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SURFACE DUST ELEMENTAL PROFILES - SOUTHEAST CHICAGO (LAKE CALUMET AND McCOOK AREAS)

by Stephen J. Vermette, Allen L. Williams, and Sheldon Landsberger

Sponsored by the
Illinois Department of Energy and Natural Resources
and the Illinois Environmental Protection Agency

Champaign, Illinois
February 1990

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Stephen J. Vermette and Allen L. Williams
Illinois State Water Survey
Atmospheric Chemistry Section
2204 Griffith Dr
Champaign, IL 61820-7495

and

Sheldon Landsberger
University of Illinois
Department of Nuclear Engineering
214 Nuclear Engineering Laboratory
103 S. Goodwin Avenue
Urbana, IL 61801

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Introduction

Numerous receptor modeling studies have indicated the significance of fugitive dust - sources to ambient PM-10 loadings. The significance of surface dust as a source of PM-10 has been reinforced in Southeast Chicago by the receptor modeling work of Vermette et al.(1988) and Sweet et al.(1990). Compliance monitoring by the Illinois Environmental Protection Agency (IEPA) has recorded annual average and 24 hour excursions of Total Suspended Particulates (TSP) and Particulate Matter ≤ 10 microns (PM-10) which are above or approaching primary or secondary standards (IEPA, 1989).

While the referenced receptor modeling studies have indicated fugitive dust emissions as a substantial source of the ambient PM-10 loading, the findings of these studies have been restricted by the absence of site specific elemental profiles of potential fugitive dust sources. As a part of the study necessary to prepare an effective and efficient State Implementation Plan (SIP) for Southeast Chicago and the McCook area, dust samples were obtained from an earlier sampling survey conducted by the Midwest Research Institute under contract with the IEPA (MRI, 1987a; MRI, 1987b; and MRI, 1988). A subset of these samples was selected for elemental analysis and will be incorporated in subsequent receptor modeling work.

This report outlines the development of surface dust elemental profiles for Southeast Chicago and the McCook area. This report is also available on a floppy disk. Included in this report are:

	Hard Copy	Disk Copy
1. Methodology and Comments	Text	CHTEXT.TX5
2. Surface Dust Profiles	Appendix A	PROFILE.ASC
3. Quality Assurance	Appendix B	STANDARD.TX5
		XRFNAA.ASC
4. Sampling Location (Maps)	Appendix C	
5. XRF Elemental Data		XRF.ASC
6. NAA Elemental Data		NAA.ASC
7. NAA Bulk Data		BULK.ASC

Sample Collection

The dust samples obtained from IEPA were from an earlier sampling survey conducted by MRI, under contract with the IEPA. The dust samples were collected by MRI to estimate PM-10 emissions from several industrial facilities and municipal streets in the Lake Calumet and McCook areas of Chicago. The selection of the sampled dust sources was based on a data gap of fugitive dust emission inventories maintained by the IEPA and their potential for suspension into the atmosphere. Ten facilities and two roadways were sampled by MRI in August and November, 1987. A detailed description of the facilities selected, of the chosen sampling sites and the calculated emission inventories for the MRI project is available (MRI, 1987a, 1987b, and MRI, 1988).

Of the approximately 275 dust samples collected by MRI, 36 were selected for elemental analysis in this study. The samples for this subset were taken from each of the facilities and streets sampled by MRI. A listing of the 36 dust samples (32 profiles) is shown in Table 1, and their locations are shown in Figures 1 and 2, and in Appendix C.

A description of the sampling protocol is reported by MRI, 1987a. In brief, samples were collected from three location types: 1) unpaved areas; 2) paved areas; and 3) storage piles. Unpaved areas were sampled with a hand broom and dustpan. The material collected was that which was available for immediate suspension into the atmosphere. For unpaved areas which were roadways, samples were taken along a transverse strip across the travel lanes. Paved areas were sampled along a transverse strip with a Hoover Model S vacuum fitted with a tare-weighed vacuum bag. Storage piles were sampled with a pointed shovel to a nominal depth of 15 cm.

The 32 profiles (36 samples) represent suspected sources of fugitive dust in the Lake Calumet and McCook areas, however, the analyzed samples represent only 13% of the collected samples and thus an important dust source may have inadvertently been omitted. It should also be noted that the elemental profiles reported from this project represent concentrations at the time of collection and that many industrial facilities use chemical dust suppressants (especially in the dust control season - March through October) which may or may not be reflected in the elemental profiles.

Suspension

The surface dust samples were sieved to < 53 um to be used as the bulk material for suspension and deposit onto filters. The suspension chamber consists of a swirl chamber where the dust was suspended by a continuous supply of filtered compressed air (see Figure 3). The compressed air and suspended dust were forced into a circular air motion (swirl) about the axis of the chamber where the particles are mixed and disaggregated. The disaggregation of the particles removes possible elemental inhomogeneity between filters due to fractionation effects (e.g. coarse particles are truly coarse particles and not aggregates) and assures true particle sizes for techniques requiring particle standards and corrections (e.g. XRF). The flow was exhausted into an 8 ft^3 cardboard box for dichotomous and PMS sampling (the box was replaced for each dust sample).

Particle samples were collected within the cardboard box using an automatic dichotomous virtual impactor fitted with a PM-10 inlet made by Anderson, Inc., Atlanta, GA(Series 245). The sampler is designed to collect particulate matter with an aerodynamic size cut off of 10 um and to further separate particles into two size fractions; a fine particle fraction (<2.5 um) and a coarse particle fraction (2.5 to 10 um). The fine and coarse deposits were collected on 37 mm diameter Teflon disks with a polyethylene support ring (for elemental analyses) and on 37 mm diameter glass fiber disks (for carbon analysis). Both filter types are made by Gelman Science, Ann Arbor, MI. Two PM-10 inlets within the box allow for the simultaneous sampling on Teflon and glass fiber filters. The similarity in particle size composition of loaded filters (disaggregation) was ensured by the continuous monitoring of particle size distribution using a PMS laser probe particle counter (model CSAS-100-HV).

Table 1. MRI Dust Samples Selected for Suspension.

Facility	Sample Code*	Description
Calumet Industrial Disposal	01U010	Unpaved Haulroad
	01U004 & 01U013	Unpaved Haulroad
Paxton II Landfill	02U001#	Unpaved Haulroad
	02U002	Unpaved Haulroad
Land & Lakes No. 3 Landfill	03U004	Unpaved Haulroad
	03S010	Clay Stockpile
	03S011#	Landfill Sample
Land & Lakes No. 1, 2, &	04U007	Unpaved Haulroad
Dolton Landfill	04S004	Flyash
	04P184	Paved Haulroad
Acme Steel Furnace Plant	05U014	Unpaved Haulroad
	05P014	Paved Haulroad
	05S002	Tilden Pellets
	05S005	Wabash Pellets
	05S101	Flue Dust
Acme Steel Coke Plant	06U004#	Coal Yard Road
	06S003	Coal
	06P001	Paved Haulroad
Acme Steel Riverdale Plant	07P008	Paved Haulroad
	07S301	Limedust
	07S302#	BOF Dust
Hechett Riverdale Plant	08U003	Slag Haulroad
	08S202#	Coarse Mill Scale
	08S206	Refuse Slag
Hechett 112th St. Plant	09U005	Unpaved Haulroad
	09S002	Slag Stockpile
Vulcan McCook Quarry	10U008#	Quarry Road
	10P202	Paved Haulroad
	10S014	Quarry Stockpile
	10S003	Screening
Stony Island Ave.	11U005 & 11U006#	Unpaved Roadway
122nd Street	12P001 & 12P002	Paved Roadway

* Sample Code: XX-T-YYY XX-Facility Code, T-Sample Type (U=unpaved, P=paved, S=stockpile), YYY-sample indentification.
# Selected for bulk elemental analysis.

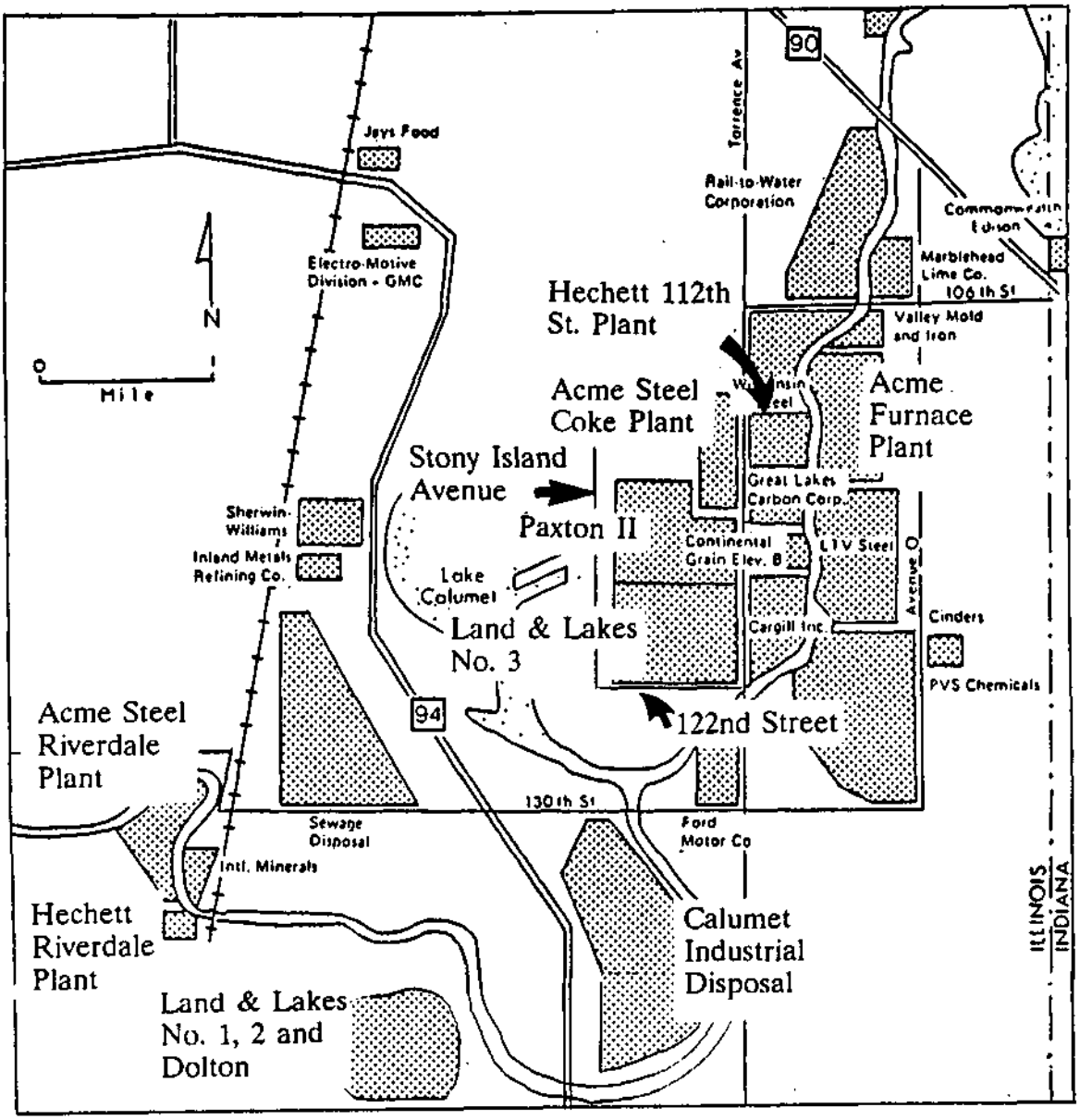

Figure 1. Lake Calumet Study Area Showing Locations of Sampled Facilities and Other Industries

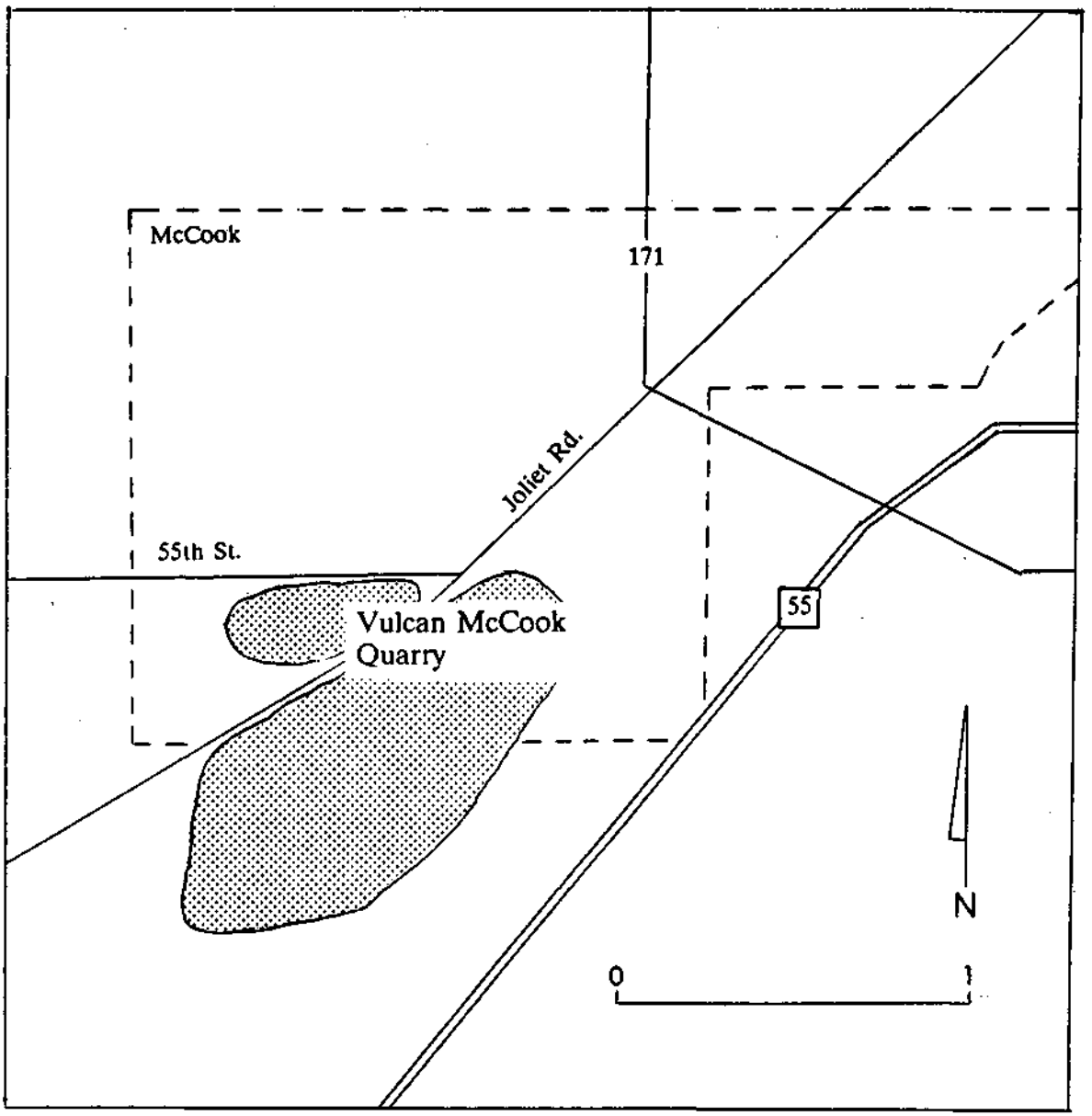

Figure 2. McGook Study Area Showing Location of Sampled Facility

Elemental and Carbon Analyses

The suspended filter deposits (fine and coarse) on Teflon were subjected to elemental analysis by X-ray fluorescence (NEA, Inc. of Beaverton, OR) and neutron activation analysis (Department of Nuclear Engineering, University of Illinois). The method of XRF is based on the atomic excitation of electrons with the subsequent emissions of characteristic x-rays when electrons from higher levels fill the void spaces. The method of NAA is based on the measurement of induced radioactivity where the radioactive decay of each element emits a characteristic gamma-ray energy spectrum.

Filters were equilibrated 24 hours at 50% relative humidity before weighing. Loaded filters were weighed prior to XRF analysis and then reweighed prior to NAA analysis. All filter handling and weighing was done in a clean room with a laminar flow clean bench. Using a Cahn microbalance, the precision (standard deviation) of duplicate weighings under these conditions is ± 5 ug.

Fine and coarse deposits have been corrected for fine particles collected on the coarse filter (dichot correction), as outlined in the automatic dichotomous sampler instruction manual (Anderson Bulletin No. 1079-245-IM).

A subset of the collected samples was analyzed in bulk form (< 53 urn material prior to suspension) by NAA.

Total carbon analysis (total elemental and organic carbon - TOC) was carried out by the Analytical Chemistry Section of the Illinois State Water Survey. Suspended filter deposits on the glass fiber filters were first treated with HCL acid to remove carbonate. Carbonate removal was essential to obtain a TOC value as a number of the dust samples were collected from a dolomite quarry and from roadways. The effectiveness of carbonate removal is demonstrated in Table 2.

Table 2. Effectiveness of Filter HCL Treatment.

Sample Type	Carbonate From Bulk Sample	Carbon on Untreated Filter	Carbon on HCL Treated Filter
Quarry Dust	53%	51%	1%
Roadway	n.a.	31%	3%

n.a. not available

The treated filters were combusted at 800 C for TOC determinations by a Dohrmann carbon analyzer.

The dust profiles presented in this report are predominantly from XRF determinations. Important inputs were made by NAA for element determinations not provided by XRF (Na, Mg and Sm) or determinations which are at or below XRF detection limits (As, V, Sb and La). Total C values were provided from the Dohrmann analyzer.

Quality Assurance

Both XRF and NAA techniques were used in the developement of elemental profiles. Each laboratory was asked to run filter blanks and standards with the sample runs (see Appendix B). In addition, the use of XRF and NAA provided for a number of redundant measurements which served as an additional quality check for a number of the reported concentrations (see Appendix B).

The XRF standards provided for only 11 of the 34 sample elemental concentrations reported (Al, Si, K, Ca, Ti, V, Mn, Fe, Cu, Zn, and Pb). Agreement between the certified values and XRF determinations were within standard uncertainties. However, it should be noted that the standard concentrations for Ti, V, Mn, Cu, Zn, and Pb were well above the typical concentration measured from the dust samples.

The standards for NAA (filters and Bulk samples) provide for all elemental concentrations reported for dust samples. Agreement between the certfied values and NAA determinations are within standard uncertainties, with the exception of Cu and Mg which were not detected. The standard concentrations were at or below the typical concentrations measured from the dust samples.

Redundant measurements by XRF and NAA provided for a possible comparison of Al, Ca, Mn, Ti, K, Cl, V, Cu, Sb, La and As concentrations for each of the dust samples (Appendix E). The elements Sb, La and As were below detection limits for XRF and thus the NAA values were used in the dust sample profiles. The elements Cu, V, and Cl were below or approaching detection limits for either XRF or NAA and thus exhibit cases of both good (within analytical errors) and poor (outside analytical errors) agreement. The technique showing the lower detection limit was used in the dust sample profiles (XRF - Cu; NAA - V and Cl). The remaining elements (Al, Ca, Mn, Ti and K) are above detection limits and exhibit agreement within analytical errors. A review of Appendix B allows for comparisons between individual filter samples.

A final quality check was to screen the elemental profiles to see if the concentrations for particular sample types 'made sense'. The approach used was to examine a subset of sample types which would be expected to exhibit heightened concentrations for particular elements (characterizing elements). The concentrations of the characterizing elements were then compared to values found in the literature for comparable materials (Table 3).

Table 3. Profile Screening (Characterizing Elements and Literature Values).

Sample Type	ID No.	Characterizing Element/Concen.	Literature Value #
Clay	(03S010)	Si (22%-24%)	Soil Rural: 20%-35% (Hopke, 1985)
Tilden Pellets*	(05S002)	Fe (26%-54%)	Ferrous Metal Emissions: 10%-32% (Hopke, 1985)
Wabash Pellets*	(05S005)		
Flue Dust*	(05S101)		
Coal	(06S003)	C (67%-69%)	Illinois Coal: 60%-70% (Gluskoter et al., 1977)
Quarry Stockpile	(10S014)	Ca (15%)	Virgin Aggregates: 21% (Vermette et al., 1987)

comparable materia] available
* Acme Steel Furnace Plant

The profiles exhibit heightened concentrations from the appropriate characterizing elements and show reasonable agreement with comparisons from the literature.

Comments

This report provides 32 elemental profiles for dust samples collected in the Lake Calumet and McCook areas of Chicago. These profiles were designed for use by receptor modeling techniques to aid in the characterization of fugitive dust sources.

The variability in elemental concentrations between profiles and particle size ranges reflects the complexity of the study area and reinforces the need to develop site-specific surface dust profiles.

Surface dust elemental profiles developed for Granite City, IL (Vermette and Williams, 1989a) and Oglesby, IL (Vermette and Williams, 1989b) are also available.

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APPENDIX A

Surface Dust Elemental Profiles
(Profile.asc)

SAMPLE ID: 01U010
DESCRIPTION: CALUMET INDUSTRIAL DISPOSAL - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 492 MICROGRAMS
NAA 485 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					n.d.	
NA					n.d.	
MG			12.374+-	3.496	2.551+-	.721
AL	5.5876+-	.7445	36.878+-	4.914	7.492+-	1.018
SI	13.3610+-	1.9791	88.182+-	13.062	17.915+-	2.696
P	.1720+-	.0216	1.135+-	.142	.231+-	.030
S	.8004+-	.1058	5.283+-	.698	1.073+-	.145
CL	.1638+-	.0264	1.081+-	.175	.220+-	.036
K	2.2136+-	.2518	14.610+-	1.662	2.968+-	.347
CA	6.4592+-	.7318	42.631+-	4.830	8.661+-	1.008
TI	.3036+-	.0174	2.003+-	.115	.407+-	.026
V			.082+-	.003	.017+-	.0007
CR	.0241+-	.0024	.159+-	.016	.032+-	.003
MN	.1459+-	.0085	.963+-	.056	.196+-	.013
FE	3.1533+-	.1677	20.812+-	1.107	4.228+-	.252
NI	.0078+-	.0016	.051+-	.010	.010+-	.002
CU	.0330+-	.0030	.218+-	.020	.044+-	.004
ZN	.0419+-	.0033	.276+-	.022	.056+-	.005
GA					n.d.	
AS			.005+-	.0007	.001+-	.0001
SE					n.d.	
BR					n.d.	
RB	.0080+-	.0021	.053+-	.014	.011+-	.003
SR	.0156+-	.0026	.103+-	.017	.021+-	.003
Y					n.d.	
ZR					n.d.	
MO	.0088+-	.0081	.058+-	.054	.012+-	.011
PD	.0098+-	.0087	.065+-	.057	.013+-	.012
AG					n.d.	
CD					n.d.	
IN	.0188+-	.0163	.124+-	.108	.025+-	.022
SN					n.d.	
SB			.003+-	.0004	.0006+-	.00008
BA					n.d.	
LA			.018+-	.0008	.004+-	.0002
SM			.002+-	.00009	.0005+-	.00002
HG					n.d.	
PB	.0097+-	.0051	.064+-	.034	.013+-	.007

n.a. not available
n.d. not detected

SAMPLE ID: 01U010
DESCRIPTION: CALUMET INDUSTRIAL DISPOSAL - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1542 MICROGRAMS
NAA 469 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					2.020+-	.202
NA			1.288+-	.238	.274+-	.058
MG			9.370+-	1.152	1.996+-	.425
AL	15.9474+-	2.1812	105.253+-	14.396	6.827+-	.935
SI	50.1815+-	7.2368	331.198+-	47.763	21.482+-	3.103
P	.4455+-	.0581	2.940+-	.384	.191+-	.025
S	1.2241+-	.2142	8.079+-	1.413	.524+-	.092
CL	.0762+-	.0444	.503+-	.293	.033+-	.019
K	6.4182+-	.7454	42.360+-	4.920	2.747+-	.320
CA	19.1796+-	2.2251	126.585+-	14.686	8.210+-	.955
TI	.8594+-	.0517	5.672+-	.341	.368+-	.022
V			.052+-	.002	.011+-	.002
CR	.0497+-	.0050	.328+-	.033	.021+-	.002
MN	.4830+-	.0281	3.188+-	.185	.207+-	.012
FE	9.7363+-	.5090	64.259+-	3.359	4.168+-	.220
NI	.0160+-	.0019	.106+-	.013	.007+-	.001
CU	.0914+-	.0059	.603+-	.039	.039+-	.003
ZN	.0602+-	.0044	.397+-	.029	.026+-	.002
GA					n.d.	
AS			.004+-	.0006	.0009+-	.0002
SE					n.d.	
BR	.0047+-	.0015	.031+-	.010	.002+-	.001
RB	.0336+-	.0029	.222+-	.019	.014+-	.001
SR	.0454+-	.0035	.300+-	.023	.019+-	.002
Y					n.d.	
ZR	.0183+-	.0133	.121+-	.088	.008+-	.006
MO					n.d.	
PD					n.d.	
AG	.0192+-	.0102	.127+-	.068	.008+-	.004
CD	.0212+-	.0125	.140+-	.082	.009+-	.005
IN					n.d.	
SN	.0366+-	.0202	.242+-	.133	.016+-	.009
SB			.002+-	.0004	.0004+-	.00009
BA	.1338+-	.0913	.883+-	.602	.057+-	.039
LA			.013+-	.0007	.003+-	.0006
SM			.003+-	.00007	.0007+-	.0001
HG					n.d.	
PB	.0235+-	.0058	.155+-	.038	.010+-	.002

n.a. not available
n.d. not detected

SAMPLE ID: 01U004 & 01U013
DESCRIPTION: CALUMET INDUSTRIAL DISPOSAL - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 714 MICROGRAMS
NAA 713 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					n.a.	
NA			4.839+-	.676	.679+-	.095
MG			20.973+-	3.718	2.943+-	.052
AL	5.1172+-	.6820	33.773+-	4.501	4.727+-	.638
SI	12.8286+-	1.9003	84.669+-	12.542	11.851+-	1.773
P	.3944+-	.0483	2.603+-	.319	.364+-	.045
S	.7713+-	.1115	5.091+-	.736	.713+-	.104
CL	.0434+-	.0267	.287+-	.176	.040+-	.025
K	1.8533+-	.2121	12.232+-	1.400	1.712+-	.199
CA	14.8438+-	1.6801	97.969+-	11.089	13.713+-	1.579
TI	.2904+-	.0194	1.917+-	.128	.268+-	.019
V			.154+-	.005	.022+-	.0006
CR	.0411+-	.0039	.271+-	.026	.038+-	.004
MN	.4078+-	.0236	2.691+-	.155	.377+-	.023
FE	7.4013+-	.3915	48.849+-	2.584	6.837+-	.389
NI	.0110+-	.0018	.073+-	.012	.010+-	.002
CU	.1576+-	.0094	1.040+-	.062	.146+-	.009
ZN	.1163+-	.0071	.768+-	.047	.107+-	.007
GA	.0018+-	.0011	.012+-	.007	.002+-	.001
AS			.011+-	.0009	.002+-	.0001
SE					n.d.	
BR	.0018+-	.0016	.012+-	.010	.002+-	.001
RB	.0073+-	.0022	.048+-	.015	.007+-	.002
SR	.0172+-	.0027	.114+-	.018	.016+-	.002
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD	.0181+-	.0092	.120+-	.061	.017+-	.009
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.006+-	.0005	.0009+-	.00007
BA					n.d.	
LA			.017+-	.001	.002+-	.0001
SM			.002+-	.00008	.0003+-	.00001
HG					n.d.	
PB	.0501+-	.0065	.331+-	.043	.046+-	.006

n.a. not available
n.d. not detected

SAMPLE ID: 01U004 & 01U013
DESCRIPTION: CALUMET INDUSTRIAL DISPOSAL - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1606 MICROGRAMS
NAA 1414 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			4.020+- .402
NA		6.108+- .396	.432+- .031
MG		30.345+- 2.380	2.146+- .152
AL	10.0701+- 1.4006	66.462+- 9.244	4.140+- .577
SI	32.0627+- 4.6884	211.614+- 30.943	13.180+- 1.931
P	.6101+- .0837	4.027+- .553	.251+- .034
S	.6960+- .1667	4.593+- 1.100	.286+- .069
CL	.1265+- .0492	.835+- .325	.052+- .020
K	3.3521+- .4011	22.124+- 2.647	1.378+- .165
CA	30.9044+- 3.6390	203.969+- 24.017	12.704+- 1.500
TI	.6111+- .0398	4.033+- .262	.251+- .016
V		.208+- .005	.015+- .001
CR	.0952+- .0079	.628+- .052	.039+- .003
MN	1.0616+- .0597	7.007+- .394	.436+- .025
FE	14.3939+- .7704	95.000+- 5.084	5.917+- .321
NI	.0206+- .0022	.136+- .015	.008+- .001
CU	.3629+- .0202	2.395+- .134	.149+- .008
ZN	.1904+- .0113	1.256+- .075	.078+- .005
GA			n.d.
AS		.016+- .001	.001+- .00008
SE	.0023+- .0012	.015+- .008	.001+- .000
BR	.0044+- .0015	.029+- .010	.002+- .001
RB	.0215+- .0025	.142+- .017	.009+- .001
SR	.0419+- .0034	.276+- .023	.017+- .001
Y			n.d.
ZR			n.d.
MO	.0256+- .0083	.169+- .055	.011+- .003
PD	.0131+- .0087	.086+- .057	.005+- .004
AG			n.d.
CD			n.d.
IN			n.d.
SN	.0515+- .0204	.340+- .135	.021+- .008
SB		.007+- .0007	.0005+- .00004
BA	.0986+- .0919	.651+- .607	.041+- .038
LA		.023+- .001	.002+- .0001
SM		.0050+- .0001	.0004+- .00003
HG			n.d.
PB	.1094+- .0084	.722+- .055	.045+- .003

n.a. not available
n.d. not detected

SAMPLE ID: 02U001
DESCRIPTION: PAXTON II LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 682 MICROGRAMS
NAA 685 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					.500+-	.050
NA			2.703+-	.684	.395+-	.100
MG					n.d.	
AL	6.5997+-	.8792	43.558+-	5.803	6.385+-	.862
SI	15.4775+-	2.2926	102.152+-	15.131	14.973+-	2.241
P	.2081+-	.0305	1.373+-	.201	.201+-	.030
S	.3558+-	.0672	2.348+-	.444	.344+-	.065
CL	.0607+-	.0273	.401+-	.180	.059+-	.026
K	2.5256+-	.2878	16.669+-	1.899	2.443+-	.283
CA	16.3102+-	1.8460	107.647+-	12.184	15.779+-	1.818
TI	.2471+-	.0177	1.631+-	.117	.239+-	.018
V			.140+-	.004	.021+-	.0006
CR	.0263+-	.0027	.174+-	.018	.025+-	.003
MN	.3869+-	.0212	2.553+-	.140	.374+-	.022
FE	4.1260+-	.2190	27.232+-	1.446	3.992+-	.229
NI	.0099+-	.0019	.065+-	.013	.010+-	.002
CU	.0112+-	.0025	.074+-	.016	.011+-	.002
ZN	.0286+-	.0029	.188+-	.019	.028+-	.003
GA					n.d.	
AS			.005+-	.0006	.0007+-	.00009
SE					n.d.	
BR	.0031+-	.0019	.021+-	.012	.003+-	.002
RB	.0108+-	.0028	.071+-	.018	.010+-	.003
SR	.0170+-	.0031	.112+-	.021	.016+-	.003
Y	.0079+-	.0037	.052+-	.024	.008+-	.004
ZR					n.d.	
MO					n.d.	
PD	.0161+-	.0110	.106+-	.073	.016+-	.011
AG					n . d . .	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.140+-	.004	.021+-	.0006
BA	.1922+-	.1198	1.269+-	.791	.186+-	.116
LA			.014+-	.0008	.002+-	.0001
SM			.002+-	.00008	.0003+-	.00001
EG					n.d.	
PB	.0100+-	.0064	.066+-	.043	.010+-	.006

n.a. not available
n.d. not detected

SAMPLE ID: 02U001
DESCRIPTION: PAXTON II LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1475 MICROGRAMS
NAA 1377 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					n.a.	
NA			4.645+-	.461	.337+-	.025
MG			25.957+-	3.429	1.886+-	.137
AL	12.1034+-	1.6896	79.882+-	11.152	5.417+-	.758
SI	37.9644+-	5.5556	250.565+-	36.667	16.990+-	2.491
P	.3588+-	.0599	2.368+-	.395	.161+-	.027
S	.2993+-	.1162	1.976+-	.767	.134+-	.052
CL	.1687+-	.0479	1.114+-	.316	.076+-	.021.
K	4.6352+-	.5521	30.592+-	3.644	2.074+-	.248
CA	32.6563+-	3.8530	215.532+-	25.430	14.615+-	1.730
TI	.5952+-	.0371	3.928+-	.245	.266+-	.017
V			.255+-	.007	.019+-	.001
CR	.0327+-	.0048	.216+-	.032	.015+-	.002
MN	.8666+-	.0497	5.720+-	.328	.388+-	.023
FE	9.3543+-	.4964	61.738+-	3.276	4.186+-	.226
NI	.0125+-	.0020,	.083+-	.013	.006+-	.001
CU	.0318+-	.0032	.210+-	.021	.014+-	.001
ZN	.0705+-	.0048	.466+-	.032	.032+-	.002
GA					n.d.	
AS			.010+-	.0008	.0007+-	.00005
SE					n.d.	
BR					n.d.	
RB	.0256+-	.0031	.169+-	.021	.011+-	.001
SR	.0413+-	.0038	.273+-	.025	.018+-	.002
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD	.0166+-	.0111	.109+-	.073	.007+-	.005
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.006+-	.0006	.0004+-	.00003
BA					n.d.	
LA			.025+-	.001	.002+-	.0001
SM			.004+-	.00009	.0003+-	.00002
HG					n.d.	
PB	.0308+-	.0071	.203+-	.047	.014+-	.003

