United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park, NC 27711

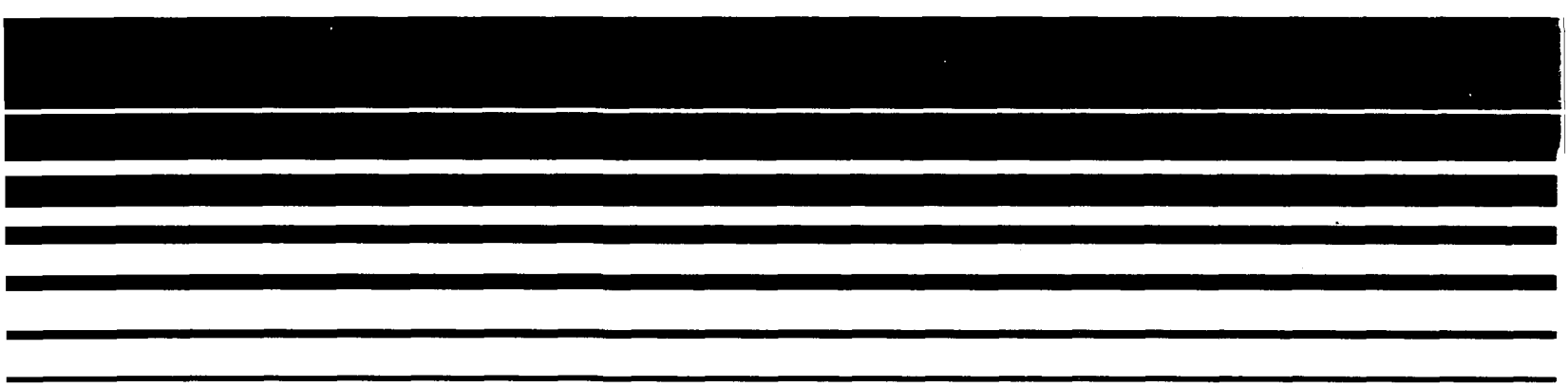
EMB Report 85-FPE-08
June 1986

Air

EPA

Hazardous Waste Treatment, Storage, and Disposal Facilities

Site-Specific Test Report Newport Steel Corporation Newport, Kentucky



SITE-SPECIFIC TEST REPORT

NEWPORT STEEL CORPORATION
NEWPORT, KENTUCKY

ESED 85/12
EMB 85 FPE 08

Prepared by:

Entropy Environmentalists, Inc.
Post Office Box 12291
Research Triangle Park, North Carolina 27709

Contract Nos. 68-02-3852 and 68-02-4336
Work Assignment Nos. 24 and 1
PN: 3024 and 3501

EPA Task Manager
Clyde E. Riley

U. S. ENVIRONMENTAL PROTECTION AGENCY
EMISSION MEASUREMENT BRANCH
EMISSIONS STANDARDS AND ENGINEERING DIVISION
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

June 1986

DISCLAIMER

This document has been reviewed by the Emission Standards and Engineering Division, Office of Air Quality Planning and Standards, Office of Air, Noise and Radiation, Environmental Protection Agency, and approved for publication. Mention of company or product names does not constitute endorsement by EPA. Copies are available free of charge to Federal employees, current contractors and grantees, and nonprofit organizations - as supplies permit - from the Library Services Office, MD-35, Environmental Protection Agency, Research Triangle Park, NC 27711.

Order: EMB Report 85-FPE-02

CONTENTS

	Page
Figures	iv
Tables	v
1.0 INTRODUCTION	1-1
2.0 SUMMARY AND DISCUSSION OF RESULTS	2-1
2.1 Background Samples	2-2
2.2 Landfill (Process Z)	2-4
2.3 Unpaved Roads (Process AA)	2-7
2.4 Conclusions	2-8
3.0 PROCESS DESCRIPTION AND OPERATION	3-1
3.1 Landfill	3-1
3.2 Unpaved Roads -- Two Segments	3-2
4.0 SAMPLING AND ANALYSIS	4-1
4.1 Site Plot Plan	4-1
4.2 Landfill (Process Z)	4-2
4.3 Unpaved Roads (Process AA)	4-6
4.4 Background Samples	4-8
5.0 QUALITY ASSURANCE	5-1

CONTENTS (continued)

APPENDICES		Page
A	RAW FIELD DATA AND SAMPLING LOGS	A-1
	Process Data Sheets and Sampling Grid Sketches	A-3
	Chain of Custody Forms	A-5
B	ANALYTICAL DATA	B-1
	EMB Split Sample Inventory	B-3
	Screening Data Sheets	B-4
	Moisture Determination Data Sheets	B-16
	Percent PM_{10} Determination Data Sheets	B-32
	Metals Analysis Results and Quality Assurance Data	B-44
C	SAMPLING AND ANALYTICAL PROCEDURES	C-1
	Sampling Apparatus	C-3
	Sampling Location Selection and Documentation	C-8
	Sample Collection	C-11
	Sample Handling and Transport	C-14
	Drying and Sieving Procedures	C-16
	Chemical Analyses	C-19
	Quality Assurance (QA) Procedures	C-25
D	SAMPLING PROGRAM PARTICIPANTS AND OBSERVERS	D-1
E	PROCESS OPERATIONS DATA	E-1
	Summary of Processes Sampled During Site Survey	E-3
	Summary of Equipment for Processes Sampled During Site Survey	E-4

FIGURES

Number		Page
4.1	Site plot plan of Newport Steel Corporation showing locations of processes sampled.	4-2
4.2	Sampling grid and process dimensions for landfill at Newport Steel.	4-5
4.3	Sketch showing locations of unpaved road samples and background samples.	4-7
C.1	Example process grid.	C-10
C.2	Label used for sample jars.	C-12

