UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

ELEMENTAL COMPOSITION OF GEOLOGIC MATERIALS FROM AREAS OF MINERALIZATION IN EGYPT - SEMIQUANTITATIVE ANALYSES

by

J. L. HARRIS, W. B. CRANDELL, AND D. W. GOLIGHTLY

Open-File Report 81-781

1981

CONTENTS

ILLUSTRATION

TABLES

ELEMENTAL COMPOSITION OF GEOLOGIC MATERIALS FROM AREAS OF MINERALIZATION IN EGYPT - SEMIQUANTITATIVE ANALYSES

by

J. L. Harris, W. B. Crandell, and D. W. Golightly

INTRODUCTION

Elemental-composition data on 162 samples from Egypt are presented in this report. The sample materials include syenites, conglomerates, clay, gypsum, limestone, greywackes, siltstones, and sulfide ores. All samples were collected by geologists of the Egyptian Geological Survey (EGS) from regions of mineralization and were made available for analysis by Ms. Mary Iskander and Mr. Sabry Holyle, EGS chemists who participated in a training program that was arranged by the U.S. Geological Survey (USGS) and conducted in Reston, Virginia, during part of the summer of 1980. A principal objective of the EGS chemists was to thoroughly characterize this diverse collection of geologic materials in terms of major-, minor-, and trace-element concentrations. The materials thus characterized will serve as valuable geochemical standards in future analyses of geologic samples by the EGS analytical chemists. To this end, each of the 162 samples was analyzed for 64 elements by semiquantitative direct-current arc atomic-emission spectrography (SQ-AES). SQ-AES is a rapid survey analysis technique that provides a relatively thorough examination of the composition of materials. It thus furnishes information that

serves as a valuable descriptor of the material and as a good guide toward subsequent quantitative estimations of elemental concentrations by atomic emission and absorption spectrometry or by other techniques.

PROCEDURE

Prior to analysis, all samples were ground to approximately -100 mesh by the USGS grinding laboratory. A portion of each of these ground samples was weighed into an aluminum weighing dish, diluted in the weighing dish with high-purity graphite, transferred through a stainless steel funnel into a graphite-cup electrode, tamped into the electrode, and arced for spectrographic analysis. In this procedure, 15 mg of sample was always diluted with 30 mg of -200-mesh graphite powder. The contents of the anodic-cup electrode were totally vaporized into a 4-mm arc gap by a stepped current that commenced at 5 A for 20 s and then switched to 15 A for 130 s. The counter electrode (cathode) was a graphite rod. Excitation that produced atomic spectra occurred in a 70% argon - 30% oxygen atmosphere that was directed into the arc gap by a Helz jet (Helz, 1964). Spectral dispersion of the optical radiation from the arc discharged was achieved with a 3.4-m focal-length Ebert-mount spectrograph. The resulting spectra, 230 - 470 nm, were recorded on a Kodak type 111-0 emulsion on a glass-plate substrate 10.2 cm by 50.8 cm. Spectral information was collected by a scanning microphotometer system that utilizes a minicomputer for data storage and interpretation (Helz, 1973;

Thomas, 1979). Background-corrected relative peak intensities of 400 spectral lines were used to estimate concentrations of the 64 analysis elements. This large set of spectral lines contains information that allows coverage of a wide dynamic range, minimization of spectral interference effects, and some valuable redundancy in concentration estimates. Complete details of this spectrographic method have been described by Dorrzapf (1973). The concentration ranges over which these elements could be determined are listed in Table 1.

RESULTS AND DISCUSSION

Sample origins and descriptions are presented in Table 2. Furthermore, sampling locations are indicated by circled numerals on the geologic map shown in figure 1; the 8 line-code designations of Table 2 correspond to the 8 location numbers in figure 1.

Results of analyses are summarized in Table 3. This table is formatted for reporting results of silicate-rock analyses, and, accordingly, first presents concentrations of the ten major rock-forming elements in units of weight percent (centigrams/gram). Then, concentrations of minor and trace elements are reported in parts per million (micrograms/gram). Concentrations of major constituents are recalculated as oxides and presented toward the bottom of each report page. Also, at the bottom of each report page is a set of footnotes that indicates limitations of the analytical method and whether any special considerations apply to the reported results. Calibration

of the spectrographic analysis method was for silicate rocks. The results of analyses by this method show a marked dependency on the sample matrix composition that is attributable to sample transport and excitation mechanisms in the direct-current arc source. Thus, systematic errors can occur in determining elemental compositions of sample matrices that greatly differ from the sample matrix of aluminosilicates.

Spectral interference from sample matrix elements required visual examination of each spectrum on the photoplate to determine the concentrations of silica in samples X-131516 - X131518, X-131705, X-131707, and X-131711, sodium in samples X-131104, X-131107, X-131110, X-131111, X-131113 - X-131115, X-131117, X-131119 - X-131121, X-131123, X-131204 - X-131223, X-131304, X-131311, X-131315 - X-131317, X-131320, X-131322, X-131323, X-131404 - X-131408, and X-131508, silver in samples X-131705 - X-131714, zinc in samples X-131622 - X-131714, magnesium in sample X-131011, calcium in samples X-131516, X-131608, X-131616, X-131706, X-131707, and X-131711, potassium in sample X-131508, strontium in samples X-131217 and X-131516, lead in samples X-131705 and X-131707 - X-131713, and zirconium in samples X-131708 and X-131710.

Results from these visual comparisons of spectra from samples and standards are entered on the report pages in place of the concentration estimates made by the automated microphotometer system.

Elemental quantitative analyses have been made of the same samples in this report by J. S. Kane and H. Smith (1981).

REFERENCES CITED

Dorrzapf, A. F., Jr., 1973, Spectrochemical computer analysis - argon - oxygen d.c. arc method for silicate rocks: U.S. Geological Survey Journal of Research, v. 1, no. 5, p. 559-562.

Egypt Geological Survey, 1979, Geological map of Egypt: Cairo, scale 1:2,000,000

Helz, A. W., 1964, A gas jet for d.c. arc spectroscopy: U.S. Geological Survey Professional Paper 475-D, p. D176-D178.

Helz, A. W., 1973, Spectrochemical computer analysis - instrumentation: U.S. Geological Survey Journal of Research, v. 1, no. 4, p. 475-482.

Kane, J. S., and Smith, Hezekiah, 1981, Analysis of Egyptian Geological Survey and Mining Department samples by rapid rock and atomic absorption procedures: U.S. Geological Survey Open-File Report 81-991, 59 p.

Thomas, C. P., 1979, A minicomputer-based emission spectrographic analysis system dependent on scanning microphotometry: Applied Spectroscopy, v. 33, no. 6, 604-612.

Table 1.
CONCENTRATION RANGES FOR ELEMENTS DETERMINED
BY COMPUTERIZED SPECTROGRAPHIC ANALYSIS OF SILICATE ROCKS
AT THE U.S. GEOLOGICAL SURVEY, RESTON, VA.

OXIDE FORMULAS (MAJORS)	CONCENTRATION RANGE (%)	ELEMENT (TRACE)	CONCENTRATION RANGE (PPM)	ELEMENT (TRACE)	CONCENTRATION RANGE (PPM)	ELEMENT (TRACE)	CONCENTRATION RANGE (PPM)
SIO2	0.0099 - 73	AG	0.10 - 10,000	IN	6.8 - 10,000	SN	10 - 1,000
AL2O3	0.088 - 60	AS	150 - 10,000	IR	15 - 10,000	SN	1.5 - 10,000
FE2O3	0.011 - 34	AU	10 - 1,500	LA	10 - 10,000	SR	1.0 - 460,000
MGO	0.0052 - 50	B	4.6 - 320	LI	68 - 32,000	TA	460 - 10,000
CAO	0.0021 - 44	BA	2.2 - 3,200	LU	15 - 1,000	TB	32 - 3,200
NA2O	0.0063 - 11	BE	1.0 - 680	MN	1.0 -460,000	TH	22 - 10,000
K2O	0.082 - 13	BI	10 - 4,600	MO	1.0 - 1,000	TL	4.6 - 10,000
TIO2	0.0053 - 25	CD	32 - 10,000	NB	3.2 - 1,000	TM	4.6 - 1,000
P2O5	0.16 - 11	CE	43 - 29,000	ND	32 - 6,800	U	320 - 10,000
MNO	0.00013- 60	CO	1.0 - 10,000	NI	1.5 - 15,000	V	1.0 - 1,000
		CR	1.0 - 6,800	OS	22 - 6,800	W	10 - 10,000
		CU	1.5 - 3,200	PB	6.8 - 1,000	Y	1.5 - 10,000
		DY	22 - 1,000	PD	1.0 - 3,200	YB	0.15- 1,000
		ER	10 - 1,000	PR	68 - 4,600	ZN	15 - 10,000
		EU	2.2 - 1,000	PT	4.6 - 10,000	ZR	3.2 - 32,000
		GA	1.5 - 1,000	RE	10 - 10,000		
		GD	15 - 1,000	RH	2.2 - 10,000		
		GE	1.5 - 10,000	RU	2.2 - 6,800		
		HF	15 - 10,000	SB	32 - 10,000		
		HO	6.8 - 1,000	SC	1.0 - 1,000		

THE ABOVE RANGES APPLY FOR INITIAL CALIBRATION CONDITIONS OF SEPTEMBER 1979. IN SOME CASES INTERFERENCES WILL NARROW THE RANGE.