n.a. not available
n.d. not detected

SAMPLE ID: 02U001
DESCRIPTION: PAXTON II LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	n.d.	n.d.	%	2.660283
BA	n.d.	n.d.	PPM	800
CA	151000	6000	PPM	9000
CL	960	130	PPM	400
DY	n.d.	n.d.	PPM	3.979316
MN	11180	150	PPM	50
NA	3050	220	PPM	700
TI	n.d.	n.d.	PPM	9000
V-	199.0567	35.11377	PPM	110
AS	14.42104	0.33569	PPM	0.738361
BR	8.941196	0.585391	PPM	1.205867
K-	24300	600	PPM	1300
LA	26.00582	0.389101	PPM	0.371386
SB	7.391212	0.143321	PPM	0.287054
SM	6.680687	0.07185	PPM	0.041904
CE	26.52069	0.497792	PPM	1.23474
CO	6.942327	0.113402	PPM	0.130343
CR	720.6703	7.908268	PPM	2.963897
CS	1.920675	0.112624	PPM	0.332736
FE	74700	2000	PPM	240
HF	9.667109	0.179727	PPM	0.260036
LU	0.215744	0.02138	PPM	0.068725
NI	n.d.	n.d.	PPM	35.58074
ND	10.74536	0.865089	PPM	2.719736
RB	36.59236	2.84217	PPM	8.834974
SC	4.815382	0.073841	PPM	0.038201
SE	n.d.	n.d.	PPM	0.786696 .
TB	1.071602	0.054021	PPM	0.160105
TH	4.441048	0.080406	PPM	0.169497
YB	1.792479	0.133199	PPM	0.409616

n.d. not detected

SAMPLE ID: 02U002
DESCRIPTION: PAXTON II LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 688 MICROGRAMS
NAA 706 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.660+-	.166
NA			3.056+-	.715	.433+-	.101
MG			16.649+-	4.197	2.358+-	.594
AL	7.7214+-	1.0285	50.961+-	6.788	7.410+-	1.000
SI	17.5672+-	2.6021	115.944+-	17.174	16.858+-	2.523
P	.1895+-	.0274	1.251+-	.181	.182+-	.027
S	.3999+-	.0723	2.639+-	.477	.384+-	.070
CL	.2026+-	.0402	1.337+-	.265	.194+-	.039
K	3.2412+-	.3682	21.392+-	2.430	3.110+-	.360
CA	13.7389+-	1.5552	90.677+-	10.265	13.184+-	1.519
TI	.3080+-	.0210	2.033+-	.139	.296+-	.021
V			.143+-	.005	.020+-	.0006
CR	.0308+-	.0030	.203+-	.020	.030+-	.003
MN	.3283+-	.0182	2.167+-	.120	.315+-	.019
FE	4.2786+-	.2271	28.238+-	1.499	4.106+-	.235
NI	.0078+-	.0019	.051+-	.012	.007+-	.002
CU	.0138+-	.0028	.091+-	.018	.013+-	.003
ZN	.0323+-	.0033	.213+-	.022	.031+-	.003
GA					n.d.	
AS			.008+-	.0007	.001+-	.0001
SE					n.d.	
BR					n.d.	
RB	.0178+-	.0031	.117+-	.021	.017+-	.003
SR	.0213+-	.0035	.141+-	.023	.020+-	.003
Y					n.d.	
ZR					n.d.	
MO	.0132+-	.0117	.087+-	.077	.013+-	.011
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN	.0252+-	.0227	.166+-	.150	.024+-	.022
SN					n.d.	
SB			.005+-	.0005	.0007+-	.00007
BA					n.d.	
LA			.019+-	.0009	.003+-	.0001
SM			.003+-	.00009	.0004+-	.00001
HG					n.d.	
PB	.0189+-	.0071	.125+-	.047	.018+-	.007

n.a. not available
n.d. not detected

SAMPLE ID: 02U002
DESCRIPTION: PAXTON II LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1130 MICROGRAMS
NAA 1116 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					2.440+-	.244
NA			4.330+-	.446	.388+-	.035
MG			22.684+-	2.662	2.032+-	.182
AL	10.8157+-	1.5369	71.384+-	10.144	6.316+-	.901
SI	32.4987+-	4.8221	214.492+-	31.826	18.978+-	2.826
P	.2821+-	.0434	1.862+-	.286	.165+-	.025
S	.5017+-	.1134	3.311+-	.748	.293+-	.066
CL	.3898+-	.0636	2.572+-	.420	.228+-	.037
K	4.5999+-	.5560	30.359+-	3.670	2.686+-	.326
CA	20.6479+-	2.4803	136.276+-	16.370	12.057+-	1.456
TI	.5798+-	.0358	3.827+-	.236	.339+-	.021
V			.183+-	.005	.016+-	.001
CR	.0333+-	.0044	.220+-	.029	.019+-	.003
MN	.5448+-	.0326	3.595+-	.215	.318+-	.019
FE	7.3629+-	.3984	48.595+-	2.630	4.300+-	.239
NI	.0118+-	.0018	.078+-	.012	.007+-	.001
CU	.0245+-	.0028	.162+-	.019	.014+-	.002
ZN	.0507+-	.0038	.334+-	.025	.030+-	.002
GA					n.d.	
AS			.010+-	.001	.0008+-	.00008
SE	.0032+-	.0013	.021+-	.009	.002+-	.001
BR	.0052+-	.0017	.034+-	.011	.003+-	.001
RB	.0223+-	.0028	.147+-	.019	.013+-	.002
SR	.0335+-	.0033	.221+-	.022	.020+-	.002
Y					n.d.	
ZR					n.d.	
MO	.0154+-	.0100	.101+-	.066	.009+-	.006
PD	.0124+-	.0096	.082+-	.063	.007+-	.006
AG	.0176+-	.0116	.116+-	.076	.010+-	.007
CD	.0171+-	.0141	.113+-	.093	.010+-	.008
IN	.0238+-	.0182	.157+-	.120	.014+-	.011
SN					n.d.	
SB			.003+-	.0005	.0003+-	.00002
BA	.1584+-	.1049	1.046+-	.692	.093+-	.061
LA			.023+-	.001	.002+-	.0002
SM			.006+-	.0001	.0005+-	.00005
HG					n.d.	
PB	.0200+-	.0062	.132+-	.041	.012+-	.004

n.a. not available
n.d. not detected

SAMPLE ID: 03U004
DESCRIPTION: LAND & LAKES No. 3 LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 309 MICROGRAMS
NAA 301 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			5.640+- .564
NA		1.539+- .458	.512+- .152
MG		11.866+- 2.711	3.945+- .901
AL	2.7660+- .3690	18.256+- 2.436	5.910+- .821
SI	6.4048+- .9490	42.272+- 6.263	13.685+- 2.096
P	.0915+- .0119	.604+- .079	.196+- .027
S	.4555+- .0601	3.007+- .397	.973+- .134
CL	.3471+- .0432	2.291+- .285	.742+- .097
K	1.1247+- .1288	7.423+- .850	2.403+- .290
CA	3.2767+- .3718	21.626+- 2.454	7.001+- .839
TI	.1748+- .0107	1.154+- .071	.373+- .027
V		.039+- .002	.013+- .0007
CR	.0322+- .0027	.213+- .018	.069+- .006
MN	.0724+- .0047	.478+- .031	.155+- .012
FE	2.4980+- .1332	16.487+- .879	5.337+- .352
NI	.0070+- .0014	.046+- .010	.015+- .003
CU	.0202+- .0024	.133+- .016	.043+- .005
ZN	.0482+- .0035	.318+- .023	.103+- .009
GA	.0017+- .0009	.011+- .006	.004+- .002
AS		.004+- .0005	.001+- .0002
SE			n.d.
BR			**n.d.**
RB	.0024+- .0019	.016+- .012	.005+- .004
SR	.0084+- .0021	.056+- .014	.018+- .005
Y	.0038+- .0027	.025+- .018	.008+- .006
ZR			n.d.
MO			n.d.
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.005+- .0004	.002+- .0001
BA			n.d.
LA		.009+- .0007	.003+- .0002
SM		.002+- .00007	.0005+- .00002
HG			n.d.
PB	.0278+- .0049	.183+- .032	.059+- .011

n.a. not available
n.d. not detected

SAMPLE ID: 03U004
DESCRIPTION: LAND & LAKES No. 3 LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 778 MICROGRAMS
NAA 655 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			5.780+- .578
NA		3.733+- .375	.570+- .087
MG		19.502+- 2.237	2.978+- .455
AL	6.7880+- .9345	44.801+- 6.168	5.758+- .797
SI	20.1671+-' 2.9241	133.103+- 19.299	17.106+- 2.492
P	.2259+- .0295	1.491+- .195	.192+- .025
S	.7321+- .1286	4.832+- .849	.621+- .109
CL	.5774+- .0832	3.811+- .549	.490+- .071
K	2.8844+- .3375	19.037+- 2.228	2.447+- .288
CA	10.0365+- 1.1635	66.241+- 7.679	8.513+- .994
TI	.4723+- .0262	3.117+- .173	.401+- .023
V		.058+- .003	.009+- .001
CR	.0835+- .0054	.551+- .036	.071+- .005
MN .	.1778+- .0102	1.173+- .067	.151+- .009
FE	6.2377+- .3298	41.169+- 2.177	5.291+- .290
NI	.0185+- .0020	.122+- .013	.016+- .002
CU	.0470+- .0036	.310+- .024	.040+- .003
ZN	.1176+- .0071	.776+- .047	.100+- .006
GA			n.d.
AS		.008+- .0008	.001+- .0002
SE			n.d.
BR			n . d . .
RB	.0178+- .0023	.117+- .015	.015+- .002
SR	.0255+- .0027	.168+- .018	.022+- .002
Y			n.d.
ZR			n.d.
MO			n.d.
PD			n.d.
AG			n.d.
CD			n.d.
IN	.0223+- .0154	.147+- .101	.019+- .013
SN			n.d.
SB		.005+- .0005	.0008+- .0001
BA			n.d.
LA		.019+- .0009	.003+- .0005
SM		.003+- .00008	.0005+- .00007
HG	.0048+- .0028	.032+- .019	.004+- .002
PB	.0589+- .0067	.389+- .044	.050+- .006

n.a. not available
n.d. not detected

SAMPLE ID: 03S010
DESCRIPTION: LAND & LAKES No. 3 LANDFILL - CLAY STOCKPILE
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 570 MICROGRAMS
NAA 573 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					.610+-	.061
NA					n.d.	
MG					n.d.	
AL	8.7477+-	1.1650	57.735+-	7.689	10.129+-	1.371
SI	19.1219+-	2.8323	126.205+-	18.693	22.141+-	3.323
P	.1568+-	.0190	1.035+-	.125	.182+-	.022
S	.6874+-	.0864	4.537+-	.570	.796+-	.102
CL	.1939+-	.0269	1.280+-	.178	.225+-	.032
K	3.6925+-	.4185	24.370+-	2.762	4.276+-	.495
CA	3.0288+-	.3442	19.990+-	2.271	3.507+-	.407
TI	.4026+-	.0227	2.657+-	.150	.466+-	.029
V			.089+-	.004	.016+-	.0007
CR	.0237+-	.0025	.156+-	.016	.027+-	.003
MN	.0531+-	.0038	.351+-	.025	.061+-	.005
FE	3.6744+-	.1952	24.251+-	1.288	4.255+-	.248
NI	.0104+-	.0018	.069+-	.012	.012+-	.002
CU	.0148+-	.0023	.098+-	.015	.017+-	.003
ZN	.0183+-	.0024	.121+-	.016	.021+-	.003
GA	.0020+-	.0010	.013+-	.007	.002+-	.001
AS			.006+-	.0007	.001+-	.0001
SE					n.d.	
BR					n.d.	
RB	.0186+-	.0026	.122+-	.017	.021+-	.003
SR	.0229+-	.0029	.151+-	.019	.027+-	.003
Y					n.d.	
ZR					n.d.	
MO	.0109+-	.0087	.072+-	.057	.013+-	.010
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN	.0334+-	.0179	.221+-	.118	.039+-	.021
SN					n.d.	
SB			.009+-	.0004	.002+-	.00009
BA					n.d.	
LA			.035+-	.001	.006+-	.0002
SM			.003+-	.00009	.0005+-	.00002
HG					n.d.	
PB					n.d.	

n.a. not available
n.d. not detected

SAMPLE ID: 03S010
DESCRIPTION:LAND & LAKES No. 3 LANDFILL - CLAY STOCKPILE
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 936 MICROGRAMS
NAA 807 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					2.540+-	.254
NA			2.215+-	.488	.275+-	.034
MG-			14.263+-	3.241	1.768+-	.219
AL	10.9302+-	1.5674	72.139+-	10.345	7.707+-	1.110
SI	34.4544+-	5.1199	227.399+-	33.792	24.295+-	3.626
P	.1918+-	.0255	1.266+-	.169	.135+-	.018
S	.6151+-	.1132	4.060+-	.747	.434+-	.080
CL					n.d.	
K	4.9266+-	.5974	32.516+-	3.943	3.474+-	.424
CA	5.9395+-	.7028	39.201+-	4.639	4.188+-	.499
TI	.6632+-	.0373	4.377+-	.246	.468+-	.027
V			.087+-	.003	.011+-	.001
CR	.0326+-	.0031	.215+-	.021	.023+-	.002
MN	.0870+-	.0057	.574+-	.037	.061+-	.004
FE	5.0957+-	.2817	33.631+-	1.859	3.593+-	.205
NI	.0108+-	.0018	.071+-	.012	.008+-	.001
CU	.0229+-	.0028	.151+-	.019	.016+-	.002
ZN	.0169+-	.0024	.111+-	.016	.012+-	.002
GA					n.d.	
AS			.006+-	.0006	.0008+-	.0001
SE					n.d.	
BR					n.d.	
RB	.0227+-	.0029	.150+-	.019	.016+-	.002
SR	.0300+-	.0033	.198+-	.022	.021+-	.002
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.001+-	.0004	.0001+-	.00002
BA					n.d.	
LA			.023+-	.0008	.003+-	.0004
SM			.005+-	.00009	.0006+-	.00007
HG					n.d.	
PB					n.d.	

n.a. not available
n.d. not detected

SAMPLE ID: 03S011
DESCCRIPTION: LAND & LAKES No. 3 LANDFILL - LANDFILL SAMPLE
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1534 MICROGRAMS
NAA 1536 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.190+-	.119
NA			2.070+-	.598	.135+-	.039
MG			17.808+-	3.262	1.159+-	.212
AL	10.9937+-	1.4641	72.559+-	9.663	4.729+-	.634
SI	24.9194+-	3.6909	164.468+-	24.360	10.718+-	1.597
P	.3032+-	.0377	2.001+-	.249	.130+-	.016
S	.4656+-	.0872	3.073+-	.576	.200+-	.038
CL	.1447+-	.0361	.955+-	.238	.062+-	.016
K	3.1755+-	.3606	20.958+-	2.380	1.366+-	.157
CA	10.8736+-	1.2311	71.766+-	8.125	4.677+-	.535
TI	.4594+-	.0304	3.032+-	.201	.198+-	.013
V			.097+-	.004	.006+-	.0002
CR	.0243+-	.0041	.161+-	.027	.010+-	.002
MN	.4534+-	.0273	2.993+-	.180	.195+-	.012
FE	12.6080+-	.6656	83.213+-	4.393	5.423+-	.299
NI	.0170+-	.0021	.112+-	.014	.007+-	.001
CU	.0507+-	.0041	.334+-	.027	.022+-	.002
ZN	.3418+-	.0189	2.256+-	.125	.147+-	.008
GA					n.d.	
AS			.023+-	.001	.002+-	.00008
SE					n.d.	
BR	.0061+-	.0019	.040+-	.012	.003+-	.001
RB	.0229+-	.0030	.151+-	.020	.010+-	.001
SR	.0313+-	.0034	.207+-	.022	.013+-	.001
Y	.0063+-	.0037	.042+-	.024	.003+-	.002
ZR					n.d.	
MO					n.d.	
PD	.0143+-	.0106	.095+-	.070	.006+-	.005
AG					n.d.	
CD	.0269+-	.0157	.177+-	.103	.012+-	.007
IN					n.d.	
SN					n.d.	
SB			.007+-	.0005	.0004+-	.00003
BA					n.d.	
LA			.029+-	.001	.002+-	.00007
SM			.007+-	.0001	.0005+-	.00001
HG					n.d.	
PB	.1450+-	.0122	.957+-	.081	.062+-	.005

n.a. not available
n.d. not detected

SAMPLE ID: 03S011
DESCRIPTION: LAND & LAKES No. 3 LANDFILL - LANDFILL SAMPLE
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 3522 MICROGRAMS
NAA 3248 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			6.240+- .624
NA		5.862+- .653	.180+- .020
MG		55.914+- 3.122	1.721+- .096
AL	25.8327+- 3.4092	170.496+- 22.501	4.841+- .640
SI	66.1301+- 9.2829	436.459+- 61.267	12.394+- 1.742
P	.6016+- .0867	3.971+- .572	.113+- .016
S			n.d.
CL	.2929+- .0737	1.933+- .486	.055+- .014
K	6.1808+- .6945	40.793+- 4.584	1.158+- .130
CA	35.8978+- 4.0223	236.925+- 26.547	6.728+- .755
TI	.9594+- .0627	6.332+- .414	.180+- .012
V		.164+- .005	.005+- .0002
CR	.0120+- .0073	.079+- .048	.002+- .001
MN	.8146+- .0513	5.376+- .339	.153+- .010
FE	29.9747+- 1.5082	197.833+- 9.954	5.618+- .285
NI	.0311+- .0028	.205+- .018	.006+- .001
CU	.1197+- .0073	.790+- .048	.022+- .001
ZN	.5208+- .0271	3.437+- .179	.098+- .005
GA			n.d.
AS		.033+- .001	.001+- .00004
SE	.0043+- .0016	.028+- .011	.001+- .000
BR	.0090+- .0020	.059+- .013	.002+- .000
RB	.0500+- .0039	.330+- .026	.009+- .001
SR	.0682+- .0048	.450+- .032	.013+- .001
Y			n.d.
ZR			n.d.
MO	.0224+- .0112	.148+- .074	.004+- .002
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN	.0315+- .0260	.208+- .172	.006+- .005
SB		.007+- .0005	.0002+- .00002
BA	.1798+- .1214	1.187+- .801	.034+- .023
LA		.055+- .001	.002+- .00005
SM		.009+- .0001	.0003+- .000004
HG			n.d.
PB	.2889+- .0170	1.907+- .112	.054+- .003

n.a. not available
n.d. not detected

SAMPLE ID: 03S011
DESCRIPTION: LAND & LAKES NO.3 LANDFILL - LANDFILL SAMPLE
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	2.496876	0.039963	%	0.0474
BA	n.d.	n.d.	PPM	230
CA	108300	2400	PPM	1700
CL	490	50	PPM	150
DY	2.70013	0.397026	PPM	1.271669
MN	1813.796	26.47054	PPM	15.23014
NA	3570	100	PPM	240
TI	1180	290	PPM	900
V-	46.15221	2.584567	PPM	6.970007
AS	7.664843	0.172596	PPM	0.349581
BR	5.622619	0.351001	PPM	0.657829
K-	8780	250	PPM	500
LA	12.88223	0.209973	PPM	0.180332
SB	1.677689	0.044327	PPM	0.108943
SM	2.905537	0.032214	PPM	0.022538
CE	29.11618	0.414625	PPM	0.796645
CO	8.417792	0.112396	PPM	0.093347
CR	49.28189	0.900268	PPM	2.212817
C S	6.876152	0.16718	PPM	0.252955
FE	74600	2000	PPM	180
HF	3.636664	0.08807	PPM	0.204555
LU	0.181043	0.016698	PPM	0.053757
NI	n.d.	n.d.	PPM	27.14717
ND	12.63853	0.631786	PPM	1.87599
RB	40.46109	2.248391	PPM	6.858085
SC	5.426441	0.081914	PPM	0.029535
SE	n.d.	n.d.	PPM	0.508193
TB	1.160576	0.044066	PPM	0.123915
TH	4.060602	0.066167	PPM	0.12661
YB	1.438212	0.088925	PPM	0.266914

n.d. not detected

SAMPLE ID: 04U007
DESCRIPTION: LAND & LAKES No. 1, 2 & DOLTON LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 312 MICROGRAMS
NAA 301 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					9.630+-	.963
NA			.959+-	.273	.319+-	.091
MG					n.d.	
AL	2.2808+-	.3045	15.054+-	2.010	4.821+-	.670
SI	5.3902+-	.7987	35.575+-	5.272	11.394+-	1.744
P	.1599+-	.0197	1.055+-	.130	.338+-	.044
S	.6345+-	.0841	4.188+-	.555	1.341+-	.185
CL	.1105+-	.0198	.730+-	.130	.234+-	.043
K	.6820+-	.0792	4.501+-	.522	1.442+-	.176
CA	4.7988+-	.5439	31.672+-	3.590	10.144+-	1.214
TI	.2150+-	.0128	1.419+-	.084	.454+-	.032
V			.090+-	.003	.030+-	.0009
CR	.0263+-	.0028	.174+-	.019	.056+-	.006
MN	.1301+-	.0084	.859+-	.055	.275+-	.021
FE	2.4809+-	.1323	16.374+-	.873	5.244+-	.344
NI	.0042+-	.0013	.028+-	.009	.009+-	.003
CU	.0170+-	.0023	.112+-	.016	.036+-	.005
ZN	.1129+-	.0069	.745+-	.046	.239+-	.017
GA					n.d.	
AS			.012+-	.0008	.004+-	.0003
SE					n.d.	
BR					n.d.	
RB	.0048+-	.0021	.032+-	.014	.010+-	.004
SR	.0111+-	.0025	.073+-	.016	.023+-	.005
Y	.0058+-	.0030	.038+-	.020	.012+-	.006
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.007+-	.0004	.002+-	.0001
BA					n.d.	
LA			.006+-	.0007	.002+-	.0002
SM			.002+-	.00008	.0007+-	.00003
HG	.0059+-	.0032	.039+-	.021	.012+-	.007
PB	.0336+-	.0058	.221+-	.038	.071+-	.013

n.a. not available
n.d. not detected

SAMPLE ID: 04U007
DESCRIPTION: LAND & LAKES No. 1, 2 & DOLTON LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 930 MICROGRAMS
NAA 449 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					8.760+-	.876
NA			1.767+-	.565	.394+-	.126
MG			7.528+-	2.753	1.677+-	.613
AL	7.4469+-	1.0144	49.150+-	6.695	5.286+-	.723
SI	18.4949+-	2.6745	122.067+-	17.652	13.129+-	1.905
P	.3175+-	.0409	2.096+-	.270	.225+-	.029
S	.8664+-	.1487	5.718+-	.982	.615+-	.106
CL					n.d.	
K	2.0027+-	.2342	13.218+-	1.546	1.422+-	.167
CA	12.6579+-	1.4752	83.542+-	9.736	8.985+-	1.053
TI	.6093+-	.0377	4.021+-	.249	.433+-	.027
V			.197+-	.005	.044+-	.001
CR	.0862+-	.0065	.569+-	.043	.061+-	.005
MN	.4113+-	.0241	2.715+-	.159	.292+-	.017
FE	8.7969+-	.4577	58.060+-	3.021	6.244+-	.333
NI	.0145+-	.0018	.096+-	.012	.010+-	.001
CU	.0424+-	.0034	.280+-	.023	.030+-	.002
ZN	.2516+-	.0142	1.661+-	.094	.179+-	.010
GA					n.d.	
AS			.012+-	.0007	.003+-	.0002
SE					n.d.	
BR					n.d.	
RB	.0104+-	.0022	.069+-	.015	.007+-	.002
SR	.0316+-	.0030	.208+-	.020	.022+-	.002
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG	.0132+-	.0103	.087+-	.068	.009+-	.007
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.008+-	.0004	.002+-	.00009
BA					n.d.	
LA			.015+-	.0007	.003+-	.0002
SM			.003+-	.00007	.0006+-	.00002
HG					n.d.	
PB	.0975+-	.0078	.644+-	.052	.069+-	.006

n.a. not available
n.d. not detected

SAMPLE ID: 04U007
DESCRIPTION: LAND & LAKES NO. 1, 2 & DOLTON LANDFILL - UNPAVED HAULROAD
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	5.328322	0.063177	%	0.020211
BA	590	210	PPM	700
CA	81000	2000	PPM	2000
CL	770	60	PPM	170
DY	4.820508	1.027973	PPM	3.339978
MN	4780	70	PPM	26.64135
NA	4220	180	PPM	500
TI	3090	290	PPM	900
V-	334.7219	7.611389	PPM	7.636034
AS	16.04596	0.314561	PPM	0.52884
BR	5.29313	0.393039	PPM	0.920746
K-	11010	360	PPM	800
LA	22.34423	0.33176	PPM	0.25236
SB	9.178204	0.148403	PPM	0.185566
SM	5.246416	0.056784	PPM	0.033951
CE	51.48743	0.706008	PPM	1.290034
CO	17.25635	0.21744	PPM	0.166581
CR	560.0527	6.198009	PPM	3.428447
CS	3.959779	0.146402	PPM	0.378759
FE	94700	2500	PPM	270
HF	8..888353	0.175156	PPM	0.31208
LU	0.424247	0.026571	PPM	0.084261
NI	107.9698	12.65262	PPM	40
ND	23.07449	1.042222	PPM	3.03486,9
RB	52.99635	3.198286	PPM	9.840846
SC	10.48965	0.15762	PPM	0.044935
SE	n.d.	n.d.	PPM	0.811778
TB	1.480162	0.06451	PPM	0.188564
TH	8.473536	0.124698	PPM	0.196181
YB	3.036882	0.150919	PPM	0.432211

n.d. not detected

SAMPLE ID: 04S004
DESCRIPTION: LAND & LAKES No. 1, 2, & DOLTON LANDFILL - FLYASH
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 100 MICROGRAMS
NAA 85 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			33.870+- 3.387
NA		.413+- .144	.483+- .169
MG			n.d.
AL	1.2018+- .1609	7.932+- 1.062	7.932+- 1.385
SI	1.9312+- .2865	12.746+- 1.891	12.746+- 2.369
P	.0251+- .0047	.166+- .031	.166+- .036
S	.2215+- .0369	1.462+- .244	1.462+- .294
CL	.0201+- .0105	.133+- .069	.133+- .071
K	.2552+- .0307	1.684+- .203	1.684+- .277
CA	.5227+- .0603	3.450+- .398	3.450+- .555
TI	.1636+- .0101	1.079+- .067	1.079+- .138
V		.141+- .004	.165+- .005
CR	.0104+- .0018	.069+- .012	.069+- .014
MN	.0113+- .0019	.075+- .013	.075+- .015
FE	.8318+- .0456	5.490+- .301	5.490+- .685
NI	.0042+- .0014	.028+- .010	.028+- .010
CU	.0073+- .0020	.048+- .013	.048+- .014
ZN	.0029+- .0018	.019+- .012	.019+- .012
GA	.0013+- .0009	.009+- .006	.009+- .006
AS		.018+- .0007	.020+- .00.09
SE			n.d.
BR			n.d.
RB			n.d.
SR	.0092+- ..0026	.061+- .017	.061+- .018
Y			n.d.
ZR			n.d.
MO	.0146+- .0087	.096+- .057	.096+- .058
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.020+- .0006	.023+- .0007
BA			n.d.
LA		.006+- .0005	.007+- .0006
SM		.002+- .00007	.002+- .00008
HG			n.d.
PB	.0068+- .0052	.045+- .034	.045+- .035

n.a. not available
n.d. not detected

SAMPLE ID: 04S004
DESCRIPTION: LAND & LAKES No. 1, 2, & DOLTON LANDFILL - FLYASH
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 438 MICROGRAMS
NAA 361 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		. PERCENT	
C					6.210+-	.621
NA			1.126+-	.375	.312+-	.086
MG						
AL	5.6217+-	.7587	37.103+-	5.007	8.471+-	1.160
SI	11.2470+-	1.6068	74.230+-	10.605	16.947+-	2.453
P.	.0869+-	.0114	.574+-	.076	.131+-	.018
S	.3785+-	.0606	2.498+-	.400	.570+-	.092
CL					n.d.	
K	1.3153+-	.1516	8.681+-	1.000	1.982+-	.233
CA	1.4228+-	.1667	9.391+-	1.100	2.144+-	.256
TI	.5570+-	.0304	3.676+-	.201	.839+-	.050
V			.311+-	.007	.086+-	.024
CR	.0298+-	.0031	.196+-	.021	.045+-	.005
MN	.0265+-	.0027	.175+-	.018	.040+-	.004
FE	5.3609+-	.2755	35.382+-	1.818	8.078+-	.455
NI	.0139+-	.0020	.092+-	.013	.021+-	.003
CU	.0257+-	.0030	.169+-	.020	.039+-	.005
ZN	.0307+-	.0030	.203+-	.020	.046+-	.005
GA					n.d.	
AS			.020+-	.0008	.006+-	.002
SE					n.d.	
BR	.0026+-	.0019	.017+-	.013	.004+-	.003
RB	.0146+-	.0029	.096+-	.019	.022+-	.004
SR	.0262+-	.0034	.173+-	.023	.039+-	.005
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG	.0254+-	.0137	.168+-	.091	.038+-	.021
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.010+-	.0005	.003+-	.0008
BA					**n.d.**	
LA.			.020+-	.0008	.005+-	.002
SM			.005+-	.00009	.001+-	.0004
HG					n.d.	.
PB	.0079+-	.0064	.052+-	.042	.012+-	.010

n.a. not available
n.d. not detected

SAMPLE ID: 04P184
DESCRIPTION: LAND & LAKES No. 1, 2, & DOLTON LANDFILL - PAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 471 MICROGRAMS
NAA 463 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			3.700+- .370
NA		2.113+- .637	.457+- .138
MG		10.425+- 3.124	2.252+- .675
AL	4.8791+- .6502	32.202+- 4.292	6.835+- .930
SI	11.9438+- 1.7693	78.829+- 11.677	16.733+- 2.521
P	.2234+- .0270	1.475+- .178	.313+- .039
S	.3740+- .0588	2.468+- .388	.524+- .084
CL			n.d.
K	1.8240+- .2078	12.038+- 1.372	2.555+- .300
CA	6.4091+- .7261	42.300+- 4.792	8.979+- 1.047
TI	.2407+- .0165	1.588+- .109	.337+- .025
V		.089+- .003	.019+- .0007
CR	.0317+- .0027	.209+- .018	.044+- .004
MN	.2011+- .0114	1.327+- .076	.282+- .018
FE	4.5427+- .2409	29.982+- 1.590	6.364+- .380
NI	.0062+- .0013	.041+- .009	.009+- .002
CU	.0216+- .0024	.142+- .016	.030+- .003
ZN	.0787+- .0052	.519+- .034	.110+- .008
GA	.0012+- .0009	.008+- .006	.002+- .001
AS		.009+- .0006	.002+- .0001
SE			n.d.
BR			n.d.
RB	.0038+- .0019	.025+- .012	.005+- .003
SR	.0066+- .0021	.043+- .014	.009+- .003
Y			n.d.
ZR			n.d.
MO			n.d.
PD	.0098+- .0077	.065+- .051	.014+- .011
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.005+- .0004	.001+- .00009
BA			n.d.
LA		.014+- .0008	.003+- .0002
SM		.002+- .00007	.0005+- .00002
HG			n.d.
PB	.0223+- .0047	.147+- .031	.031+- .007

n.a. not available
n.d. not detected

SAMPLE ID: 04P184
DESCRIPTION: LAND & LAKES No. 1, 2, & DOLTON LANDFILL - PAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 977 MICROGRAMS
NAA 981 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			25.010+- 2.501
NA		3.329+- .367	.339+- .035
MG		23.516+- 2.506	2.398+- .244
AL	8.3883+- 1.1757	55.362+- 7.760	5.667+- .797
SI	26.1878+- 3.8517	172.839+- 25.421	17.693+- 2.611
P	.3574+- .0471	2.359+- .311	.241+- .032
S	.3966+- .0901	2.618+- .595	.268+- .061
CL	.1903+- .0372	1.256+- .245	.129+- .025
K	3.2450+- .3868	21.417+- 2.553	2.192+- .263
CA	15.1964+- 1.7789	100.296+- 11.741	10.267+- 1.209
TI	.5166+- .0327	3.410+- .216	.349+- .023
V		.116+- .004	.012+- .001
CR	..0383+- .0046	.253+- .031	.026+- .003
MN	.4194+- .0256	2.768+- .169	.283+- .018
FE	8.6778+- .4656	57.274+- 3.073	5.863+- .323
NI	.0165+- .0019	.109+- .013	.011+- .001
CU -	.0400+- .0032	.264+- .021	.027+- .002
ZN	.1429+- .0085	.943+- .056	.097+- .006
GA			n.d.
AS		.012+- .0008	.001+- .0001
SE			n.d.
BR			n.d.
RB	.0154+- .0020	.102+- .013	.010+- .001
SR	.0257+- .0025	.170+- .017	.017+- .002
Y			n.d.
ZR			n.d.
MO			n.d.
PD	.0095+- .0072	.063+- .048	.006+- .005
AG			n.d.
CD	.0220+- .0111	.145+- .073	.015+- .007
IN			n.d.
SN			n.d.
SB		.006+- .0005	.0006+- .0006
BA	.1807+- .0807	1.193+- .533	.122+- .055
LA		.024+- .0009	.002+- .0003
SM		.004+- .00009	.0004+- .00004
EG			n.d.
PB	.0508+- .0054	.335+- .036	.034+- .004