TABLES

Number		Page
2.1	Sampling Plan for Newport Steel Corporation	2-3
2.2	Analytical Results of Silt Screening, Weight Loss on Drying, and PM_{10} Sieving, Fugitive Particulate from TSDF (85/12), NSC Site, Newport, KY	2-5
2.3	Analytical Results for Metals, Fugitive Particulate from TSDF (85/12), NSC Site, Newport, KY	2-6
4.1	Metals, Measurement Methods, and Detection Limits	4-8
5.1	Quality Assurance Results For Metals Analysis	5-2
C.1	Sampling Equipment Specifications	C-5
C.2	Sampling Equipment Preparation and Clean-Up	C-7
C.3	Metals and Measurement Methods	C-20
C.4	Semivolatile Organic Compounds Measured	C-22
C.5	Pesticides Analyzed For and Their Quantifiable Detection Limits	C-24
C.6	Spiking Compounds: Acid Extractables II	C-27
C.7	Spiking Compounds: Neutral Extractables V	C-28
C.8	Spiking Compounds: Neutral Extractables VI	C-29
C.9	Spiking Compounds: Pesticides II	C-30
C.10	Spiking Compounds: Metals	C-31

1.0 INTRODUCTION

On November 12, 1985, Entropy Environmentalists, Inc. collected soil samples from two disposal related processes at Newport Steel Corporation (NSC) located in Newport, Kentucky. The purpose of this sampling program was to provide preliminary data on the magnitude of fugitive particulate emissions from various processes at treatment, storage, and disposal facilities (TSDF's) and on the degree to which these emissions are contaminated. The U. S. Environmental Protection Agency (EPA) anticipates utilizing the analytical data from this program with emission models to estimate contaminated fugitive particulate emissions from TSDF's. The information generated by this study may ultimately be used by the Office of Air Quality Planning and Standards (OAQPS) of EPA to assess the adequacy of regulations governing contaminated fugitive particulate emissions from TSDF's.

To accomplish the overall goals of this study, soil samples were collected from two representative processes at this plant and were submitted for the appropriate analyses in order to determine the following:

- The percent by weight of silt in the soil (i.e., material that passes through a 200 mesh screen and has a nominal diameter less than 75 um) and the percent by weight of moisture in the soil.
- The degree of contamination of the soil silt fraction with metals.
- The percent by weight of soil silt less than 20 um in diameter based on a sonic sieving technique.

- The particle size dependency of the degree of contamination (i.e., greater or lesser degree of contamination in particles with diameters not in excess of 20 um) by conducting separate analyses of different soil particle size fractions.

- The repeatability and reproducibility of the sampling and analytical procedures for the entire sampling program (not included in this report since no samples were collected for this purpose at NSC).

At NSC, the two processes sampled were (1) a landfill, and (2) two unpaved road segments. A pair of background samples were also taken.

Samples taken were analyzed for weight loss on drying (LOD), silt content, PM_{10} content, and metals as described in Section 4. Entropy Environmentalists, Inc. conducted the analyses for LOD, silt content, and PM_{10} content. Research Triangle Institute (RTI) conducted the analyses for metals.

Field sampling was performed by Mr. Steve Plaisance and Mr. Kent Spears of Entropy Environmentalists. Mr. Tom Lapp of Midwest Research Institute (MRI) directed Entropy personnel regarding specific processes to be sampled and the boundaries of the processes, and recorded the pertinent process and operating characteristics. Mr. Gene Riley (EPA Task Manager) of the Emission Measurement Branch (EMB) observed the sampling program. Mr. Bob Brunson, Manager of Plant Engineering, served as the contact for NSC.

This report is organized into several chapters addressing various aspects of the sampling and analysis program. Immediately following this chapter is the "Summary and Discussion of Results" chapter which presents table summaries of data on silt and PM_{10} content and degree of contamination for each sample fraction analyzed. Following the "Summary and Discussion of Results" chapter is the "Process Description" chapter (supplied by MRI) which includes descriptions of each process sampled. The next chapter, "Sampling and Analysis," presents the plot plan and sampling grid for each process. The method of selecting the sampling grid and the sample collection procedures are

outlined, including any deviations and problems encountered. This chapter also describes the sample preparation and analytical procedures used for each sample; any deviations from the normal procedures are addressed. The appendices present the Raw Field Data and Sampling Logs (Appendix A); Analytical Data (Appendix B); detailed Sampling and Analytical Procedures (Appendix C); Sampling Program Participants and Observers (Appendix D); and Process Operations Data (Appendix E).

2.0 SUMMARY AND DISCUSSION OF RESULTS

This chapter presents a summary of the sampling and analysis results and a brief discussion of significant deviations from the proposed sampling and analysis protocol for this program. Since the standard sampling and analytical procedures are not addressed in this chapter, it is recommended that those individuals who are not familiar with the sampling and analytical procedures used in this study review Chapter 4, "Sampling and Analysis," prior to reading this chapter.

Soil samples were collected from two processes at the Newport Steel Corporation (NSC) facility located in Newport, Kentucky. The processes were a landfill and two unpaved road segments. Sampling and analysis were conducted using the procedures described in the Sampling and Analysis Protocol. The protocol was written specifically for this sampling program and was provided to the facility prior to the sample collection. The procedures described in this protocol are described again in detail in Chapter 4 and Appendix C of this report.

As described in the Sampling and Analysis Protocol, this site-specific report is intended to present the data relevant to the samples obtained at one site in this study and the procedures used to obtain these samples. Some statistical analyses will be performed on the data concerning this site; however, the majority of statistical analyses will involve the data collected over the entire study and will be included in the summary report to be completed at the conclusion of the program. With the exception of the data from the screening conducted to determine silt contents, there is not sufficient data to conduct meaningful statistical analyses on a site- or process-specific basis.

The sampling plan for NSC is shown in Table 2.1. The sampling procedures were designed to obtain a representative sample of that portion of the soil having the potential of becoming airborne. The analyses of the collected samples were conducted to measure the concentration of the most likely elements that could be soil contaminates. Sample collection was conducted using a scooping technique to obtain near-surface samples from moderately disturbed surfaces. The number of samples collected within each process was a function of the variability expected in the degree of contamination and/or the amount of sample that was needed for the analyses.

According to the Sampling and Analysis Protocol, the collected samples were to be analyzed for metals, cyanide, semivolatile organics, and pesticides. The organics of interest were taken from the Hazardous Substance List (HSL) in the EPA Contract Laboratory Program (CLP), Statement of Work. If significant quantities of cyanide, semivolatile organics, or pesticides were not expected to be present in a particular process, the analyses of the corresponding compounds were not conducted. MRI decided that at this particular site, cyanide, semivolatile organics and pesticides would not be present in significant quantities, and therefore, the analyses for these compounds were deleted. All samples were analyzed for metals. A complete list of the elements that were measured and their detection limits are presented in Chapter 4 (see Table 4.1).