Table 2. Sample Description and Origin

Line Code[1]	Number of Samples	Sample Numbers[2]	Rock Type	Place of Origin		
				Locality	Latitude (N) deg.min.sec.	Longitude (E) deg.min.sec
1	30	1S-30S	Syenite	Gabal Mishbih	22.44.00	34.43.00
2	20	31S-50S	Syenite	Gabal Nigrub El Tahtani	23.01.00	35.02.00
3	16	51S-66S	Syenite	Gabal Maladobe	22.44.00	34.50.00
4	10	C1-C10	Conglom-erate	Umm Gheig Lead-Zinc Mine	25.43.00	34.31.15
4	10	CL1-CL10	Clay	Umm Gheig Lead-Zinc Mine	25.43.00	34.31.15
4	10	G1-G10	Gypsum	Umm Gheig Lead-Zinc Mine	25.43.00	34.31.15
4	10	OL1-OL10	Oil-tainted Limestone	Umm Gheig Lead-Zinc Mine	25.43.00	34.31.15
4	12	LG1-LG12	Limegrit	Umm Gheig Lead-Zinc Mine	25.43.00	34.31.15
5	8	Emine1-Emine7, Makal15	Sulfide Ore	Umm Samiuki Copper Mine	24.14.00	34.49.00
6	5	Darhib1-Darhib5	Sulfide Ore	Darhib Talc Mine	24.01.00	35.01.00
7	2	Hamata1-Hamata2	Sulfide Ore	Hamata Talc Mine	24.15.30	35.13.00
8	29	1M-29M	Grey-wackes, Silt-stones	Wadi Hammamat	25.58.00	33.33.00

1/ Sample-location number in figure 1

2/ These numbers occur in the Field Number row of Table 3.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IM59 PLATE NO. CE-1309 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IM59 D. W. COLIGHTLY (PROJECT LEADER)

FIELD #		1M	2M	3M	4M	5M	6M	7M	8M	9M	10M
SAMPLE		X-130916	X-130917	X-130918	X-130919	X-130920	X-130921	X-130922	X-130923	X-130924	X-130925
SPECTRUM		16	17	18	19	20	21	22	23	24	25
SI	%	32	34	32	29	30	32	31	32	29	28
AL	%	8.6	8.2	8.3	7.1	7.8	8.2	7.2	7.7	6.9	7.0
FE	%	6.2	5.0	6.4	7.5	6.4	6.7	5.8	5.5	5.5	6.8
MG	%	2.1	1.7	1.8	2.0	1.9	1.8	1.9	2.3	1.7	2.4
CA	%	3.0	2.4	2.3	2.5	2.1	2.3	2.1	2.9	2.0	2.4
NA	%	2.3	3.0	2.7	2.0	2.4	2.4	2.0	3.0	2.4	2.3
K	%	1.3	1.9	1.8	0.98	1.6	1.6	0.99	0.72	1.5	1.4
TI	%	0.23	0.27	0.24	0.54	0.29	0.32	0.29	0.24	0.34	0.32
P	%	0.13	0.11	0.14	0.14	0.14	0.14	< 0.068	< 0.068	0.15	0.12
MN	%	0.14	0.13	0.16	0.17	0.18	0.20	0.22	0.17	0.14	0.19
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.26	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	20	14	16	18	15	21	20	12	17	11
BA	PPM	630	640	590	450	570	570	420	460	570	490
BE	PPM	2.0	1.9	1.7	1.9	2.1	2.3	2.0	1.2	2.1	1.7
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	< 63	96	< 43	110	< 43	50	< 43	< 43	< 43	59
CO	PPM	18	20	22	27	23	22	23	25	21	25
CR	PPM	140	130	170	320	190	160	130	300	140	360
CU	PPM	33	48	49	48	32	49	32	350	33	33
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	21	17	18	17	17	17	16	16	16	17
GD	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	19	23	15	46	22	29	24	< 10	25	24
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
NN	PPM	1400	1300	1600	1700	1800	2000	2200	1700	1400	1900
NO	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2
NB	PPM	16	9.7	10	17	15	13	7.3	6.3	11	8.4
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	54	55	57	58	60	58	57	110	57	89

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 1-8

FIELD #	1M	2M	3M	4M	5M	6M	7M	8M	9M	10M
SAMPLE	X-130916	X-130917	X-130918	X-130919	X-130920	X-130921	X-130922	X-130923	X-130924	X-130925
SPECTRUM	16	17	18	19	20	21	22	23	24	25
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	120	60	51	39	32	40	34	120	49	26
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	14	17	15	24	18	18	19	15	19	17
SM PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	< 1.5	< 1.5	< 1.5	2.8	< 1.5	2.1	< 1.5	3.3	< 1.5	< 1.5
SR PPM	240	390	360	480	340	430	400	380	400	320
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TN PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	100	80	91	150	110	110	110	87	93	100
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	15	19	15	30	20	21	19	13	21	16
YB PPM	3.0	2.5	2.5	4.4	3.2	3.9	3.0	2.2	3.1	2.4
ZN PPM	74	56	66	87	74	99	78	78	92	81
ZR PPM	250	120	180	240	280	190	190	100	170	140
MAJORS RECALCULATED AS OXIDES										
SIO2 %	69	73	69	62	64	69	66	69	62	60
AL203 %	16	16	16	13	15	16	14	15	13	13
FE203 %	8.9	7.2	9.2	11	9.2	9.6	8.3	7.9	7.9	9.7
MGO %	3.5	2.8	3.0	3.3	3.2	3.0	3.2	3.8	2.8	4.0
CAO %	4.2	3.4	3.2	3.5	2.9	3.2	2.9	4.1	2.8	3.4
NA20 %	3.1	4.0	3.6	2.7	3.2	3.2	2.7	4.0	3.2	3.1
K20 %	1.6	2.3	2.2	1.2	1.9	1.9	1.2	0.87	1.6	1.7
TI02 %	0.38	0.45	0.40	0.90	0.48	0.53	0.48	0.40	0.57	0.53
P205 %	0.30	0.25	0.32	0.32	0.32	0.32	< 0.16	< 0.16	0.34	0.28
MNO %	0.18	0.17	0.21	0.22	0.23	0.26	0.28	0.22	0.18	0.25

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1310 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		11M	12M	13M	14M	15M	16M	17M	18M	19M	20M
SAMPLE		X-131004	X-131005	X-131006	X-131007	X-131008	X-131009	X-131010	X-131011	X-131012	X-131013
SPECTRUM		4	5	6	7	8	9	10	11	12	13
SI	%	32	33	32	31	34	25	30	30	32	28
AL	%	6.5	8.1	8.0	7.4	8.4	6.9	8.7	10	8.6	9.9
FE	%	5.9	5.8	7.1	6.5	6.0	5.2	6.9	7.4	6.1	7.0
MG	%	1.8	1.7	2.2	1.8	2.0	3.3	2.6	3.5	2.4	2.7
CA	%	3.3	2.1	3.8	2.7	2.8	2.2	1.6	3.2	2.3	3.9
NA	%	2.7	1.7	2.6	2.7	3.0	2.3	2.3	2.3	2.6	3.3
K	%	0.96	1.6	0.53	1.6	1.5	0.65	1.5	1.5	1.5	1.5
TI	%	0.19	0.23	0.23	0.27	0.21	0.22	0.24	0.40	0.33	0.35
P	%	0.13	< 0.068	0.16	< 0.068	0.16	0.11	0.20	< 0.068	0.17	0.15
MN	%	0.14	0.14	0.17	0.14	0.18	0.12	0.15	0.15	0.13	0.20
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	23	38	< 6.8	17	17	10	28	36	19	34
BA	PPM	370	470	580	720	430	300	550	680	510	540
BE	PPM	1.7	2.3	2.0	1.8	2.0	< 1.0	2.3	< 1.0	2.1	1.5
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	< 43	< 43	< 63	< 43	< 63	< 43	< 43	< 43	< 43	< 63
CO	PPM	17	19	25	23	20	23	26	< 1.0	27	34
CR	PPM	170	120	180	150	150	290	140	150	170	190
CU	PPM	69	32	68	50	47	51	49	70	47	44
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	140	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	15	15	18	22	20	16	23	22	23	30
GD	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	16
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	17	18	18	18	12	12	15	22	22	20
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
NN	PPM	1400	1400	1700	1400	1800	1200	1500	1500	1300	2000
NO	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
NB	PPM	12	13	13	6.8	9.5	5.7	14	< 3.2	11	11
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	56	52	74	60	60	150	61	75	81	100