n.a. not available
n.d. not detected

SAMPLE ID: 05U014
DESCRIPTION: ACME STEEL FURNACE PLANT - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS) -
EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1182 MICROGRAMS
NAA 1182 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.a.
NA		1.592+- .364	.135+- .031
MG		20.934+- 2.475	1.771+- .209
AL	2.2238+- .2970	14.677+- 1.960	1.242+- .166
SI	7.6307+- 1.1306	50.362+- 7.462	4.261+- .631
P	.2371+- .0414	1.565+- .273	.132+- .023
S	1.6829+- .2622	11.107+- 1.731	.940+- .146
CL			n.d.
K	.2956+- .0612	1.951+- .404	.165+- .034
CA	29.3554+- 3.3216	193.746+- 21.922	16.391+- 1.855
TI	.1488+- .0180	.982+- .119	.083+- .010
V		.122+- .003	.010+- .0003
CR	.0481+- .0064	.318+- .042	.027+- .004
MN	.8211+- .0487	5.419+- .322	.458+- .027
FE	22.0689+- 1.1639	145.655+- 7.681	12.323+- .650
NI	.0172+- .0020	.114+- .013	.010+- .001
CU	.0777+- .0053	.513+- .035	.043+- .003
ZN	.1580+- .0092	1.043+- .061	.088+- .005
GA	.0018+- .0011	.012+- .007	.001+- .0006
AS		.015+- .001	.001+- .00009
SE	.0021+- .0012	.014+- .008	.001+- .0007
BR	.0052+- .0016	.034+- .010	.003+- .0008
RB	.0077+- .0021	.051+- .014	.004+- .001
SR	.0336+- .0030	.221+- .020	.019+- .002
Y			n.d.
ZR			n.d.
MO			n.d.
PD	.0146+- .0086	.096+- .056	.008+- .005
AG			n.d.
CD	.0197+- .0126	.130+- .083	.011+- .007
IN	.0323+- .0163	.213+- .108	.018+- .009
SN	.0213+- .0197	.141+- .130	.012+- .011
SB		.008+- .0005	.0007+- .00005
BA			n.d.
LA		.014+- .001	.001+- .00008
SM		.003+- .00009	.0002+- .000007
HG			n.d.
PB	.0862+- .0073	.569+- .048	.048+- .004

n.a. not available
n.d. not detected

SAMPLE ID: 05U014
DESCRIPTION: ACME STEEL FURNACE PLANT - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1051 MICROGRAMS
NAA 968 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.a.
NA		2.522+- .429	.261+- .044
MG		25.470+- 2.349	2.632+- .243
AL	1.9561+- .2594	12.911+- 1.712	1.228+- .164
SI	6.7741+- .9515	44.709+- 6.280	4.254+- .600
P	.1645+- .0327	1.086+- .216	.103+- .021
S	.3266+- .1063	2.156+- .702	.205+- .067
CL	.1383+- .0425	.912+- .281	.087+- .027
K	.2585+- .0525	1.706+- .347	.162+- .033
CA	25.5693+- 2.8651	168.757+- 18.910	16.057+- 1.810
TI	.1360+- .0183	.898+- .121	.085+- .012
V		.127+- .004	.013+- .0004
CR	.0699+- .0076	.461+- .050	.044+- .005
MN	.8542+- .0491	5.638+- .324	.536+- .032
FE	28.2740+- 1.4228	186.608+- 9.390	17.755+- .919
NI	.0206+- .0021	.136+- .014	.013+- .001
CU	.0461+- .0035	.304+- .023	.029+- .002
ZN	.0783+- .0049	.517+- .032	.049+- .003
GA			n.d.
AS		.013+- .0008	.001+- .00008
SE			n.d.
BR	.0051+- .0015	.034+- .010	.003+- .001
RB	.0058+- .0021	.038+- .014	.004+- .001
SR	.0303+- .0029	.200+- .019	.019+- .002
Y			n.d.
ZR	.0171+- .0134	.113+- .088	.011+- .008
MO			n.d.
PD	.0152+- .0087	.100+- .057	.010+- .005
AG	.0108+- .0102	.071+- .067	.007+- .006
CD			n.d.
IN	.0190+- .0162	.125+- .107	.012+- .010
SN			n.d.
SB		.007+- .0004	.0007+- .00005
BA			n.d.
LA		.013+- .0007	.001+- .00007
SM		.002+- .00007	.0002+- .000007
HG	.0054+- .0030	.036+- .020	.003+- .002
PB	.0557+- .0061	.368+- .040	.035+- .004

n.a. not available
n.d. not detected

SAMPLE ID: 05P014
DESCRIPTION: ACME STEEL FURNACE PLANT - PAVED HAULROAD -
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 610 MICROGRAMS
NAA 606 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					17.640+-	1.764
NA			2.582+-	.472	.426+-	.078
MG			13.877+-	2.975	2.290+-	.491
AL	2.3457+-	.3132	15.482+-	2.067	2.538+-	.344
SI	5.5698+-	.8254	36.761+-	5.447	6.026+-	.904
P	.1623+-	.0217	1.071+-	.143	.176+-	.024
S	.8476+-	.1184	5.594+-	.782	.917+-	.130
CL					n.d.	
K	.6705+-	.0788	4.425+-	.520	.725+-	.087
CA	9.382.6+-	1.0624	61.925+-	7.012	10.152+-	1.173
TI	.0970+-	.0111	.640+-	.073	.105+-	.012
V			.056+-	.002	.009+-	.0004
CR	.0269+-	.0037	.177+-	.024	.029+-	.004
MN	.6133+-	.0354	4.048+-	.234	.664+-	.041
FE	13.0788+-	.6904	86.320+-	4.557	14.151+-	.815
NI	.0094+-	.0016	.062+-	.010	.010+-	.002
CU	.0219+-	.0025	.144+-	.016	.024+-	.003
ZN	.6156+-	.0333	4.063+-	.220	.666+-	.039
GA					n.d.	
AS			.030+-	.001	.005+-	.0002
SE					n.d.	
BR	.0039+-	.0014	.026+-	.010	.004+-	.002
RB	.0224+-	.0025	.148+-	.016	.024+-	.003
SR	.0184+-	.0025	.122+-	.016	.020+-	.003
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD	.0097+-	.0079	.064+-	.052	.010+-	.009
AG	.0144+-	.0096	.095+-	.063	.016+-	.010
CD					n.d.	
IN	.0186+-	.0149	.122+-	.098	.020+-	.016
SN					n.d.	
SB			.009+-	.0005	.002+-	.00008
BA					n.d.	
LA			.012+-	.0007	.002+-	.0001
SM			.002+-	.00008	.0004+-	.00001
EG	.0044+-	.0029	.029+-	.019	.005+-	.003
PB	.3850+-	.0222	2.541+-	.146	.417+-	.026

n.a. not available
n.d. not detected

SAMPLE ID: 05P014
DESCRIPTION: ACME STEEL FURNACE PLANT - PAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1506 MICROGRAMS
NAA 1496 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			10.000+- 1.000
NA		.989+- .402	.066+- .004
MG		32.167+- 2.683	2.150+- .144
AL	4.7162+- .6560	31.127+- 4.330	2.067+- .288.
SI	11.7575+- 1.7329	77.599+- 11.437	5.153+- .761
P	.2524+- .0489	1.666+- .323	.111+- .021
S	.2985+- .1622	1.970+- 1.071	.131+- .071
CL			n.d.
K	.8826+- .1251	5.825+- .826	.387+- .055
CA	31.7240+- 3.6636	209.378+- 24.180	13.903+- 1.610
TI	.1422+- .0256	.939+- .169	.062+- .011
V		.092+- .003	.006+- .0004
CR-	.0429+- .0087	.283+- .058	.019+- .004
MN	1.2180+- .0751	8.039+- .496	.534+- .033
FE	40.3666+- 2.1055	266.420+- 13.896	17.691+- .936
NI	.0252+- .0024	.166+- .016	.011+- .001
CU	.0303+- .0029	.200+- .019	.013+- .001
ZN	.9038+- .0503	5.965+- .332	.396+- .022
GA	.0065+- .0033	.043+- .022	.003+- .001
AS		.041+- .001	.003+- .00.02
SE			n.d.
BR	.0056+- .0016	.037+- .011	.002+- .001
RB	.0353+- .0030	.233+- .020	.015+- .001
SR	.0482+- .0036	.318+- .024	.021+- .002
Y			n.d.
ZR			n.d.
MO			n.d.
PD	.0177+- .0084	.117+- .056	.008+- .004
AG	.0160+- .0099	.105+- .066	.007+- .004
CD			n.d.
IN	.0202+- .0155	.134+- .102	.009+- .007
SN	.0555+- .0201	.366+- .133	.024+- .009
SB		.015+- .0006	.001+- .00007
BA	.1114+- .0881	.735+- .581	.049+- .039
LA		.021+- .0009	.001+- .00009
SM		.004+- .00009	.0003+- .00002
HG			n.d.
PB	.5811+- .0334	3.835+- .221	.255+- .015

n.a. not available
n.d. not detected

SAMPLE ID: 05S002
DESCRIPTION: ACME STEEL FURNACE PLANT - TILDEN PELLETS
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 436 MICROGRAMS
NAA 428 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.930+-	.193
NA			.808+-	.147	.189+-	.034
MG			9.323+-	1.168	2.176+-	.273
AL	.6313+-	.0852	4.166+-	.562	.957+-	.132
SI	3.8331+-	.5682	25.299+-	3.750	5.808+-	.877
P	.1078+-	.0141	.712+-	.093	.163+-	.022
S					n.d.	
CL					n.d.	
K	.0377+-	.0160	.249+-	.105	.057+-	.024
CA	4.6145+-	.5261	30.456+-	3.472	6.992+-	.823
TI	.0210+-	.0161	.139+-	.106	.032+-	.024
V			.036+-	.001	.008+-	.0003
CR					n.d.	
MN	.1802+-	.0145	1.189+-	.096	.273+-	.023
FE	24.8484+-	1.3103	164.000+-	8.648	37.653+-	2.269
NI	.0093+-	.0016	.062+-	.010	.014+-	.002
CU	.0902+-	.0058	.595+-	.039	.137+-	.010
ZN	.0542+-	.0039	.358+-	.026	.082+-	.006
GA	.0014+-	.0009	.010+-	.006	.002+-	.001
AS			.018+-	.0009	.004+-	.0002
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0060+-	.0021	.040+-	.014	.009+-	.003
Y					n.d.	
ZR					n.d.	
MO	.0086+-	.0072	.056+-	.048	.013+-	.011
PD	.0129+-	.0079	.085+-	.052	.020+-	.012
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.003+-	.0004	.0007+-	.00009
BA					n.d.	
LA			.007+-	.0006	.002+-	.0001
SM			.001+-	.00007	.0003+-	.00002
HG	.0040+-	.0027	.026+-	.018	.006+-	.004
PB	.0199+-	.0051	.131+-	.034	.030+-	.008

n.a. not available
n.d. not detected

SAMPLE ID: 05S002
DESCRIPTION: ACME STEEL FURNACE PLANT - TILDEN PELLETS
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1091 MICROGRAMS
NAA 1051 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.920+-	.192
NA					n.d.	
MG			10.927+-	1.771	1.039+-	.167
AL	1.2790+-	.1703	8.442+-	1.124	.773+-	.103
SI	6.5813+-	.9245	43.437+-	6.101	3.980+-	.561
P	.2003+-	.0256	1.322+-	.169	.121+-	.016
S					n.d.	
CL	.0832+-	.0469	.549+-	.309	.050+-	.028
K	.2038+-	.0387	1.345+-	.255	.123+-	.023
CA	9.4667+-	1.0693	62.480+-	7.057	5.725+-	.650
TI					n.d.	
V			.081+-	.002	.008+-	.0002
CR	.0220+-	.0133	.145+-	.088	.013+-	.008
MN	.2952+-	.0349	1.948+-	.230	.179+-	.021
FE	84.6678+-	4.2574	558.807+-	28.099	51.199+-	2.633
NI	.0219+-	.0022	.145+-	.015	.013+-	.001
CU	.1905+-	.0107	1.257+-	.071	.115+-	.007
ZN	.1072+-	.0065	.708+-	.043	.065+-	.004
GA					n.d.	
AS			.024+-	.001	.002+-	.0001
SE	.0033+-	.0013	.022+-	.009	.002+-	.001
BR	.0043+-	.0016	.028+-	.011	.003+-	.001
RB	.0129+-	.0024	.085+-	.016	.008+-	.001
SR	.0222+-	.0028	.147+-	.018	.013+-	.002
Y					n.d.	
ZR	.0220+-	.0144	.145+-	.095	.013+-	.009
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN	.0239+-	.0177	.158+-	.117	.014+-	.011
SN	.0308+-	.0218	.203+-	.144	.019+-	.013
SB	.0698+-	.0413	.461+-	.273	.042+-	.025
BA					n.d.	
LA			.007+-	.001	.0006+-	.0001
SM			.001+-	.0001	.0001+-	.00001
HG					n.d.	
PB	.0538+-	.0085	.355+-	.056	.033+-	.005

n.a. not available
n.d. not detected

SAMPLE ID: 05S005
DESCRIPTION: ACME STEEL FURNACE PLANT - WABASH PELLETS
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 977 MICROGRAMS
NAA 942 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			.270+- .027
NA			n.d.
MG			n.d.
AL	.9400+- .1265	6.204+- .835	.635+- .086
SI	4.9596+- .7351	32.733+- 4.851	3.352+- .500
P	.1675+- .0208	1.106+- .137	.113+- .014
S	.2015+- .1206	1.330+- .796	.136+- .082
CL			n.d.
K	.2064+- .0354	1.362+- .233	.139+- .024
CA	4.8975+- .5608	32.323+- 3.701	3.310+- .384
TI			n.d.
V		.072+- .004	.008+- .0005
CR			n.d.
MN	4.2597+- .2478	28.114+- 1.635	2.879+- .175
FE	78.6083+- 4.1415	518.815+- 27.334	53.121+- 2.960
NI	.0231+- .0024	.153+- .016	.016+- .002
CU	.2978+- .0168	1.965+- .111	.201+- .012
ZN	.0712+- .0050	.470+- .033	.048+- .003
GA			n.d.
AS		.091+- .002	.010+- .0002
SE	.0040+- .0012	.026+- .008	.003+- .001
BR	.0056+- .0016	.037+- .010	.004+- .001
RB	.0122+- .0022	.081+- .015	.008+- .002
SR	.0172+- .0026	.114+- .017	.012+- .002
Y	.0087+- .0029	.057+- .019	.006+- .002
ZR			n.d.
MO	.0099+- .0081	.065+- .054	.007+- .005
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.004+- .0004	.0005+- .00004
BA	.1898+- .0949	1.253+- .627	.128+- .064
LA		.018+- .0008	.002+- .00009
SM		.003+- .00009	.0003+- .000009
HG			n.d.
PB	.0317+- .0062	.209+- .041	.021+- .004

n.a. not available
n.d. not detected

SAMPLE ID: 05S005
DESCRIPTION: ACME STEEL FURNACE PLANT - WABASH PELLETS
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 4510 MICROGRAMS
NAA 4488 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			.350+- .035
NA		3.630+- 1.436	.081+- .002
MG			n.d.
AL	5.0213+- .6787	33.141+- 4.479	.735+- .099
SI	19.4891+- 2.8084	128.628+- 18.535	2.852+- .411
P	.6395+- .0811	4.221+- .536	.094+- .012
S			n.d.
CL			n.d.
K	.2949+- .1023	1.946+- .675	.043+- .015
CA	18.6458+- 2.1732	123.062+- 14.343	2.728+- .318
TI			n.d.
V		.244+- .013	.005+- .0001
CR			n.d.
MN	12.4402+- .7433	82.106+- 4.906	1.820+- .109
FE	366.8577+- 18.8735	2421.260+-124.565	53.683+- 2.769
NI	.1012+- .0064	.668+- .042	.015+- .001
CU .	1.2363+- .0651	8.160+- .429	.181+- .010
ZN	.2693+- .0159	1.777+- .105	.039+- .002
GA .			n.d.
AS		.162+- .003	.004+- .00008
SE	.0087+- .0018	.057+- .012	.001+- .000
BR	.0204+- .0024	.135+- .016	.003+- .000
RB	.1406+- .0079	.928+- .052	.021+- .001
SR	.0713+- .0049	.470+- .032	.010+- .001
Y			n.d.
ZR			n.d.
MO	.0268+- .0139	.177+- .092	.004+- .002
PD			n.d.
AG			n.d.
CD	.1264+- .0277	.834+- .183	.018+- .004
IN			n.d.
SN			n.d.
SB		.009+- .0006	.0002+- .000004
BA	.1467+- .1312	.968+- .866	.021+- .019
LA		.037+- .001	.0008+- .00002
SM		.006+- .0001	.0001+- .000002
HG			n.d.
PB	.0817+- .0065	.539+- .043	.012+- .001

n.a. not available
n.d. not detected

SAMPLE ID: 05S101
DESCRIPTION: ACME STEEL FURNACE PLANT - FLUE DUST
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 348 MICROGRAMS
NAA 365 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			6.700+- .670
NA		1.603+- .294	.439+- .081
MG		13.274+- 2.427	3.635+- .665
AL	1.6356+- .2188	10.795+- 1.444	3.104+- .429
SI	4.2986+- .6371	28.371+- 4.205	8.158+- 1.242
P	.1321+- .0169	.872+- .111	.251+- .033
S	.6181+- .0932	4.079+- .615	1.173+- .182
CL			n.d.
K	.9373+- .1078	6.186+- .712	1.779+- .214
CA	4.7906+- .5430	31.618+- 3.584	9.091+- 1.078
TI	.0409+- .0094	.270+- .062	.078+- .018
V		.046+- .003	.013+- .0007
CR			n.d.
MN	.5371+- .0332	3.545+- .219	1.019+- .072
FE	13.7644+- .7266	90.845+- 4.796	26.122+- 1.654
NI	.0060+- .0017	.040+- .011	.011+- .003
CU	.0143+- .0026	.095+- .017	.027+- .005
ZN	.6287+- .0340	4.149+- .225	1.193+- .077
GA			n.d.
AS		.038+- .001	.011+- .0003
SE			n.d.
BR	.0050+- .0019	.033+- .012	.009+- .004
RB	.0338+- .0034	.223+- .022	.064+- .007
SR	.0160+- .0031	.106+- .021	.030+- .006
Y			n.d.
ZR			n.d.
MO			n.d.
PD	.0123+- .0109	.081+- .072	.023+- .021
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.011+- .0005	.003+- .0001
BA			**n.d.**
LA		.008+- .0007	.002+- .0002
SM		.002+- .00008	.0004+- .00002
HG	.0044+- .0037	.029+- .024	.008+- .007
PB	.3918+- .0228	2.586+- .151	.744+- .051

n.a. not available
n.d. not detected

SAMPLE ID: 05S101
DESCRIPTION: ACME STEEL FURNACE PLANT - FLUE DUST
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 53 5 MICROGRAMS
NAA 54 6 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					8.750+-	.875
NA			.907+-	.246	.166+-	.030
MG			8.187+-	1.331	1.498+-	.274
AL	1.4364+-	.2147	9.480+-	1.417	1.771+-	.267
SI	4.1782+-	.6533	27.576+-	4.312	5.152+-	.813
P	.1213+-	.0184	.801+-	.121	.150+-	.023
S					n.d.	
CL					n.d.	
K	.7519+-	.1017	4.963+-	.671	.927+-	.127
CA	7.2575+-	.8719	47.899+-	5.755	8.949+-	1.091
TI					n.d.	
V			.041+-	.002	.008+-	.001
CR					n.d.	
MN	.6921+-	.0463	4.568+-	.306	.853+-	.060
FE	27.4010+-	1.4628	180.846+-	9.654	33.789+-	1.937
NI	.0119+-	.0018	.079+-	.012	.015+-	.002
CU	.0189+-	.0025	.125+-	.017	.023+-	.003
ZN	.4814+-	.0297	3.177+-	.196	.594+-	.039
GA	.0030+-	.0020	.020+-	.013	.004+-	.002
AS			.032+-	.001	.006+-	.001
SE					n.d.	
BR	.0039+-	.0017	.026+-	.011	.005+-	.002
RB	.0238+-	.0029	.157+-	.019	.029+-	.004
SR	.0212+-	.0029	.140+-	.019	.026+-	.004
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD	.0172+-	.0097	.113+-	.064	.021+-	.012
AG					n.d.	
CD	.0151+-	.0142	.100+-	.094	.019+-	.018
IN	.0288+-	.0180	.190+-	.119	.036+-	.022
SN	.0224+-	.0220	.148+-	.146	.028+-	.027
SB			.008+-	.0004	.001+-	.0003
BA					n.d.	
LA			.007+-	.0005	.001+-	.0002
SM			.002+-	.00006	.0004+-	.00007
HG	.0046+-	.0033	.030+-	.022	.006+-	.004
PB	.3211+-	.0210	2.119+-	.138	.396+-	.027

n.a. not available
n.d. not detected

SAMPLE ID: 05S101
DESCRIPTION: ACME STEEL FURNACE PLANT - FLUE DUST
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	0.771603	0.013037	%	0.022029
BA	n.d.	n.d.	PPM	400
CA	48000	1400	PPM	1400
CL	280	60	PPM	190
DY	n.d.	n.d.	PPM	2.318737
MN	5930	80	PPM	29.38733
NA	840	100	PPM	310
TI	810	300	PPM	1000
V-	56.92408	2.231737	PPM	5.491923
AS	30.39809	0.477291	PPM	0.374518
BR	6.482909	0.399644	PPM	0.746551
K-	4050	160	PPM	380
LA	7.359533	0.121408	PPM	0.114535
SB	6.791096	0.10771	PPM	0.129213
SM	1.732404	0.020021	PPM	0.020673
CE	11.46203	0.393664	PPM	1.202923
CO	7.35109	0.102411	PPM	0.10743
CR	85.38451	1.452853	PPM	3.508893
CS	24.05325	0.525407	PPM	0.49278
FE	345000	9000	PPM	360
HF	0.928939	0.101005	PPM	0.326391
LU	0.193795	0.024728	PPM	0.080513
NI	n.d.	n.d.	PPM	50
ND	2.954902	0.81505	PPM	2.669045
RB	99.08139	4.287735	PPM	12.96785
SC	2.134409	0.035284	PPM	0.045537
SE	n.d.	n.d.	PPM	0.766146
TB	3.343849	0.08809	PPM	0.211522
TH	1.777018	0.066207	PPM	0.200708
YB	0.741765	0.126064	PPM	0.409385

n.d. not detected

SAMPLE ID: 06U004
DESCRIPTION: ACME STEEL COKE PLANT - COAL YARD ROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 492 MICROGRAMS
NAA 464 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					75.890+-	7.589
NA					n.d.	
MG					n.d.	
AL	1.0813+-	.1450	7.137+-	.957	1.450+-	.198
SI	2.2128+-	.3282	14.604+-	2.166	2.967+-	.447
P	.0807+-	.0101	.532+-	.067	.108+-	.014
S	.6074+-	.0777	4.009+-	.513	.814+-	.106
CL					n.d.	
K	.1771+-	.0220	1.169+-	.145	.237+-	.030
CA	.3603+-	.0420	2.378+-	.277	.483+-	.058
TI	.0962+-	.0071	.635+-	.047	.129+-	.010
V			.031+-	.001	.007+-	.0003
CR	.0089+-	.0016	.059+-	.010	.012+-	.002
MN	.0486+-	.0035	.320+-	.023	.065+-	.005
FE	1.7524+-	.0940	11.566+-	.620	2.350+-	.141
NI	.0046+-	.0013	.030+-	.009	.006+-	.002
CU	.0216+-	.0025	.142+-	.016	.029+-	.003
ZN	.0058+-	.0018	.038+-	.012	.008+-	.002
GA	.0013+-	.0009	.009+-	.006	.002+-	.001
AS			.0040+-	.0005	.0009+-	.0001
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0074+-	.0023	.049+-	.015	.010+-	.003
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD	.0127+-	.0087	.084+-	.057	.017+-	.012
AG	.0111+-	.0102	.073+-	.067	.015+-	.014
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.003+-	.0003	.0006+-	.00007
BA					n.d.	
LA			.007+-	.0005	.002+-	.0001
SM			.0008+-	.00007	.0002+-	.00001
HG					n.d.	
PB					n.d.	

n.a. not available
n.d. not detected

SAMPLE ID: 06U004
DESCRIPTION: ACME STEEL COKE PLANT - COAL YARD ROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1271 MICROGRAMS
NAA 664 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					65.850+-	6.585
NA			.609+-	.192	.092+-	.014
MG					n.d.	
AL	2.3931+-	.3170	15.795+-	2.092	1.243+-	.165
SI	5.0032+-	.7029	33.021+-	4.639	2.599+-	.366
P	.1501+-	.0177	.991+-	.117	.078+-	.009
S	.9336+-	.1114	6.162+-	.735	.485+-	.058
CL	.0739+-	.0141	.487+-	.093	.038+-	.007
K	.2714+-	.0321	1.791+-	.212	.141+-	.017
CA	.5449+-	.0621	3.596+-	.410	.283+-	.032
TI	.1662+-	.0097	1.097+-	.064	.086+-	.005
V			.036+-	.002	.005+-	.0008
CR	.0102+-	.0016	.067+-	.011	.005+-	.001
MN	.0506+-	.0034	.334+-	.022	.026+-	.002
FE	2.7256+-	.1386	17.989+-	.915	1.416+-	.073'
NI	.0045+-	.0013	.030+-	.009	.002+-	.001
CU	.0354+-	.0030	.234+-	.020	.018+-	.002
ZN	.0036+-	.0016	.024+-	.011	.002+-	.001
G			A		n.d.	
AS ,			.004+-	.0004	.0007+-	.0001
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0153+-	.0023	.101+-	.015	.008+-	.001
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.003+-	.0002	.0005+-	.00007
BA					n.d.	
LA			.006+-	.0004	.0009+-	.0001
SM			.001+-	.00004	.0002+-	.00002
"HG					n.d.	
PB					n.d.	

n.a. not available
n.d. not detected

SAMPLE ID: 06U004
DESCRIPTION: ACME STEEL COKE PLANT - COAL YARD ROAD
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	0.9296	0.027044	%	0.025419
BA	n.d.	n.d.	PPM	170
CA	1600	500	PPM	1200
CL	181.5425	30.91689	PPM	80
DY	1.277763	0.293841	PPM	0.942131
MN	26.1965	2.401753	PPM	5.147624
NA	160.5609	32.17854	PPM	100
TI	660	130	PPM	400
V-	51.50248	2.470327	PPM	3.965708
AS	3.067474.	0.078832	PPM	0.149128
BR	4.540931	0.245096	PPM	0.260125
K-	1390	70	PPM	170
LA	5.388186	0.09006	PPM	0.058315
SB	1.071523	0.025598	PPM	0.051705
SM	1.364017	0.015365	PPM	0.009775
CE	10.92789	0.308233	PPM	0.850916
CO	3.404109	0.073048	PPM	0.090147
CR	14.38123	0.682611	PPM	2.049382
CS	0.450431	0.055696	PPM	0.174301
FE	3780	120	PPM	130
HF	0.847913	0.05725	PPM	0.173449
LU	n.d.	n.d.	PPM	0.098241
NI	n.d.	n.d.	PPM	19.4862
ND	5.624534	0.81405	PPM	2.61307
RB	8.18936	1.478937	PPM	4.657755
SC	2.987037	0.04646	PPM	0.021424
SE	n.d.	n.d.	PPM	0.497369
TB	0.273697	0.02907	PPM	0.090816
TH	1.73826	0.047036	PPM	0.117907
YB	0.529753	0.101427	PPM	0.328099

n.d. not detected

SAMPLE ID: 06S003
DESCRIPTION: ACME STEEL COKE PLANT - COAL
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 512 MICROGRAMS
NAA 477 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					67.140+-	6.714
NA					n.d.	
MG					n.d.	
AL	1.8287+-	.2444	12.069+-	1.613	2.356+-	.321
SI	3.5645+-	.5284	23.526+-	3.487	4.593+-	.691
P	.1032+-	.0125	.681+-	.083	.133+-	.016
S	.8504+-	.1047	5.613+-	.691	1.096+-	.138
CL	.0238+-	.0110	.157+-	.073	.031+-	.014
K	.3695+-	.0435	2.438+-	.287	.476+-	.057
CA	.1850+-	.0223	1.221+-	.147	.238+-	.029
TI	.1169+-	.0080	.771+-	.053	.151+-	.011
V			.037+-	.002	.008+-	.0004
CR	.0063+-	.0014	.042+-	.010	.008+-	.002
MN	.0138+-	.0018	.091+-	.012	.018+-	.002
FE	1.4912+-	.0803	9.842+-	.530	1.921+-	.115
NI	.0041+-	.0012	.027+-	.008	.005+-	.002
CU	.0201+-	.0024	.133+-	.016	.026+-	.003
ZN	.0098+-	.0018	.065+-	.012	.013+-	.002
GA					n.d.	
AS			.012+-	.0006	.003+-	.0001
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0081+-	.0021	.054+-	.014	.010+-	.003
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.004+-	.0003	.0008+-	.00007
BA					n.d.	
LA			.009+-	.0005	.002+-	.0001
SM			.001+-	.00007	.0002+-	.00001
HG					n.d.	
PB	.0044+-	.0042	.029+-	.028	.006+-	.005

n.a. not available
n.d. not detected

SAMPLE ID: 06S003
DESCRIPTION: ACME STEEL COKE PLANT - COAL
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1680 MICROGRAMS
NAA 1561 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					68.690+-	6.869
NA					n.d.	
MG			5.371+-	1.941	.344+-	.022
AL	5.0769+-	.6710	33.507+-	4.429	1.995+-	.264
SI	9.9479+-	1.3970	65.656+-	9.220	3.909+-	.550
P	.3085+-	.0354	2.036+-	.233	.121+-	.014
S	2.1402+-	.2463	14.125+-	1.625	.841+-	.097
CL	.1611+-	.0237	1.064+-	.156	.063+-	.009
K	.7432+-	.0847	4.905+-	.559	.292+-	.033
CA	.6333+-	.0722	4.180+-	.476	.249+-	.028
TI	.3289+-	.0179	2.171+-	.118	.129+-	.007
V			.074+-	.002	.005+-	.0003
CR	.0153+-	.0020	.101+-	.013	.006+-	.001
MN	.0435+-	.0032	.287+-	.021	.017+-	.001
FE	3.1820+-	.1615	21.001+-	1.066	1.250+-	.064
NI	.0057+-	.0014	.038+-	.009	.002+-	.001
CU	.0341+-	.0030	.225+-	.020	.013+-	.001
ZN	.0076+-	.0018	.050+-	.012	.003+-	.001
GA					n.d.	
AS			.016+-	.0007	.001+-	.00007
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0265+-	.0028	.175+-	.018	.010+-	.001
Y					n.d.	
ZR					n.d.	
MO	.0090+-	.0083	.059+-	.055	.004+-	.003
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.004+-	.0003	.0003+-	.00002
BA					n.d.	
LA			.014+-	.0007	.0009+-	.00006
SM			.003+-	.00007	.0002+-	.00001
EG	.0067+-	.0032	.044+-	.021	.003+-	.001
PB	.0066+-	.0049	.044+-	.032	.003+-	.002

n.a. not available
n.d. not detected

SAMPLE ID: 06P001
DESCRIPTION: ACME STEEL COKE PLANT - PAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 404 MICROGRAMS
NAA 396 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			52.530+- 5.253
NA			n.d.
MG			n.d.
AL	1.0469+- .1404	6.910+- .927	1.708+- .235
SI	1.8913+- .2806	12.483+- 1.852	3.086+- .468
P	.0673+- .0087	.444+- .057	.110+- .015
S	.5540+- .0722	3.656+- .477	.904+- .121
CL	.0406+- .0122	.268+- .081	.066+- .020
K	.1921+- .0236	1.268+- .156	.313+- .040
CA	.8765+- .1003	5.785+- .662	1.430+- .170
TI	.0753+- .0054	.497+- .035	.123+- .010
V		.033+- .002	.008+- .0004
CR	.0057+- .0013	.037+- .009	.009+- .002
MN	.0313+- .0026	.207+- .017	.051+- .005
FE	.9953+- .0541	6.569+- .357	I.624+- .102
NI	.0022+- .0011	.015+- .007	.004+- .002
CU	.0116+- .0020	.076+- .013	.019+- .003
ZN	.0168+- .0020	.111+- .013	.027+- .003
			n.d.
AS		.006+- .0006	.002+- .0001
SE			n.d.
BR			n.d.
RB			n.d.
SR	.0036+- .0020	.023+- .013	.006+- .003
Y			n.d.
ZR			n.d.
MO			n.d.
PD			n.d.
AG			n.d.
CD	.0130+- .0113	.086+- .075	.021+- .019
IN			n.d.
SN			n.d.
SB		.003+- .0003	.0007+- .00008
BA			n.d.
LA		.005+- .0005	.001+- .0001
SM		.001+- .00006	.0003+- .00001
HG			n.d.
PB	.0108+- .0044	.071+- .029	.018+- .007