The analytical results are discussed in the following subsections. Complete sampling data sheets are presented in Appendix A and all analytical data sheets are presented in Appendix B.

2.1 BACKGROUND SAMPLES

Because many compounds and elements are either naturally occuring in the soil or may be present as a result of factors other than those attributed to

TABLE 2.1. SAMPLING PLAN FOR NEWPORT STEEL CORPORATION

Process Sampled	Process Designation	Number of Samples	Collection Method	Analyses
Landfill	Z	8	Scooping	Loss on drying Silt and PM_{10} content Metals
Unpaved Roads	AA	2	Scooping	Loss on drying Silt and PM_{10} content Metals
Background Samples	BGD	2	Scooping	Loss on drying Silt and PM_{10} content Metals

NSC's activities, background samples were taken at a point on-site and analyzed.

The percent weight loss on drying (LOD), determined on a 10 g portion of each sample, averaged 17.37 percent (see Table 2.2) for the two background samples (sample identification numbers BGD-711 and BGD-712). The background samples were oven-dried for 3.5 hours at 105°C followed by desiccation for 18 hours. The silt content of the dried background samples was determined on a full stack of sieves consisting of the following mesh sizes: 3/8, 4, 40, 140, and 200. The silt content of the two background samples averaged 14.9 percent. The silt material from the background samples was mixed together to form a homogeneous silt composite sample. The silt composite sample was sonic sieved to determine the percent PM_{10} content (sample identification number BGD-739). The PM_{10} content for the silt composite averaged 45.71 percent by weight of the silt material (see Table 2.2).

Results of the analyses for metals are shown in Table 2.3. The analytical results for the metals in the background silt sample (Sample ID BGD-737) are in terms of micrograms of the metal per gram (ug/g) of silt sample (dry basis). These results reflect the nominal concentrations of these materials present in the soil which are not a result of NSC's landfill activities. The results for the background samples have not been subtracted from the results for the other samples since risk assessments utilize the inclusive value of the degree of contamination. It should be understood, however, that the actual outside contribution to the degree of contamination of the soil is that portion of the contaminate concentration which exceeds the nominal background level.

2.2 LANDFILL (PROCESS Z)

The landfill (Process Z) was sampled using a grid layout. Eight samples were collected within this grid in a random manner as described in Chapter 4.

TABLE 2.2.
ANALYTICAL RESULTS OF SILT SCREENING, WEIGHT LOSS ON DRYING, AND PM_{10} SIEVING
FUGITIVE PARTICULATE FROM TSDF (85/12)
NSC SITE, NEWPORT, KY

Site and Process	Sample ID	Percent Silt*	Percent Loss on Drying	Sample ID	Percent PM_{10}
Newport Steel, Newport, KY Landfill (Process Z)	Z-701	2.6	7.12		
	Z-702	5.5	12.67		
	Z-703	4.1	5.99		
	Z-704	4.8	7.12		
	Z-705	4.8	8.53		
	Z-706	4.2	11.73		
	Z-707	3.6	5.95	Z-726	38.53
	Z-708	3.7	14.50	Z-726	39.20
	Average	4.2	9.50		38.87
	Std. Dev.	0.9	3.31		0.47
Newport Steel, Newport, KY Road Sample (Process AA)	AA-709	4.0	10.26	AA-732	46.70
				AA-732	46.41
				Average	46.56
				Std. Dev.	0.21
Newport Steel, Newport, KY Road Sample (Process AA)	AA-710	12.6	8.14	AA-735	51.70
				AA-735	50.88
				Average	51.29
				Std. Dev.	0.58
Newport Steel, Newport, KY Background Sample	BGD-711	16.3	17.08	BGD-739	45.87
	BGD-712	13.6	17.66	BGD-739	45.54
	Average	14.9	17.37		45.71
	Std. Dev.	1.9	0.41		0.23

*All silt values determined with a full sieve stack.

TABLE 2.3. ANALYTICAL RESULTS FOR METALS
FUGITIVE PARTICULATE FROM TSDF (85/12)
NSC SITE, NEWPORT, KENTUCKY

Metals Analysis	Landfill			Road	Road	Background
Sample Identity	Silt Z-721	PM_{10} A-723	$>PM_{10}$ Z-725	Silt AA-731	Silt AA-734	Silt BGD-737
Element	(ug/g)	(ug/g)	(ug/g)	(ug/g)	(u/g)	(ug/g)
Aluminum (Al)	20,059	23,065	20,178	13,831	10,211	13,493
Antimony (Sb)	2.3	2.5	2.1	1.9	1.5	1.9
Arsenic (As)	19.2	22.9	21.5	16.5	27.9	12.6
Barium (Ba)	163	169	157	208	144	223
Beryllium (Be)	1.17	1.08	1.21	1.08	0.64	1.20
Cadmium (Cd)	97.3	121	81.5	80.7	42.7	16.5
Chromium (Cr)	1,501	1,110	1,692	2,192	1,328	344
Cobalt (Co)	11.0	8.1	9.4	11.8	11.1	12.1
Copper (Cu)	718	957	575	548	408	326
Iron (Fe)	144,943	129,723	157,773	190,237	181,727	80,336
Lead (Pb)	4,324	5,163	3,725	3,874	2,426	945
Manganese (Mn)	23,963	19,578	26,372	27,377	16,374	422
Mercury (Hg)	1.10	1.48	0.84	0.55	0.34	0.23
Molybdenum (Mo)	68.8	66.2	64.1	80.7	76.8	26.1
Nickel (Ni)	108	110	103	144	99.4	69.5
Osmium (Os)	<2	<2	<2	<2	<2	<2
Selenium (Se)	1.4	1.7	1.2	0.9	1.0	0.5
Silver (Ag)	41.4	36.0	41.6	62.2	30.8	<9
Thallium (Tl)	<0.5	0.5	<0.5	<0.5	<0.5	0.6
Vanadium (V)	147	132	156	205	140	61.6
Zinc (Zn)	32,005	40,314	25,917	42,634	29,267	2,851

A scoop sampling technique was employed to obtain near-surface samples.