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 2-8

FIELD #	11M	12M	13M	14M	15M	16M	17M	18M	19M	20M
SAMPLE	X-131004	X-131005	X-131006	X-131007	X-131008	X-131009	X-131010	X-131011	X-131012	X-131013
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	47	23	71	85	57	12	38	25	54	44
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	12	14	18	14	13	15	17	20	20	17
SM PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	11	2.5	< 1.5
SR PPM	370	240	710	370	530	270	190	230	500	520
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	94	97	110	110	100	88	110	110	140	130
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	14	19	16	14	12	14	16	17	19	17
YB PPM	3.4	3.1	3.4	2.6	2.8	2.4	3.7	4.2	3.5	3.3
ZN PPM	74	77	94	83	85	88	110	110	85	120
ZR PPM	69	200	220	93	94	96	230	130	140	100
MAJORS RECALCULATED AS OXIDES										
SIO2 %	69	71	69	66	73	54	64	64	69	60
AL2O3 %	12	15	15	14	16	13	16	19	16	19
FE2O3 %	8.4	8.3	10	9.3	8.6	7.4	9.9	11	8.7	10
MGO %	3.0	2.8	3.7	3.0	3.3	5.5	4.3	5.8	4.0	4.5
CAO %	4.6	2.9	5.3	3.8	3.9	3.1	2.2	4.5	3.2	5.5
NA2O %	3.6	2.3	3.5	3.6	4.0	3.1	3.1	3.1	3.5	4.5
K2O %	1.2	1.9	0.64	1.9	1.8	0.78	1.8	1.8	1.8	1.8
TIO2 %	0.32	0.38	0.38	0.45	0.35	0.37	0.40	0.67	0.55	0.58
P2O5 %	0.30	< 0.16	0.37	< 0.16	0.37	0.25	0.46	< 0.16	0.39	0.34
MNO %	0.18	0.18	0.22	0.18	0.23	0.16	0.19	0.19	0.17	0.26

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. MAGNESIUM DETERMINED VISUALLY IN SPECTRUM #11.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1310 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		21M	22M	23M	24M	25M	26M	27M	28M	29M	18
SAMPLE		X-131014	X-131015	X-131016	X-131017	X-131018	X-131019	X-131020	X-131021	X-131022	X-131023
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	32	29	30	22	31	30	22	32	32	22
AL	%	9.4	10	10	6.6	9.4	9.5	4.9	7.9	8.3	7.6
FE	%	6.8	7.3	5.4	5.1	7.2	7.0	3.7	6.3	6.1	4.9
MG	%	2.4	2.6	2.7	2.4	2.5	2.4	3.3	2.7	2.3	0.23
CA	%	2.2	2.9	2.8	8.5	2.1	2.0	5.3	0.80	2.6	1.3
NA	%	2.0	1.7	2.2	2.3	2.6	2.0	2.5	2.7	2.3	9.8
K	%	1.5	1.5	1.8	0.72	1.6	1.8	0.28	1.1	1.5	4.9
TI	%	0.35	0.36	0.23	0.24	0.31	0.37	0.21	0.28	0.31	0.20
P	%	< 0.068	0.20	0.19	0.18	< 0.068	< 0.068	0.11	< 0.068	< 0.068	0.097
MN	%	0.14	0.17	0.15	0.21	0.16	0.13	0.23	0.048	0.13	0.33
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	54	36	46	27	30	38	45	15	35	< 4.6
BA	PPM	650	750	620	440	500	560	320	350	640	600
BE	PPM	1.9	2.4	2.3	1.2	2.0	2.1	< 1.0	1.4	2.2	2.6
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	< 43	< 43	< 63	< 63	84	76	< 63	< 43	< 43	< 43
CO	PPM	28	31	28	19	29	29	28	30	25	< 1.0
CR	PPM	130	140	170	110	170	150	380	240	150	< 1.0
CU	PPM	47	8.2	32	92	63	69	66	32	93	14
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	2.8	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	3.1
GA	PPM	24	25	26	14	22	22	12	17	21	35
GD	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	26	25	11	29	21	27	13	< 10	26	39
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MM	PPM	1400	1700	1500	2100	1600	1300	2300	480	1300	3300
MO	PPM	< 1.0	1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
NB	PPM	6.5	18	15	5.5	14	12	< 3.2	8.9	11	67
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	59
NI	PPM	76	87	76	40	79	71	160	160	54	3.8

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 3-8

FIELD #	21M	22M	23M	24M	25M	26M	27M	28M	29M	18
SAMPLE	X-131014	X-131015	X-131016	X-131017	X-131018	X-131019	X-131020	X-131021	X-131022	X-131023
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	26	27	39	43	30	22	37	15	94	8.8
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	20	22	17	14	18	22	14	18	17	8.8
SN PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SR PPM	< 1.5	< 1.5	< 1.5	< 1.5	1.7	2.3	< 1.5	< 1.5	1.7	5.9
TA PPM	230	400	120	440	410	390	270	160	250	59
TB PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TH PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TL PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
V PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
W PPM	130	110	100	83	120	140	70	100	110	< 1.0
Y PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
YB PPM	22	23	16	19	19	24	11	16	21	19
ZN PPM	3.7	4.3	3.6	3.2	3.8	4.0	1.5	2.9	4.3	3.1
ZR PPM	100	94	100	120	100	120	83	93	120	120
	100	140	220	160	140	210	92	150	160	230

MAJORS RECALCULATED AS OXIDES

SIO2 %	69	62	64	47	66	64	47	69	69	47
AL2O3 %	18	19	19	13	18	18	9.3	15	16	14
FE2O3 %	9.7	10	7.7	7.3	10	10	5.3	9.0	8.7	7.0
MGO %	4.0	4.3	4.5	4.0	4.1	4.0	5.5	4.5	3.8	0.38
CAO %	3.1	4.1	3.9	12	2.9	2.8	7.4	1.1	3.6	1.8
NA2O %	2.7	2.3	3.0	3.1	3.5	2.7	3.4	3.6	3.1	13
K2O %	1.8	1.8	2.2	0.87	1.9	2.2	0.34	1.3	1.8	5.9
TIO2 %	0.58	0.60	0.38	0.40	0.52	0.62	0.35	0.47	0.52	0.33
P2O5 %	< 0.16	0.46	0.44	0.41	< 0.16	< 0.16	0.25	< 0.16	< 0.16	0.22
MNO %	0.18	0.22	0.19	0.27	0.21	0.17	0.30	0.062	0.17	0.43

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1311 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
SAMPLE		X-131104	X-131105	X-131106	X-131107	X-131108	X-131109	X-131110	X-131111	X-131112	X-131113
SPECTRUM		4	5	6	7	8	9	10	11	12	13
SI	%	28	29	24	29	30	29	28	30	28	31
AL	%	10	8.3	11	12	11	9.9	11	11	9.8	13
FE	%	4.9	6.5	4.7	4.9	3.1	3.9	4.6	4.9	5.8	5.0
MG	%	0.33	0.11	0.23	0.31	0.23	0.11	0.37	0.53	0.19	0.34
CA	%	2.6	0.89	2.1	2.3	1.6	1.1	1.8	2.6	2.8	2.0
NA	%	12	9.0	11	8.0	11	9.0	11	10	9.0	9.0
K	%	5.0	5.4	5.6	5.5	6.1	5.3	6.4	5.3	4.9	5.2
TI	%	0.25	0.18	0.16	0.22	0.13	0.13	0.23	0.23	0.23	0.19
P	%	< 0.068	< 0.068	0.12	0.093	0.087	< 0.068	< 0.068	0.15	0.071	0.096
MN	%	0.23	0.31	0.24	0.21	0.21	0.18	0.18	0.062	0.33	0.22
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 4.6	< 6.8	< 4.6	< 4.6	7.1	< 4.6	< 4.6	8.3	< 4.6	< 4.6
BA	PPM	1900	100	92	220	220	150	120	1700	460	250
BE	PPM	2.8	5.3	3.6	7.0	4.8	1.9	3.8	3.6	4.5	2.1
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	120	98	110	200	< 43	120	95	110	180	45
CO	PPM	1.9	< 1.0	2.0	2.1	1.8	1.3	1.8	1.8	1.5	1.2
CR	PPM	6.9	3.9	8.2	5.4	3.7	6.7	3.8	4.1	10	3.9
CU	PPM	26	16	31	16	12	16	15	14	37	14
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	4.0	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	4.5	< 2.2	2.6
GA	PPM	36	56	45	40	48	41	36	39	45	34
GD	PPM	22	< 15	< 15	19	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	43	30	64	97	33	65	57	52	78	33
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	2300	3100	2400	2100	2100	1800	1800	620	3300	2200
MO	PPM	1.8	< 1.0	1.3	< 1.0	< 1.0	< 1.0	1.2	3.9	1.4	< 1.0
NB	PPM	100	100	130	190	130	71	140	150	130	60
ND	PPM	< 32	59	< 32	53	< 32	73	< 32	< 32	38	< 32
NI	PPM	11	3.7	11	5.1	5.0	6.2	4.7	4.3	15	4.5