n.a. not available
n.d. not detected

SAMPLE ID: 06P001
DESCRIPTION: ACME STEEL COKE PLANT - PAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 895 MICROGRAMS
NAA 896 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					61.920+-	6.192
NA			1.227+-	.215	.137+-	.015
MG			5.891+-	1.500	.657+-	.073
AL	2.3227+-	.3220	15.330+-	2.125	1.714+-	.239
SI	4.8110+-	.7035	31.752+-	4.643	3.550+-	.521
P	.1468+-	.0182	.969+-	.120	.108+-	.014
S	1.2115+-	.1565	7.996+-	1.033	.894+-	.116'
CL	.0544+-	.0171	.359+-	.113	.040+-	.013
K	.4152+-	.0505	2.741+-	.333	.306+-	.037
CA	2.2543+-	.2638	14.878+-	1.741	1.663+-	.196.
TI	.1459+-	.0092	.963+-	.061	.108+-	.007
V			.054+-	.002	.006+-	.0007
CR	.0113+-	.0016	.075+-	.011	.008+-	.001
MN	.0634+-	.0042	.418+-	.028	.047+-	.003
FE	1.9762+-	.1070	13.043+-	.706	1.458+-	.081
NI	.0068+-	.0014	.045+-	.009	.005+-	.001
CU	.0282+-	.0027	.186+-	.018	.021+-	.002
ZN	.0304+-	.0027	.201+-	.018	.022+-	.002.
GA					n.d.	
AS			.007+-	.0005	.0007+-	.00008
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0162+-	.0023	.107+-	.015	.012+-	.002
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD	.0095+-	.0076	.063+-	.050	.007+-	.006
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB'			.002+-	.0003	.0002+-	.00002
BA					n.d.	
LA			.008+-	.0005	.0009+-	.0001
SM			.002+-	.00006	.0002+-	.00002
HG					n.d.	
PB	.0130+-	.0046	.086+-	.031	.010+-	.003

n.a. not available
n.d. not detected

SAMPLE ID: 07P008
DESCRIPTION: ACME STEEL RIVERDALE PLANT - PAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 614 MICROGRAMS
NAA 595 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			7.450+- .745
NA		1.833+- .249	.308+- .042
MG		13.548+- 1.870	2.277+- .314
AL	1.3444+- .1800	8.873+- 1.188	1.444+- .196
SI	4.9333+- .7311	32.560+- 4.825	5.299+- .795
P	.1466+- .0230	.967+- .152	.157+- .025
S			n.d.
CL			n.d.
K	.2570+- .0401	1.697+- .265	.276+- .044
CA	13.7773+- 1.5595	90.930+- 10.293	14.799+- 1.709
TI	.0888+- .0124	.586+- .082	.095+- .014
V		.082+- .002	.014+- .0004
CR	.0372+- .0049	.246+- .032	.040+- .005
MN	.5800+- .0348	3.828+- .229	.623+- .040
FE	17.1013+- .9023	112.869+- 5.955	18.369+- 1.057
NI	.0122+- .0017	.081+- .011	.013+- .002
CU	.0369+- .0031	.243+- .020	.040+- .003
ZN	.1610+- .0093	1.063+- .062	.173+- .011
GA	.0019+- .0010	.012+- .007	.002+- .001
AS		.009+- .0006	.001+- .0001
SE			n.d.
BR			n.d.
RB			n.d.
SR	.0119+- .0021	.078+- .014	.013+- .002
Y			n.d.
ZR			n.d.
MO	.0122+- .0068	.081+- .045	.013+- .007
PD	.0109+- .0073	.072+- .048	.012+- .008
AG			n.d.
CD	.0180+- .0108	.119+- .071	.019+- .012
IN			n.d.
SN	.0211+- .0169	.139+- .111	.023+- .018
SB		.006+- .0004	.001+- .00007
BA	.1609+- .0805	1.062+- .531	.173+- .087
LA		.007+- .0007	.001+- .0001
SM		.002+- .00007	.0003+- .00001
HG	.0054+- .0028	.036+- .018	.006+- .003
PB	.0611+- .0062	.403+- .041	.066+- .007

n.a. not available
n.d. not detected

SAMPLE ID: 07P008
DESCRIPTION: ACME STEEL RIVERDALE PLANT - PAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 3619 MICROGRAMS
NAA 3333 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					5.570+-	.557
NA			4.326+-	1.091	.130+-	.033
MG			143.330+-	8.990	4.301+-	.270
AL	9.1912+-	1.2145	60.662+-	8.016	1.676+-	.222
SI ..	29.6347+-	4.1604	195.589+-	27.459	5.405+-	.759
P	.7062+-	.1318	4.661+-	.870	.129+-	.024
S					n.d.	
CL	.3429+-	.1152	2.263+-	.760	.063+-	.021
K	1.4107+-	.2100	9.311+-	1.386	.257+-	.038.
CA	79.1693+-	8.8692	522.517+-	58.537	14.440+-	1.619
TI	.4274+-	.0593	2.821+-	.391	.078+-	.011
V			.429+-	.011	.013+-	.0003
CR	.1025+-	.0208	.676+-	.137	.019+-	.004
MN	3.0163+-	.1778	19.908+-	1.173	.550+-	.032
FE	87.7307+-	4.4113	579.023+-	29.115	16.001+-	.807
NI	.0559+-	.0040	.369+-	.026	.010+-	.001
CU	.1650+-	.0094	1.089+-	.062	.030+-	.002
ZN	.6799+-	.0351	4.487+-	.232	.124+-	.006
GA					n.d.	
AS			.043+-	.001	.001+-	.00004
SE	.0043+-	.0015	.028+-	.010	.001+-	.000
BR	.0129+-	.0020	.085+-	.013	.002+-	.000.
RB	.0265+-	.0029	.175+-	.019	.005+-	.001
SR	.0713+-	.0047	.471+-	.031	.013+-	.001
Y					n.d.	
ZR					n.d.	
MO	.0341+-	.0108	.225+-	.071	.006+-	.002
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN	.0347+-	.0240	.229+-	.158	.006+-	.004
SB			.028+-	.0009	.0008+-	.00003
BA					**n.d.**	
LA			.026+-	.001	.0008+-	.00003
SM			.005+-	.0001	.0001+-	.000003
HG					n.d.	
PB	.2925+-	.0202	1.930+-	.133	.053+-	.004

n.a. not available
n.d. not detected

SAMPLE ID: 07S301
DESCRIPTION: ACME STEEL RIVERDALE PLANT - LIMEDUST
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 422 MICROGRAMS
NAA 432 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.d.
NA		.652+- .254	.151+- .059
MG		5.423+- 1.741	1.256+- .403
AL	1.4173+- .1897	9.354+- 1.252	2.215+- .304
SI	5.1412+- .7619	33.932+- 5.028	8.036+- 1.215
P	.0559+- .0212	.369+- .140	.087+- .033
S	.2084+- .0496	1.376+- .328	.326+- .078
CL			n.d.
K			n.d.
CA	18.6010+- 2.1051	122.767+- 13.894	29.076+- 3.403
TI	.0344+- .0051	.227+- .034	.054+- .008
V		.013+- .001	.003+- .0003
CR	.0147+- .0019	.097+- .013	.023+- .003
MN	.1124+- .0068	.742+- .045	.176+- .012
FE	3.5320+- .1877	23.311+- 1.239	5.521+- .337
NI	.0044+- .0013	.029+- .009	.007+- .002
CU	.0922+- .0061	.609+- .040	.144+- .010
ZN	.1538+- .0091	1.015+- .060	.240+- .016
GA			n.d.
AS		.085+- .002	.020+- .0004
SE			n.d.
BR			n.d.
RB			n.d.
SR	.0144+- .0026	.095+- .017	.023+- .004
Y			n.d.
ZR			n.d.
MO	.0088+- .0082	.058+- .054	.014+- .013
PD			n.d.
AG			n.d.
CD			n.d.
IN	.0230+- .0168	.152+- .111	.036+- .026
SN			n.d.
SB		.009+- .0004	.002+- .0001
BA			n.d.
LA		.004+- .0005	.001+- .0001
HG		.001+- .00007	.0003+- .00002
PB	.0418+- .0058	.276+- .038	.065+- .009

n.a. not available
n.d. not detected

SAMPLE ID: 07S301
DESCRIPTION: ACME STEEL RIVERDALE PLANT - LIMEDUST
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1372 MICROGRAMS
NAA 1037 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					.590+-	.059
NA			1.894+-	.287	.183+-	.018
MG			10.820+-	1.740	1.044+-	.101
AL	4.9906+-	.6788	32.938+-	4.480	2.401+-	.327
SI	18.2081+-	2.6306	120.174+-	17.362	8.760+-	1.268
P	.1169+-	.0831	.771+-	.549	.056+-	.040
S					n.d.	
CL					n.d.	
K					n.d.	
CA	73.9440+-	8.4988	488.030+-	56.092	35.576+-	4.100
TI	.1187+-	.0064	.783+-	.042	.057+-	.003.
V			.023+-	.002	.002+-	.0002
CR	.0088+-	.0025	.058+-	.017	.004+-	.001
MN	.1758+-	.0119	1.160+-	.079	.085+-	.006
FE	6.1781+-	.3341	40.775+-	2.205	2.972+-	.163
NI	.0127+-	.0018	.084+-	.012	.006+-	.001
CU	.2898+-	.0162	1.913+-	.107	.139+-	.008
ZN	.4756+-	.0257	3.139+-	.170	.229+-	.013
					n.d.	
AS			.216+-	.004	.020+-	.002
SE					n.d.	
BR	.0039+-	.0016	.026+-	.011	.002+-	.001
RB	.0074+-	.0021	.049+-	.014	.004+-	.001
SR	.0618+-	.0042	.408+-	.028	.030+-	.002
Y					n.d.	
ZR					n.d.	
MO	.0106+-	.0083	.070+-	.055	.005+-	.004
PD					n.d.	-
AG					n.d.	
CD	.0235+-	.0129	.155+-	.085	.011+-	.006
IN	.0234+-	.0165	.154+-	.109	.011+-	.008
SN	.0336+-	.0203	.222+-	.134	.016+-	.010
SB			.016+-	.0005	.002+-	.0001
BA					n.d.	
LA			.010+-	.0006	.0009+-	.00009
SM			.003+-	.00008	.0003+-	.00003
HG	.0077+-	.0040	.051+-	.026	.004+-	.002
PB	.0950+-	.0077	.627+-	.051	.046+-	.004

n.a. not available
n.d. not detected

SAMPLE ID: 07S302
DESCRIPTION: ACME STEEL RIVERDALE PLANT - BOF DUST
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 917 MICROGRAMS
NAA 904 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.d.
NA		8.772+- .501	.971+- .055
MG			n.d.
AL	.2770+- .0389	1.828+- .257	.199+- .028
SI	1.0409+- .1548	6.870+- 1.022	.749+- .112
P	.1315+- .0160	.868+- .106	.095+- .012
S			n.d.
CL	.1149+- .0492	.758+- .325	.083+- .035
K	.4532+- .0605	2.991+- .399	.326+- .044
CA	1.7152+- .2010	11.321+- 1.327	1.235+- .147
TI			n.d.
V		.038+- .002	.004+- .0002
CR.	.0356+- .0150	.235+- .099	.026+- .011
MN	1.8414+- .1197	12.154+- .790	1.326+- .090
FE	86.1889+- 4.5407	568.847+- 29.968	62.056+- 3.468
NI	.0224+- .0024	.148+- .016	.016+- .002
CU	.0272+- .0028	.180+- .019	.020+- .002
ZN	.7430+- .0401	4.904+- .264	.535+- .031
GA	.0038+- .0019	.025+- .012	.003+- .001
AS		.031+- .001	.003+- .0001
SE			n.d.
BR	.0040+- .0016	.026+- .010	.003+- .001
RB	.0068+- .0021	.045+- .014	.005+- .002
SR	.0078+- .0023	.051+- .015	.006+- .002
Y	.0046+- .0030	.030+- .020	.003+- .002
ZR	.0264+- .0135	.175+- .089	.019+- .010
MO	.0123+- .0081	.081+- .054	.009+- .006
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN	.0413+- .0207	.273+- .136	.030+- .015
SB		.010+- .0007	.001+- .00008
BA			n.d.
LA		.003+- .001	.0003+- .0001
SM			n.d.
HG			n.d.
PB	.0962+- .0104	.635+- .069	.069+- .008

n.a. not available
n.d. not detected

SAMPLE ID: 07S302
DESCRIPTION: ACME STEEL RIVERDALE PLANT - BOF DUST
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1254 MICROGRAMS
NAA 1237 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.210+-	.121
NA			10.406+-	.510	.841+-	.068
MG					n.d.	
AL	.5875+-	.0835	3.877+-	.551	.309+-	.044.
SI	1.7939+-	.2681	11.840+-	1.769	.944+-	.142
P	.1821+-	.0238	1.202+-	.157	.096+-	.013
S					n.d.	
CL	.2038+-	.0786	1.345+-	.519	.107+-	.041
K	.4370+-	.0716	2.884+-	.473	.230+-	.038
CA	5.3549+-	.6298	35.342+-	4.157	2.818+-	.333
TI					n.d.	
V			.032+-	.002	.003+-	.0002
CR	.0866+-	.0195	.572+-	.128	.046+-	.010
MN	2.3169+-	.1532	15.291+-	1.011	1.219+-	.082
FE	109.9554+-	6.1004	725.706+-	40.263	57.856+-	3.298
NI	.0378+-	.0031	.249+-	.021	.020+-	.002
CU	.0534+-	.0040	.352+-	.027	.028+-	.002
ZN	.9644+-	.0543	6.365+-	.358	.507+-	.029
GA	.0071+-	.0038	.047+-	.025	.004+-	.002
AS			.040+-	.002	.003+-	.0003
SE	.0044+-	.0012	.029+-	.008	.002+-	.001
BR	.0078+-	.0016	.051+-	.011	.004+-	.001
RB	.0196+-	.0024	.130+-	.016	.010+-	.001
SR	.0183+-	.0025	.121+-	.017	.010+-	.001
Y					n.d.	
ZR					n.d.	
MO	.0158+-	.0085	.104+-	.056	.008+-	.004
PD					n.d.	
AG					n.d.	
CD	.0189+-	.0141	.125+-	.093	.010+-	.007
IN	.0202+-	.0174	.133+-	.115	.011+-	.009
SN					n.d.	
SB			.010+-	.0008	.0008+-	.00007
BA	.1370+-	.0916	.904+-	.604	.072+-	.048
LA					n.d.	
SM			.0004+-	.00009	.00003+-	.000002
HG					n.d.	
PB	.1369+-	.0149	.903+-	.098	.072+-	.008

n.a. not available
n.d. not detected

SAMPLE ID: 07S302
DESCRIPTION: ACME STEEL RIVERDALE PLANT - BOF DUST
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	0.052188	0.01084	%	0.035047
BA	n.d.	n.d.	PPM	1000
CA	14100	1100	PPM	1900
CL	1550	160	PPM	500
DY	n.d.	n.d.	PPM	5.307698
MN	14040	190	PPM	70
NA	8940	340	PPM	1000
TI	1700	600	PPM	2000
V-	32.11681	3.205248	PPM	9.913927
AS	26.9448	0.530375	PPM	0.947133
BR	10.22588	0.710236	PPM	1.570523
K-	1800	400	PPM	1400
LA	n.d.	n.d.	PPM	0.473838
SB	6.449648	0.145529	PPM	0.327108
SM	n.d.	n.d.	PPM	0.043135
CE	n.d.	n.d.	PPM	2.138354
CO	12.42991	0.180623	PPM	0.179796
CR	260.7643	3.497745	PPM	6.185335
CS	n.d.	n.d.	PPM	0.836231
FE	589000	16000	PPM	700
HF	n.d.	n.d.	PPM	0.586337
LU	0.136821	0.041939	PPM	0.137546
NI	63.41871	27.21256	PPM	90
ND	n.d.	n.d.	PPM	4.570385
RB	41.12653	7.495245	PPM	24.43195
SC	1.136699	0.034656	PPM	0.096672
SE	n.d.	n.d.	PPM	1.364194
TB	5.321723	0.157136	PPM	0.405205
TH	0.276752	0.107745	PPM	0.353726
YB	n.d.	n.d.	PPM	0.723419

n.d. not detected

SAMPLE ID: 08U003
DESCRIPTION: HECHETT RIVERDALE PLANT - SLAG HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1237 MICROGRAMS
NAA 1242 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			3.470+- .347
NA		16.351+- .693	1.316+- .056
MG		24.723+- 3.892	1.990+- .313
AL	2.5551+- .3412	16.863+- 2.252	1.364+- .184
SI	8.3408+- 1.2358	55.049+- 8.156	4.451+- .664
P	.3847+- .0674	2.539+- .445	.205+- .036
S	.5007+- .1193	3.305+- .787	.267+- .064
CL	.7907+- .1072	5.218+- .707	.422+- .058
K	.5428+- .0904	3.582+- .596	.290+- .048
CA	45.7625+- 5.1774	302.032+- 34.171	24.423+- 2.793
TI	.3408+- .0194	2.249+- .128	.182+- .011
V		.316+- .008	.025+- .0006
CR	.0964+- .0062	.637+- .041	. .051+- .003
MN	1.4224+- .0758	9.388+- .500	.759+- .042
FE	14.7250+- .7771	97.185+- 5.129	7.859+- .435
NI	.0129+- .0018	.085+- .012	.007+- .001
CU	.0688+- .0048	.454+- .032	.037+- .003
ZN	.0908+- .0057	.599+- .038	.048+- .003
GA			n.d.
AS		.011+- .001	.0009+- .0001
SE			n.d.
BR	.0056+- .0016	.037+- .010	.003+- .001
RB	.0047+- .0021	.031+- .014	.002+- .001
SR	.0316+- .0030	.208+- .020	.017+- .002
Y	.0080+- .0029	.053+- .019	.004+- .002
ZR			n.d.
MO	.0174+- .0083	.115+- .055	.009+- .004
PD			n.d.
AG			n.d.
CD			n.d.
IN	.0207+- .0161	.136+- .106	.011+- .009
SN	.0267+- .0199	.176+- .131	.014+- .011
SB		.008+- .0009	.0006+- .00007
BA	.		n.d.
LA		.004+- .002	.0003+- .0001
SM		.0008+- .0001	.00006+-.000008
EG			n.d.
PB	.0132+- .0056	.087+- .037	.007+- .003

n.a. not available
n.d. not detected

SAMPLE ID: 08U003
DESCRIPTION: HECHETT RIVERDALE PLANT - SLAG HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 2651 MICROGRAMS
NAA 1903 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					3.290+-	.329
NA			15.810+-	.535	.831+-	.044
MG			20.007+-	3.169	1.051+-	.055
AL	6.8646+-	.9423	45.306+-	6.219	1.709+-	.235
SI	20.8473+-	3.0488	137.592+-	20.122	5.190+-	.760
P	.8472+-	.1615	5.591+-	1.066	.211+-	.040
S					n.d.	
CL	1.2068+-	.1965	7.965+-	1.297	.300+-	.049
K	.5395+-	.1700	3.561+-	1.122	.134+-	.042
CA	99.4752+-	11.6856	656.536+-	77.125	24.762+-	2.915
TI	.5201+-	.0283	3.433+-	.187	.129+-	.007
V			.406+-	.009	.021+-	.001
CR	.1594+-	.0156	1.052+-	.103	.040+-	.004
MN	3.9739+-	.2219	26.227+-	1.465	.989+-	.056
FE	38.3438+-	2.0151	253.069+-	13.299	9.545+-	.507
NI	.0294+-	.0027	.194+-	.018	.007+-	.001
CU	.1528+-	.0092	1.009+-	.060	.038+-	.002
ZN	.1555+-	.0094	1.026+-	.062	.039+-	.002
GA					n.d.	
AS			.015+-	.002	.0008+-	.00004
SE	.0040+-	.0014	.026+-	.009	.001+-	.000
BR	.0110+-	.0019	.073+-	.013	.003+-	.000
RB	.0161+-	.0026	.106+-	.017	.004+-	.001
SR	.0676+-	.0047	.446+-	.031	.017+-	.001
Y	.0137+-	.0034	.090+-	.023	.003+-	.001
ZR	.0365+-	.0160	.241+-	.105	.009+-	.004
MO	.0446+-	.0114	.294+-	.075	.011+-	.003
PD	.0224+-	.0112	.148+-	.074	.006+-	.003
AG	.0312+-	.0185	.206+-	.122	.008+-	.005
CD	.0388+-	.0194	.256+-	.128	.010+-	.005
IN					n.d.	
SN	.0412+-	.0234	.272+-	.154	.010+-	.006
SB			.007+-	.001	.0003+-	.00002
BA	.1374+-	.1076	.907+-	.710	.034+-	.027
LA			.009+-	.002	.0005+-	.00002
SM			.002+-	.0001	.00008+-	.000004
HG					n.d.	
PB	.0560+-	.0080	.369+-	.053	.014+-	.002

n.a. not available
n.d. not detected

SAMPLE ID: 08S202
DESCRIPTION: HECHETT RIVERDALE PLANT - COARSE MILL SCALE
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 912 MICROGRAMS
NAA 894 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			8.580+- .858
NA		2.876+- .374	.322+- .042
MG	.		n.d.
AL	1.9715+- .2637	13.012+- 1.740	1.426+- .193
SI	4.1266+- .6117	27.235+- 4.037	2.986+- .446
P	.2033+- .0252	1.342+- .166	.147+- .018
S			n.d.
CL			n.d.
K	.2435+- .0364	1.607+- .240	.176+- .027
CA	6.5512+- .7422	43.238+- 4.898	4.740+- .544
TI			n.d.
V		.062+- .003	.007+- .0003
CR	.2194+- .0127	1.448+- .084	.159+- .010
MN	1.0623+- .0568	7.011+- .375	.769+- .044
FE	59.4257+- 3.1313	392.209+- 20.666	42.995+- 2.403
NI	.0574+- .0043	.379+- .028	.042+- .003
CU	.3617+- .0202	2.387+- .133	.262+- .015
ZN	.1688+- .0100	1.114+- .066	.122+- .008
GA	.0027+- .0014	.018+- .010	.002+- .001
AS		.059+- .002	.007+- .0002
SE	.0027+- .0016	.018+- .010	.002+- .001
BR	.0050+- .0019	.033+- .012	.004+- .001
RB	.0066+- .0027	.043+- .018	.005+- .002
SR	.0174+- .0031	.115+- .021	.013+- .002
Y			n.d.
ZR			n.d.
MO	.0199+- .0111	.131+- .073	.014+- .008
PD			n.d.
AG			n.d.
CD			n.d. .
IN	.0364+- .0208	.241+- .137	.026+- .015
SN	.0493+- .0258	.326+- .170	.036+- .019
SB		.037+- .0009	.004+- .0001
BA			n.d.
LA		.006+- .0007	.0006+- .00008
SM		.0007+- .00008	.00008+-.000008
HG			n.d.
PB	.0921+- .0102	.608+- .067	.067+- .007

n.a. not available
n.d. not detected

SAMPLE ID: 08S202
DESCRIPTION: HECHETT RIVERDALE PLANT - COARSE MILL SLAG
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 2650 MICROGRAMS
NAA 2523 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			4.710+- .471
NA		3.984+- .474	.158+- .006
MG		14.508+- 3.363	.575+- .023
AL	8.5809+- 1.1339	56.634+- 7.484	2.137+- .283
SI	11.4319+- 1.6056	75.451+- 10.597	2.847+- .400
P	.5145+- .0636	3.395+- .420	.128+- .016
S			n.d.
CL			n.d.
K	.2732+- .0712	1.803+- .470	.068+- .018
CA	18.5962+- 2.0995	122.735+- 13.857	4.632+- .524
TI			n.d.
V		.139+- .004	.005+- .0002
CR	.1812+- .0389	1.196+- .257	.045+- .010
MN	2.0035+- .1514	13.223+- .999	.499+- .038
FE	217.2594+- 10.9220	1433.912+- 72.085	54.114+- 2.741
NI	.1544+- .0089	1.019+- .059	.038+- .002
CU	1.0941+- .0562	7.221+- .371	.273+- .014
ZN	.3807+- .0206	2.513+- .136	.095+- .005
GA			n.d.
AS		.129+- .003	.005+- .0002
SE	.0061+- .0014	.040+- .009	.002+- .000
BR	.0138+- .0019	.091+- .013	.003+- .000
RB	.0544+- .0038	.359+- .025	.014+- .001
SR	.0471+- .0036	.311+- .024	.012+- .001
Y			n.d.
ZR			n.d.
MO	.0596+- .0111	.393+- .073	.015+- .003
PD			n.d.
AG			n.d.
CD	.0227+- .0182	.150+- .120	.006+- .005
IN			n.d.
SN	.0756+- .0258	.499+- .170	.019+- .006
SB			n.d.
BA			n.d.
LA		.008+- .0009	.0003+- .00001
SM		.002+- .0001	.00007+-.000002
HG			n.d.
PB	.2360+- .0303	1.558+- .200	.059+- .008

n.a. not available
n.d. not detected

SAMPLE ID: 08S202
DESCRIPTION: HECHETT RIVERDALE PLANT - COARSE MILL SLAG
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	3.963043	1.25361	%	4.093938
BA	n.d.	n.d.	PPM	500
CA	9700	1500	PPM	4000
CL	290	50	PPM	140
DY	n.d.	n.d.	PPM	2.242763
MN	4620	60	PPM	19.3199
NA	1330	90	PPM	270
TI	5700	1700	PPM	5000
V-	n.d.	n.d.	PPM	120
AS	23.17421	0.370305	PPM	0.370205
BR	1.244877	0.176838	PPM	0.537125
K-	840	110	PPM	330
LA	1.799698	0.048467	PPM	0.104038
SB	9.763128	0.143951	PPM	0.134693
SM	0.308116	0.006771	PPM	0.018043
CE	n.d.	n.d.	PPM	1.222928
CO	20.54878	0.237412	PPM	0.150266
CR	458.4249	5.076609	PPM	3.425308
CS	n.d.	n.d.	PPM	0.453342
FE	515000	14000	PPM	400
HF	1.063835	0.100132	PPM	0.322599
LU,	0.069492	0.022815	PPM	0.074896
NI	137.4961	14.99399	PPM	50
ND	n.d.	n.d.	PPM	2.531608
RB	31.62528	4.158537	PPM	13.52041
SC	1.465247	0.027286	PPM	0.051561
SE	n.d.	n.d.	PPM	0.77767
TB	4.762529	0.106325	PPM	0.216004
TH	1.304611	0.062466	PPM	0.19582
YB	0.344726	0.124695	PPM	0.408919

n.d. not detected

SAMPLE ID: 08S206
DESCRIPTION: HECHETT RIVERDALE PLANT - REFUSE SLAG
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1000 MICROGRAMS
NAA 991 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT . .
C			1.280+- .128
NA		3.774+- .609	.381+- .061
MG		22.754+- 4.187	2.296+- .422
AL	2.6147+- .3492	17.257+- 2.305	1.726+- .233
SI	9.8387+- 1.4576	64.936+- 9.620	6.494+- .969
P	.4441+- .0720	2.931+- .475	.293+- .048
S	1.1245+- .1689	7.422+- 1.115	.742+- .112
CL	.1215+- .0497	.802+- .328	.080+- .033
K	.2068+- .0733	1.365+- .484	.137+- .048
CA	46.6519+- 5.2780	307.902+- 34.835	30.790+- 3.527
TI	.4120+- .0283	2.719+- .187	.272+- .019
V		.484+- .011	.049+- .001
CR	.0356+- .0044	.235+- .029	.023+- .003
MN	1.7921+- .0953	11.828+- .629	1.183+- .066
FE	5.9920+- .3173	39.547+- 2.094	3.955+- .221
NI	.0072+- .0019	.048+- .012	.005+- .001
CU	.0874+- .0060	.577+- .040	.058+- .004
ZN	.0314+- .0033	.208+- .022	.021+- .002
GA			n.d.
AS		.005+- . .0007	.0005+- .00007
SE	.0037+- .0017	.024+- .011	.002+- .001
BR	.0049+- .0021	.032+- .014	.003+- .001
RB			n.d.
SR	.0363+- .0039	.240+- .026	.024+- .003
Y	.0054+- .0040	.036+- .026	.004+- .003
ZR			n.d.
MO	.0233+- .0117	.154+- .077	.015+- .008
PD	.0197+- .0121	.130+- .080	.013+- .008
AG	.0202+- .0144	.133+- .095	.013+- .010
CD			n.d.
IN			n.d.
SN			n.d.
SB		.003+- .0005	.0003+- .00005
BA			n.d.
LA		.009+- .0008	.0009+- .00008
SM		.001+- .00008	.0001+- .000007
HG			n.d.
PB	.0186+- .0071	.122+- .047	.012+- .005

n.a. not available
n.d. not detected

SAMPLE ID: 08S206
DESCRIPTION: HECHETT RIVERDALE PLANT - REFUSE SLAG
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1818 MICROGRAMS
NAA 1795 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					.750+-	.075
NA			4.789+-	.519	.267+-	.015
MG			18.430+-	3.220	1.027+-	.057
AL	4.7238+-	.6610	31.177+-	4.363	1.715+-	.241
SI	18.9154+-	2.8010	124.841+-	18.486	6.867+-	1.019
P	.7201+-	.1464	4.753+-	.966	.261+-	.053
S					n.d.	
CL	.2863+-	.0935	1.889+-	.617	.104+-	.034
K					n.d.	'
CA	96.0821+-	11.3176	634.142+-	74.696	34.881+-	4.122
TI	.6926+-	.0458	4.571+-	.302	.251+-	.017
V			.806+-	.018	.045+-	.003
CR	.0848+-	.0087	.560+-	.058	.031+-	.003
MN	3.8905+-	.2137	25.677+-	1.410	1.412+-	.079
FE	13.5099+-	.7165	89.165+-	4.729	4.905+-	.264
NI	.0155+-	.0020	.102+-	.013	.006+-	.001
CU	.2439+-	.0139	1.609+-	.092	.089+-	.005
ZN	.0693+-	.0049	.457+-	.033	.025+-	.002
GA					n.d.	
AS			.005+-	.0008	.0002+-	.00002
SE	.0056+-	.0015	.037+-	.010	- .002+-	.001
BR	.0085+-	.0018	.056+-	.012	.003+-	.001
RB	.0125+-	.0026	.082+-	.017	.005+-	.001
SR	.0709+-	.0049	.468+-	.033	.026+-	.002
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN	.0363+-	.0194	.240+-	' .128	.013+-	.007
SN	.0462+-	.0239	.305+-	.157	.017+-	.009
SB			.002+-	.0005	.0001+-	.000007
BA	.1124+-	.1089	.742+-	.718	.041+-	.040
LA			.013+-	.0009	.0007+-	.00004
SM			.002+-	.00008	.0001+-	.000006
HG					n.d.	
PB	.0215+-	.0065	.142+-	.043	.008+-	.002

n.a. not available
n.d. not detected

SAMPLE ID: 08S206
DESCRIPTION: HECHETT RIVERDALE PLANT - REFUSE SLAG
PARTICLE SIZE: BULK (< 53 MICRONS) .