A 10 g portion of each sample was taken for the percent LOD determination. The LOD for the eight samples (sample identification numbers Z-701 to Z-708) averaged 9.50 percent by weight (see Table 2.2). The remainder of each sample was oven-dried at 105°C for 2.5 hours followed by desiccation for 14 hours. After drying, each of the eight samples was screened with a full stack of sieves to determine the percent silt content. The silt content for the eight samples averaged 4.2 percent silt by weight. The silt from the eight samples was mixed together to form a homogeneous silt composite (sample identification number Z-726). The PM_{10} content of the silt composite, determined by sonic sieving, averaged 38.87 percent by weight of the silt (see Table 2.2).

Portions of three fractions (silt, $>PM_{10}$, and PM_{10}) produced from the composite silt sample from the landfill were analyzed for the metals as shown in Table 2.3. The portion of the silt sample that did not pass through the 20 m sieve was referred to as the "greater than PM_{10}" ($>PM_{10}$) fraction. All three fractions were analyzed to determine if the degree of contamination was less or greater in the PM_{10} fraction than in the silt or $>PM_{10}$ fraction (particle size dependent). The results for the metals are expressed in micrograms of the metal per gram of sample on a dry basis. The concentrations measured for the background sample were not subtracted from the landfill sample results.

2.3 UNPAVED ROADS (PROCESS AA)

Two unpaved road segments leading to the landfill were sampled using the scoop sampling technique. A separate sample jar was filled with each sample. The percent weight loss on drying (LOD) was 10.26 percent for sample AA-709 and 8.14 percent for sample AA-711 (see Table 2.2). The road samples were oven

dried for 3.5 hours at 105°C followed by desiccation for 18 hours. The silt content of the dried road samples, determined by using a full stack of sieves, was 4.0 percent for sample AA-709 and 12.6 percent for AA-710. The silt samples were sonic sieved to determine the percent PM_{10} content (sample identification numbers AA-732 and AA-735). The PM_{10} content for AA-732 averaged 46.56 percent by weight of the silt material and, for AA-735, averaged 51.29 percent by weight of the silt material (see Table 2.2). Because an insufficient amount of silt was available, PM_{10} and $>PM_{10}$ fractions were not separated from the silt for analysis of the concentrations of metals in these fractions.

The results of the metals analyses of the unpaved road silt samples are presented in Table 2.3. The concentrations measured for the background sample were not subtracted from the results for the road silt samples.

2.4 CONCLUSIONS

No major problems were encountered during sample collection. And the sampling program was considered successful in obtaining representative samples.

In the analyses of the samples, no problems were encountered in obtaining silt content or determining PM_{10} content. The results of the metals analyses are also believed to be accurate.

3.0 PROCESS DESCRIPTION

Sampling at this facility was undertaken for two processes. The term "process" refers to a likely source of potentially contaminated fugitive particulate emissions within a facility. The processes sampled were:

a. The active lift for landfill; and

b. Unpaved roadway segments at two locations within the facility.

The following process descriptions are based largely upon the information provided by the facility and observations made during the course of the survey/sampling effort.

3.1 LANDFILL

The landfill was inactive during the survey/sampling visit. All information concerning the landfill operation was provided by company representatives. This landfill has been in existence for 13 years. The area of the landfill is 8 acres with a total design capacity of 112 acre-feet. The only hazardous waste landfilled at this site is electric arc furnace (EAF) dust (K061) generated by the three furnaces at this facility. Currently, only two of the three furnaces operate at any given time. On the average, about 26 lb of EAF dust is generated per ton of steel produced.

Last year 11,100 yd^3 of K061 plus cover were landfilled at this site; of the total, 2,990 yd^3 was K061. The cover consists primarily of coarse furnace slag, with some mill scale, which provides a porous cover. A typical lift dimension is 200 ft x 7 ft x 2 in. of EAF dust. One lift is completed daily; an intermediate (operating) cover 4 in. in depth is applied to the open lift after each load of EAF dust.

The principal equipment types, functions, and appropriate level of activity for this landfill operation are as follows.

Equipment (commercial designation if available)	Function	Activity units
Dump truck (International) --3-axle, 10-wheel	Transports EAF baghouse dust to landfill; also used to spread material.	Truck capacity 240 ft^3; 2-3 loads every 2 days.
Water truck (Ford F-500) --2-axle, 6-wheel	Dust control concurrent with waste application at landfill.	Waste truck--1,000 gal. capacity; 14-ft pressurized spray bar.

Equipment (commercial designation if available)	Function	Activity units
Off-road truck (Euclid R-30)--2-axle, 6-wheel	Used to transport and spread furnace slag which is used as temporary cover at landfill.	Activity assumed same as dump truck.
Front-end loader (John Deere JD 844)--2-axle, 4-wheel	Used to transport and level waste and cover.	Bucket capacity 5 yd^3; activity assumed same as dump truck.

The transport of the EAF dust is very intermittent depending upon the level of use of the furnaces. A dedicated dump truck travels from the landfill to the baghouse where it is filled with EAF dust. The load is covered with a tarp and transported to the landfill. At the landfill, the dust is spread by dropping from the rear of the dump truck (3- to 4-ft drop height) while the truck is traversing the lift face. The EAF truck is followed immediately by a water spray truck to wet the dust and suppress particulate distribution. The spray bar on the spray truck is mounted on the driver's side of the truck so the truck does not travel on the freshly deposited EAF dust. After wetting, a slag cover is placed over the dust.

3.2 UNPAVED ROADS--TWO SEGMENTS

Samples were collected from roads at two different locations in the facility. The truck filling area at the baghouse is asphalt paved, but because of the very wet conditions, samples could not be obtained. An unpaved road from the baghouse to the main paved road had been regraveled 2 weeks prior to the visit so no samples were taken along this portion of roadway. Samples were collected at two points of unpaved road: (1) the road leading down into the landfill; and (2) at a railroad crossing on the way to the landfill. These samples were not normal dust samples but scoop samples of damp road material.

The average vehicle volume at the railroad crossing is 1 to 1.5 trips per day by the covered EAF truck. For the road leading down into the landfill, the average volume is 1 to 1.5 trips per day each for the EAF truck, water spray truck, front-end loader, and off-road truck.

4.0 SAMPLING AND ANALYSIS

This section outlines the procedures used for (1) the sampling conducted at Newport Steel Corporation (NSC) and (2) the analysis of the samples collected. Included are descriptions of the location of each process sampled and the sampling grid used for sample collection. Sample handling, preparation, and/or analysis specific to this facility or any process therein are described in detail. Any deviations from the standard sampling and analysis procedures (see Appendix C) are discussed.