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 4-8

FIELD #	2S	3S	4S	5S	6S	7S	8S	9S	10S	11S
SAMPLE	X-131104	X-131105	X-131106	X-131107	X-131108	X-131109	X-131110	X-131111	X-131112	X-131113
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	13	14	20	20	9.2	7.3	9.8	11	12	11
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	6.8	3.7	3.4	4.6	2.3	2.2	5.7	6.7	5.6	5.7
SN PPM	< 10	< 10	< 10	11	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	3.8	17	9.3	15	10	7.1	10	5.3	21	6.1
SR PPM	360	35	49	< 15	100	61	87	370	< 15	38
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	4.7	2.4	1.4	3.9	3.2	2.3	2.5	2.7	2.3	2.0
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	19	20	22	41	19	23	22	23	32	11
YB PPM	2.5	4.0	5.2	5.9	3.4	3.3	2.9	2.9	5.2	2.4
ZN PPM	70	95	130	89	73	92	69	64	90	90
ZR PPM	350	340	370	1300	610	280	580	610	790	120

MAJORS RECALCULATED AS OXIDES

SIO2 %	60	62	51	62	64	62	60	64	60	66
AL2O3 %	19	16	21	23	21	19	21	21	19	25
FE2O3 %	7.0	9.3	6.7	7.0	4.4	5.6	6.6	7.0	8.3	7.2
MGO %	0.55	0.18	0.38	0.51	0.38	0.18	0.61	0.88	0.32	0.56
CAO %	3.6	1.3	2.9	3.2	2.2	1.5	2.5	3.6	3.9	2.8
NA2O %	16	12	15	11	15	12	15	13	12	12
K2O %	6.0	6.5	6.8	6.6	7.4	6.4	7.7	6.4	5.9	6.3
TIO2 %	0.42	0.30	0.27	0.37	0.22	0.22	0.38	0.38	0.38	0.32
P2O5 %	< 0.16	< 0.16	0.28	0.21	0.20	< 0.16	< 0.16	0.34	0.16	0.22
MNO %	0.30	0.40	0.31	0.27	0.27	0.23	0.23	0.080	0.43	0.28

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. SODIUM DETERMINED VISUALLY IN SPECTRA #'S 4,7,10,11 AND 13.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT
JOB NO. IN59
SPEC.LAB.#IN59

PROGRAM NO. 1280202
PLATE NO. CE-1311

FOR: MOHAMED S. S. HOLYLE
DATE: 09/17/80

JOSEPH L. HARRIS (ANALYST)
W. B. CRANDELL (PLATE RECORDER)
D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		12S	13S	14S	15S	16S	17S	18S	19S	20S	21S
SAMPLE		X-131114	X-131115	X-131116	X-131117	X-131118	X-131119	X-131120	X-131121	X-131122	X-131123
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	28	27	28	30	29	24	22	30	32	28
AL	%	10	14	10	12	10	11	8.9	9.7	9.2	9.5
FE	%	3.9	7.0	5.2	5.3	4.8	4.4	4.3	7.2	5.4	4.0
MG	%	0.23	1.2	0.15	0.27	0.22	0.65	0.17	0.092	0.096	0.28
CA	%	1.4	4.5	1.6	2.5	1.8	2.9	1.7	0.17	0.74	1.5
NA	%	12	11	11	9.0	10	8.0	9.0	9.0	7.3	8.0
K	%	5.5	3.2	6.2	5.4	5.0	4.7	3.2	5.7	3.5	4.9
TI	%	0.18	0.37	0.13	0.17	0.20	0.31	0.26	0.24	0.12	0.19
P	%	< 0.068	0.25	< 0.068	0.14	< 0.068	0.16	0.087	< 0.068	< 0.068	< 0.068
MN	%	0.21	0.23	0.20	0.22	0.24	0.19	0.25	0.23	0.25	0.21
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 4.6	< 6.8	< 4.6	< 4.6	< 4.6	< 4.6	8.9	< 4.6	5.4	< 4.6
BA	PPM	88	2000	72	480	160	1400	400	140	210	170
BE	PPM	5.2	3.1	7.6	4.8	4.2	2.9	3.2	7.0	7.9	3.4
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	130	79	180	230	280	< 63	340	160	190	96
CO	PPM	1.3	9.4	1.3	3.7	1.5	3.9	1.6	< 1.0	< 1.0	1.4
CR	PPM	3.0	12	5.0	6.4	6.6	23	6.2	3.2	3.9	3.9
CU	PPM	12	28	22	100	17	18	10	12	16	13
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	5.9	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	3.4	< 2.2	< 2.2
GA	PPM	41	33	55	48	41	33	30	52	45	36
GD	PPM	< 15	< 15	< 15	< 15	49	39	96	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	79	44	94	110	130	65	72	93	87	50
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	2100	2300	2000	2200	2400	1900	2500	2300	2500	2100
MO	PPM	< 1.0	1.9	< 1.0	7.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
NB	PPM	140	68	260	330	140	88	74	200	210	86
ND	PPM	45	< 32	57	55	94	< 32	41	89	96	< 32
NI	PPM	3.2	11	4.0	6.0	5.2	6.1	4.2	4.2	3.9	3.8

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 5-B

FIELD #	12S	13S	14S	15S	16S	17S	18S	19S	20S	21S
SAMPLE	X-131114	X-131115	X-131116	X-131117	X-131118	X-131119	X-131120	X-131121	X-131122	X-131123
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	16	14	16	15	19	9.6	7.6	15	14	7.1
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	2.7	9.3	2.0	3.0	4.5	7.4	5.9	5.4	3.7	4.1
SN PPM	< 10	< 10	11	16	13	< 10	< 10	10	12	< 10
SR PPM	13	5.7	23	19	14	5.1	4.0	14	16	4.3
TA PPM	26	710	49	260	98	440	120	41	41	59
TB PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TH PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TL PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
V PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
W PPM	2.3	33	1.1	3.7	2.8	7.7	2.4	3.3	3.0	1.6
Y PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
YB PPM	27	15	34	46	41	26	28	39	48	23
ZN PPM	5.1	2.2	5.7	8.9	6.0	3.0	3.2	6.0	9.9	2.9
ZR PPM	99	77	91	120	120	82	72	120	180	73
	500	220	1000	2400	470	420	370	650	770	400

MAJORS RECALCULATED AS OXIDES

SIO2	%	60	58	60	64	62	51	47	64	69	60
AL2O3	%	19	27	19	23	19	21	17	18	17	18
FE2O3	%	5.6	10	7.4	7.6	6.9	6.3	6.2	10	7.7	5.7
MGO	%	0.38	2.0	0.25	0.45	0.37	1.1	0.28	0.15	0.16	0.46
CAO	%	2.0	6.3	2.2	3.5	2.5	4.1	2.4	0.24	1.0	2.1
NA2O	%	16	15	15	12	13	11	12	12	9.9	11
K2O	%	6.6	3.9	7.5	6.5	6.0	5.7	3.9	6.9	4.2	5.9
TIO2	%	0.30	0.62	0.22	0.28	0.33	0.52	0.43	0.40	0.20	0.32
P2O5	%	< 0.16	0.57	< 0.16	0.32	< 0.16	0.37	0.20	< 0.16	< 0.16	< 0.16
MNO	%	0.27	0.30	0.26	0.28	0.31	0.25	0.32	0.30	0.32	0.27

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. SODIUM DETERMINED VISUALLY IN SPECTRA #'S 14,15,17,19,20,21 AND 23.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. PAGE 6-A

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1312 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		22S	23S	24S	25S	26S	27S	28S	29S	30S	31S
SAMPLE		X-131204	X-131205	X-131206	X-131207	X-131208	X-131209	X-131210	X-131211	X-131212	X-131213
SPECTRUM		4	5	6	7	8	9	10	11	12	13
SI	%	31	30	30	30	33	29	31	34	32	31
AL	%	11	14	11	12	16	11	9.3	14	12	11
FE	%	7.0	4.8	4.3	4.2	3.5	8.0	9.1	12	7.2	7.2
MG	%	0.29	0.22	0.34	0.36	0.27	0.24	0.24	0.27	0.31	0.22
CA	%	1.9	2.2	1.8	1.4	1.2	3.2	1.5	1.7	2.0	1.1
NA	%	10	9.0	8.0	7.5	7.5	9.0	7.5	9.0	8.0	8.0
K	%	4.7	5.4	3.7	5.6	5.0	5.1	4.2	4.8	3.5	3.9
TI	%	0.21	0.22	0.26	0.27	0.30	0.21	0.22	0.30	0.26	0.30
P	%	< 0.068	< 0.068	< 0.068	< 0.068	0.090	< 0.068	< 0.068	< 0.068	0.095	< 0.068
MN	%	0.45	0.28	0.19	0.24	0.11	0.21	0.39	0.46	0.26	0.32
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 6.8	< 6.8	< 4.6	12	< 4.6	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
BA	PPM	1300	220	1700	960	1600	1100	350	1700	720	1900
BE	PPM	6.6	2.1	2.0	1.8	2.2	4.0	5.9	7.6	6.0	4.3
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	300	120	88	140	83	170	210	270	370	210
CO	PPM	1.2	1.2	1.5	1.3	2.9	< 1.0	1.4	5.1	4.2	1.4
CR	PPM	7.8	7.4	6.5	6.8	4.3	6.7	18	44	29	6.6
CU	PPM	20	17	14	18	13	20	50	110	48	16
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	17	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	3.9	3.9	4.7	3.7	4.3	3.9	< 2.2	5.4
GA	PPM	43	50	31	35	38	45	46	67	46	48
GD	PPM	39	< 15	< 15	< 15	< 15	< 15	20	15	64	24
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	130	41	42	54	40	68	85	110	150	84
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	4500	2800	1900	2400	1100	2100	3900	4600	2600	3200
MO	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	10	< 1.0	< 1.0
NB	PPM	300	51	40	38	62	84	150	200	170	75
ND	PPM	120	33	< 32	47	82	47	71	91	140	140
NI	PPM	5.1	5.2	4.4	4.8	11	4.6	18	19	14	5.8