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	n.d.	n.d.	%	3700
BA	n.d.	n.d.	PPM	2300
CA	331000	28000	PPM	67000
CL	n.d.	n.d.	PPM	600
DY	n.d.	n.d.	PPM	10.03244
MN	23660	320	PPM	100
NA	1830	360	PPM	1200
TI	n.d.	n.d.	PPM	2700
V-	n.d.	n.d.	PPM	13000
AS	1.340241	0.077071	PPM	0.229484
BR	1.040332	0.124733	PPM	0.361552
K-	750	110	PPM	350
LA	4.196609	0.081156	PPM	0.124154
SB	0.361403	0.022916	PPM	0.06971
SM	0.876101	0.010951	PPM	0.015982
CE	10.45905	0.474383	PPM	1.467166
CO	. 2.763151	0.064547	PPM	0.078665
CR	882.9918	9.701083	PPM	3.328168
CS	n.d.	n.d.	PPM	0.333218
FE	97600	2600	PPM	280
HF	3.973449	0.110591	PPM	0.269678
LU	n.d.	n.d.	PPM	0.139991
NI	n.d.	n.d.	PPM	37.79158
ND	n.d.	n.d.	PPM	4.31665
RB	11.51273	3.795288	PPM	12.40255
SC	1.123186	0.021886	PPM	0.03971
SE	n.d.	n.d.	PPM	0.841916
TB	0.993414	0.056053	PPM	0.168005
TH	2.40838	0.070035	PPM	0.191275
YB	1.734105	0.178789	PPM	0.56665

n.d. not detected

SAMPLE ID: 09U005
DESCRIPTION: HECHETT 112TH ST. PLANT - UNPAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1090 MICROGRAMS
NAA 1067 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					3.450+-	.345
NA			2.155+-	.343	.202+-	.032
MG			41.195+-	2.465	3.862+-	.231
AL	4.1233+-	.5498	27.214+-	3.629	2.497+-	.336
SI	16.1424+-	2.3911	106.540+-	15.781	9.774+-	1.458
P	.2502+-	.0515	1.651+-	.340	.151+-	.031
S	7.0173+-	.8449	46.314+-	5.576	4.249+-	.517
CL					n.d.	
K	.7537+-	.1079	4.975+-	.712	.456+-	.066
CA	38.3016+-	4.3335	252.791+-	28.601	23.192+-	2.655
TI	.2354+-	.0154	1.554+-	.102	.143+-	.010
V			.012+-	.002	.001+-	.0002
CR					n.d.	
MN	.5060+-	.0290	3.340+-	.191	.306+-	.018
FE	3.5770+-	.1901	23.608+-	1.254	2.166+-	.121
NI	.0069+-	.0016	.045+-	.010	.004+-	.001
CU	.0237+-	.0027	.156+-	.018	.014+-	.002
Z'N	.0250+-	.0026	.165+-	.017	.015+-	.002
GA					n.d.	
AS					n.d.	
SE	.0043+-	.0013	.029+-	.009	.003+-	.001
BR	.0030+-	.0016	.020+-	.010	.002+-	.001
RB	.0052+-	.0022	.034+-	.015	.003+-	.001
SR	.0624+-	.0044	.412+-	.029	.038+-	.003
Y	.0098+-	.0031	.065+-	.021	.006+-	.002
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN	.0250+-	.0217	.165+-	.143	.015+-	.013
SB			.004+-	.0005	.0004+-	.00004
BA					n.d.	
LA			.040+-	.001	.004+-	.0001
SM			.007+-	.0001	.0007+-	.00001
HG	.0044+-	.0031	.029+-	.021	.003+-	.002
PB	.0070+-	.0056	.046+-	.037	.004+-	.003

n.a. not available
n.d. not detected

SAMPLE ID: 09U005
DESCRIPTION: HECHETT 112TH ST. PLANT - UNPAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 784 MICROGRAMS
NAA 986 MICROGRAMS

ELEMENT.	UG/CM2	UG/FILTER	PERCENT
C			2.460+- .246
NA		2.108+- .352	.214+- .036
MG		29.747+- 2.050	3.016+- .208
AL	3.1044+- .4106	20.489+- 2.710	2.613+- .351
SI	11.8016+- 1.6571	77.890+- 10.937	9.935+- 1.414
P	.2077+- .0360	1.371+- .237	.175+- .031
S	4.4980+- .5392	29.687+- 3.559	3.787+- .463
CL			n.d.
K	.4812+- .0694	3.176+- .458	.405+- .059
CA	24.7862+- 2.7774	163.589+- 18.331	20.866+- 2.389
TI	.1459+- .0099	.963+- .065	.123+- .009
V		.013+- .001	.001+- .0001
CR	.0045+- .0020	.030+- .013	.004+- .002
MN	.3366+- .0186	2.222+- .123	.283+- .017
FE	2.4573+- .1251	16.218+- .826	2.069+- .116
NI	.0043+- .0014	.028+- .009	.004+- .001
CU	.0154+- .0024	.102+- .016	.013+- .002
ZN	.0378+- .0031	.249+- .020	.032+- .003
GA			n.d.
AS		.004+- .0007	.0003+- .00007
SE			n.d.
BR			n.d.
RB	.0054+- .0023	.036+- .015	.005+- .002
SR	.0411+- .0035	.271+- .023	.035+- .003
Y	.0052+- .0032	.034+- .021	.004+- .003
ZR			n.d.
MO	.0114+- .0091	.075+- .060	.010+- .008
PD			n.d.
AG	.0189+- .0116	.125+- .077	.016+- .010
CD	.0166+- .0140	.110+- .092	.014+- .012
IN			n.d.
SN			n.d.
SB		.002+- .0003	.0002+- .00003
BA			n.d.
LA		.020+- .0008	.002+- .00008
SM		.004+- .00009	.0004+- .000008
HG			n.d.
PB	.0235+- .0058	.155+- .038	.020+- .005

n.a. not available
n.d. not detected

SAMPLE ID: 09S002
DESCRIPTION: HECHETT 112TH ST. PLANT - SLAG STOCKPILE.
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1349 MICROGRAMS
NAA 1359 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			.580+- .058
NA		1.696+- .335	.125+- .025
MG		21.770+- 2.211	1.602+- .163
AL	3.8960+- .5196	25.713+- 3.429	1.906+- .256
SI	13.3038+- 1.9708	87.805+- 13.007	6.509+- .970
P	.5101+- .0824	3.367+- .544	.250+- .041
S	19.6970+- 2.2908	130.000+- 15.119	9.638+- 1.132
CL			n.d.
K	.4591+- .0967	3.030+- .638	.225+- .047
CA	52.0939+- 5.8936	343.819+- 38.898	25.489+- 2.914
TI	.1533+- .0097	1.012+- .064	.075+- .005
V		.015+- .001	.001+- .0001
CR			n.d.
MN	.3774+- .0206	2.491+- .136	.185+- .011
FE	1.4813+- .0797	9.777+- .526	.725+- .041
NI	.0078+- .0016	.051+- .010	.004+- .001
CU	.1402+- .0085	.925+- .056	.069+- .004
ZN	.0328+- .0030	.216+- .020	.016+- .002
GA			n.d.
AS		.002+- .0007	.0001+- .00006
SE	.0089+- .0016	.059+- .010	.004+- .001
BR	.0057+- .0017	.037+- .011	.003+- .001
RB	.0080+- .0023	.053+- .015	.004+- .001
SR	.0687+- .0047	.453+- .031	.034+- .002
Y	.0099+- .0031	.065+- .021	.005+- .002
ZR			n.d.
MO			n.d.
PD			n.d.
AG			n.d.
CD	.0250+- .0138	.165+- .091	.012+- .007
IN	.0210+- .0176	.139+- .116	.010+- .009
SN	.0238+- .0216	.157+- .142	.012+- .011
SB		.004+- .0004	.0003+- .00003
BA	.1571+- .1035	1.037+- .683	.077+- .051
LA		.023+- .001	.002+- .00008
SM		.005+- .0001	.0004+- .000007
HG			n.d.
PB	.0184+- .0059	.122+- .039	.009+- .003

n.a. not available
n.d. not detected

SAMPLE ID: 09S002
DESCRIPTION: HECHETT 112TH ST. PLANT - SLAG STOCKPILE
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 2158 MICROGRAMS
NAA 2134 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			.730+- .073
NA		2.240+- .489	.105+- .023
MG		70.363+- 3.318	3.297+- .155
AL	7.8464+- 1.0365	51.786+- 6.841	2.400+- .318
SI	23.6505+- 3.3203	156.093+- 21.914	7.233+- 1.018
P	.9178+- .1404	6.058+- .926	.281+- .043
S	27.8695+- 3.2205	183.939+- 21.255	8.523+- .989
CL			n.d.
K	.8149+- .1634	5.378+- 1.079	.249+- .050
CA	88.2523+- 9.8866	582.465+- 65.252	26.990+- 3.036
TI	.3112+- .0186	2.054+- .123	.095+- .006
V		.018+- .003	.0008+- .0001
CR			n.d.
MN	.5661+- .0309	3.736+- .204	.173+- .010
FE	2.8418+- .1444	18.756+- .953	.869+- .045
NI	.0090+- .0016	.059+- .011	.003+- .000
C'U	.2647+- .0144	1.747+- .095	.081+- .004
ZN	.0490+- .0039	.323+- .026	.015+- .001
GA			n.d.
AS		.002+- .0007	.0001+- .00003
SE	.0108+- .0016	.071+- .011	.003+- .000
BR	.0062+- .0017	.041+- .011	.002+- .001
RB	.0112+- .0024	.074+- .016	.003+- .001
SR	.1305+- .0074	.861+- .049	.040+- .002
Y			n.d.
ZR	.0235+- .0163	.155+- .108	.007+- .005
MO	.0162+- .0096	.107+- .063	.005+- .003
PD			n.d.
AG			n.d.
CD			n.d.
IN	.0335+- .0180	.221+- .119	..010+- .006
SN			n.d.
SB		.003+- .0004	.0001+- .00002
BA	.2395+- .1044	1.581+- .689	.073+- .032
LA		.046+- .001	.002+- .00006
SM		.007+- .0001	.0003+- .000005
HG	.0063+- .0033	.042+- .022	.002+- .001
PB	.0239+- .0068	.158+- .045	.007+- .002

n.a. not available
n.d. not detected

SAMPLE ID: 10U008
DESCRIPTION: VULCAN McCOOK QUARRY - QUARRY ROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 683 MICROGRAMS
NAA 668 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.470+-	.147
NA			1.715+-	.290	.257+-	.043
MG			67.975+-	2.830	10.173+-	.424
AL	1.6672+-	.2230	11.004+-	1.472	1.610+-	.218
SI	6.0177+-	.8917	39.717+-	5.885	5.812+-	.870
P	.0824+-	.0221	.544+-	.146	.080+-	.021
S	1.7834+-	.2224	11.770+-	1.468	1.722+-	.218
CL	.0854+-	.0289	.564+-	.191	.082+-	.028
K	.8725+-	.1036	5.759+-	.683	.843+-	.102
CA	17.6265+-	1.9949	116.335+-	13.166	17.025+-	1.961
TI	.1026+-	.0081	.677+-	.053	.099+-	.008
V			.013+-	.001	.002+-	.0002
CR	.0063+-	.0016	.042+-	.010	.006+-	.002
MN	.0571+-	.0040	.377+-	.026	.055+-	.004
FE	.8976+-	.0491	5.924+-	.324	.867+-	.051
NI	.0021+-	.0013	.014+-	.009	.002+-	.001
CU	.0959+-	.0062	.633+-	.041	.093+-	.006
ZN	.0259+-	.0027	.171+-	.018	.025+-	.003
GA	.0016+-	.0010	.010+-	.007	.002+-	.001
AS			.002+-	.0005	.0004+-	.00008
SE					n.d.	
BR	.0027+-	.0016	.018+-	.010	.003+-	.002
RB	.0041+-	.0022	.027+-	.015	.004+-	.002
SR	.0147+-	.0027	.097+-	.018	.014+-	.003
Y					n.d.	
ZR					n.d.	
MO	.0147+-	.0087	.097+-	.057	.014+-	.008
PD					n.d.	
AG	.0179+-	.0112	.118+-	.074	.017+-	.011
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.003+-	.0003	.0004+-	.00005
BA					n.d.	
LA			.012+-	.0007	.002+-	.0001
SM			.001+-	.00007	.0002+-	.00001
HG					n.d.	
PB	.0107+-	.0053	.070+-	.035	.010+-	.005

n.a. not available
n.d. not detected

SAMPLE ID: 10U008
DESCRIPTION: VULCAN McCOOK QUARRY - QUARRY ROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 2699 MICROGRAMS
NAA 1386 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					5.250+-	.525
NA					n.d.	
MG			115.140+-	3.035	8.307+-	.599
AL	6.5327+-	.8862	43.116+-	5.849	1.598+-	.217
SI	23.7867+-	3.4261	156.992+-	22.613	5.817+-	.838
P	.1685+-	.0946	1.112+-	.624	.041+-	.023
S	1.6470+-	.3375	10.871+-	2.227	.403+-	.083
CL	.2473+-	.0854	1.632+-	.564	.060+-	.021
K	2.8380+-	.3550	18.731+-	2.343	.694+-	.087
CA	71.7425+-	8.2409	473.500+-	54.390	17.546+-	2.017
TI	.2643+-	.0211	1.745+-	.139	.065+-	.005
V			.017+-	.001	.001+-	.00009
CR	.0083+-	.0022	.055+-	.015	.002+-	.001
MN	.1306+-	.0085	.862+-	.056	.032+-	.002
FE	2.6598+-	.1405	17.555+-	.927	.651+-	.035
NI	.0126+-	.0018	.083+-	.012	.003+-	.000
CU	.2468+-	.0141	1.629+-	.093	.060+-	.003
ZN	.0627+-	.0046	.414+-	.031	.015+-	.001
GA					n.d.	
AS			.040+-	.002	.003+-	.0002
SE	.0032+-	.0013	.021+-	.009	.001+-	.000
BR	.0100+-	.0018	.066+-	.012	.002+-	.000
RB	.0168+-	.0026	.111+-	.017	.004+-	.001
SR	.0494+-	.0038	.326+-	.025	.012+-	.001
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN	.0218+-	.0181	.144+-	.119	.005+-	.004
SN					n.d.	
SB			.009+-	.0008	.0006+-	.00005
BA	.1629+-	.1046	1.075+-	.690	.040+-	.026
LA					n.d.	
SM			.0001+-	.00008	.00001+-	.000
HG					n.d.	
PB	.0122+-	.0060	.081+-	.040	.003+-	.001

n.a. not available
n.d. not detected

SAMPLE ID: 10U008
DESCRIPTION: VULCAN McCOOK QUARRY - QUARRY ROAD
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	0.663107	0.009191	%	0.004428
BA	n.d.	n.d.	PPM	160
CA .	195100	3100	PPM	1700
CL	1120	50	PPM	130
DY	n.d.	n.d.	PPM	0.936978
MN	151.1141	4.617399	PPM	8.801624
NA	350	60	PPM	190
TI	400	90	PPM	300
V-	8.361404	0.631436	PPM	1.775178
AS	1.148961	0.04748	PPM	0.130877
BR	13.2286	0.656482	PPM	0.247307
K-	4660	100	PPM	170
LA	7.171975	0.104648	PPM	0.057939
SB	0.199051	0.014876	PPM	0.045988
SM	1.213674	0.013283	PPM	0.008018
CE	10.37696	0.186907	PPM	0.42656
CO	1.88324	0.037938	PPM	0.04199
CR	7.681532	0.262502	PPM	0.736558
CS	0.636644	0.032116	PPM	0.086817
FE	2790	80	PPM	60
HF	0.869481	0.028509	PPM	0.071788
LU	0.044651	0.007597	PPM	0.024588
NI	8.826364	2.889978	PPM	9.411974
ND	4.330215	0.313157	PPM	0.963642
RB	11.58178	0.737406	PPM	2.095094
SC	1.337622	0.020857	PPM	0.010443
SE	n.d.	n.d.	PPM	0.25521
TB	0.188642	0.01443	PPM	0.043859
TH	1.391491	0.026584	PPM	0.053331
YB	0.507704	0.041573	PPM	0.127488

n.d. not detected

SAMPLE ID: 10P202
DESCRIPTION: VULCAN McCOOK QUARRY - PAVED HAULROAD
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 622 MICROGRAMS
NAA 606 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			1.670+- .167
NA			n.d.
MG		48.583+- 2.306	8.016+- .381
AL	2.2453+- .2999	14.819+- 1.979	2.382+- .323
SI	8.1868+- 1.2129	54.033+- 8.005	8.684+- 1.302
P	.0821+- .0198	.542+- .131	.087+- .021
S	.1590+- .0703	1.049+- .464	.169+- .075
CL	.0547+- .0272	.361+- .179	.058+- .029
K	1.3547+- .1563	8.941+- 1.032	1.437+- .169
CA	15.3217+- 1.7342	101.123+- 11.445	16.252+- 1.876
TI	.1573+- .0098	1.038+- .064	.167+- .011
V		.018+- .001	.003+- .0002
CR	.0061+- .0014	.040+- .010	.006+- .002
MN	.0354+- .0028	.234+- .019	.038+- .003
FE	.9156+- .0500	6.043+- .330	.971+- .057
NI	.0026+- .0012	.017+- .008	.003+- .001
CU	.0110+- .0020	.073+- .013	.012+- .002
ZN	.0136+- .0020	.089+- .013	.014+- .002
GA			n.d.
AS		.003+- .0006	.0005+- .00009
SE			n.d.
BR	.0046+- .0016	.030+- .010	.005+- .002
RB	.0054+- .0021	.036+- .014	.006+- .002
SR	.0140+- .0025	.092+- .016	.015+- .003
Y			n.d.
ZR			n.d.
MO	.0104+- .0080	.069+- .053	.011+- .008
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.003+- .0003	.0006+- .00005
BA			n.d.
LA		.012+- .0007	.002+- .0001
SM		.003+- .00008	.0004+- .00001
HG			n.d.
PB	.0096+- .0048	.063+- .032	.010+- .005

n.a. not available
n.d. not detected

SAMPLE ID: 10P202
DESCRIPTION: VULCAN McCOOK QUARRY - PAVED HAULROAD
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1947 MICROGRAMS
NAA 1938 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		. PERCENT	
C					1.470+-	.147
NA			1.573+-	.548	.081+-	.028
MG			191.927+-	4.771	9.901+-	.246
AL	5.3473+-	.7070	35.292+-	4.666	1.813+-	.240
SI	19.9490+-	2.8007	131.663+-	18.485	6.763+-	.951
P	.2225+-	.0576	1.468+-	.380	.075+-	.020
S	.6578+-	.1473	4.342+-	.972	.223+-	.050
CL	.4766+-	.0767	3.146+-	.506	.162+-	.026
K	3.0830+-	.3528	20.348+-	2.328	1.045+-	.120
CA	47.8820+-	5.3646	316.021+-	35.406	16.233+-	1.822
TI	.3214+-	.0184	2.121+-	.121	.109+-	.006
V			.042+-	.002	.002+-	.0001
CR	.0067+-	.0019	.044+-	.013	.002+-	.001
MN	.0663+-	.0048	.438+-	.032	.022+-	.002
FE	1.9517+-	.0997	12.881+-	.658	.662+-	.034
NI	.0083+-	.0016	.055+-	.011	.003+-	.001
CU	.0271+-	.0028	.179+-	.018	.009+-	.001
ZN	.0374+-	.0031	.247+-	.020	.013+-	.001
GA					n.d.	
AS			.005+-	.0007	.0002+-	.00004
SE	.0018+-	.0013	.012+-	.009	.001+-	.000
BR	.0059+-	.0017	.039+-	.011	.002+-	.001
RB	.0122+-	.0024	.081+-	.016	.004+-	.001
SR	.0357+-	.0033	.236+-	.022	.012+-	.001
Y					n.d.	
ZR					n.d.	
MO	.0188+-	.0094	.124+-	.062	.006+-	.003
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.002+-	.0004	.0001+-	.00002
BA					n.d.	
LA			.023+-	.0009	.001+-	.00005
SM			.004+-	.00009	.0002+-	.000004
HG					n.d.	
PB	.0195+-	.0057	.129+-	.038	.007+-	.002

n.a. not available
n.d. not detected

SAMPLE ID: 10S014
DESCRIPION: VULCAN McCOOK QUARRY - QUARRY STOCKPILE
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 742 MICROGRAMS
NAA 739 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.a.
NA			n.d.
MG		72.812+- 3.263	9.849+- .441
AL	3.0013+- .4005	19.808+- 2.643	2.669+- .360
SI	10.5115+- 1.5572	69.376+- 10.277	9.347+- 1.398
P	.0770+- .0214	.508+- .141	.069+- .019
S	.2933+- .0571	1.936+- .377	.261+- .051
CL	.0946+- .0274	.624+- .181	.084+- .024
K	1.7614+- .2021	11.625+- 1.334	1.566+- .183
CA	16.8989+- 1.9126	111.533+- 12.623	15.027+- 1.729
TI	.1733+- .0119	1.144+- .078	.154+- .011
V		.031+- .002	.004+- .0002
CR	.0067+- .0016	.044+- .010	.006+- .001
MN	.0271+- .0025	.179+- .016	.024+- .002
FE	.9230+- .0504	6.092+- .332	.821+- .048
NI	.0034+- .0013	.023+- .009	.003+- .001
CU	.0133+- .0021	.088+- .014	.012+- .002
ZN	.0140+- .0020	.092+- .013	.012+- .002
GA			n.d.
AS		.001+- .0005	.0002+- .00007
SE			.n.d.
BR			n.d.
RB	.0047+- .0021	.031+- .014	.004+- .002
SR	.0090+- .0023	.059+- .015	.008+- .002
Y	.0056+- .0029	.037+- .019	.005+- .003
ZR			n.d.
MO	.0096+- .0080	.063+- .053	.008+- .007
PD	.0104+- .0086	.069+- .056	.009+- .008
AG	.0139+- .0103	.092+- .068	.012+- .009
CD	.0218+- .0128	.144+- .084	.019+- .011
IN			n.d.
SN			n.d.
SB		.002+- .0003	.0002+- .00005
BA			n.d.
LA		.015+- .0007	.002+- .00009
SM		.002+- .00007	.0002+- .000009
HG			n.d.
PB			n.d.

n.a. not available
n.d. not detected

SAMPLE ID: 10S014
DESCRIPTION: VULCAN McCOOK QUARRY - QUARRY STOCKPILE
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 1366 MICROGRAMS
NAA 801 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					.670+-	.067
NA			1.035+-	.233	.129+-	.016
MG			87.901+-	2.465	10.973+-	1.370
AL	3.4232+-	.4960	22.593+-	3.273	1.654+-	.240
SI	13.6716+-	2.0782	90.232+-	13.716	6.607+-	1.007
P	.0778+-	.0385	.514+-	.254	.038+-	.019
S					n.d.	
CL	.2388+-	.0466	1.576+-	.308	.115+-	.023
K	2.0593+-	.2580	13.592+-	1.703	• .995+-	.125
CA	32.0158+-	3.7888	211.305+-	25.006	15.471+-	1.838
TI	.1704+-	.0132	1.124+-	.087	.082+-	.006
V			.017+-	.001	.002+-	.0003
CR	.0084+-	.0016	.056+-	.011	.004+-	.001
MN	.0418+-	.0031	.276+-	.021	.020+-	.002
FE	1.0528+-	.0608	6.948+-	.401	.509+-	.030
NI	.0032+-	.0012	.021+-	.008	.002+-	.001
CU	.0190+-	.0023	.125+-	.015	.009+-	.001
ZN	.0066+-	.0017	.044+-	.011	.003+-	.001
GA					n.d.	
AS			.003+-	.0005	.0004+-	.00005
SE					n.d.	
BR					n.d.	
RB	.0070+-	.0020	.046+-	.013	.003+-	.001
SR	.0166+-	.0024	.110+-	.016	.008+-	.001
Y					n.d.	
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG	.0122+-	.0097	.081+-	.064	.006+-	.005
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.006+-	.0008	.0008+-	.0001
BA					n.d.	
LA			.012+-	.0008	.001+-	.0002
SM			.002+-	.00009	.0003+-	.00003
HG					n.d.	
PB					n.d.	

n.a. not available
n.d. not detected

SAMPLE ID: 10S003
DESCRIPTION: VULCAN McCOOK QUARRY - SCREENING
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 428 MICROGRAMS
NAA 386 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.d.
NA		1.011+- .377	.262+- .098
MG		38.352+- 2.630	9.929+- .681
AL	1.9722+- .2635	13.017+- 1.739	3.043+- .416
SI	6.3322+- .9382	41.792+- 6.192	9.770+- 1.476
P	.0571+- .0130	.377+- .086	.088+- .020
S	.0635+- .0358	.419+- .236	.098+- .055
CL	.0625+- .0175	.412+- .116	.096+- .027
K	1.1060+- .1274	7.299+- .841	1.706+- .203
CA	9.6062+- 1.0877	63.401+- 7.179	14.821+- 1.734
TI	.1376+- .0087	.908+- .058	.212+- .015
V		.025+- .002	.006+- .0004
CR	.0060+- .0014	.040+- .010	.009+- .002
MN	.0273+- .0025	.180+- .016	.042+- .004
FE	.7496+- .0412	4.947+- .272	1.156+- .072
NI	.0041+- .0012	.027+- .008	.006+- .002
CU	.0194+- .0024	.128+- .016	.030+- .004
ZN	.0066+- .0017	.043+- .011	.010+- .003
GA			n.d.
AS		.003+- .0005	.0006+- .0001
SE			n.d.
BR			n.d.
RB			n.d.
SR	.0052+- .0021	.034+- .014	.008+- .003
Y			n.d.
ZR			n.d.
MO			n.d.
PD			n.d. .
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.003+- .0003	.0007+- .00009
BA			n.d.
LA		.010+- .0006	.003+- .0002
SM		.001+- .00007	.0003+- .00002
HG			n.d.
PB	.0116+- .0046	.076+- .030	.018+- .007

n.a. not available
n.d. not detected

SAMPLE ID: 10S003
DESCRIPTION: VULCAN McCOOK QUARRY - SCREENING
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 702 MICROGRAMS
NAA 315 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			n.d.
NA			n.d.
MG		30.374+- 1.350	9.631+- 3.054
AL	1.9569+- .2879	12.915+- 1.900	1.839+- .272
SI	7.0469+- 1.0863	46.510+- 7.170	6.623+- 1.027
P	.0454+- .0200	.300+- .132	.043+- .019
S			n.d.
CL			n.d.
K	1.1210+- .1429	7.399+- .943	1.054+- .135
CA	16.2993+- 1.9421	107.575+- 12.818	15.319+- 1.843
TI	.0999+- .0090	.660+- .059	.094+- .009
V		.012+- .0008	.004+- .001
CR	.0063+- .0015	.042+- .010	.006+- .001
MN	.0281+- .0026	.185+- .017	.026+- .003
FE	.7069+- .0425	4.666+- .281	.664+- .041
NI	.0040+- .0013	.026+- .009	.004+- .001
CU	.0114+- .0021	.075+- .014	.011+- .002
ZN			n.d.
GA			n.d.
AS		.001+- .0003	.0004+- .0001
SE			n.d.
BR			n.d.
RB	.0030+- .0021	.020+- .014	.003+- .002
SR	.0090+- .0024	.059+- .016	.008+- .002
Y	.0038+- .0028	.025+- .019	.004+- .003
ZR			n.d.
MO			n.d.
PD			n.d.
AG	.0125+- .0103	.083+- .068	.012+- .010
CD			n.d.
IN			n.d.
SN			n.d.
SB		.001+- .0002	.0004+- .0001
BA			n.d.
LA		.005+- .0004	.002+- .0005
SM		.0009+- .00004	.0003+- .00009
HG			n.d.
PB	.0077+- .0048	.051+- .032	.007+- .005

n.a. not available
n.d. not detected

SAMPLE ID: 11U005 & 11U006
DESCRIPTION: STONY ISLAND AVE. - UNPAVED ROADWAY
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 469 MICROGRAMS
NAA 473 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					2.980+-	.298
NA			1.690+-	.350	.357+-	.074
MG			29.439+-	2.666	6.226+-	.564
AL	1.4395+-	.1927	9.501+-	1.272	2.026+-	.277
SI	5.0405+-	.7470	33.267+-	4.930	7.095+-	1.069
P	.2021+-	.0287	1.334+-	.190	.284+-	.041
S	.2726+-	.0565	1.799+-	.373	.384+-	.080
CL	.1023+-	.0288	.675+-	.190	.144+-	.041
K	.4808+-	.0604	3.173+-	.399	.677+-	.087
CA	15.0029+-	1.6981	99.019+-	11.208	21.118+-	2.460
TI	.0949+-	.0089	.626+-	.059	.134+-	.013
V			.155+-	.004	.033+-	.0008
CR	.0362+-	.0032	.239+-	.021	.051+-	.005
MN	.3439+-	.0190	2.270+-	.125	.484+-	.030
FE	3.0107+-	.1603	19.870+-	1.058	4.238+-	.254
NI	.0076+-	.0018	.050+-	.012	.011+-	.003
CU	.1120+-	.0072	.739+-	.048	.158+-	.011
ZN	.0621+-	.0046	.410+-	.030	.087+-	.007
GA					n.d.	
AS			.005+-	.0005	.001+-	.0001
SE					n.d.	
BR					n.d.	
RB					n.d.	
SR	.0129+-	.0031	.085+-	.021	.018+-	.004
Y	.0066+-	.0038	.043+-	.025	.009+-	.005
ZR					n.d.	
MO	.0114+-	.0106	.076+-	.070	.016+-	.015
PD	.0184+-	.0113	.122+-	.075	.026+-	.016
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.004+-	.0004	.0009+-	.00008
BA					n . d . .	
LA			.007+-	.0006	.002+-	.0001
SM			.001+-	.00007	.0002+-	.00002
HG					n.d.	
PB	.0210+-	.0068	.139+-	.045	.030+-	.010

n.a. not available
n.d. not detected

SAMPLE ID: 11U005 & 11U006
DESCRIPTION: STONY ISLAND AVE. - UNPAVED ROADWAY
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 900 MICROGRAMS
NAA 892 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					1.980+-	.198
NA			1.350+-	.301	.151+-	.017
MG			53.829+-	2.417	6.037+-	.677
AL	2.0208+-	.2882	13.337+-	1.902	1.482+-	.212
SI	7.7846+-	1.1686	51.378+-	7.713	5.708+-	.860
P	.2312+-	.0421	1.526+-	.278	.169+-	.031
S	.0806+-	.0738	.532+-	.487	.059+-	.054
CL	.1992+-	.0422	1.315+-	.279	.146+-	.031
K	.5153+-	.0799	3.401+-	.527	.378+-	.059
CA	26.5954+-	3.1598	175.529+-	20.854	19.501+-	2.332
TI	.1648+-	.0129	1.088+-	.085	.121+-	.010
V			.183+-	.005	.021+-	.002
CR	.0522+-	.0050	.344+-	.033	.038+-	.004
MN	.6719+-	.0387	4.435+-	.255	.493+-	.029
FE	5.4971+-	.2965	36.281+-	1.957	4.031+-	.224
NI	.0062+-	.0017	.041+-	.011	.005+-	.001
CU	.2621+-	.0149	1.730+-	.098	.192+-	.011
ZN	.0900+-	.0062	.594+-	.041	.066+-	.005
GA					n.d.	
AS			.005+-	.0006	.0006+-	.00006
SE					n.d.	
BR	.0023+-	.0019	.015+-	.013	.002+-	.001
RB	.0072+-	.0027	.048+-	.018	.005+-	.002
SR	.0252+-	.0034	.166+-	.023	.018+-	.003
Y	.0059+-	.0037	.039+-	.025	.004+-	.003
ZR					n.d.	
MO					n.d.	
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN					n.d.	
SB			.003+-	.0003	.0004+-	.00004
BA					n.d.	
LA			.009+-	.0006	.001+-	.0001
SM			.002+-	.00006	.0002+-	.00002
HG					n.d.	
PB	.0227+-	.0069	.150+-	.046	.017+-	.005

n.a. not available
n.d. not detected

SAMPLE ID: 11U005 & 11U006
DESCRIPTION: STONY ISLAND AVE. - UNPAVED ROADWAY
PARTICLE SIZE: BULK (< 53 MICRONS)

ELEMENT	CONCEN.	ERROR	UNITS	DET. LMT.
AL	n.d.	n.d.	%	21.70146
BA	n.d.	n.d.	PPM	800
CA	178000	6000	PPM	9000
CL	1340	90	PPM	240
DY	0	0	PPM	3.679871
MN	8070	110	PPM	32.49209
NA	2270	160	PPM	500
TI	n.d.	n.d.	PPM	14000
V-	170	60	PPM	210
AS	2.509577	0.06371	PPM	0.15071
BR	7.160006	0.369989	PPM	0.324198
K-	2850	90	PPM	240
LA	6.413587	0.098627	PPM	0.085148
SB	1.553118	0.025784	PPM	0.045594
SM	1.266748	0.013651	PPM	0.009693
CE	14.74983	0.3031	PPM	0.7933
CO	3.348412	0.054763	PPM	0.053287
CR	682.7659	7.419974	PPM	1.817686
CS	0.349402	0.053721	PPM	0.172926
FE	47000	1300	PPM	140
HF	1.656407	0.054665	PPM	0.147647
LU	0.127746	0.022873	PPM	0.074508
NI	31.61177	5.973773	PPM	19.36698
ND	4.430573	0.686754	PPM	2.225432
RB	11.42887	1.875462	PPM	6.05099
SC	1.999615	0.031109	PPM	0.020869
SE	n.d.	n.d.	PPM	0.441799
TB	0.592614	0.029802	PPM	0.088265
TH	2.197031	0.044666	PPM	0.104442
YB	1.145682	0.084855	PPM	0.261119

n.d. not detected

SAMPLE ID: 12P001 & 12P002 & 12P003
DESCRIPTION: 122ND STREET - PAVED ROADWAY
PARTICLE SIZE: FINE (< 2.5 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 313 MICROGRAMS
NAA 320 MICROGRAMS

ELEMENT	UG/CM2	UG/FILTER	PERCENT
C			4.030+- .403
NA		3.087+- .456	.966+- .143
MG		9.665+- 2.735	3.023+- .856
AL	3.2269+- .4304	21.298+- 2.840	6.797+- .943
SI	7.6193+- 1.1289	50.287+- 7.450	16.049+- 2.455"
P .	.1408+- .0173	.930+- .114	.297+- .038
S	.3767+- .0561	2.486+- .370	.794+- .122
CL	.1491+- .0258	.984+- .170	.314+- .056
K	1.2367+- .1414	8.163+- .934	2.605+- .314
CA	3.8120+- .4323	25.159+- 2.853	8.030+- .961
TI	.1939+- .0116	1.280+- .077	.408+- .029
V		.052+- .002	.016+- .0008
CR	.0458+- .0034	.302+- .023	.096+- .008
MN	.0979+- .0061	.646+- .040	.206+- .015
FE	3.0600+- .1628	20.196+- 1.075	6.446+- .422
NI	.0086+- .0016	.056+- .010	.018+- .003
CU	.0340+- .0030	.224+- .020	.072+- .007.
ZN	.0540+- .0039	.356+- .026	.114+- .009
GA	.0017+- .0009	.011+- .006	.004+- .002
AS		.006+- .0007	.002+- .0002
SE			n.d.
BR			n.d.
RB			n.d.
SR			n.d.
Y			n.d.
ZR			n.d.
MO			n.d.
PD			n.d.
AG			n.d.
CD			n.d.
IN			n.d.
SN			n.d.
SB		.005+- .0004	.001+- .0001
BA			n.d.
LA		.012+- .0007	.004+- .0002
SM		.001+- .00007	.0004+- .00002
HG	.0048+- .0029	.032+- .019	.010+- .006
PB	.0143+- .0049	.095+- .032	.030+- .010

n.a. not available
n.d. not detected

SAMPLE ID: 12P001 & 12P002 & 12P003
DESCRIPTION: 122ND STREET - PAVED ROADWAY
PARTICLE SIZE: COARSE (2.5 - 10 MICRONS)

EXPOSED AREA: 6.60 SQUARE CM
MASS OF DEPOSIT: XRF 797 MICROGRAMS
NAA 723 MICROGRAMS

ELEMENT	UG/CM2		UG/FILTER		PERCENT	
C					6.150+-	.615
NA			3.189+-	.251	.441+-	.061
MG			17.626+-	1.482	2.438+-	.337
AL	7.6832+-	1.0589	50.709+-	6.989	6.365+-	.882
SI	23.4492+-	3.4024	154.765+-	22.456	19.427+-	2.831
P	.2778+-	.0357	1.833+-	.235	.230+-	.030
S	.9085+-	.1384	5.996+-	.913	.753+-	.115
CL	.4674+-	.0661	3.085+-	.436	.387+-	.055
K	3.1328+-	.3666	20.677+-	2.420	2.595+-	.306
CA	10.6057+-	1.2337	69.998+-	8.143	8.786+-	1.029
TI	.4674+-	.0291	3.085+-	.192	.387+-	.025
•V			.045+-	.002	.006+-	.0009
CR	.0770+-	.0061	.508+-	.041	.064+-	.005
MN	.2031+-	.0134	1.341+-	.088	.168+-	.011
FE	6.8707+-	.3652	45.347+-	2.410	5.692+-	.313
NI	.0177+-	.0019	.117+-	.013	.015+-	.002
CU	.0949+-	.0060	.626+-	.040	.079+-	.005
ZN	.1189+-	.0072	.785+-	.047	.099+-	.006
GA					n. d.	
AS			.004+-	.0006	.0009+-	.0002
SE	.0019+-	.0010	.013+-	.007	.002+-	.001
BR	.0020+-	.0012	.013+-	.008	.002+-	.001
RB	.0153+-	.0020	.101+-	.013	.013+-	.002
SR	.0210+-	.0023	.139+-	.015	.017+-	.002
Y					n.d.	
ZR					n.d.	
MO	.0125+-	.0066	.083+-	.044	.010+-	.006
PD					n.d.	
AG					n.d.	
CD					n.d.	
IN					n.d.	
SN	.0265+-	.0166	.175+-	.110	.022+-	.014
SB			.007+-	.0005	.0009+-	.0001
BA					n.d.	
LA			.020+-	.0009	.003+-	.0004
SM			.003+-	.00007	.0007+-	.0001
HG					n.d.	
PB	.0591+-	.0056	.390+-	.037	.049+-	.005

n.a. not available
n.d. not detected

APPENDIX B

Quality Assurance
(Standard.asc)
(Naaxrf.asc)

Standard Reference Materials Used In Filter Analysis

Neutron Activation Analysis: NBS Standard Reference Material Trace Elements in Coal.