Two processes were sampled at NSC: a landfill and two unpaved road segments. The samples from each of these processes were analyzed for silt, PM_{10} content, and metals. A tabular presentation of the sampling plan for NSC which specifies the number and types of samples and the locations at which they were collected can be found in Chapter 2 (see Table 2.1). The subsections that follow further describe the sampling locations, sampling grid schemes, and applicable sampling and analytical procedures.

4.1 SITE PLOT PLAN

Figure 4.1 shows the site plot plan of NSC in Newport, Kentucky. The scale of Figure 4.1 is approximately 1 inch equals 500 feet. The location of processes sampled is indicated on the site plot plan. Pertinent topographical features, both natural and man-made, are also shown.

4.2 LANDFILL (PROCESS Z)

The landfill, designated process Z, is located west of the electric arc furnaces (see Figure 4.1). The process boundaries were determined to approximate a rectangle with sides of 300 feet and 90 feet. Based on these dimensions, the sampling grid was designed and laid out using 30 foot square grid cells (see Figure 4.2). The grid cells were numbered from left to right starting in the northwest corner of the sampling grid.

MRI determined that eight grid cells would be sampled. A random number table was used to select the grid cells for sampling (Appendix C). Cell 2 was eliminated due to its proximity to selected Cells 1, 3, and 5. Cell 19 was selected to replace Cell 2.

Because this process involved a temporary cover of furnace slag which is a moderately disturbed surface, MRI decided that the landfill would be sampled using the scooping technique (see Appendix C). Within each cell a sampling template was randomly tossed four times. The sample from each cell consisted of the four soil aliquots (two scoops each) taken from inside the areas defined by the template. The eight samples were numbered Z-701 through Z-708. Figure 4.2 shows each sample and the corresponding grid cell from which it was taken.

A 10 g portion of each sample from this process was first analyzed for weight loss on drying (LOD) by drying for 12 to 16 hours in an oven at 105°C. The remaining portion of each sample was oven dried for 2.5 hours at 105°C followed by desiccation for 14 hours. The dried samples were analyzed for percent silt content and percent PM_{10} content (see Appendix C for specifics of sample handling during each of these analyses). The silt content was determined on a full stack of sieves consisting of a 3/8 inch, 4, 20, 40, 100, 140, and 200 mesh sieves.

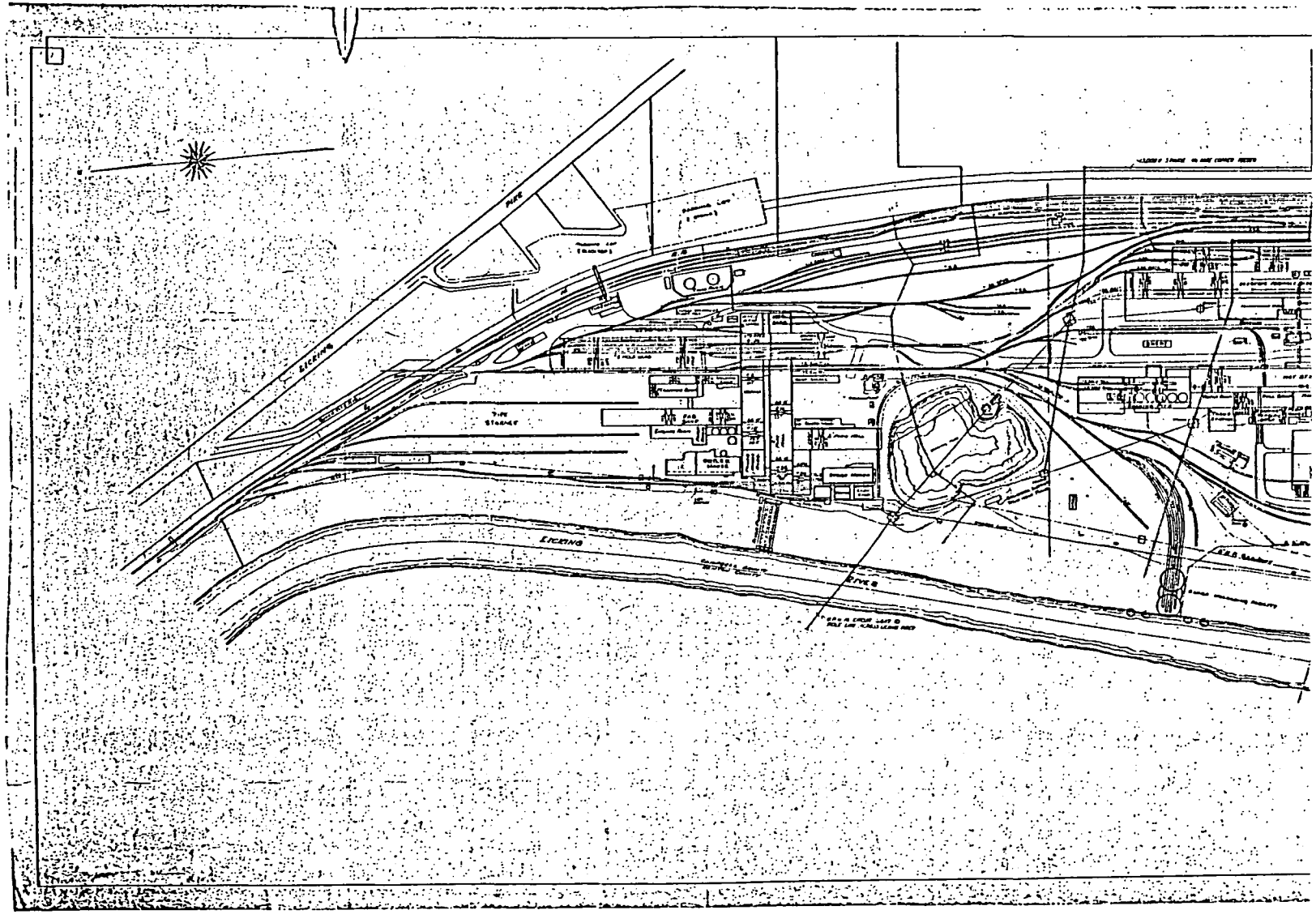
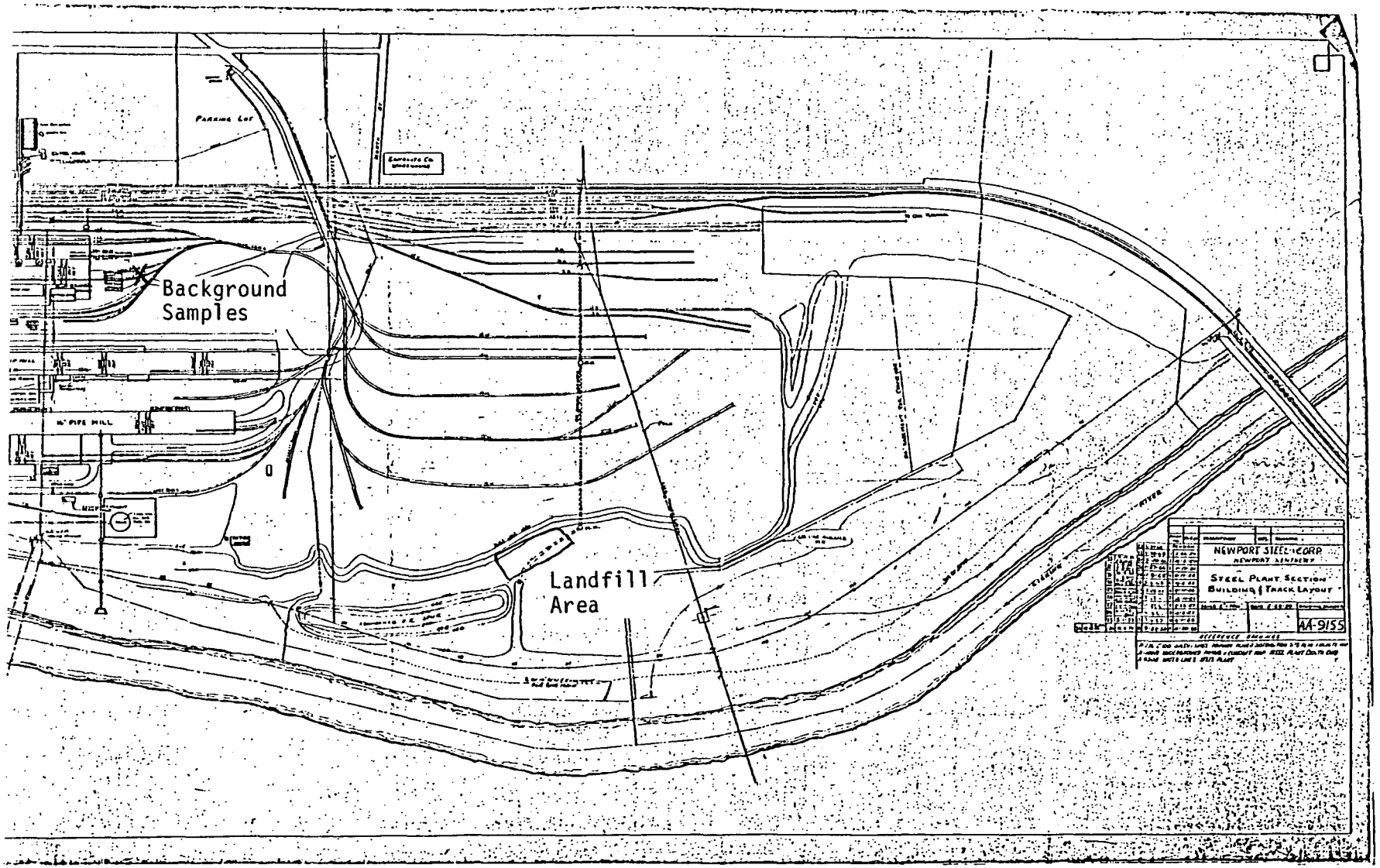