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 6-8

FIELD #	22S	23S	24S	25S	26S	27S	28S	29S	30S	31S
SAMPLE	X-131204	X-131205	X-131206	X-131207	X-131208	X-131209	X-131210	X-131211	X-131212	X-131213
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	19	9.5	6.8	8.0	< 6.8	9.2	13	21	15	< 6.8
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	75	< 68	< 68	< 68	< 68	< 68	< 68	< 68	79	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	11	4.3	7.6	8.9	7.2	14	7.4	6.4	8.1	17
SN PPM	16	< 10	< 10	< 10	< 10	10	11	15	16	< 10
SR PPM	9.9	4.4	1.6	< 1.5	1.6	2.8	< 1.5	21	21	3.1
TA PPM	120	55	410	75	320	60	52	69	120	120
TB PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TH PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	1.9	1.4	2.5	1.9	2.9	1.6	2.5	6.3	3.3	1.9
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	73	14	18	21	19	26	40	44	53	39
YB PPM	9.2	2.6	1.6	1.5	2.1	3.3	6.0	6.8	6.7	5.9
ZN PPM	120	96	63	86	41	92	140	200	150	80
ZR PPM	1300	240	230	190	310	440	770	960	680	490
MAJORS RECALCULATED AS OXIDES										
SIO2 %	66	64	64	64	71	62	66	73	69	66
AL2O3 %	21	27	21	23	30	21	18	27	23	21
FE2O3 %	10	6.9	6.2	6.0	5.0	11	13	17	10	10
MGO %	0.48	0.37	0.56	0.60	0.45	0.40	0.40	0.45	0.51	0.37
CAO %	2.7	3.1	2.5	2.0	1.7	4.5	2.1	2.4	2.8	1.5
NA2O %	13	12	11	10	10	12	10	12	11	11
K2O %	5.7	6.5	4.5	6.8	6.0	6.1	5.1	5.8	4.2	4.7
TIO2 %	0.35	0.37	0.43	0.45	0.50	0.35	0.37	0.50	0.43	0.50
P2O5 %	< 0.16	< 0.16	< 0.16	< 0.16	0.21	< 0.16	< 0.16	< 0.16	0.22	< 0.16
MNO %	0.58	0.36	0.25	0.31	0.14	0.27	0.50	0.59	0.34	0.41

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. SODIUM DETERMINED VISUALLY IN SPECTRA #'S 4,5,6,7,8,9,10,11,12 AND 13.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1312 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		32S	33S	34S	35S	36S	37S	38S	39S	40S	41S
SAMPLE		X-131214	X-131215	X-131216	X-131217	X-131218	X-131219	X-131220	X-131221	X-131222	X-131223
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	33	> 34	33	> 34	33	32	33	> 34	33	32
AL	%	10	14	12	12	11	11	14	10	14	15
FE	%	5.4	5.5	5.5	7.6	4.8	1.1	5.5	4.9	3.2	5.4
MG	%	0.15	0.16	0.14	0.14	0.33	0.062	0.43	0.12	0.18	0.16
CA	%	1.6	1.7	0.66	1.3	3.1	0.21	1.7	0.54	0.62	0.80
NA	%	8.0	9.0	8.0	8.0	7.5	8.0	8.0	7.5	10	8.0
K	%	4.9	5.9	5.0	4.9	4.0	5.2	4.3	4.5	5.4	4.5
TI	%	0.18	0.18	0.15	0.11	0.20	0.082	0.14	0.11	0.097	0.26
P	%	< 0.068	0.072	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
MN	%	0.13	0.18	0.14	0.18	0.21	0.013	0.25	0.048	0.065	0.35
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	13	5.9	14	19	< 4.6	< 4.6	< 6.8	5.2	< 4.6	< 6.8
BA	PPM	410	300	240	87	2000	1100	690	120	490	640
BE	PPM	5.5	6.3	6.1	7.9	4.0	2.4	4.5	11	2.5	3.0
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	140	210	120	130	110	< 43	160	260	48	160
CO	PPM	1.2	2.3	1.4	1.1	1.4	< 1.0	1.1	1.5	< 1.0	1.4
CR	PPM	7.2	11	8.9	7.8	6.4	4.2	11	14	7.2	7.4
CU	PPM	17	23	20	22	20	9.2	35	50	18	19
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	11	< 10	< 10	< 10	< 10	< 10	14	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	2.2	5.9	3.8	< 2.2	3.1	< 2.2	3.8
GA	PPM	50	59	52	63	50	37	51	60	54	43
GD	PPM	19	39	< 15	< 15	< 15	< 15	< 15	< 15	< 15	21
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	82	88	63	78	60	41	53	140	24	37
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	1300	1800	1400	1800	2100	130	2500	480	650	3500
MO	PPM	< 1.0	3.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
NB	PPM	70	140	92	160	68	23	68	250	25	45
ND	PPM	75	68	72	90	66	55	40	140	35	76
NI	PPM	4.0	4.9	5.9	5.2	6.0	3.5	6.7	6.7	4.5	5.0

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 7-B

FIELD #	32S	33S	34S	35S	36S	37S	38S	39S	40S	41S
SAMPLE	X-131214	X-131215	X-131216	X-131217	X-131218	X-131219	X-131220	X-131221	X-131222	X-131223
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	9.8	12	22	19	15	12	14	17	< 6.8	9.0
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	2.9	3.7	2.2	1.4	9.7	3.7	4.8	2.6	2.4	14
SN PPM	< 10	11	< 10	10	< 10	< 10	< 10	18	< 10	< 10
SN PPM	7.9	8.5	50	27	5.5	4.0	10	20	2.4	3.6
SR PPM	75	110	66	300	260	48	68	44	46	56
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TN PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	1.0	4.2	2.2	3.7	5.5	1.4	1.3	4.9	1.3	1.5
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	34	43	31	34	29	18	28	67	16	23
YB PPM	6.6	7.9	6.6	9.3	6.3	2.1	6.0	16	2.1	3.2
ZN PPM	170	140	150	180	140	71	180	100	32	82
ZR PPM	430	820	460	800	300	180	370	1100	180	250

MAJORS RECALCULATED AS OXIDES

SIO2 %	71	> 73	71	> 73	71	69	71	> 73	71	69
AL203 %	19	27	23	23	21	21	27	19	27	28
FE203 %	7.7	7.9	7.9	11	6.9	1.6	7.9	7.0	4.6	7.7
MGO %	0.25	0.27	0.23	0.23	0.55	0.10	0.71	0.20	0.30	0.27
CAO %	2.2	2.4	0.92	1.8	4.3	0.29	2.4	0.76	0.87	1.1
NA2O %	11	12	11	11	10	11	11	10	13	11
K2O %	5.9	7.1	6.0	5.9	4.8	6.3	5.2	5.4	6.5	5.4
TIO2 %	0.30	0.30	0.25	0.18	0.33	0.14	0.23	0.18	0.16	0.43
P2O5 %	< 0.16	0.17	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
MNO %	0.17	0.23	0.18	0.23	0.27	0.017	0.32	0.062	0.084	0.45

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. SODIUM(SPECTRA #'S 14,15,16,17,18,19,20,21,22,23) AND STRONTIUM(SPECTRUM #17) WERE DETERMINED VISUALLY.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1313 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.# IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		42S	43S	44S	45S	46S	47S	48S	49S	50S	51S
SAMPLE		X-131304	X-131305	X-131306	X-131307	X-131308	X-131309	X-131310	X-131311	X-131312	X-131313
SPECTRUM		4	5	6	7	8	9	10	11	12	13
SI	%	34	> 34	34	> 34	27	> 34	33	32	> 34	> 34
AL	%	13	9.4	11	12	10	11	12	11	14	13
FE	%	6.2	5.3	6.5	7.4	9.0	6.6	8.6	6.6	5.3	4.6
MG	%	0.31	0.075	0.17	0.19	0.27	0.16	0.57	0.20	0.14	0.21
CA	%	2.9	0.71	2.0	1.5	4.6	1.4	3.1	2.8	1.2	2.8
NA	%	11	9.6	9.9	9.9	8.5	8.5	7.5	10	9.2	10
K	%	5.1	4.1	5.0	4.8	3.2	4.5	3.0	5.1	4.5	5.6
TI	%	0.24	0.10	0.19	0.26	0.53	0.20	0.51	0.17	0.20	0.19
P	%	0.11	< 0.068	< 0.068	< 0.068	0.34	< 0.068	< 0.068	< 0.068	0.081	< 0.068
MN	%	0.21	0.19	0.31	0.17	0.37	0.34	0.20	0.32	0.13	0.24
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 6.8	6.4	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 4.6	< 6.8	6.6
BA	PPM	1900	240	340	510	300	360	790	230	760	410
BE	PPM	2.2	11	4.6	5.9	6.0	4.2	6.1	2.7	1.4	4.9
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	110	200	120	110	260	130	180	54	< 43	94
CO	PPM	2.9	< 1.0	1.3	1.8	8.9	1.4	4.6	1.6	< 1.0	1.2
CR	PPM	6.6	7.1	8.5	4.2	4.3	6.6	11	8.4	6.4	6.7
CU	PPM	21	21	19	16	18	20	25	19	18	19
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	2.9	2.9	3.0	< 2.2	< 2.2	2.2	2.5	< 2.2
GA	PPM	47	61	51	56	56	52	45	48	39	50
GD	PPM	19	15	< 15	< 15	18	19	30	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	26	87	41	45	140	55	110	27	34	41
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MM	PPM	2100	1900	3100	1700	3700	3400	2000	3200	1300	2400
MO	PPM	< 1.0	4.9	< 1.0	< 1.0	2.3	< 1.0	< 1.0	1.5	< 1.0	< 1.0
NB	PPM	59	230	84	100	230	62	160	53	40	190
ND	PPM	< 32	71	< 32	< 32	110	69	90	< 32	44	< 32
HI	PPM	4.9	5.3	5.0	4.5	4.9	5.7	8.3	4.7	4.6	4.6