Element	Unit	1632A	NAA Value	1632B	NAA Value
AL	%	(3.07)	3.22 ± 0.15	0.855 ± 0.019	0.98 ± 0.03
CA	%	0.23 ± 0.03	0.22 ± 0.01	0.204 ± 0.006	0.21 ± 0.01
CL	ppm	(756 ± 30)	739 ± 17	(1260)	1102 ± 34
CU	ppm	16.5 ± 1	n.d.	6.28 ± 0.3	n.d.
MG	ppm	(1000)	n.d.	383 ± 80	n.d.
MN	ppm	28 ± 2	27.1 ± 1.1	12.4 ± 1	11.34 ± 0.66
NA	ppm	840 ± 40	740 ± 14	515 ± 11	456.1 ± 17.1
TI	ppm	(1800)	1600 ± 40	454 ± 17	462.27 ± 12.3
V	ppm	44 ± 3	40.4 ± 1	(14)	13.56 ± 0.29
AS	ppm	9.3 ± 1	9.2 ± 0.2	3.72 ± 0.09	3.65 ± 0.08
K	ppm	4200 ± 200	4200 ± 100	748 ± 28	774 ± 53
LA	ppm	15 ± 2	15.3 ± 0.08	(5.1)	4.5 ± 0.2
SB	ppm	(0.6)	0.65 £ 0.02	(0.24)	0.26 ± 0.01

( ) information value
n.d. not detected

X-Ray Fluorescence: NBS Standard Reference Materials 1832 and 1833.

Element	Certified Value (ug/cm^2)	XRF % Dev. from C.V. Mean	S.D.	Range	NBS % Uncertainty
AL	15.0 ± 1.0	-5.08	1.66	6.1	6.7
SI	36.7 ± 2.4	-4.58	1.87	8.4	6.5
K	18.9 ± 1.9	-2.28	1.53	6.1	10.0
CA	19.4 ± 1.3	-1.71	1.16	4.9	6.7
TI	13.6 ± 2.0	-1.32	1.21	4.6	14.7
V	4.7 ± 0.5	-7.07	1.37	5.4	10.4
MN	4.4 ± 0.5	5.00	1.12	4.0	9.2
FE	15.2 ± 0.5	1.77	0.69	2.4	3.3
CU	2.4 ± 0.2	-0.15	1.08	4.3	6.6
ZN	5.6 ± 0.3	0.14	0.92	3.8	6.0
PB	16.9 ± 0.9	4.53	0.76	2.9	5.3

Standard Reference Materials Used In NAA Bulk Analysis

Neutron Activation Analysis: NBS Standard Reference Material Trace Elements in Coal.

Element	Unit	1632A	NAA Value	1632B	NAA Value
AL	%	(3.07)	3.15 ± 0.04	0.855 ± 0.019	0.96 ± 0.01
BA	ppm	120 ± 15	n.d..	6.75 ± 2.1	n.d.
CA	%	0.23 ± 0.03	0.279 ± 0.03	0.204 ± 0.006	0.185 ± 0.022
CL	ppm	(756 ± 30)	812 ± 33	(1260)	1167 ± 36
DY	ppm	(2.06 ± 0.14)	1.83 ± 0.30	n.a.	1.04 ± 0.19
MN	ppm	28 ± 2	25.8 ± 2	12.4 ± 1	15.2 ± 1.3
NA	ppm	840 ± 40	980 ± 70	515 ± 11	569 ± 32
TI	ppm	(1800)	1590 ± 80	454 ± 17	440 ± 50
V	ppm	44 ± 3	47 ± 2	(14)	15 ± 0.8
AS	ppm	9.3 ± 1	8.5 ± 0.2	3.72 ± 0.09	3.49 ± 0.09
BR	ppm	41 ± 2	39 ± 2	(17)	16.5 ± 0.8
K	ppm	4200 ± 200	3680 ± 150	748 ± 28	760 ± 70
LA	ppm	15 ± 2	12 ± 0.2	(5.1)	3.8 ± 0.07
SB	ppm	(0.6)	0.65 ± 0.03	(0.24)	0.026 ± 0.02
SM	ppm	(2.4 ± 0.3)	2.8 ± 0.03	(0.87)	0.94 ± 0.01
CE	ppm	(29 ± 2)	25.3 ± 0.4	(9)	8.1 ± 0.2
CO	ppm	(6.7 ± 0.4)	6.3 ± 0.1	2.29 ± 0.17	2.45 ± 0.05
CR	ppm	34.3 ± 1.5	27.2 ± 0.8	(11)	8.6 ± 0.5
CS	ppm	(2.3 ± 0.2)	2.0 ± 0.1	(0.44)	0.52 ± 0.04
FE	%	1.11 ± 0.02	0.932 ± 0.026	0.759 ± 0.045	0.664 ± 0.019
HF	ppm	(1.62 ± 0.15)	1.46 ± 0.07	(0.43)	0.42 ± 0.04
LU	ppb	(170 ± 15)	159 ± 21	n.a.	72 ± 23
NI	ppm	19.4 ± 1	n.d.	6.1 ± 0.27	n.d.
ND	ppm	(12 ± 2)	11 ± 0.8	n.a.	4.3 ± 0.7
RB	ppm	(30 ± 2)	24 ± 2	5.05 ± 0.11	6.89 ± 1.26
SC	ppm	(6.3 ± 0.3)	5.8 ± 0.09	(1.9)	1.9 ± 0.03
SE	ppm	2.6 ± 0.7	n.d.	1.29 ± 0.11	1.05 ± 0.25
TB	ppb	(311 ± 17)	501 ± 39	n.a.	186 ± 22
TH	ppm	4.5 ± 0.2	4.1 ± 0.07	1.342 ± 0.036	1.273 ± 0.036
YB	ppm	(1.08 ± 0.09)	1.06 ± 0.10	n.a.	0.26 ± 0.07

( ) information value
n.a. not available
n.d. not detected

Comparison of XRF and NAA Analytical Results

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	AL	7.49	1.02	8.73	0.28	0.857961
01U004*	AL	4.73	0.64	5.49	0.18	0.861566
02U001	AL	6.39	0.86	6.71	0.22	0.95231
02U002	AL	7.41	1	7.72	0.25	0.959845
03U004	AL	5.91	0.82	8.2	0.27	0.720732
03S010	AL	10.13	1.37	11.83	0.38	0.856298
03S011	AL	4.73	0.63	3.98	0.13	1.188442
04U007	AL	4.82	0.67	5.11	0.17	0.943249
04S004	AL	7.93	1.39	12.51	0.44	0.633893
04P184	AL	6.84	0.93	8.18	0.27	0.836186
05U014	AL	1.24	0.17	1.39	0.05	0.892086
05P014	AL	2.54	0.34	3.24	0.11	0.783951
05S002	AL	0.96	0.13	0.83	0.03	1.156627
05S005	AL	0.64	0.09	0.66	0.02	0.969697
05S101	AL	3.1	0.43	3.63	0.12	0.853994
06U004	AL	1.45	0.2	1.85	0.06	0.783784
06S003	AL	2.36	0.32	2.93	0.1	0.805461
06P001	AL	1.71	0.24	2.17	0.07	0.788018
07P008	AL	1.44	0.2	1.44	0.05	1
07S301	AL	2.22	0.3	2.46	0.08	0.902439
07S302	AL	0.2	0.03	0.1	0.005	2
08U003	AL	1.36	0.18	1.41	0.05	0.964539
08S202	AL	1.43	0.19	1.46	0.05	0.979452
08S206	AL	1.73	0.23	1.77	0.06	0.977401
09U005	AL	2.5	0.34	2.21	0.07	1.131222
09S002	AL	1.91	0.26	1.35	0.04	1.414815
10U008	AL	1.61	0.22	1.83	0.06	0.879781
10P202	AL	2.38	0.32	2.58	0.08	0.922481
10S014	AL	2.67	0.36	3.04	0.1	0.878289
10S003	AL	3.04	0.42	4.22	0.14	0.720379
11U005*	AL	2.03	0.28	2.31	0.08	0.878788
12P001*	AL	6.8	0.94	7.98	0.26	0.85213

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	AL	6.83	0.94	5.94	1.26	1.149832
01U004*	AL	4.14	0.58	3.66	0.26	1.131148
02U001	AL	5.42	0.76	5.25	0.38	1.032381
02U002	AL	6.32	0.9	5.86	0.52	1.078498
03U004	AL	5.76	0.8	6.21	0.95	0.927536
03S010	AL	7.71	1.11	7.59	0.94	1.01581
03S011	AL	4.84	0.64	3.15	0.1	1.536508
04U007	AL	5.29	0.72	7.73	0.25	0.684347
04S004	AL	8.47	1.12	12.68	3.51	0.667981
04P184	AL	5.67	0.8	4.61	0.47	1.229935
05U014	AL	1.23	0.16	1.41	0.46	0.87234
05P014	AL	2.07	2.89	1.83	0.12	1.131148
05S002	AL	0.77	0.1	0.74	0.02	1.040541
05S005	AL	0.74	0.1	0.37	0.01	2
05S101	AL	1.77	0.27	1.73	0.32	1.023121
06U004	AL	1.24	0.17	1.73	0.26	0.716763
06S003	AL	2	2.6	1.56	0.1	1.282051
06P001	AL	1.71	0.24	1.59	1.78	1.075472
07P008	AL	1.68	0.22	1.33	0.04	1.263158
07S301	AL	2.4	0.33	2.12	0.2	1.132075
07S302	AL	0.31	0.04	0.13	0.01	2.384615
08U003	AL	1.71	0.24	1.04	0.05	1.644231 '
08S202	AL	1.72	0.24	1.14	0.06	1.508772
08S206	AL	2.14	0.28	1.68	.0.07	1.27381
09U005	AL	2.61	0.35	1.62	0.05	1.611111
09S002	AL	2.4	0.32	2.17	0.07	1.105991
10U008	AL	1.6	0.22	1.25	0.09	1.28
10P202	AL	1.81	0.24	1.75	0.06	1.034286
10S014	AL	1.65	0.24	1.77	0.22	0.932203
10S003	AL	1.84	0.27	1.91	0.61	0.963351
11U005*	AL	1.48	0.21	1.43	0.16	1.034965
12P001*	AL	6.37	0.88	3.01	0.42	2.116279

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR. %	XRF/NAA
01UO10	CA	8.66	1.01	8.94	0.49	0.96868
01U004*.	CA	13.713	1.58	14.15	0.52	0.969117
02U001	CA	15.78	1.82	15.5	0.55	1.018065
02U002	CA	13.184	1.52	12.68	0.49	1.039748
03U004	CA	7	0.84	9.53	0.61	0.734523
03S010	CA	3.51	0.41	3.87	0.32	0.906977
03S011	CA	4.68	0.54	4.22	0.18	1.109005
04U007	CA	10.14	1.21	9.89	0.59	1.025278
04S004	CA	3.45	0.56	4.56	0.99	0.756579
04P184	CA	8.98	1.05	10.18	0.52	0.882122
05U014	CA	16.39	1.86	14.98	0.4	1.094126
05P014	CA	10.15	1.17	11.14	0.48	0.911131
05S002	CA	6.99	0.82	5.95	0.4	1.17479
05S005	CA	3.31	0.38	3.1	0.34	1.067742
05S101	CA	9.09	1.08	9.62	0.62	0.944906
. 06U004	CA	0.48	0.06	0.69	0.13	0.695652
06S003	CA	0.24	0.03	0.43	0.11	0.55814
06P001	CA	1.43	0.17	1.41	0.19	1.014184
07P008	CA	14.8	1.71	14.89	0.54	0.993956
07S301	CA	29.08	3.4	30.34	0.98	0.958471
07S302	CA	1.24	0.15	1.44	0.18	0.861111
08U003	CA	24.42	2.79	25.83	0.59	0.945412
08S202	CA	4.74	0.54	4.19	0.26	1.131265
08S206	CA	30.79	3.53	33.4	0.76	0.921856
09U005	CA	23.19	2.66	20.13	0.51	1.152012
09S002	CA	25.489	2.91	23.25	0.49	1.096301
10U008	CA	17.03	1.96	18.34	0.59	0.928571
10P202	CA	16.25	1.88	15.63	0.54	1.039667
10S014	CA	15.03	1.73	16.35	0.53	0.919266
10S003	CA	14.821	1.73	18.68	0.75	0.793415
11U005*	CA	21.12	2.46	21.95	0.75	0.962187
12P001*	CA	8.03	0.96	9	0.58	0.892222

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	CA	8.21	0.96	6.72	1.43	1.221726
01U004*	CA	12.704	1.5	11.42	0.81	1.112434
02U001	CA	14.62	1.73	14.13	1.03	1.034678
02U002	CA	12.06	1.46	10.53	0.94	1.145299
03U004	CA	8.52	0.99	8.02	1.22	1.062344
03S010	CA	4.19	0.5	3.98	0.49	1.052764
03S011	CA	6.73	0.76	5.9	0.15	1.140678
04U007	CA	8.99	1.05	10.69	0.52	0.840973
04S004	CA	2.14	0.26	2.17	0.6	0.986175
04P184	CA	10.27	1.21	6.97	0.71	1.473458
05U014	CA	16.06	1.81	16.41	0.45	0.978672
05P014	CA	13.9	1.61	12.38	0.83	1.122779
05S002	CA	5.73	0.65	4.98	0.22	1.150602
05S005	CA	2.73	0.32	2.38	0.05	1.147059
05S101	CA	8.95	1.09	8.1	1.48	1.104938
06U004	CA	0.28	0.03	0.62	0.09	0.451613
06S003	CA	0.25	0.03	0.27	0.02	0.925926
06P001	CA	1.66	0.2	1.72	0.19	0.965116
07P008	CA	14.44	1.62	13.51	0.34	1.068838
07S301	CA	35.58	4.1	32.61	3.14	1.091076
07S302	CA	2.82	0.33	2.53	0.2	1.114625
08U003	CA	24.76	2.92	17.52	0.92	1.413242
08S202	CA	4.63	0.52	3.43	0.14	1.349854
08S206	CA	34.88	4.12	28.64	1.6	1.217877
09U005	CA	20.87	2.39	14.18	0.41	1.471791
09S002	CA	26.99	3.04	25.87	0.47	1.043293
10U008	CA	17.55	2.02	15.16	1.09	1.157652
10P202	CA	16.23	1.82	16.35	0.34	0.992661
10S014	CA	15.47	1.84	17.24	2.15	0.897332
10S003	CA	15.32	1.84	15.3	4.85	1.001307
11U005*	CA	19.5	2.33	17.82	2	1.094276
12P001*	CA	8.79	1.03	6.05	0.84	1.452893

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	MN	0.196	0.13	0.186	0.007	1.053763
01U004*	MN	0.377	0.023	0.402	0.011	0.937811
02U001	MN	0.374	0.022	0.338	0.1	1.106509
02U002	MN	0.315	0.019	0.28	0.008	1.125
03U004	MN	0.155	0.012	0.161	0.007	0.962733
03S010	MN	0.061	0.005	0.052	0.004	1.173077
03S011	MN	0.195	0.012	0.174	0.005	1.12069
04U007	MN	0.275	0.021	0.266	0.009	1.033835
04S004	MN	0.075	0.015	0.069	0.008	1.086957
04P184	MN	0.282	0.018	0.277	0.009	1.018051
05U014	MN	0.458	0.027	0.435	0.01	1.052874
05P014	MN	0.664	0.041	0.73	0.019	0.909589
05S002	MN	0.273	0.023	0.254	0.008	1.074803
05S005	MN	2.879	0.175	3.362	0.08	0.856336
05S101	MN	1.019	0.072	1.082	0.028	0.941774
06U004	MN	0.065	0.005	0.059	0.003	1.101695
06S003	MN	0.018	0.002	0.017	0.002	1.058824
06P001	MN	0.051	0.005	0.051	0.003	1
07P008	MN	0.623	0.04	0.569	0.15	1.094903
07S301	MN	0.176	0.012	0.166	0.006	1.060241
07S302	MN	1.326	0.09	1.6	0.038	0.82875
08U003	MN	0.759	0.042	0.763	0.018	0.994758
08S202	MN	0.769	0.044	0.644	0.016	1.194099
08S206	MN	1.183	0.066	1.26	0.03	0.938889
09U005	MN	0.306	0.018	0.266	0.007	1.150376
09S002	MN	0.185	0.011	0.151	0.004	1.225166
10U008	MN	0.055	0.004	0.056	0.003	0.982143
10P202	MN	0.038	0.003	0.034	0.002	1.117647
10S014	MN	0.024	0.002	0.023	0.002	1.043478
10S003	MN	0.042	0.004	0.044	0.003	0.954545
11U005*	MN	0.484	0.03	0.505	0.014	0.958416
12P001*	MN	0.206	0.015	0.191	0.008	1.078534

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	MN	0.207	0.012	0.16	0.034	1.29375
01U004*	MN	0.436	0.025	0.394	0.28	1.106599
02U001	MN	0.388	0.023	0.381	0.028	1.018373
02U002	MN	0.318	0.019	0.283	0.025	1.123675
03U004	MN	0.151	0.009	0.125	0.19	1.208
03S010	MN	0.061	0.004	0.037	0.005	1.648649
03S011	MN	0.153	0.01	0.159	0.004	0.962264
04U007	MN	0.292	0.017	0.342	0.01	0.853801
04S004	MN	0.04	0.004	0.025	0.007	1.6
04P184	MN	0.283	0.018	0.211	0.022	1.341232
05U014	MN	0.536	0.032	0.555	0.14	0.965766
05P014	MN	0.534	0.033	0.526	0.035	1.015209
05S002	MN	0.179	0.021	0.254	0.007	0.704724
05S005	MN	1.82	0.109	2.275	0.051	0.8
05S101	MN	0.853	0.06	0.836	0.153	1.020335
06U004	MN	0.026	0.002	0.042	0.006	0.619048
06S003	MN	0.017	0.001	0.01	0.001	1.7
06P001	MN	0.047	0.003	0.037	0.004	1.27027
07P008	MN	0.55	0.032	0.601	0.014	0.915141
07S301	MN	0.085	0.006	0.085	0.008	1
07S302	MN	1.219	0.082	1.192	0.096	1.022651
08U003	MN	0.989	0.056	0.744	0.039	1.329301
08S202	MN	0.499	0.38	0.54	0.021	0.924074
08S206	MN	1.412	0.079	1.21	0.68	1.166942
09U005	MN	0.283	0.017	0.192	0.005	1.473958
09S002	MN	0.173	0.01	0.177	0.005	0.977401
10U008	MN	0.032	0.002	0.028	0.002	1.142857
10P202	MN	0.022	0.002	0.023	0.001	0.956522
10S014	MN	0.02	0.002	0.02	0.002	1
10S003	MN	0.026	0.003	0.38	0.012	0.068421
11U005*	MN	0.493	0.029	0.447	0.05	1.102908
12P001*	MN	0.168	0.011	0.127	0.018	1.322835

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	TI	0.407	0.026	0.53	0.076	0.767925
01U004*	TI	0.268	0.019	0.331	0.058	0.809668
02U001	TI	0.239	0.018	0.36	0.061	0.663889
02U002	TI	0.296	0.021	0.342	0.061	0.865497
03U004	TI	0.373	0.027	0.466	0.09	0.800429
03S010	TI	0.466	0.029	0.496	0.08	0.939516
03S011	TI	0.198	0.013	0.168	0.023	1.178571
04U007	TI	0.454	0.032	0.426	0.061	1.065728
04S004	TI	1.079	0.138	1.457	0.246	0.740563
04P184	TI	0.337	0.025	0.549	0.08	0.613843
05U014	TI	0.083	0.01	0.124	0.023	0.669355
05P014	TI	0.105	0.012	0.227	0.058	0.462555
05S002	TI	0.032	0.024	n.d.	n.d.	n.a.
05S005	TI	n.d.	n.d.	n.d.	n.d.	n.a.
05S101	TI	0.078	0.018	n.d.	n.d.	n.a.
06U004	TI	0.129	0.01	0.186	0.037	0.693548
06S003	TI	0.151	0.011	0.162	0.041	0.932099
06P001	TI	0.123	0.01	0.254	0.042	0.484252
07P008	TI	0.095	0.014	n.d.	n.d.	n.a.
07S301	TI	0.054	0.008	n.d.	n.d.	n.a.
07S302	TI	n.d.	n.d.	n.d.	n.d.	n.a.
08U003	TI	0.182	0.011	0.192	0.04	0.947917
08S202	TI	0.012	0.026	n.d.	n.d.	n.a.
08S206	TI	0.272	0.019	0.431	0.06	0.63109
09U005	TI	0.143	0.01	0.075	0.02	1.906667
09S002	TI	0.075	0.005	0.043	0.015	1.744186
10U008	TI	0.099	0.008	0.142	0.028	0.697183
10P202	TI	0.167	0.011	0.143	0.027	1.167832
10S014	TI	0.154	0.011	0.164	0.035	0.939024
10S003	TI	0.212	0.015	0.242	0.056	0.876033
11U005*	TI	0.134	0.013	0.303	0.058	0.442244
12P001*	TI	0.408	0.029	0.475	0.087	0.858947

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	TI	0.368	0.022	0.33	0.07	1.115152
01U004*	TI	0.251	0.016	0.243	0.017	1.032922
02U001	TI	0.266	0.017	0.261	0.019	1.019157
02U002	TI	0.339	0.021	0.315	0.028	1.07619
03U004	TI	0.401	0.023	0.292	0.045	1.373288
03S010	TI	0.468	0.027	0.343	0.042	1.364431
03S011	TI	0.18	0.012	0.151	0.033	1.192053
04U007	TI	0.433	0.027	0.662	0.075	0.654079
04S004	TI	0.839	0.05	0.877	0.243	0.95667
04P184	TI	0.349	0.023	0.268	0.027	1.302239
05U014	TI	0.085	0.012	0.142	0.034	0.598592
05P014	TI	0.062	0.011	0.056	0.004	1.107143
05S002	TI	n.d.	0.03	0.061	0.023	n.a.
05S005	TI	n.d.	n.d.	n.d.	n.d.	n.a.
05S101	TI	n.d.	n.d.	0.086	0.015	n.a.
06U004	TI	0.086	0.005	0.104	0.016	0.826923
06S003	TI	0.129	0.007	0.112	0.007	1.151786
06P001	TI	0.108	0.007	0.077	0.009	1.402597
07P008	TI	0.078	0.011	0.151	0.033	0.516556
07S301	TI	0.057	0.003	0.055	0.005	1.036364
07S302	TI	n.d.	n.d.	n.d.	n.d.	n.a.
08U003	TI	0.129	0.007	0.103	0.005	1.252427
08S202	TI	n.d.	n.d.	0.081	0.003	n.a.
08S206	TI	0.251	0.017	n.d.	n.d.	n.a.
09U005	TI	0.123	0.009	0.121	0.025	1.016529
09S002	TI	0.095	0.006	0.098	0.019	0.969388
10U008	TI	0.065	0.005	0.101	0.007	0.643564
10P202	TI	0.109	0.006	0.101	0.016	1.079208
10S014	TI	0.082	0.006	0.15	0.019	0.546667
10S003	TI	0.094	0.009	0.16	0.05	0.5875
11U005*	TI	0.121	0.01	n.d.	n.d.	n.a.
12P001*	TI	0.387	0.025	0.33	0.07	1.172727

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	K	2.968	0.347	3.7	0.141	0.802162
01U004*	K	1.712	0.199	2.164	0.095	0.791128
02U001	K	2.443	0.283	2.452	0.08	0.99633
02U002	K	3.11	0.36	3.146	0.096	0.988557
03U004	K	2.403	0.29	3.226	0.144	0.744885
03S010	K	4.276	0.495	4.797	0.126	0.89139
03S011	K	1.366	0.157	1.267	0.54	1.078137
04U007	K	1.442	0.176	2.032	0.18	0.709646
04S004	K	1.684	0.277	3.469	0.293	0.485442
04P184	K	2.555	0.3	3.072	0.103	0.831706
05U014	K	0.165	0.034	0.341	0.05	0.483871
05P014	K	0.725	0.087	0.849	0.054	0.853946
05S002	K	0.057	0.024	0.49	0.097	0.116327
05S005	K	0.139	0.024	0.201	0.04	0.691542
05S101	K	1.779	0.214	2	0.113	0.8895
06U004	K	0.237	0.03	0.467	0.053	0.507495
06S003	K	0.476	0.057	0.655	0.06	0.726718
06P001	K	0.313	0.04	0.65	0.064	0.481538
07P008	K	0.276	0.044	0.5	0.69	0.552
07S301	K	n.d.	n.d.	0.35	0.062	n.a.
07S302	K	0.326	0.044	0.287	0.076	1.135889
08U003	K	0.29	0.048	0.4	0.071	0.725
08S202	K	0.176	0.027	0.294	0.05	0.598639
08S206	K	0.137	0.048	0.261	0.041	0.524904
09U005	K	0.456	0.066	0.681	0.052	0.669604
09S002	K	0.225	0.047	0.385	0.041	0.584416
10U008	K	0.843	0.102	1.124	0.063	0.75
10P202	K	1.437	0.169	1.431	0.084	1.004193
10S014	K	1.566	0.183	1.817	0.069	0.86186
10S003	K	1.706	0.203	2.358	0.111	0.723494
11U005*	K	0.677	0.087	0.987	0.067	0.685917
12P001*	K	2.605	0.314	3.07	0.159	0.848534

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	K	2.747	0.32	2.644	0.563	1.038956
01U004*	K	1.378	0.165	1.523	0.108	0.904793
02U001	K	2.074	0.248	1.833	0.133	1.131478
02U002	K	2.686	0.326	2.347	'0.21	1.14444
03U004	K	2.447	0.288	2.435	0.372	1.004928
03S010	K	3.474	0.424	3.398	0.421	1.022366
03S011	K	1.158	0.13	0.914	0.026	1.266958
04U007	K	1.422	0.167	1.331	0.088	1.06837
04S004	K	1.982	0.233	2.345	0.649	0.845203
04P184	K	2.192	0.263	1.635	0.167	1.340673
05U014	K	0.162	0.033	0.302	0.034	0.536424
05P014	K	0.387	0.055	0.419	0.028	0.923628
05S002	K	0.123	0.023	0.18	0.07	0.683333
05S005	K	0.043	0.014	0.065	0.001	0.661538
05S101	K	0.927	0.127	0.834	0.153	1.111511
06U004	K	0.141	0.017	0.297	0.045	0.474747
06S003	K	0.292	0.033	0.276	0.018	1.057971
06P001	K	0.306	0.037	0.151	0.017	2.02649
07P008	K	0.257	0.038	0.361	0.2	0.711911
07S301	K	n.d.	n.d.	0.282	0.027	n.a.
07S302	K	0.23	0.038	0.324	0.026	0.709877
08U003	K	0.134	0.042	0.132	0.007	1.015152
08S202	K	0.068	0.018	0.163	0.006	0.417178
08S206	K	n.d.	n.d.	0.225	0.13	n.a.
09U005	K	0.405	0.059	0.348	0.035	1.163793
09S002	K	0.249	0.05	0.352	0.02	0.707386
10U008	K	0.694	0.087	0.264	0.019	2.628788
10P202	K	1.045	0.12	0.962	0.033	1.086279
10S014	K	0.995	0.125	1.028	0.128	0.967899
10S003	K	1.054	0.135	1.424	0.451	0.740169
11U005*	K	0.378	0.059	0.514	0.058	0.735409
12P001*	K	2.595	0.306	2.644	0.563	0.981467

n.a. not available
n.d. not detected
* composite sample

. SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	V	0.027	0.005	0.016	0.0007	1.6875
01U004*	V	0.029	0.004	0.022	0.0006	1.318182
02U001	V	0.032	0.004	0.021	0.0006	1.52381
02U002	V	0.034	0.005	0.02	0.0006	1.7
03U004	V	0.02	0.006	0.013	0.0007	1.538462
03S010	V	0.03	0.006	0.016	0.0007	1.875
03S011	V	0.013	0.003	0.006	0.0002	2.166667
04U007	V	0.042	0.007	0.03	0.0009	1.4
04S004	V	0.136	0.025	0.165	0.005	0.824242
04P184	V	0.038	0.006	0.019	0.0007	2
05U014	V	0.017	0.003	0.01	0.0003	1.7
05P014	V	0.03	0.004	0.009	0.0004	3.333333
05S002	V	n.d.	n.d.	0.008	0.0003	n.a.
05S005	V	n.d.	n.d.	0.008	0.0005	n.a.
05S101	V	0.02	0.007	0.013	0.0007	1.538462
06U004	V	0.008	0.003	0.007	0.0003	1.142857
. 06S003	V	0.013	0.003	0.008	0.0004	1.625
06P001	V	0.01	0.003	0.008	0.0004	1.25
07P008	V	0.031	0.004	0.014	0.0004	2.214286
07S301	V	0.013	0.003	0.003	0.0003	4.333333
07S302	V	n.d.	n.d.	0.004	0.0002	n.a.
08U003	V	0.035	0.003	0.025	0.0006	1.4
08S202	V	0.076	0.006	0.007	0.0003	10.85714
08S206	V	0.052	0.005	0.049	0.001	1.061224
09U005	V	n.d.	n.d.	0.001	0.0002	n.a.
. 09S002	V	n.d.	n.d.	0.001	0.0001	n.a.
10U008	V	0.005	0.002	0.002	0.0002	2.5
10P202	V	0.008	0.003	0.003	0.0002	2.666667
10S014	V	0.004	0.002	0.004	0.0003	1
10S003	V	0.009	0.003	0.006	0.0004	1.5
11U005*	V	0.032	0.004	0.033	0.0008	0.969697
12P001*	V	0.024	0.006	0.016	0.0008	1.5

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	V	0.008	0.005	0.011	0.002	0.727273
01U004*	V	0.022	0.004	0.014	0.001	1.571429
02U001	V	0.019	0.004	0.019	0.001	1
02U002	V	0.019	0.005	0.016	0.001	1.1875
03U004	V	0.024	0.005	0.009	0.001	2.666667
03S010	V	0.028	0.006	0.011	0.001	2.545455
03S011	V	0.006	0.003	0.005	0.0002	1.2
04U007	V	0.033	0.006	0.044	0.001	0.75
04S004	V	0.098	0.012	0.086	0.024	1.139535
04P184	V	0.02	0.005	0.012	0.001	1.666667
05U014	V	0.025	0.004	0.013	0.0004	1.923077
05P014	V	0.014	0.003	0.006	0.0004	2.333333
05S002	V	0.02	0.006	0.008	0.0002	2.5
05S005	V	0.008	0.006	0.005	0.0001	1.6
05S101	V	0.008	0.006	0.008	0.001	1
06U004	V	0.007	0.001	0.005	0.0008	1.4
06S003	V	0.01	0.002	0.005	0.0003	2
06P001	V	0.01	0.002	0.006	0.0007	1.666667
07P008	V	0.011	0.003	0.013	0.0003	0.846154
07S301	V	0.006	0.001	0.002	0.0002	3
07S302	V	0.032	0.007	0.003	0.0002	10.66667
08U003	V	0.022	0.003	0.021	0.001	1.047619
08S202	V	0.018	0.006	0.005	0.0002	3.6
08S206	V	n.d.	n.d.	0.045	0.003	n.a.
09U005	V	0.009	0.002	0.001	0.0001	9
09S002	V	0.006	0.001	0.0008	0.0001	7.5
10U008	V	0.006	0.001	0.001	0.0001	6
10P202	V	0.002	0.001	0.002	0.0001	1
10S014	V	n.d.	n.d.	0.002	0.0003	n.a.
10S003	V	n.d.	n.d.	0.004	0.001	n.a.
11U005*	V	0.023	0.003	0.021	0.002	1.095238
12P001*	V	0.019	0.005	0.006	0.0009	3.166667