Figure 4.1. Site plot plan for Newport Steel Corporation.



NEWPORT STEEL CORPORATION

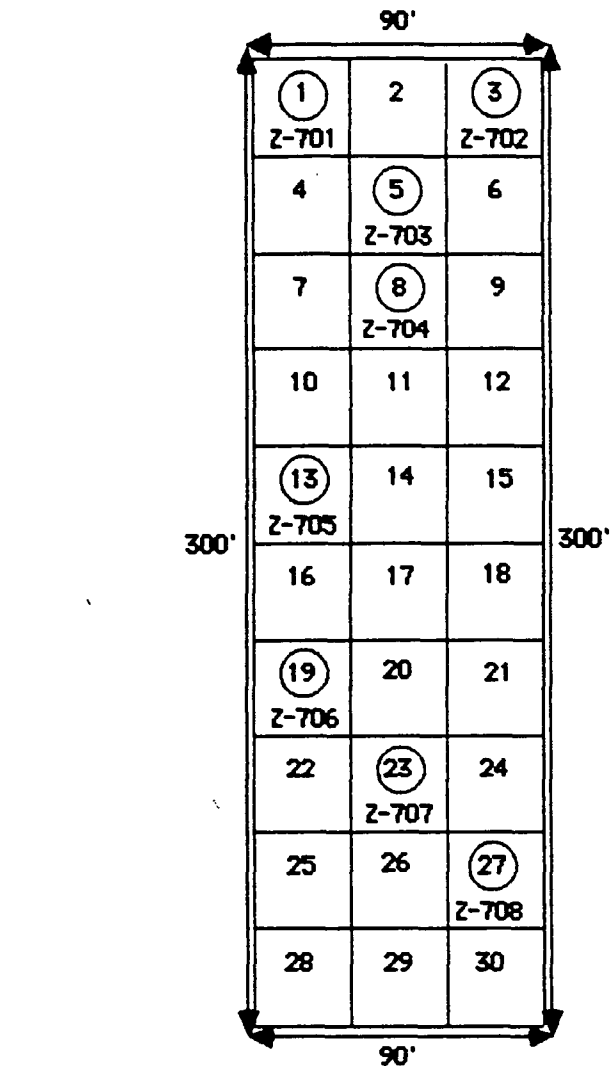


FIGURE 4.2. SAMPLING GRID, PROCESS DIMENSIONS, AND SAMPLE NUMBERS FOR LANDFILL AT NEWPORT STEEL (PROCESS Z).