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 8-B

FIELD #	42S	43S	44S	45S	46S	47S	48S	49S	50S	51S
SAMPLE	X-131304	X-131305	X-131306	X-131307	X-131308	X-131309	X-131310	X-131311	X-131312	X-131313
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	14	23	8.4	12	20	8.2	14	11	9.8	12
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	9.6	1.5	6.0	4.8	10	6.0	17	4.9	6.9	5.9
SN PPM	< 10	11	< 10	< 10	17	< 10	12	< 10	< 10	< 10
SN PPM	17	24	54	6.7	18	28	23	93	9.9	8.9
SR PPM	150	42	73	82	190	74	260	75	75	150
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TN PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TH PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	8.1	1.9	2.4	4.1	34	2.5	3.7	2.2	2.1	2.1
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	14	47	27	26	73	34	68	16	15	28
YB PPM	2.3	9.8	3.8	3.9	9.5	5.0	8.6	3.5	2.6	5.5
ZN PPM	95	190	100	140	170	140	140	130	79	170
ZR PPM	200	1700	280	400	1300	280	1200	290	160	1500

MAJORS RECALCULATED AS OXIDES

SIO2 %	73	> 73	73	> 73	58	> 73	71	69	> 73	> 73
AL2O3 %	25	18	21	23	19	21	23	21	27	25
FE2O3 %	8.9	7.6	9.3	11	13	9.4	12	9.4	7.6	6.6
MGO %	0.51	0.12	0.28	0.32	0.45	0.27	0.95	0.33	0.23	0.35
CAO %	4.1	0.99	2.8	2.1	6.4	2.0	4.3	3.9	1.7	3.9
NA2O %	15	13	13	13	11	11	10	13	12	13
K2O %	6.1	4.9	6.0	5.8	3.9	5.4	3.6	6.1	5.4	6.8
TIO2 %	0.40	0.17	0.32	0.43	0.88	0.33	0.85	0.28	0.33	0.32
P2O5 %	0.25	< 0.16	< 0.16	< 0.16	0.78	< 0.16	< 0.16	< 0.16	0.19	< 0.16
MNO %	0.27	0.25	0.40	0.22	0.48	0.44	0.26	0.41	0.17	0.31

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. SODIUM DETERMINED VISUALLY IN SPECTRA #'S 4,7,8,9,10 AND 11.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1313 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		528	538	548	558	568	578	588	598	608	618
SAMPLE		X-131314	X-131315	X-131316	X-131317	X-131318	X-131319	X-131320	X-131321	X-131322	X-131323
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	34	33	33	> 34	33	33	33	33	34	33
AL	%	10	13	11	13	13	8.6	14	10	11	11
FE	%	3.6	4.5	6.7	6.7	4.4	3.5	7.1	4.1	5.1	6.0
MG	%	0.12	0.22	0.67	0.54	0.18	0.097	0.61	0.19	0.15	0.53
CA	%	1.2	2.6	3.8	2.7	1.6	0.94	3.3	2.3	2.6	2.9
NA	%	8.4	10	10	10	9.5	8.5	10	9.2	9.2	10
K	%	4.1	5.0	4.2	4.1	4.5	4.4	4.4	4.0	4.9	4.0
TI	%	0.15	0.20	0.34	0.34	0.17	0.10	0.32	0.17	0.17	0.27
P	%	< 0.068	< 0.068	0.16	< 0.068	0.069	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
MN	%	0.19	0.32	0.28	0.27	0.19	0.094	0.25	0.18	0.25	0.26
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 4.6	< 4.6	7.7	< 4.6	6.3	< 4.6	5.2	< 4.6	5.3	< 6.8
BA	PPM	380	320	1700	1400	470	420	1700	1100	340	1500
BE	PPM	7.6	6.0	3.4	4.4	3.4	4.4	3.7	6.9	4.0	3.1
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	200	170	82	150	180	370	150	160	220	< 63
CO	PPM	1.1	1.3	3.9	2.3	1.8	1.2	3.3	1.2	2.0	2.4
CR	PPM	7.1	6.6	7.1	6.3	8.4	5.3	6.7	7.1	10	3.9
CU	PPM	19	16	19	16	18	13	19	17	22	14
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	11	< 10	< 10	< 10	12	< 10
EU	PPM	2.2	< 2.2	4.4	4.2	2.2	< 2.2	4.3	3.9	< 2.2	3.9
GA	PPM	41	48	42	42	41	40	44	39	45	37
GD	PPM	< 15	19	< 15	< 15	< 15	H	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 15	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	120	75	50	65	120	52	62	93	110	36
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
NN	PPM	1900	3200	2800	2700	1900	940	2500	1800	2500	2600
NO	PPM	< 1.0	1.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.7	< 1.0
NB	PPM	140	150	74	120	98	170	89	120	210	60
ND	PPM	130	73	< 32	54	65	58	< 32	71	74	< 32
NI	PPM	4.4	4.3	5.0	5.0	5.6	4.2	6.0	5.9	7.7	3.9

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 9-B

FIELD #	52S	53S	54S	55S	56S	57S	58S	59S	60S	61S
SAMPLE	X-131314	X-131315	X-131316	X-131317	X-131318	X-131319	X-131320	X-131321	X-131322	X-131323
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	9.2	11	12	14	11	9.0	11	12	11	11
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	4.8	4.6	11	14	4.6	2.6	11	6.5	5.8	11
SM PPM	13	< 10	< 10	< 10	12	< 10	< 10	10	14	< 10
SN PPM	9.4	12	8.0	2.9	7.9	4.2	6.1	9.7	10	3.7
SR PPM	110	120	450	330	120	77	430	210	120	370
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	2.1	1.9	9.6	4.3	1.0	7.2	9.7	1.1	2.3	9.0
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	46	33	23	30	27	28	27	39	37	17
YB PPM	7.0	6.7	3.6	4.0	4.6	3.9	4.1	6.2	6.3	2.5
ZN PPM	160	150	170	150	200	62	130	140	150	160
ZR PPM	590	430	430	480	610	950	460	470	1500	220

MAJORS RECALCULATED AS OXIDES

SIO2 %	73	71	71	> 73	71	71	71	71	73	71
AL2O3 %	19	25	21	25	25	16	27	19	21	21
FE2O3 %	5.2	6.4	9.6	9.6	6.3	5.0	10	5.9	7.3	8.6
MGO %	0.20	0.37	1.1	0.90	0.30	0.16	1.0	0.32	0.25	0.88
CAO %	1.7	3.6	5.3	3.8	2.2	1.3	4.6	3.2	3.6	4.1
NA2O %	11	13	13	13	13	11	13	12	12	13
K2O %	4.9	6.0	5.1	4.9	5.4	5.3	5.3	4.8	5.9	4.8
TIO2 %	0.25	0.33	0.57	0.57	0.28	0.17	0.53	0.28	0.28	0.45
P2O5 %	< 0.16	< 0.16	0.37	< 0.16	0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
MNO %	0.25	0.41	0.36	0.35	0.25	0.12	0.32	0.23	0.32	0.34