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	CL	0.22	0.036	n.d.	n.d.	n.a.
01U004*	CL	0.04	0.025	0.166	0.068	0.240964
02U001	CL	0.059	0.026	0.174	0.077	0.33908
02U002	CL	0.194	0.039	0.2	0.079	0.97
03U004	CL	0.742	0.097	0.913	0.141	0.812705
03S010	CL	0.225	0.032	n.d.	n.d.	n.a.
03S011	CL	0.062	0.016	0.139	0.031	0.446043
04U007	CL	0.234	0.043	n.d.	n.d.	n.a.
04S004	CL	0.133	0.071	n.d.	n.d.	n.a.
04P184	CL	n.d.	n.d.	n.d.	n.d.	n.a.
05U014	CL	n.d.	n.d.	0.107	0.029	n.a.
05P014	CL	n.d.	n.d.	n.d.	n.d.	n.a.
05S002	CL	n.d.	n.d.	0.087	0.029	n.a.
05S005	CL	n.d.	n.d.	n.d.	n.d.	n.a.
05S101	CL	n.d.	n.d.	0.304	0.071	n.a.
06U004	CL	n.d.	n.d.	0.125	0.046	n.a.
06S003	CL	0.031	0.014	0.17	0.065	0.182353
- 06P001	CL	0.066	0.02	n.d.	n.d.	n.a.
07P008	CL	n.d.	n.d.	0.116	0.38	n.a.
07S301	CL	n.d.	n.d.	n.d.	n.d.	n.a.
07S302	CL	0.083	0.035	0.268	0.053	0.309701
08U003	CL	0.422	0.058	0.377	0.047	1.119363
08S202	CL	n.d.	n.d.	0.165	0.038	n.a.
08S206	CL	0.08	0.033	n.d.	n.d.	n.a.
09U005	CL	n.d.	n.d.	0.064	0.027	n.a.
09S002	CL	n.d.	n.d.	n.d.	n.d.	n.a.
10U008	CL	0.082	0.028	0.137	0.036	0.59854
10P202	CL	0.058	0.029	0.246	0.038	0.235772
10S014	CL	0.084	0.024	0.16	0.052	0.525
10S003	CL	0.096	0.027	0.212	0.076	0.45283
11U005*	CL	0.144	0.041	0.319	0.063	0.451411
12P001*	CL	0.314	0.056	0.527	0.123	0.595825

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	CL	0.033	0.019	n.d.	n.d.	n.a.
01U004*	CL	0.052	0.02	0.095	0.007	0.547368
02U001	CL	0.076	0.021	n.d.	n.d.	n.a.
02U002	CL	0.228	0.037	0.119	0.011	1.915966
03U004	CL	0.49	0.071	0.683	0.104	0.717423
03S010	CL	n.d.	n.d.	n.d.	n.d.	n.a.
03S011	CL	0.055	0.014	0.023	0.012	2.391304
04U007	CL	n.d.	n.d.	n.d.	n.d.	n.a.
04S004	CL	n.d.	. n.d.	n.d.	n.d.	n.a.
04P184	CL	0.129	0.025	0.11	0.011	1.172727
05U014	CL	0.087	0.027	n.d.	n.d.	n.a.
05P014	CL	n.d.	n.d.	n.d.	n.d.	n.a.
05S002	CL	0.05	0.028	n.d.	n.d.	n.a.
05S005	CL	n.d.	n.d.	n.d.	n.d.	n.a.
05S101	CL	n.d.	n.d.	n.d.	n.d.	n.a.
06U004	CL	0.038	0.007	n.d.	n.d.	n.a.
06S003	CL	0.063	0.009	0.04	0.003	1.575
06P001	CL	0.04	0.013	0.142	0.016	0.28169
07P008	CL	0.063	0.021	0.087	0.033	0.724138
07S301	CL	n.d.	n.d.	n.d.	n.d.	n.a.
07S302	CL	0.107	0.041	0.239	0.019	0.447699
08U003	CL	0.3	0.049	0.275	0.014	1.090909
08S202	CL	n.d.	n.d.	0.053	0.002	n.a.
08S206	CL	0.104	0.034	0.081	0.004	1.283951
09U005	CL	n.d.	n.d.	n.d.	n.d.	n.a.
09S002	CL			0.064	0.016	n.a.
10U008	CL	0.06	0.021	0.114	0.008	0.526316
10P202	CL	0.162	0.026	0.166	0.021	0.975904
10S014	CL	0.11.5	0.023	0.089	0.011	1.292135
10S003	CL	n.d.	n.d.	n.d.	n.d.	n.a.
11U005*	CL	0.146	0.031	0.09	0.01	1.622222
12P001*	CL	0.387	0.055	0.256	0.035	1.511719

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	CU	0.044	0.004	0.053	0.02	0.830189
01U004*	CU	0.146	0.009	0.15	0.017	0.973333
02U001	CU	0.011	0.002	n.d.	n.d.	n.a.
02U002	CU	0.013	0.003	0.056	0.02	0.232143
03U004	CU	0.043	0.005	n.d.	n.d.	n.a.
03S010	CU	0.017	.0.003	n.d.	n.d.	n.a.
03S011	CU	0.022	0.002	n.d.	n.d.	n.a.
04U007	CU	0.036	0.005	0.048	0.018	0.75
04S004	CU	0.048	0.014	n.d.	n.d.	n.a.
04P184	CU	0.03	0.003	0.056	0.024	0.535714
05U014	CU	0.043	0.003	0.04	0.006	1.075
05P014	CU	0.024	0.003	0.067	0.015	0.358209
05S002	CU	0.137	0.01	0.104	0.01	1.317308
05S005	CU	0.201	0.012	0.263	0.021	0.764259
05S101	CU	0.027	0.005	0.059	0.024	0.457627
06U004	CU	0.029	0.003	0.061	0.012	0.47541
06S003	CU	0.026	0.003	n.d.	n.d.	n.a.
06P001	CU	0.019	0.003	n.d.	n.d.	n.a.
07P008	CU	0.04	0.003	0.032	0.009	1.25
07S301	CU	0.144	0.01	0.153	0.016	0.941176
07S302	CU	0.02	0.002	0.026	0.009	0.769231
08U003	CU	0.037	0.003	0.025	0.0006	1.48
08S202	CU	0.262	0.015	0.294	0.014	0.891156
08S206	CU	0.058	0.004	0.08	0.013	0.725
09U005	CU	0.014	0.002	0.015	0.006	0.933333
09S002	CU	0.069	0.004	0.065	0.005	1.061538
10U008	CU	0.093	0.006	0.107	0.011	0.869159
10P202	CU	0.012	0.002	n.d.	n.d.	n.a.
10S014	CU	0.012	0.002	n.d.	n.d.	n.a.
10S003	CU	0.03	0.004	n.d.	n.d.	n.a.
11U005*	CU	0.158	0.011	0.156	0.017	1.012821
12P001*	CU	0.072	0.007	0.111	0.024	0.648649

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	CU	0.039	0.003	0.032	0.007	1.21875
01U004*	CU	0.149	0.008	0.1	0.007	1.49
02U001	CU	0.014	0.001	0.023	0.002	0.608696
02U002	CU	0.014	0.002	n.d.	n.d.	n.a.
03U004	CU	0.04	0.003	0.04	0.006	1
03S010	CU	0.016	0.002	n.d.	n.d.	n.a.
03S011	CU	0.022	0.001	0.024	0.004	0.916667
04U007	CU	0.03	0.002	0.068	0.028	0.441176
04S004	CU	0.039	0.005	n.d.	n.d.	n.a.
04P184	CU	0.027	0.002	n.d.	n.d.	n.a.
05U014	CU	0.029	0.002	n.d.	n.d.	n.a.
05P014	CU	0.013	0.001	n.d.	n.d.	n.a.
05S002	CU	0.115	0.007	0.122	0.008	0.942623
05S005	CU	0.181	0.01	0.234	0.005	0.773504
05S101	CU	0.023	0.003	n.d.	n.d.	n.a.
06U004	CU	0.018	0.002	0.015	0.002	1.2
06S003	CU	0.013	0.001	0.015	0.0009	0.866667
06P001	CU	0.021	0.002	0.034	0.004	0.617647
07P008	CU	0.03	0.002	0.031	0.008	0.967742
07S301	CU	0.139	0.008	0.121	0.012	1.14876
07S302	CU	0.028	0.002	0.039	0.003	0.717949
08U003	CU	0.038	0.002	0.024	0.001	1.583333
08S202	CU	0.273	0.014	0.224	0.009	1.21875
08S206	CU	0.089	0.005	0.073	0.004	1.219178
09U005	CU	0.013	0.002	0.015	0.006	0.866667
09S002	CU	0.081	0.004	0.098	0.008	0.826531
10U008	CU	0.06	0.003	0.048	0.003	1.25
10P202	CU	0.009	0.001	n.d.	n.d.	n.a.
10S014	CU	0.009	0.001	0.015	0.002	0.6
10S003	CU	0.011	0.002	n.d.	n.d.	n.a.
11U005*	CU	0.192	0.011	0.204	0.023	0.941176
12P001*	CU	0.079	0.005	0.036	0.005	2.194444

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	SB	0.086	0.052	0.0006	8E-05	143.3333
01U004*	SB	n.d.	n.d.	0.0009	7E-05	n.a.
02U001	SB	0.079	0.047	0.0007	6E-05	112.8571
02U002	SB	0.063	0.05	0.0007	7E-05	90
03U004	SB	0.087	0.074	0.0016	0.00014	54.375
03S010	SB	n.d.	n.d.	0.0015	9E-05	n.a.
03S011	SB	n.d.	n.d.	0.0004	3E-05	n.a.
04U007	SB	n.d.	n.d.	0.0022	0.00014	n.a.
04S004	SB	n.d.	n.d.	0.0229	0.00069	n.a.
04P184	SB	n.d.	n.d.	0.0011	9E-05	n.a.
05U014	SB	n.d.	n.d.	0.0007	5E-05	n.a.
05P014	SB	n.d.	n.d.	0.0015	8E-05	n.a.
05S002	SB	n.d.	n.d.	0.0007	9E-05	n.a.
05S005	SB	n.d.	n.d.	0.0005	4E-05	n.a.
05S101	SB	n.d.	n.d.	0.0029	0.00014	n.a.
06U004	SB	0.11	0.052	0.0006	7E-05	n.a.
06S003	SB	0.065	0.043	0.0008	7E-05	81.25
06P001	SB	n.d.	n.d.	0.0007	8E-05	n.a.
07P008	SB	0.045	0.034	0.0011	7E-05	40.90909
07S301	SB	0.099	0.061	0.0022	0.0001	45
07S302	SB	0.044	0.028	0.0011	8E-05	40
08U003	SB	0.023	0.02	0.0006	7E-05	38.33333
08S202	SB	0.059	0.035	0.0042	0.0001	14.04762
08S206	SB	0.061	0.035	0.0003	5E-05	203.3333
09U005	SB	0.043	0.025	0.0004	4E-05	107.5
09S002	SB	n.d.	n.d.	0.0003	3E-05	n.a.
10U008	SB	n.d.	n.d.	0.0004	5E-05	n.a.
10P202	SB	0.044	0.04	0.0006	5E-05	73.33333
10S014	SB	n.d.	n.d.	0.0002	5E-05	n.a
10S003	SB	0.076	0.054	0.0007	9E-05	108.5714
11U005*	SB	0.095	0.07	0.0009	8E-05	105.5556
12P001*	SB	n.d.	n.d.	0.0015	0.00013	n.a.

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	SB	n.d.	n.d.	0.0004	9E-05	n.a.
01U004*	SB	n.d.	n.d.	0.0005	4E-05	n.a.
02U001	SB	n.d.	n.d.	0.0004	3E-05	n.a.
02U002	SB	0.029	0.025	0.0003	2E-05	96.66667
03U004	SB	0.05	0.031	0.0008	0.00012	62.5
03S010	SB	0.049	0.031	0.0001	2E-05	490
03S011	SB	0.013	0.009	0.0002	2E-05	65
04U007	SB	0.035	0.027	0.0017	9E-05	20.58824
04S004	SB	n.d.	n.d.	0.0028	0.00077	n.a.
04P184	SB	0.033	0.022	0.0006	6E-05	55
05U014	SB	0.036	0.024	0.0007	5E-05	51.42857
05P014	SB	0.021	0.016	0.001	7E-05	21
05S002	SB	0.042	0.025	0.0008	0.00013	52.5
05S005	SB	n.d.	n.d.	0.0002	1E-05	n.a.
05S101	SB	0.058	0.051	0.0014	0.00026	41.42857
06U004	SB	0.025	0.018	0.0005	7E-05	50
06S003	SB	n.d.	n.d.	0.0003	2E-05	n.a.
06P001	SB	0.036	0.025	0.0002	2E-05	180
07P008	SB	0.012	0.008	0.0008	3E-05	15
07S301	SB	0.02	0.018	0.0015	0.00014	13.33333
07S302	SB	n.d.	n.d.	0.0008	7E-05	n.a.
08U003	SB	n.d.	n.d.	0.0003	2E-05	n.a.
08S202	SB	n.d.	n.d.	0.0026	0.0001	n.a.
08S206	SB	n.d.	n.d.	0.0001	1E-05	n.a.
09U005	SB	n.d.	n.d.	0.0002	3E-05	n.a.
09S002	SB	0.024	0.013	0.0001	2E-05	240
10U008	SB	0.019	0.01	0.0007	5E-05	27.14286
10P202	SB	n.d.	n.d.	0.0001	2E-05	n.a.
10S014	SB	n.d.	n.d.	0.0008	0.0001	n.a.
10S003	SB	n.d.	n.d.	0.0004	0.00012	n.a.
11U005*	SB	n.d.	n.d.	0.0004	4E-05	n.a.
12P001*	SB	n.d.	n.d.	0.0009	0.00013	n.a.

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	LA	n.d.	n.d.	0.004	0.0002	n.a.
01U004*	LA	n.d.	n.d.	0.002	0.0001	n.a.
02U001	LA	n.d.	n.d.	0.002	0.0001	n.a.
02U002	LA	n.d.	n.d.	0.003	0.0001	n.a.
03U004	LA	0.358	0.265	0.003	0.0002	119.3333
03S010	LA	n.d.	n.d.	0.006	0.0002	n.a.
03S011	LA	n.d.	n.d.	0.002	7E-05	n.a.
04U007	LA	n.d.	n.d.	0.002	0.0002	n.a.
04S004	LA	n.d.	n.d.	0.007	0.0006	n.a.
04P184	LA	n.d.	n.d.	0.003	0.0002	n.a.
05U014	LA	n.d.	n.d.	0.001	8E-05	n.a.
05P014	LA	n.d.	n.d.	0.002	0.0001	n.a.
05S002	LA	n.d.	n.d.	0.002	0.0001	n.a.
05S005	LA	0.128	0.064	0.002	9E-05	64
05S101	LA	n.d.	n.d.	0.002	0.0002	n.a.
06U004	LA	n.d.	n.d.	0.002	0.0001	n.a.
06S003	LA	n.d.	n.d.	0.002	0.0001	n.a.
06P001	LA	n.d.	n.d.	0.001	0.0001	n.a.
07P008	LA	0.198	0.122	0.001	0.0001	198
07S301	LA	n.d.	n.d.	0.001	0.0001	n.a.
07S302	LA	n.d.	n.d.	0.0003	0.0001	n.a.
08U003	LA	0.109	0.071	0.0003	0.0001	363.3333
08S202	LA	n.d.	n.d.	0.0006	8E-05	n.a.
08S206	LA	n.d.	n.d.	0.0009	8E-05	n.a.
09U005	LA	0.092	0.088	0.004	0.0001	23
09S002	LA	n.d.	n.d.	0.002	8E-05	n.a.
10U008	LA	n.d.	n.d.	0.002	0.0001	n.a.
10P202	LA	0.2	. 0.142	0.002	0.0001	100
10S014	LA	n.d.	n.d.	0.002	9E-05	n.a.
10S003	LA	n.d.	n.d.	0.003	0.0002	n.a.
11U005*	LA	n.d.	n.d.	0.002	0.0001	n.a.
12P001*	LA	n.d.	n.d.	0.004	0.0002	n.a.

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	COARSE XRF WT %	ERROR %	COARSE NAA WT %	ERROR %	XRF/NAA
01UO10	LA	n.d.	n.d.	0.003	0.0006	n.a.
01U004*	LA	n.d.	n.d.	0.002	0.0001	n.a.
02U001	LA	n.d.	n.d.	0.002	0.0001	n.a.
02U002	LA	0.11	0.088	0.002	0.0002	55
03U004	LA	n.d.	n.d.	0.003	0.0005	n.a.
03S010	LA	n.d.	n.d.	0.003	0.0004	n.a.
03S011	LA	n.d.	n.d.	0.002	5E-05	n.a.
04U007	LA	n.d.	n.d.	0.003	0.0002	n.a.
04S004	LA	n.d.	n.d.	0.005	0.002	n.a.
04P184	LA	n.d.	n.d.	0.002	0.0003	n.a.
05U014	LA	n.d.	n.d.	0.001	7E-05	n.a.
05P014	LA	n.d.	n.d.	0.001	9E-05	n.a.
05S002	LA	n.d.	n.d.	0.0006	0.0001	n.a.
05S005	LA	0.025	0.024	0.0008	2E-05	31.25
05S101	LA	n.d.	n.d.	0.001	0.0002	n.a.
06U004	LA	n.d.	n.d.	0.0009	0.0001	n.a.
06S003	LA	n.d.	n.d.	0.0009	6E-05	n.a.
06P001	LA	n.d.	n.d.	0.0009	0.0001	n.a.
07P008	LA	n.d.	n.d.	0.0008	3E-05	n.a.
07S301	LA	0.108	0.065	0.0009	9E-05	120
07S302	LA	0.074	0.067	n.d.	n.d.	n.a.
08U003	LA	n.d.	n.d.	0.0005	2E-05	n.a.
08S202	LA	n.d.	n.d.	0.0003	1E-05	n.a.
08S206	LA	n.d.	n.d.	0.0007	4E-05	n.a.
09U005	LA	n.d.	n.d.	0.002	8E-05	n.a.
09S002	LA	n.d.	n.d.	0.002	6E-05	n.a.
10U008	LA	n.d.	n.d.			n.a.
10P202	LA	n.d.	n.d.	0.001	5E-05	n.a.
10S014	LA	n.d.	n.d.	0.001	0.0002	n.a.
10S003	LA	n.d.	n.d.	0.002	0.0005	n.a.
11U005*	LA	n.d.	n.d.	0.001	0.0001	n.a.
12P001*	LA	n.d.	n.d.	0.003	0.0004	n.a.

n.a. not available
n.d. not detected
* composite sample

SAMPLE	ELEMENT	FINE XRF WT %	ERROR %	FINE NAA WT %	ERROR %	XRF/NAA
01UO10	AS	n.d.	n.d.	0.001	0.0001	n.a.
01U004*	AS	n.d.	n.d.	0.002	0.0001	n.a.
02U001*	AS	n.d.	n.d.	0.0008	9E-05	n.a.
02U002	AS	n.d.	n.d.	0.001	0.0001	n.a.
03U004	AS	n.d.	n.d.	0.001	0.0002	n.a.
03S010 ,	AS	0.005	0.003	0.001	0.0001	5
03S011	AS	0.005	0.004	0.002	8E-05	2.5
04U007	AS	n.d.	n.d.	0.004	0.0003	n.a.
04S004	AS	n.d.	n.d.	0.021	0.0009	n.a.
04P184	AS	0.005	0.004	0.002	0.0001	2.5
05U014	AS	n.d.	n.d.	0.001	9E-05	n.a.
05P014	AS	n.d.	n.d.	0.005	0.0002	n.a.
05S002	AS	n.d.	n.d.	0.004	0.0002	n.a.
05S005	AS	n.d.	n.d.	0.1	0.0002	n.a.
05S101	AS	n.d.	n.d.	0.11	0.0003	n.a.
06U004	AS	n.d.	n.d.	0.001	0.0001	n.a.
06S003	AS	n.d.	n.d.	0.003	0.0001	n.a.
06P001	AS	n.d.	n.d.	0.002	0.0001	n.a.
07P008	AS	n.d.	n.d.	0.001	0.0001	n.a.
07S301	AS	0.01	0.006	0.02	0.0004	0.5
07S302	AS	n.d.	n.d.	0.003	0.0001	n.a.
08U003	AS	0.005	0.002	0.0009	0.0001	5.555556
08S202	AS	n.d.	n.d.	0.007	0.0002	n.a.
08S206	AS	n.d.	n.d.	0.0005	7E-05	n.a.
09U005	AS	n.d.	n.d.	n.d.	n.d.	n.a.
09S002	AS	n.d.	n.d.	0.0001	6E-05	n.a.
1.0U008	AS	n.d.	n.d.	0.0004	8E-05	n.a.
10P202	AS	n.d.	n.d.	0.0005	9E-05	n.a.
10S014	AS	n.d.	n.d.	0.0002	7E-05	n.a.
10S003	AS	n.d.	n.d.	0.0006	0.0001	n.a.
11U005*	AS	0.01	0.006	0.001	0.0001	10
12P001*	AS	0.011	0.006	0.002	0.0002	5.5

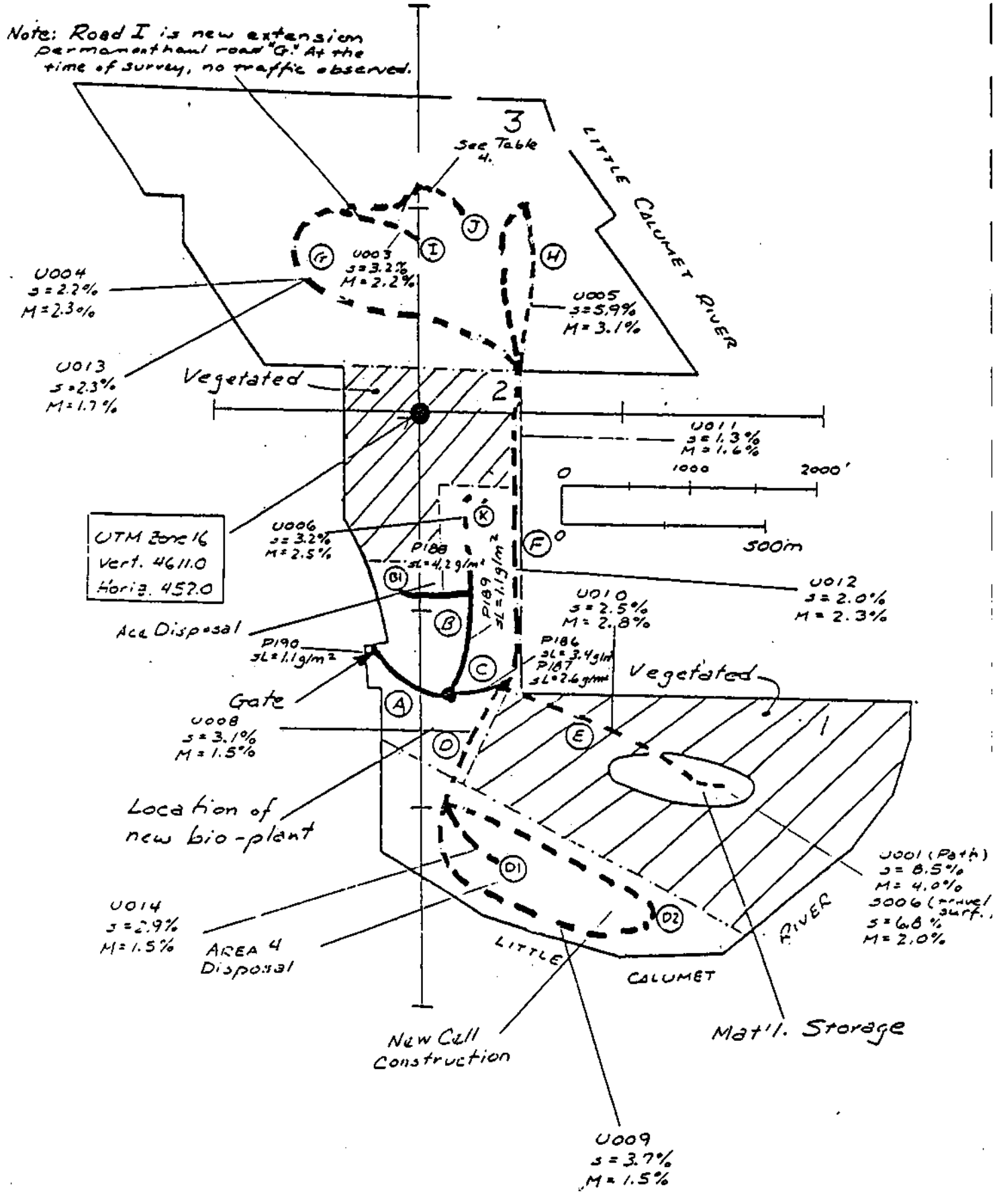
n.a. not available
n.d. not detected
* composite sample

		COARSE XRF		COARSE NAA		
SAMPLE	ELEMENT	WT %	ERROR %	WT %	ERROR %	XRF/NAA
01UO10	AS	n.d.	n.d.	0.0009	0.0002	n.a.
01U004*	AS	n.d.	n.d.	0.001	8E-05	n.a.
02U001	AS	n.d.	n.d.	0.0007	5E-05	n.a.
02U002	AS	0.005	0.002	0.0009	8E-05	5.555556
03U004	AS	n.d.	n.d.	0.001	0.0002	n.a.
03S010	AS	0.004	0.002	0.0008	0.0001	5
03S011	AS	n.d.	n.d.	0.0003	4E-06	n.a.
04U007	AS	n.d.	n.d.	0.003	0.0002	n.a.
04S004	AS	n.d.	n.d.	0.006	0.002	n.a.
04P184	AS	n.d.	n.d.	0.001	0.0001	n.a.
05U014	AS	n.d.	n.d.	0.001	8E-05	n.a.
05P014	AS	n.d.	n.d.	0.003	0.0002	n.a.
05S002	AS	n.d.	n.d.	0.002	0.0001	n.a.
05S005	AS	n.d.	n.d.	0.004	8E-05	n.a.
05S101	AS	n.d.	n.d.	0.006	0.001	n.a.
06U004	AS	n.d.	n.d.	0.0007	0.0001	n.a.
06S003	AS	n.d.	n.d.	0.001	7E-05	n.a.
06P001	AS	n.d.	n.d.	0.0007	8E-05	n.a.
07P008	AS	n.d.	n.d.	0.001	4E-05	n.a.
07S301	AS	0.019	0.003	0.021	0.002	0.904762
07S302	AS	n.d.	n.d.	0.003	0.0003	n.a.
08U003	AS	n.d.	n.d.	0.0008	4E-05	n.a.
08S202	AS	n.d.	n.d.	0.005	0.0002	n.a.
08S206	AS	n.d.	n.d.	0.0003	2E-05	n.a.
09U005	AS	n.d.	n.d.	0.0004	7E-05	n.a.
09S002	AS	n.d.	n.d.	0.0001	3E-05	n.a.
10U008	AS	n.d.	n.d.	0.003	0.0002	n.a.
10P202	AS	n.d.	n.d.	0.0002	4E-05	n.a.
10S014	AS	n.d.	n.d.	0.0004	5E-05	n.a.
10S003	AS	n.d.	n.d.	0.0004	0.0001	n.a.
11U005*	AS	n.d.	n.d.	0.0006	6E-05	n.a.
12P001*	AS	n.d.	n.d.	0.001	0.0002	n.a.

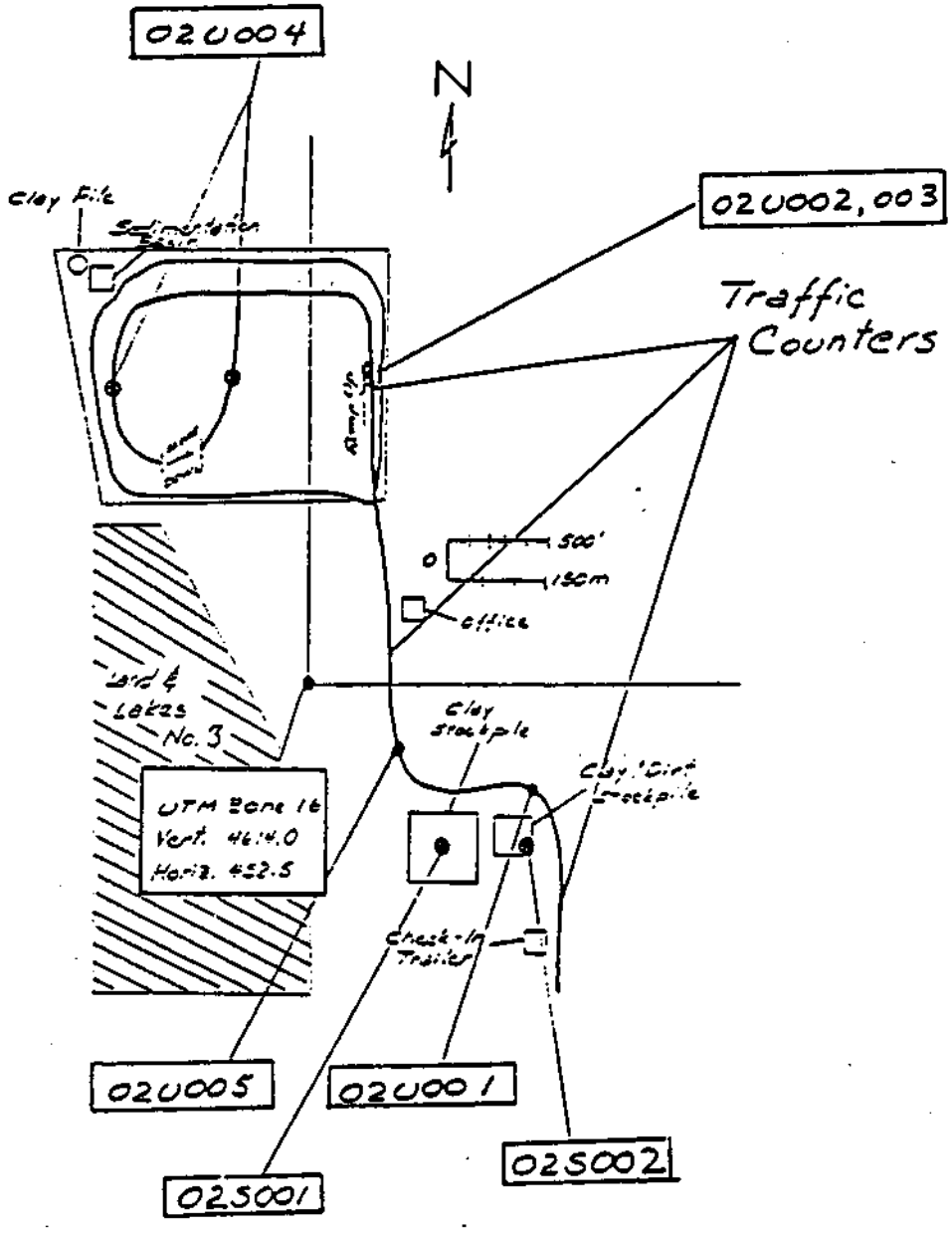
n.a. not available
n.d. not detected
* composite sample