Using the screening and sieving techniques described in Appendix C, all the samples from this process were utilized to make composite samples of the silt, PM_{10}, and $>PM_{10}$ fractions. The part of the silt sample that did not pass through the 20 um sonic sieve was referred to as the "greater than PM_{10}" ($>PM_{10}$) fraction. Portions of these fractions were then sent to RTI for metals analysis. The procedures used for analysis of the metals followed the methods outlined in the EPA publication "Testing Methods for Evaluating Solid Waste," SW-846. The metals measured and the detection limits of the analytical methods used are shown in Table 4.1. Samples for analysis of all metals except mercury (Hg) were prepared by acid digestion using EPA Method 3050 (SW-846). Mercury (Hg) samples were prepared and analyzed by the cold-vapor atomic absorption procedure following EPA Method 7471. Two modifications were used in the final dilutions of the digestates. The samples for inductively-coupled argon plasmography (ICAP) determination by EPA Method 6010 and furnace atomic absorption determination of antimony (Sb) by EPA Method 7041 were diluted to achieve a final concentration of 5% HCl. The sample digestates for arsenic (As) determination by EPA Method 7060, for selenium (Se) determination by EPA Method 7740, and for thallium (Tl) determination by EPA Method 7841 were diluted to achieve a final concentration of 0.5% nitric acid.

The samples were only analyzed for metals since MRI decided that cyanide, semivolatile organics, and pesticides would not be found in significant quantities.

4.3 UNPAVED ROADS (PROCESS AA)

Two samples were collected from unpaved roads at NSC (see Figure 4.3). One sample (identification number AA-710) was taken at a railroad crossing on the unpaved road leading to the landfill. The other road sample (identification number AA-709) was taken from the unpaved road leading down into the landfill.

DATE: 11/12/85 PROCESS LETTER: AA

SITE NAME NEWPORT STEEL

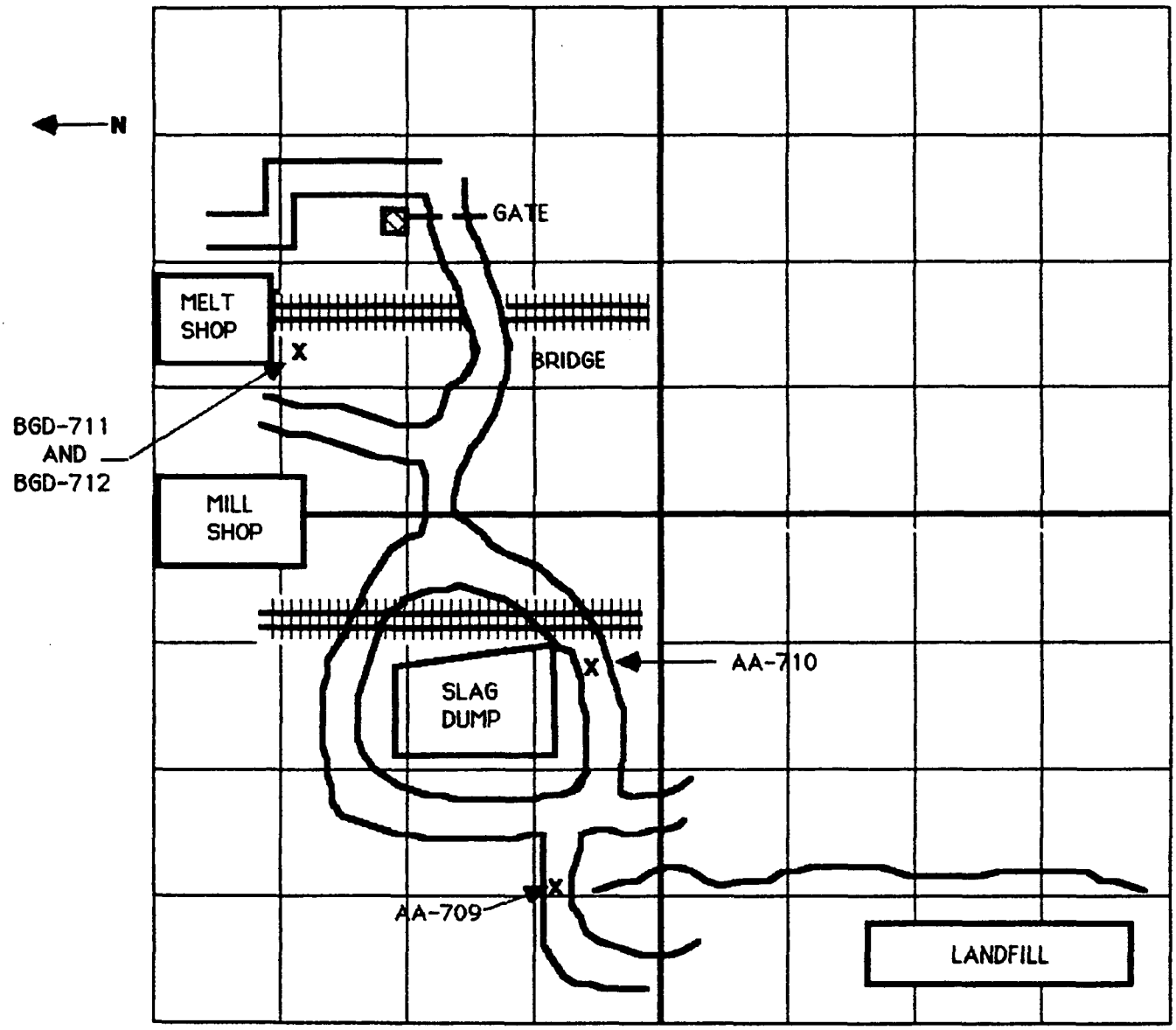
LOCATION NEWPORT, KENTUCKY

SAMPLING TEAM S. PLAISANCE, K. SPEARS

PROCESS NAME ROAD SAMPLES

SAMPLING TECHNIQUE SCOOPING

PROCESS LAYOUT (Indicate Cell #, Sampled Cell #, Sample #, and Dimensions)