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'N' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. SODIUN DETERMINED VISUALLY IN SPECTRA #'S 15,16,17,20,22 AND 23.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1314 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		62S	63S	64S	65S	66S	C1	C2	C3	C4	C5
SAMPLE		X-131404	X-131405	X-131406	X-131407	X-131408	X-131409	X-131410	X-131411	X-131412	X-131413
SPECTRUM		4	5	6	7	8	9	10	11	12	13
SI	%	> 34	> 34	> 34	> 34	> 34	0.76	1.0	0.29	2.5	0.73
AL	%	13	14	13	14	18	0.19	0.55	0.056	0.76	0.18
FE	%	7.5	7.7	7.6	6.4	5.5	1.5	1.2	1.2	1.9	0.89
MG	%	0.56	0.60	0.63	0.63	0.24	9.4	11	8.2	12	7.3
CA	%	3.0	2.7	2.6	2.5	2.8	18	22	15	23	23
NA	%	10	10	10	10	11	1.4	0.25	1.4	0.32	0.40
K	%	3.9	3.7	3.7	4.5	6.8	0.16	0.21	0.11	0.33	0.13
TI	%	0.39	0.33	0.37	0.31	0.24	0.0064	0.024	0.0039	0.035	0.0070
P	%	< 0.068	0.16	< 0.068	0.13	0.081	< 0.068	< 0.068	0.084	< 0.068	< 0.068
MN	%	0.30	0.28	0.28	0.24	0.26	1.0	0.99	1.2	1.1	0.92
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.44	1.2	< 0.10	0.26
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 4.6	< 6.8	< 6.8	< 6.8	< 4.6	30	34	50	52	47
BA	PPM	1200	1100	900	1600	440	95	170	390	270	120
BE	PPM	6.9	4.9	4.8	4.1	6.5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	200	130	150	130	370	< 63	< 63	< 63	< 63	< 63
CO	PPM	3.5	3.2	3.3	3.0	1.5	1.1	3.3	6.1	3.1	3.6
CR	PPM	5.8	8.3	6.4	6.8	7.7	8.7	14	2.5	23	5.6
CU	PPM	17	20	20	32	13	7.8	13	8.9	12	6.9
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	4.6	3.8	< 2.2	4.4	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	2.5
GA	PPM	45	49	44	44	53	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
GD	PPM	< 15	< 15	< 15	< 15	H	< 15	< 15	< 15	H	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	110	55	70	40	180	11	14	< 10	< 10	< 10
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	3000	2800	2800	2400	2600	10000	9900	12000	11000	9200
MO	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.6	3.5	12	16	7.7
NB	PPM	74	69	160	68	240	< 3.2	< 3.2	< 3.2	5.4	< 3.2
ND	PPM	76	< 32	32	< 32	120	< 32	< 32	< 32	< 32	< 32
NI	PPM	4.8	5.6	5.4	6.2	4.5	3.9	5.9	8.7	9.1	18

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 10-B

FIELD #	62S	63S	64S	65S	66S	C1	C2	C3	C4	C5
SAMPLE	X-131404	X-131405	X-131406	X-131407	X-131408	X-131409	X-131410	X-131411	X-131412	X-131413
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	19	12	11	16	11	66	170	210	290	130
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	70	< 68	< 68	< 68	68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 4.6	< 2.2	< 4.6	< 4.6	< 4.6	< 4.6
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	10	10	10	10	7.6	4.5	3.7	1.3	2.9	3.2
SM PPM	< 10	< 10	< 10	< 10	17	< 10	< 10	< 10	< 10	< 10
SN PPM	9.3	5.6	5.0	5.5	6.4	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
SR PPM	420	430	420	410	140	360	440	430	460	570
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	40	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	10	9.1	11	7.3	3.9	30	29	20	60	13
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	34	31	32	21	56	3.1	3.7	4.6	6.3	6.0
YB PPM	5.1	5.1	4.2	3.9	6.6	0.32	0.27	< 0.15	0.53	0.51
ZN PPM	190	180	150	160	130	850	1100	1600	850	530
ZR PPM	300	390	770	290	1200	45	51	72	63	41
MAJORS RECALCULATED AS OXIDES										
SIO2 %	> 73	> 73	> 73	> 73	> 73	1.6	2.1	0.62	5.4	1.6
AL2O3 %	25	27	25	27	34	0.36	1.0	0.11	1.4	0.34
FE2O3 %	11	11	11	9.2	7.9	2.1	1.7	1.7	2.7	1.3
MGO %	0.93	1.0	1.0	1.0	0.40	16	18	14	20	12
CAO %	4.2	3.8	3.6	3.5	3.9	25	31	21	32	32
NA2O %	13	13	13	13	15	1.9	0.34	1.9	0.43	0.54
K2O %	4.7	4.5	4.5	5.4	8.2	0.19	0.25	0.13	0.40	0.16
TIO2 %	0.65	0.55	0.62	0.52	0.40	0.011	0.040	0.0065	0.058	0.012
P2O5 %	< 0.16	0.37	< 0.16	0.30	0.19	< 0.16	< 0.16	0.19	< 0.16	< 0.16
MNO %	0.39	0.36	0.36	0.31	0.34	1.3	1.3	1.6	1.4	1.2

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. SODIUM DETERMINED VISUALLY IN SPECTRA #'S 4,5,6,7 AND 8.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT IN59 PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1314 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		C6	C7	C8	C9	C10	CL1	CL2	CL3	CL4	CL5
SAMPLE		X-131414	X-131415	X-131416	X-131417	X-131418	X-131419	X-131420	X-131421	X-131422	X-131423
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	1.2	2.6	3.5	1.8	2.5	33	> 34	33	> 34	30
AL	%	0.38	0.55	0.99	0.77	1.4	11	14	11	14	10
FE	%	0.95	3.0	4.3	2.2	2.5	5.6	5.4	5.1	5.3	4.5
MG	%	9.0	9.3	6.2	9.1	6.0	3.4	2.0	1.8	2.1	3.1
CA	%	18	13	5.3	17	15	5.1	1.7	1.3	1.6	4.7
NA	%	3.4	1.9	2.0	0.71	1.9	2.7	2.8	3.2	3.6	3.0
K	%	0.21	0.27	0.55	0.24	0.42	1.9	2.1	1.3	2.0	1.5
TI	%	0.012	0.016	0.035	0.023	0.059	0.25	0.37	0.28	0.35	0.30
P	%	< 0.068	0.10	0.072	0.11	< 0.068	< 0.068	0.15	0.095	0.12	0.12
MN	%	1.1	1.2	1.3	1.2	1.1	0.23	0.031	0.071	0.031	0.17
AG	PPM	< 0.10	0.69	< 0.10	< 0.10	0.64	< 0.10	0.46	0.34	1.4	0.99
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	45	240	150	54	65	160	150	150	150	130
BA	PPM	180	140	1300	220	310	290	380	300	350	300
BE	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.9	2.2	2.0	2.2	1.8
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	< 63	< 63	< 63	< 63	< 63	< 63	< 43	< 43	< 43	< 43
CO	PPM	2.3	2.6	8.9	2.3	6.6	5.8	5.8	23	5.2	5.0
CR	PPM	8.9	15	45	17	29	210	220	220	220	170
CU	PPM	7.7	17	290	13	35	65	68	70	65	130
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	< 1.5	< 1.5	3.7	< 1.5	2.4	26	28	27	30	25
GD	PPM	< 15	< 15	< 15	H	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	< 10	< 10	11	< 10	14	26	29	18	20	< 10
LI	PPM	< 68	< 68	< 68	< 68	< 68	86	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	11000	12000	13000	12000	11000	2300	310	710	310	1700
MO	PPM	6.0	41	49	16	16	< 1.0	2.6	< 1.0	< 1.0	< 1.0
NB	PPM	< 3.2	< 3.2	4.5	< 3.2	8.0	26	25	29	31	19
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	5.5	15	34	9.3	25	33	33	27	29	27

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 11-B

FIELD #	C6	C7	C8	C9	C10	CL1	CL2	CL3	CL4	CL5
SAMPLE	X-131414	X-131415	X-131416	X-131417	X-131418	X-131419	X-131420	X-131421	X-131422	X-131423
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	260	450	360	970	250	73	140	230	53	42
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	1.3	2.6	3.3	2.4	6.2	23	26	24	19	24
SM PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	3.7	5.7	3.8	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	13
SR PPM	950	320	350	500	430	250	280	170	300	490
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	18	< 4.6	43	< 4.6	23	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	28	78	63	39	63	110	120	110	110	100
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	3.0	6.9	6.2	5.9	12	22	30	23	24	27
YB PPM	0.23	0.28	0.19	0.17	0.76	4.1	5.5	4.8	5.3	5.1
ZN PPM	440	1500	1600	1500	1500	1100	960	880	680	360
ZR PPM	66	72	88	83	87	200	150	120	210	180
MAJORS RECALCULATED AS OXIDES										
SIO2 %	2.6	5.6	7.5	3.9	5.4	71	> 73	71	> 73	64
AL2O3 %	0.72	1.0	1.9	1.5	2.7	21	27	21	27	19
FE2O3 %	1.4	4.3	6.2	3.2	3.6	8.0	7.7	7.3	7.6	6.4
MGO %	15	15	10	15	10	5.6	3.3	3.0	3.5	5.1
CAO %	25	18	7.4	24	21	7.1	2.4	1.8	2.2	6.6
NA2O %	4.6	2.6	2.7	0.96	2.6	3.6	3.8	4.3	4.9	4.0
K2O %	0.25	0.33	0.66	0.29	0.51	2.3	2.5	1.6	2.4	1.8
TIO2 %	0.020	0.027	0.058	0.038	0.098	0.42	0.62	0.47	0.58	0.50
P2O5 %	< 0.16	0.23	0.17	0.25	< 0.16	< 0.16	0.34	0.22	0.28	0.28
MNO %	1.4	1.6	1.7	1.6	1.4	0.30	0.040	0.092	0.040	0.22

