted at the areas identified in item 1 above. This Report shall identify additional investigation and sampling needed to determine the extent of contamination to air, surface water, and groundwater in or from the areas identified in item 1 above.
4. Within two years of the effective date of this Order, Doe Run shall conduct the sampling and investigations identified in the Other Areas Evaluation Report.
5. Any significant risks to human health or the environment found as a result of the sampling and investigations conducted pursuant to the Other Areas Evaluation Report shall be addressed through a revision to this Order, or another action brought by EPA, MDNR, MDOH, or USF&W.

VI. Sampling and Analysis Plan/Quality Assurance Project Plan -

1. Each sampling activity described above will be accompanied by an activity-specific Sampling and Analysis Plan. In addition, Doe Run shall develop a Quality Assurance Project Plan covering all sampling activities. Doe Run shall submit Sampling and Analysis Plans (SAP) and Quality Assurance Project Plans (QAPP) meeting the following requirements:

The SAP/QAPP shall govern all monitoring procedures, including sampling, field measurements and sample analysis to be performed to ensure that all information and data resulting from the investigation are technically defensible, representative, properly documented, and support decisions. Doe Run may elect to include whichever of the following requirements that are applicable to all sampling activities in the QAPP and include those of the following requirements which are specific to one or more sampling activities in each applicable activity-specific SAP.

A. Data Quality Objectives - The SAP/QAPP shall contain a qualitative and quantitative data quality objective analysis to define the purpose of the investigative effort, to clarify what data need to be collected to satisfy the identified purpose(s), and specify the performance standards for the quality of the information to be obtained. At a minimum, the SAP/QAPP shall include the following:

a. A description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. A description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;

c. A description of the rationale used to assure that the data are representative of a characteristic of a population, variability at a sampling point, a process condition or an environmental condition. Examples of factors which shall be considered and discussed include:

1. Environmental conditions at the time of sampling;

2. Number of sampling points;

3. Representativeness of selected media; and

4. Representativeness of selected analytical parameters.

d. A description of the measures to be taken to assure that the following data sets generated after the effective date of this Order can be compared to each other:

1. Data generated over some time period;
2. Data generated by the EPA at this facility;
3. Data generated by an outside laboratory or consultant versus data generated by the facility;
4. Data generated by multiple consultants or laboratories; and
5. Data generated by an outside consultant or laboratory over some time period.

e. Details relating to the schedule and information to be provided in quality assurance reports. The reports should include but not be limited to:

1. Periodic assessment of measurement data accuracy, precision, and completeness;
2. Results of performance and systems audits; and
3. Significant quality assurance problems and corrective actions taken.

B. Sampling - The sampling section of the SAP/QAPP shall include:

- a. The rationale for selection of appropriate sampling locations, media, depths, etc.;
- b. Parameters are to be measured;
- c. Types of sample (e.g., composites vs. grabs) and number of samples to be collected;
- d. Frequency and duration of sampling;
- e. Assurance that the sampling effort will be representative by providing a statistically significant number of sampling sites;

- f. All ancillary measurements;
- g. Measures to be taken to prevent contamination of the sampling equipment and cross contamination between sampling points;
- h. A listing of sample containers to be utilized;
- i. Sample preservation;
- j. including:
 - 1. Standardized field tracking and reporting forms to establish sample custody in the field prior to and during shipment; and
 - 2. Pre-prepared forms containing information necessary for effective sample tracking.
- k. Procedures for documenting field sampling operations including:
 - 1. Procedures for maintaining chain-of-custody;
 - 2. Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;
 - 3. Documentation of specific sample preservation methods;
 - 4. Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters and adsorbing reagents);
 - 5. Locations of quality control samples;
 - 6. Potential site-specific interferences;
 - 7. Construction materials and techniques associated with monitoring wells and piezometers;
 - 8. Sampling order; and
 - 9. Decontamination procedures.

C. Field Measurements - The Field Measurements section of the SAP/QAPP shall provide:

- a. Parameters to be measured:
- b. Locations, media and depths of field measurements to be measured;
- c. Frequency of field measurements;
- d. Calibration procedures; and
- e. Procedures for documenting field measurement activities, including:
 1. Procedures and forms for recording raw data and the exact location, time, and facility-specific considerations associated with the data acquisition;
 2. Recording calibration of field instruments;
 3. Collection of replicate measurements;
 4. Potential site-specific interferences;
 5. Field equipment listing;
 6. Order in which field measurements were made; and
 7. Decontamination procedures.

D. Sample Analysis - The Sample Analysis section of the SAP/QAPP shall specify the following:

- a. Chain-of-custody procedures, including:
 1. Procedures to document sample receipt at the laboratory;
 2. Specification of laboratory sample custody procedures for sample handling, storage, and disbursement for analysis.
- b. Check in procedures for recording the whether custody seals were intact upon shipping container receipt, shipping container (cooler) temperature, pH of preserved samples, sample container condition, and dates and times of sample receipt;
- c. Sample preparation methods;
- d. Analytical procedures, including:

1. Scope and application of the procedure;
 2. Sample matrix;
 3. Potential interferences;
 4. Precision and accuracy of the methodology;
and
 5. Reporting limits (concentration of the low standard).
- e. Instrument calibration procedures and frequency;
- f. Data reduction, validation and reporting, including sample turnaround time;
- g. Internal quality control checks, laboratory performance and system audits and frequency, including:
1. Method blank results;
 2. Laboratory control sample results;
 3. Initial and continuing calibration verification;
 4. Duplicate sample results;
 5. Matrix spike sample results;
 6. Instrument Detection Limit (IDL) verification results;
 7. Reagent quality control checks;
 8. Preventative maintenance procedures and schedules; and
 9. Corrective action (for laboratory problems).