NOTES: _____

TABLE 4.1. METALS, MEASUREMENT METHODS, AND DETECTION LIMITS*

Element	Detection Limits (ug/g)* ICAP***	GFAA***	Cold Vapor AA***
Aluminum (Al)	375	-----	
Antimony (Sb)	-----	0.5	
Arsenic** (As)	-----	2.0	
Barium** (Ba)	4.0	-----	
Beryllium (Be)	0.3	-----	
Cadmium** (Cd)	5.0	-----	
Chromium** (Cr)	6.0	-----	
Cobalt (Co)	4.0	-----	
Copper (Cu)	22	-----	
Iron (Fe)	375	-----	
Lead** (Pb)	8.0	-----	
Manganese (Mn)	2.0	-----	
Mercury** (Hg)	-----	-----	0.03
Molybdenum (Mo)	6.0	-----	
Nickel (Ni)	10	-----	
Osmium (Os)	2.0	-----	
Selenium** (Se)	-----	0.5	
Silver** (Ag)	9.0	-----	
Thallium (Tl)	-----	0.5	
Vanadium (V)	2.0	-----	
Zinc (Zn)	4.0	-----	

* Detection limits were calculated as three times the standard deviation the values measured for compounds at or near the suspected detection limit in the background sample. For compounds not detected in the background sample, the detection limits were calculated as three times the standard deviation of the background noise. Fe, Mg, and Al detection limits were determined using low level standards as three times the standard deviation of the values measured.

** Eight RCRA metals

*** ICAP = Inductively-Coupled Argon Plasmography
GFAA = Graphite Furnace Atomic Absorption
AA = Atomic Absorption

Both road samples were collected using the scoop sampling technique.

The samples from this process were first analyzed for weight loss on drying by drying a 10 g portion for 12 to 16 hours in a 105°C oven. Later, the remaining portion of each sample was oven dried at 105°C for 3.5 hours followed by desiccation for 18 hours. The dried samples were analyzed for percent silt content and percent PM_{10} content (see Appendix C). A full sieve stack was used to determine the percent silt content. PM_{10} and $>PM_{10}$ material for metals analysis was not produced because insufficient amounts of silt were available.

Portions of the silt fraction of the samples were submitted to RTI for metals analysis. They were analyzed for metals as described previously for the composite samples from Process Z.

4.4 BACKGROUND SAMPLES

Two background samples were taken at NSC near the melt shop (see Figure 4.3). The scooping technique was used for sample collection. These samples were numbered BGD-711 and BGD-712.

The background samples were analyzed for weight loss on drying. The samples were oven dried at 105°C for 3.5 hours followed by desiccation for 18 hours. The dried samples were then analyzed for percent silt and percent PM_{10} content (see Appendix C). A full sieve stack was used to determine the percent silt content.

A homogeneous silt composite was made by mixing the silt from the background samples. PM_{10} and $>PM_{10}$ material for metals analysis was not produced because an insufficient amount of silt was available.

A portion of the silt composite generated by screening was sent to RTI for metals analysis. The sample was analyzed for metals as described previously for the composite samples from Process Z.

5.0 QUALITY ASSURANCE

The quality assurance (QA) measures for the metals analysis was conducted internally by RTI. For the metals analysis, RTI used EPA Trace Metals QC samples for Water Quality Analyses as check samples for the accuracy of the instrumentation. A marine sediment reference material (MESS-1) acquired from the Marine Analytical Chemistry Standard Program of the National Research Council (NRC) of Canada and an NBS fly ash sample (1633 A) were used as QA samples to check the overall accuracy of the digestion and analysis procedures. One sample was spiked with eight elements and their percent recoveries calculated to assess matrix effects. Another sample was analyzed in duplicate to demonstrate analytical precision. Results of these checks are presented in Table 5.1.

TABLE 5.1. QUALITY ASSURANCE RESULTS FOR METALS ANALYSIS

Sample Identity	EPA Check Sample		NBS Fly Ash 1633 A		NRC Sediment MESS-1		Matrix Spike Recovery			Duplicates	
	Expected	Found	Expected	Found	Expected	Found	Expected	Found	Percent	Silt	Silt
Elements (ug/g)	(ug/g)	(ug/g)	(ug/g)	(ug/g)	(ug/g)	(ug/g)	(ug/g)	(ug/g)		(ug/g)	(ug/g)
Aluminum (Al)	-	-	140,000	18,000	58,000	14,000	30,859	31,436	-	89,102	83,695
Antimony (Sb)	8.2	9.0	7.0	3.5	0.73	0.73	-	-	-	1.5	1.3
Arsenic (As)	43.0	43.6	145	136	10.6	10.3	25.50	28.30	111%	12.0	5.7
Barium (Ba)	-	-	1500	743	-	46.0	1,713	1,300	76%	94.4	88.6
Beryllium (Be)	29.0	30.5	12.0	3.9	1.9	0.9	482	422	88%	3.7	3.6
Cadmium (Cd)	9.1	7.7	1.0	3.0	0.6	0.1	481	412	86%	<5	<5
Chromium (Cr)	7.1	6.8	196	41.4	71.0	31.3	173	142	82%	4,278	4,103
Cobalt (Co)	43.0	40.1	46.0	15.9	10.8	10.5	10.1	11.5	-	250	240
Copper (Cu)	8.9	12.3	118	43.3	25.1	23.3	594	541	91%	248	239
Iron (Fe)	-	-	94,000	35,000	36,500	23,000	15,285	14,718	-	173,248	172,113
Lead (Pb)	43.0	43.0	72.4	64.5	34.0	53.2	521	446	86%	97.3	94.5
Manganese (Mn)	13.0	12.9	190	78.0	513	322	619	550	89%	192	187
Mercury (Hg)	-	-	0.17	0.18	-	-	0.45	0.46	103%	<0.03	<0.03
Molybdenum (Mo)	-	-	29	66	-	25.4	109	84	77%	89.3	92.0
Nickel (Ni)	-	-	127	40.0	29.5	22.8	136	119	88%	528	483
Osmium (Os)	-	-	-	-	-	-	-	-	-	<2	<2
Selenium (Se)	7.6	6.9	10.3	7.6	0.4	0.4	20.0	19.7	99%	<0.5	<0.5
Silver (Ag)	-	-	-	-	-	-	494	437	88%	52.3	116
Thallium (Tl)	25.2	26.7	5.7	2.7	0.7	0.3	19.9	17.8	89%	0.5	<0.5
Vanadium (V)	130	123	300	121	72.4	42.9	158	147	93%	694	663
Zinc (Zn)	10.0	10.0	200	94.2	191	247	703	599	85%	963	912
cyanide	-	-	-	-	-	-	-	-	-	<0.5	<0.5