APPENDIX C

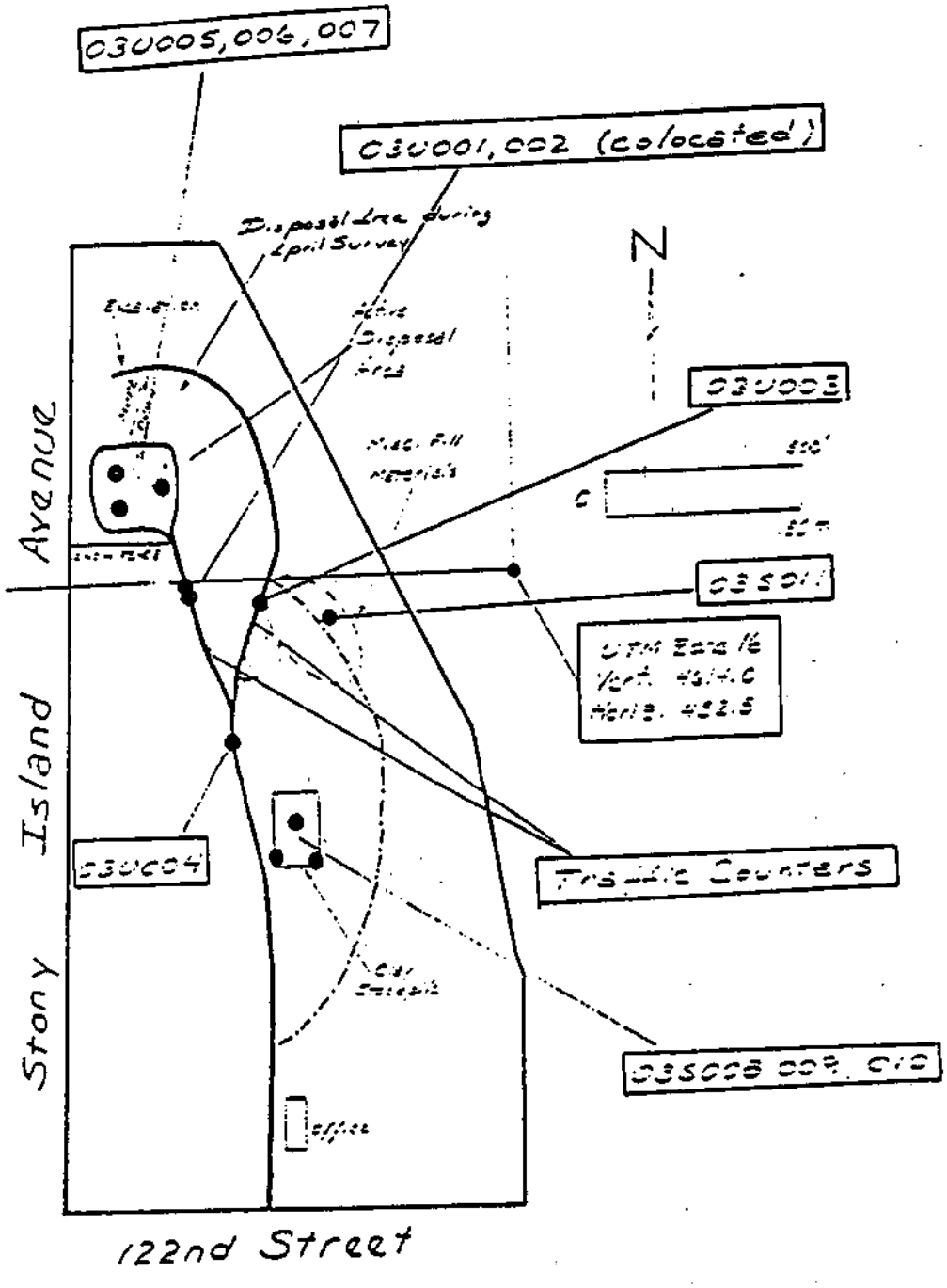
Field Sampling Notes



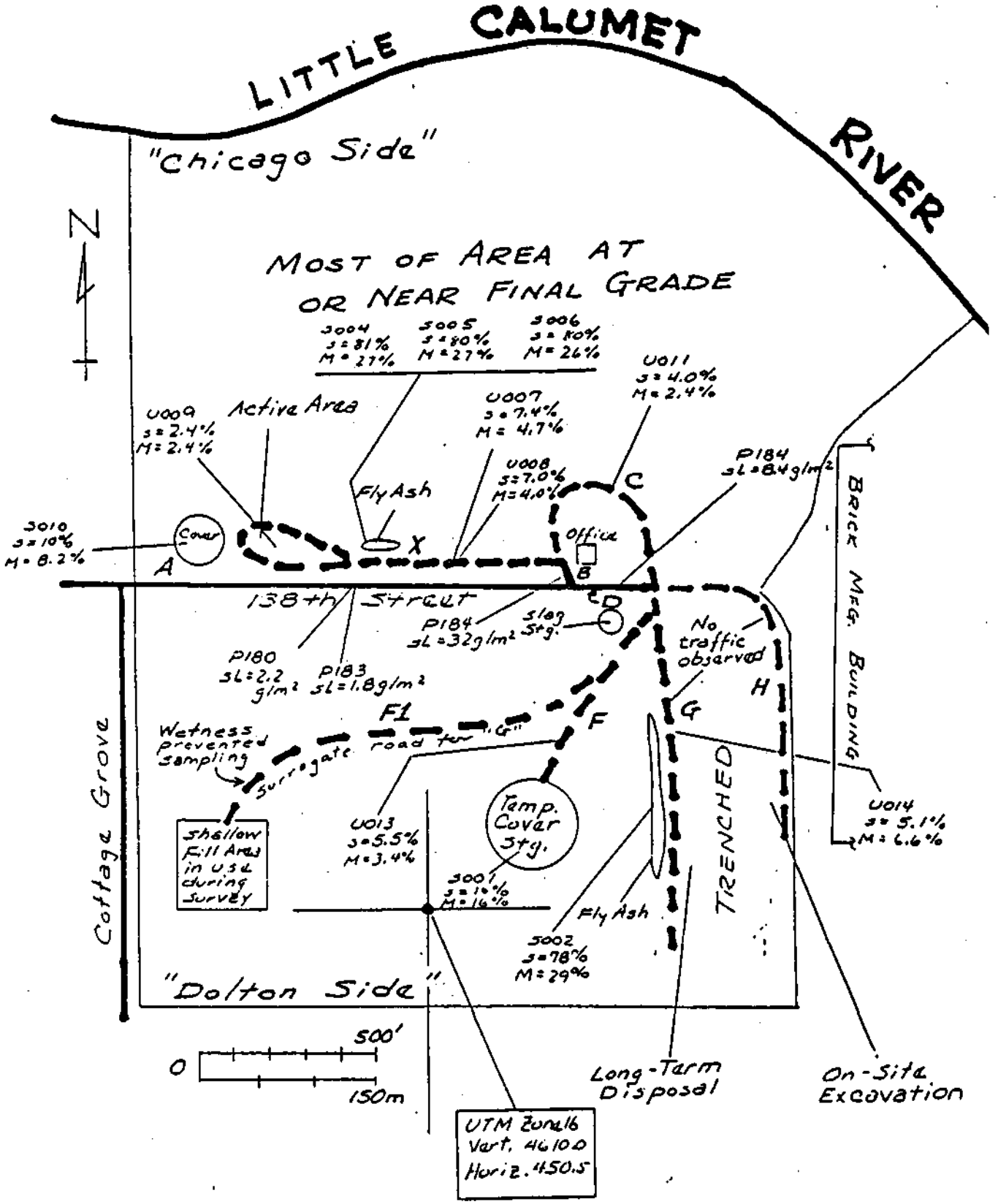
Sampling Locations at Facility 1 - Calumet Industrial Disposal (MRI, 1988)



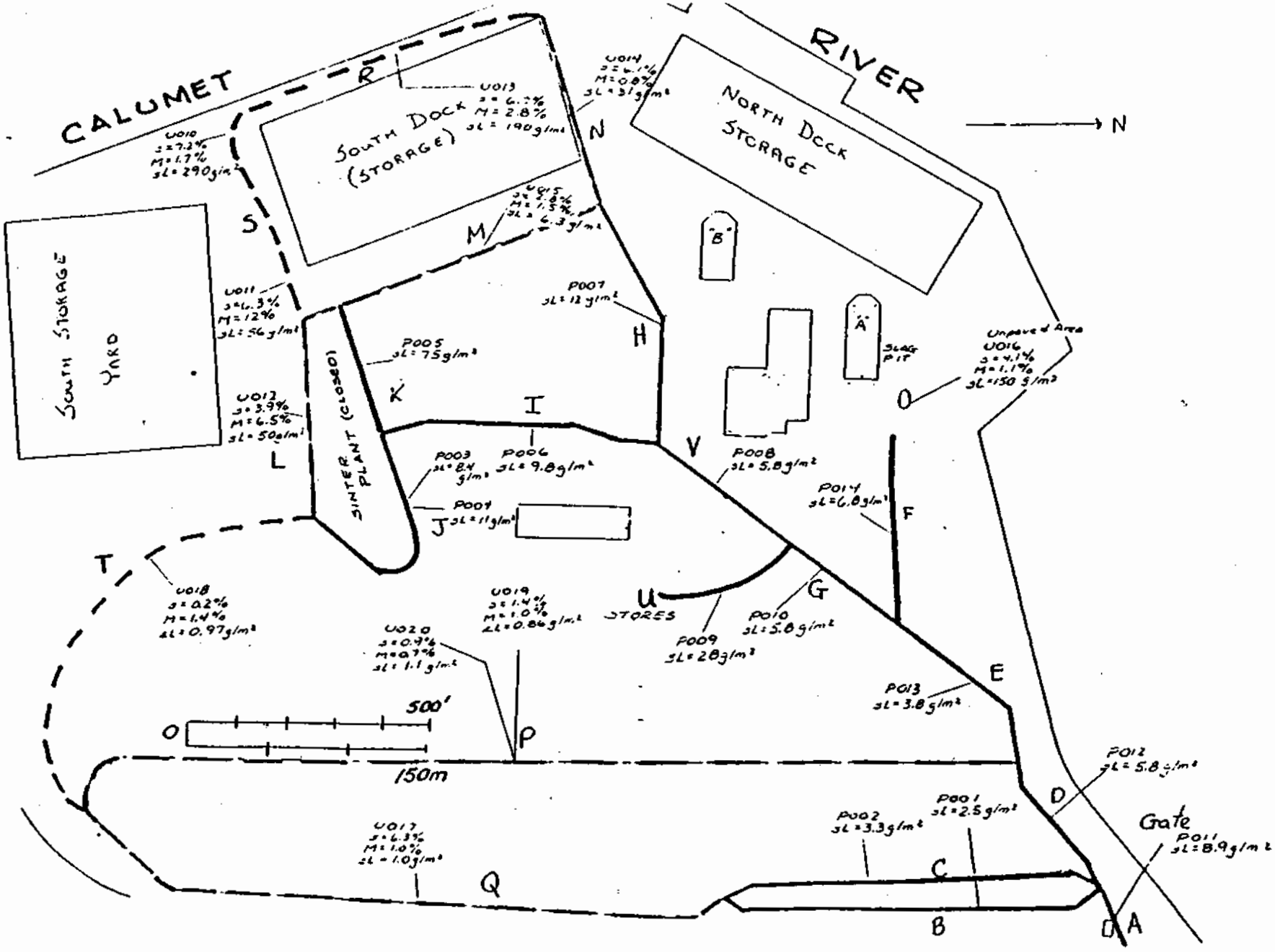
Sampling Locations at Facility 2 - Paxton II Landfill (MRI, 1988)



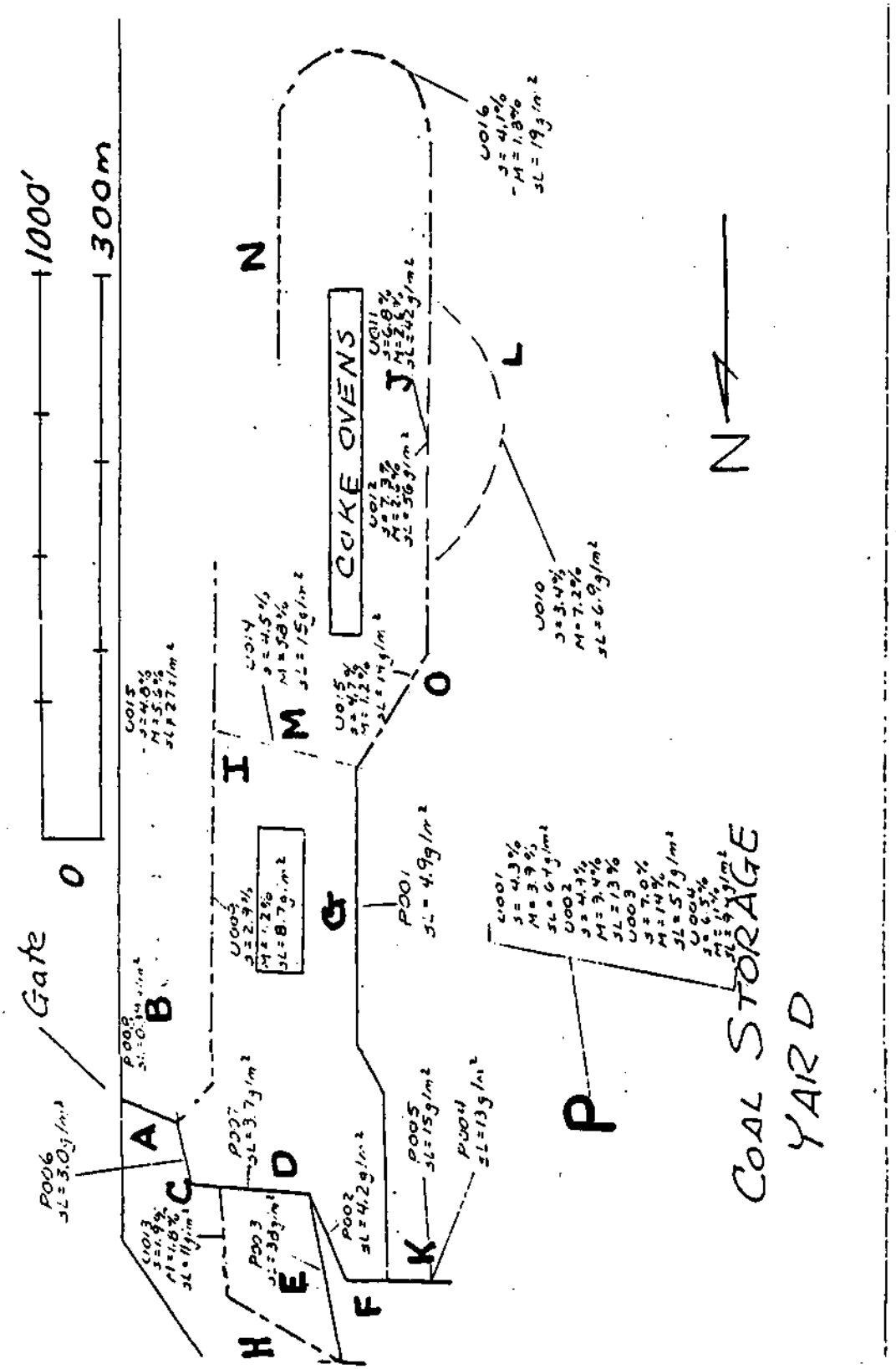
Sampling Locations at Facility 3 - Land and Lakes No. 3 Landfill (MRI, 1988)



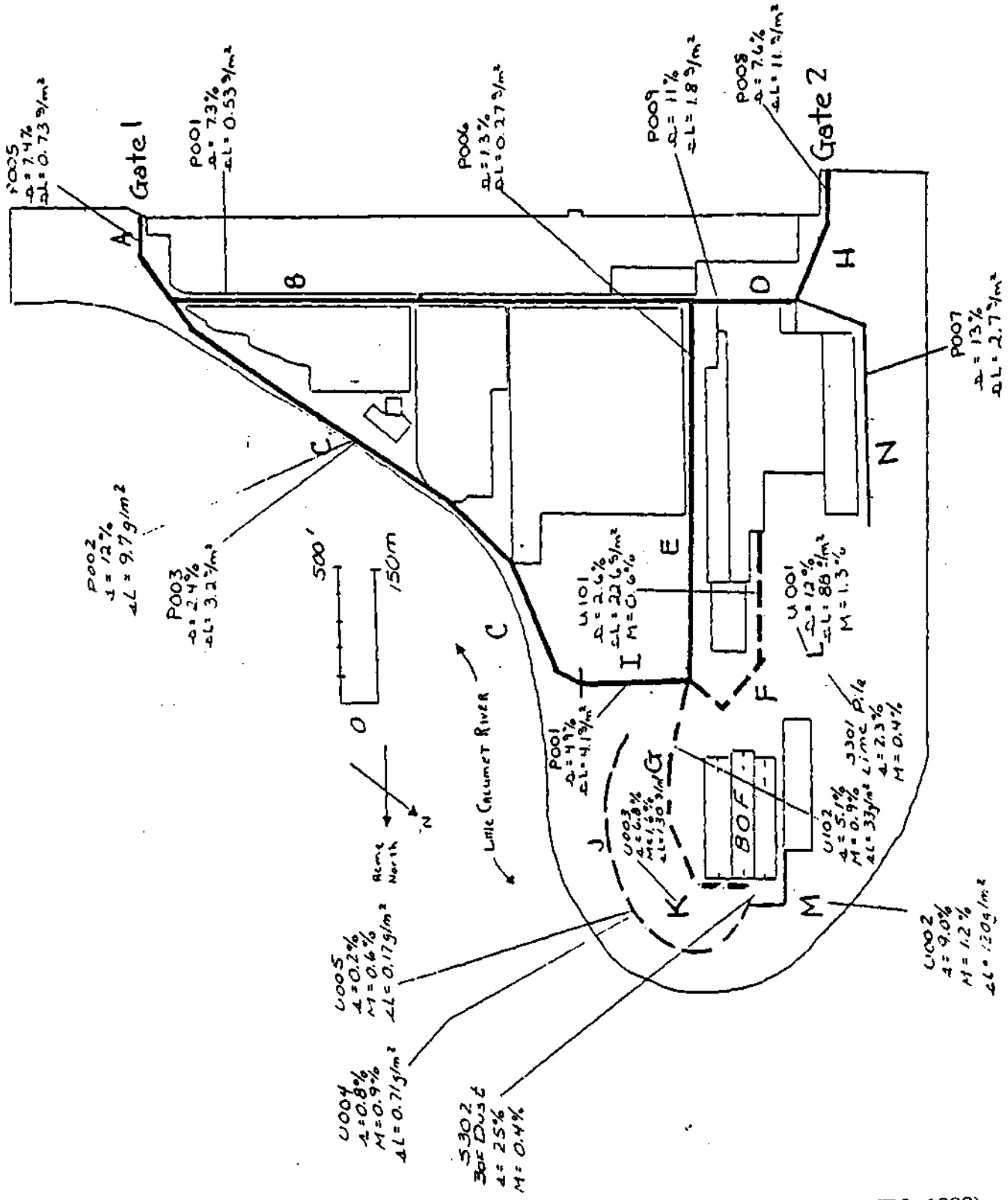
Sampling Locations at Facility 4 - Land and Lakes No. 1, 2, & Dolton Landfill (MRI, 1988)



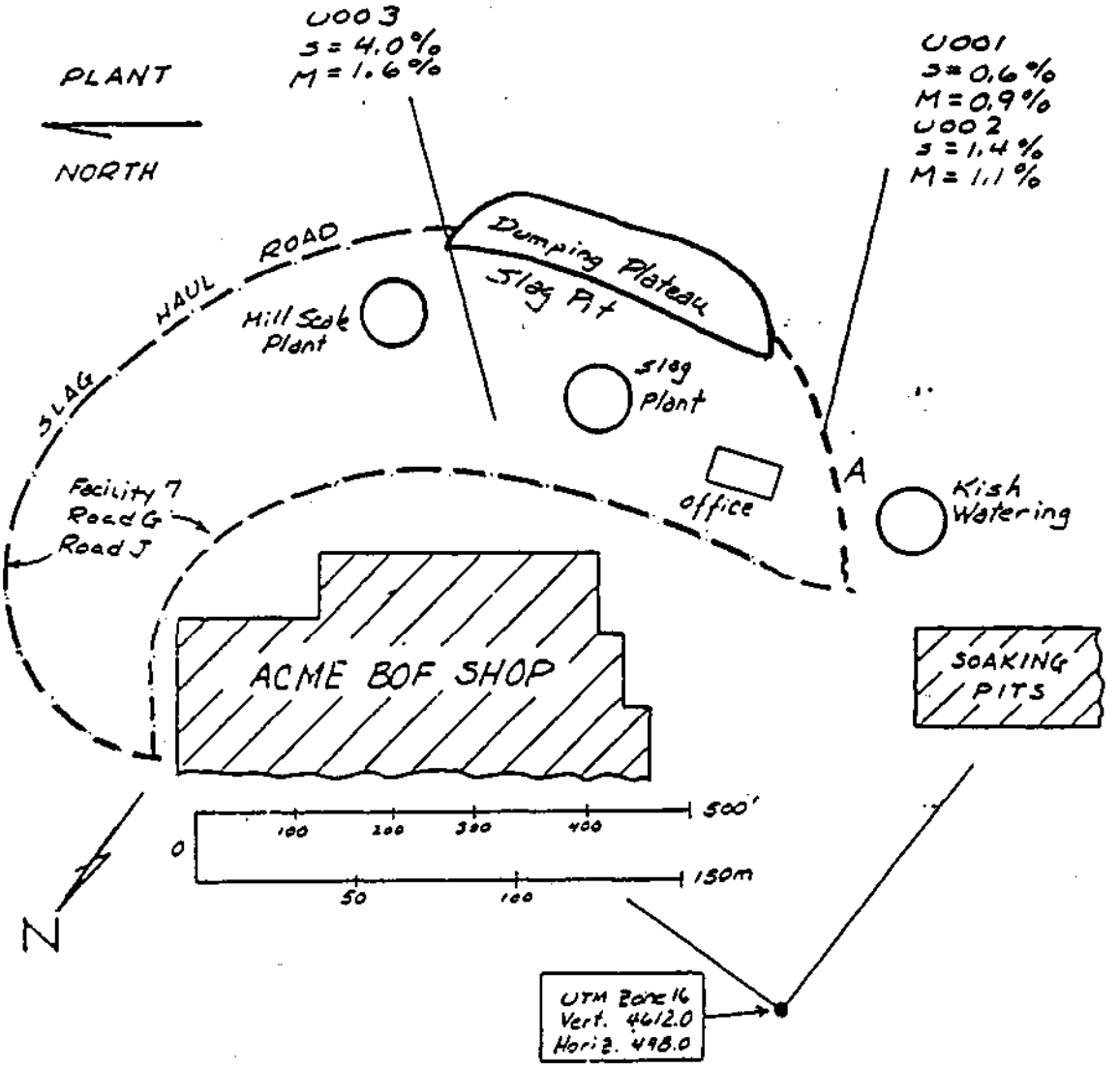
Sampling Locations at Facility 5 - Acme Steel Furnace Plant (MRI, 1988)



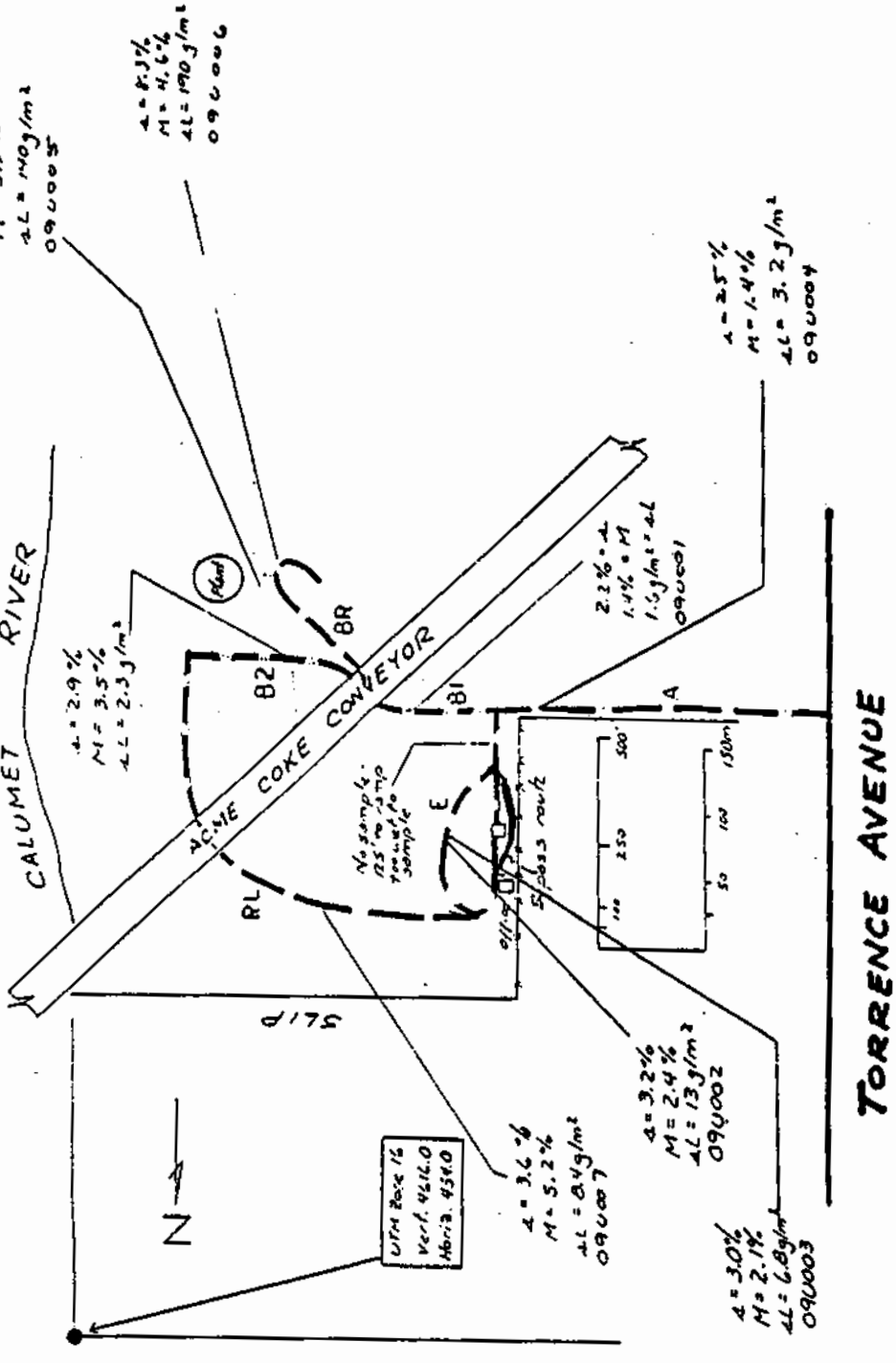
Sampling Locations at Facility 6 - Acme Steel Coke Plant (MRI, 1988)



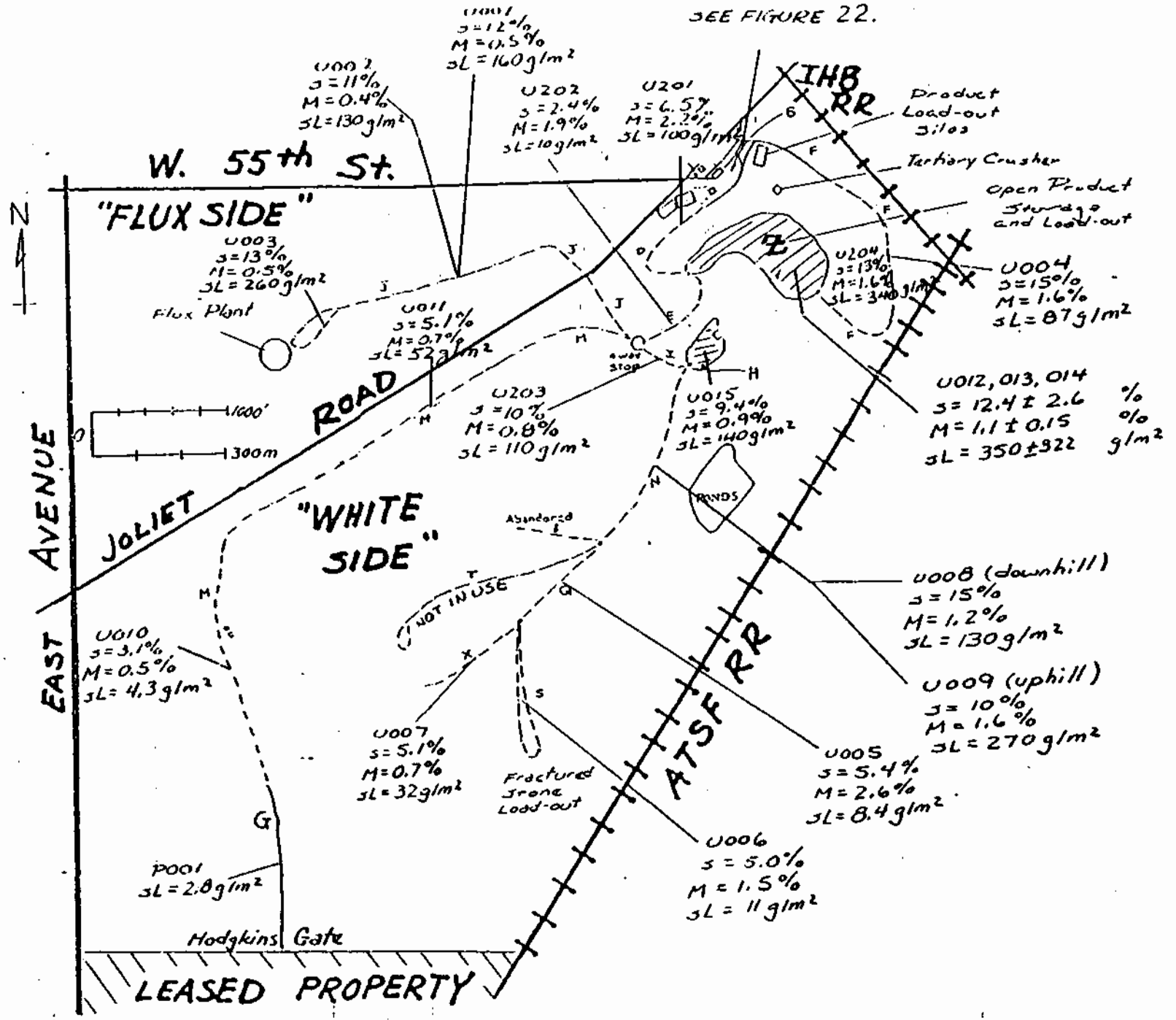
Sampling Locations at Facility 7 - Acme Steel Riverdale Plant (MRI, 1988)



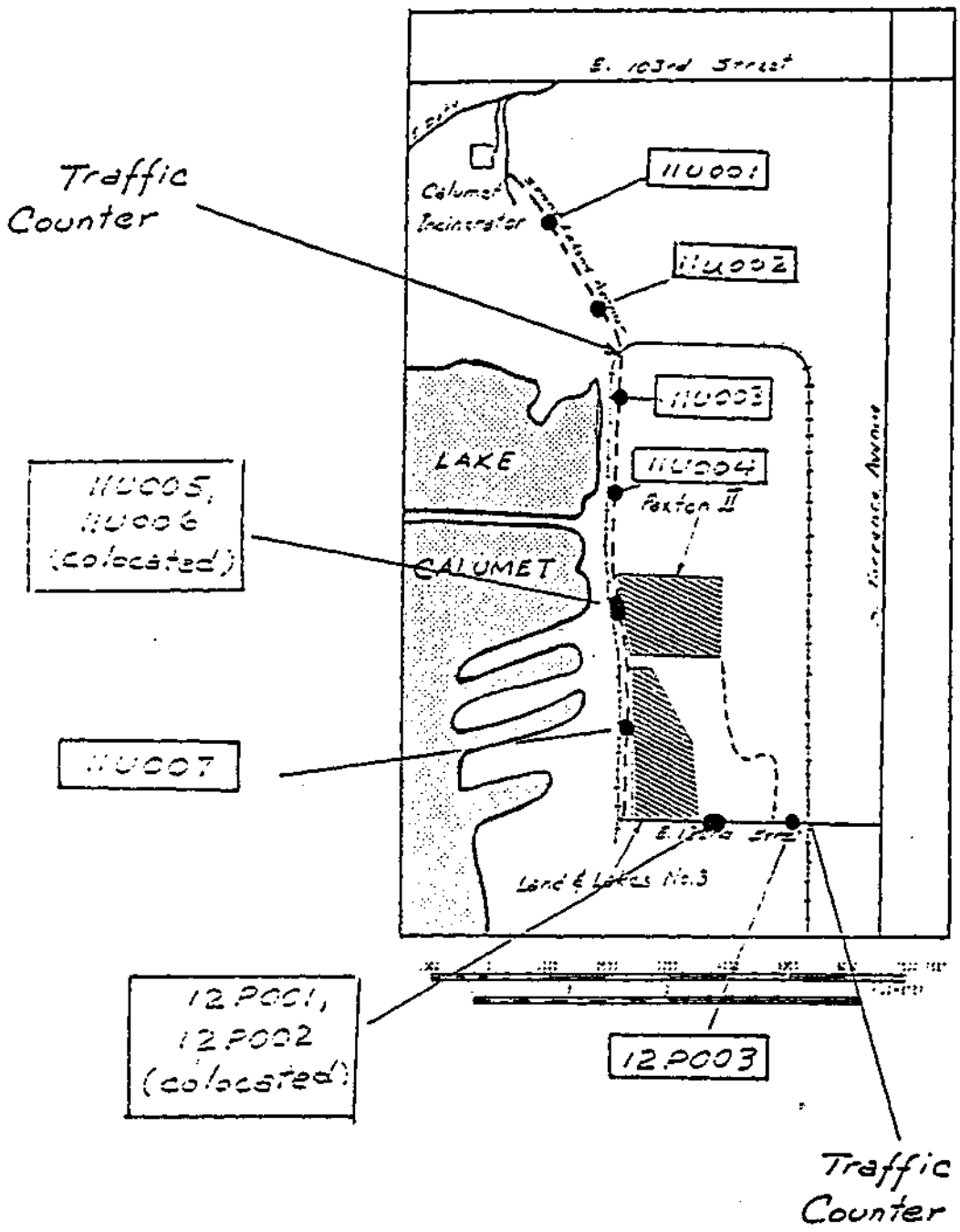
Sampling Locations at Facility 8 - Hechett Riverdale Plant (MRI, 1988)



Sampling Locations at Facility 9 - Hechett 112th St. Plant (MRI, 1988)



Sampling Locations at Facility 10 - Vulcan McCook Quarry (MRI, 1988)



Sampling Locations at Facility 11 & 12 - Stony Island Ave. & 122nd Street (MRI, 1988)