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1315 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.# IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		CL6	CL7	CL8	CL9	CL10	G1	G2	G3	G4	G5
SAMPLE		X-131504	X-131505	X-131506	X-131507	X-131508	X-131509	X-131510	X-131511	X-131512	X-131513
SPECTRUM		4	5	6	7	8	9	10	11	12	13
SI	%	28	26	27	20	17	0.18	0.20	0.29	0.21	0.050
AL	%	9.1	8.4	9.0	7.3	5.8	0.071	< 0.046	< 0.046	< 0.046	< 0.046
FE	%	4.4	4.7	4.5	3.9	2.6	0.17	0.16	0.28	0.11	0.086
MG	%	1.8	1.5	1.8	1.5	1.3	0.18	0.15	0.16	0.14	0.18
CA	%	1.6	1.3	1.3	1.0	0.99	27	17	19	24	28
NA	%	2.9	3.3	2.8	2.5	10	> 6.8	1.6	0.077	0.090	0.045
K	%	1.9	1.8	1.9	1.2	1.2	0.19	0.12	0.10	0.11	0.12
TI	%	0.24	0.20	0.21	0.22	0.21	0.0058	0.0042	0.0042	< 0.0032	< 0.0032
P	%	< 0.068	0.11	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
MN	%	0.053	0.030	0.023	0.049	0.056	0.014	0.057	0.012	0.033	0.026
AG	PPM	0.36	0.58	0.41	0.27	0.15	0.14	< 0.10	< 0.10	< 0.10	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	94	84	92	86	96	< 4.6	5.7	19	16	5.4
BA	PPM	280	310	290	240	250	29	120	8.9	480	28
BE	PPM	1.9	2.1	1.8	1.4	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	< 43	< 43	< 43	< 43	91	< 63	< 63	< 63	< 63	< 63
CO	PPM	6.5	5.5	5.1	9.4	24	1.4	1.1	< 1.0	< 1.0	< 1.0
CR	PPM	180	240	210	160	140	5.7	5.7	3.3	1.9	< 1.0
CU	PPM	57	57	54	120	58	3.5	3.8	3.8	2.2	2.6
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	28	26	26	23	21	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
GD	PPM	< 15	< 15	< 15	< 15	37	< 15	< 15	< 15	< 15	< 15
GE	PPM	1.6	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	< 10	21	16	18	19	19	12	< 10	< 10	< 10
LI	PPM	80	110	< 68	97	120	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
NN	PPM	530	300	230	490	560	140	570	120	330	260
NO	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.1	2.7	< 1.0	4.0	5.5
NB	PPM	27	26	32	30	13	3.2	< 3.2	< 3.2	< 3.2	< 3.2
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	39	29	27	28	24	2.2	3.0	1.6	1.6	2.0

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 12-B

FIELD #	CL6	CL7	CL8	CL9	CL10	G1	G2	G3	G4	G5
SAMPLE	X-131504	X-131505	X-131506	X-131507	X-131508	X-131509	X-131510	X-131511	X-131512	X-131513
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	86	80	76	90	43	7.8	18	< 6.8	< 6.8	< 6.8
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	21	14	16	13	17	2.0	2.5	2.7	2.9	7.0
SN PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SR PPM	3.8	4.0	4.1	12	6.1	< 1.5	< 1.5	2.9	< 1.5	3.0
TA PPM	270	290	250	200	180	940	1300	2400	20000	2200
TB PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TH PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TL PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	11	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
V PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
W PPM	100	94	110	93	86	4.6	4.4	3.8	3.7	91
Y PPM	< 10	< 10	< 10	< 10	< 10	H	< 10	H	< 10	H
YB PPM	18	20	18	14	20	< 1.5	2.0	< 1.5	< 1.5	< 1.5
ZN PPM	4.7	4.6	4.6	3.2	2.6	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
ZR PPM	620	320	330	500	130	H	H	H	H	H
	95	110	150	100	110	3.9	7.8	4.3	5.9	8.8

MAJORS RECALCULATED AS OXIDES

SIO2 %	60	56	50	43	36	0.39	0.43	0.62	0.45	0.11
AL2O3 %	17	16	17	14	11	0.13	< 0.087	< 0.087	< 0.087	< 0.087
FE2O3 %	6.3	6.7	6.4	5.6	3.7	0.24	0.23	0.40	0.16	0.12
MGO %	3.0	2.5	3.0	2.5	2.2	0.30	0.25	0.27	0.23	0.30
CAO %	2.2	1.8	1.8	1.4	1.4	38	24	27	34	39
NA2O %	3.9	4.5	3.8	3.4	13	> 9.2	2.2	0.10	0.12	0.060
K2O %	2.3	2.2	2.3	1.4	1.4	0.23	0.15	0.12	0.13	0.15
TIO2 %	0.40	0.33	0.35	0.37	0.35	0.0097	0.0070	0.0070	< 0.0053	< 0.0053
P2O5 %	< 0.16	0.25	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
MNO %	0.068	0.039	0.030	0.063	0.072	0.018	0.074	0.016	0.043	0.034

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. SODIUM AND POTASSIUM DETERMINED VISUALLY IN SPECTRUM #8.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1315 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		G6	G7	G8	G9	G10	LG1	LG2	LG3	LG4	LG5
SAMPLE		X-131514	X-131515	X-131516	X-131517	X-131518	X-131519	X-131520	X-131521	X-131522	X-131523
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	0.072	0.15	1.7	0.31	0.34	0.42	0.51	0.49	0.46	0.18
AL	%	< 0.046	< 0.046	< 0.046	< 0.046	< 0.046	0.15	0.16	0.23	0.31	0.099
FE	%	0.12	0.14	< 0.0074	0.12	0.11	2.3	1.3	1.8	1.6	0.94
MG	%	0.11	0.19	< 0.0032	0.11	0.16	7.3	6.7	6.4	9.7	7.2
CA	%	26	21	> 32	> 32	29	14	12	12	16	17
NA	%	0.10	3.0	1.6	0.17	0.67	1.4	0.42	1.3	0.34	0.30
K	%	0.12	0.17	0.13	0.14	0.13	0.097	0.11	0.15	0.11	0.097
TI	%	0.0036	< 0.0032	< 0.0032	0.0044	0.0045	0.0084	0.0093	0.0080	0.014	0.0052
P	%	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
MN	%	0.014	0.027	< 0.00010	0.015	0.015	1.4	0.93	1.1	1.1	1.0
AG	PPM	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10	1.2	< 0.10
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	44	39	35	30	36
BA	PPM	850	100	170	250	15	290	120	210	230	160
BE	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE	PPM	< 63	< 63	< 43	< 63	< 63	< 63	< 63	< 63	< 63	< 63
CO	PPM	1.0	1.1	4.5	1.2	1.3	6.4	M	3.0	7.2	3.1
CR	PPM	1.9	2.7	5.3	2.1	1.4	3.5	4.1	4.4	9.8	2.0
CU	PPM	2.6	3.3	< 1.5	2.0	2.9	6.6	5.6	9.3	13	4.1
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	M	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
GD	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	< 10	< 10	24	< 10	< 10	18	< 10	11	< 10	21
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	140	270	< 1.0	150	150	14000	9300	11000	11000	10000
MO	PPM	< 1.0	2.6	< 1.0	5.8	4.0	14	11	17	13	14
NB	PPM	< 3.2	< 3.2	< 3.2	6.3	< 3.2	< 3.2	< 3.2	3.5	< 3.2	< 3.2
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	7.4	2.1	20	1.7	1.8	43	9.0	22	28	8.7

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 13-8

FIELD #	G6	G7	G8	G9	G10	LG1	LG2	LG3	LG4	LG5
SAMPLE	X-131514	X-131515	X-131516	X-131517	X-131518	X-131519	X-131520	X-131521	X-131522	X-131523
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	160	150	260	84	79
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	2.8	1.9	3.3	8.0	3.0	1.8	2.0	1.9	3.9	1.7
SM PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	1.6	3.2	5.2	< 1.5	4.6	< 1.5	< 1.5	< 1.5	< 1.5	3.1
SR PPM	2400	1400	1500	2000	1700	1100	410	520	360	350
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	19	15	28	20	12
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	3.1	4.0	20	3.4	4.8	21	21	28	22	14
W PPM	H	H	H	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	8.7	7.2	8.2	7.1	7.3
YB PPM	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	1.1	0.64	1.1	0.59	0.30
ZN PPM	H	H	< 15	< 15	< 15	3600	1300	3500	830	1200
ZR PPM	4.9	29	7.4	10	9.3	78	60	67	85	76

MAJORS RECALCULATED AS OXIDES

SIO2 %	0.15	0.32	3.6	0.66	0.73	0.90	1.1	1.1	0.99	0.39
AL2O3 %	< 0.087	< 0.087	< 0.087	< 0.087	< 0.087	0.28	0.30	0.44	0.59	0.19
FE2O3 %	0.17	0.20	< 0.011	0.17	0.16	3.3	1.9	2.6	2.3	1.3
MGO %	0.18	0.32	< 0.0053	0.18	0.27	12	11	11	16	12
CAO %	36	29	> 45	> 45	41	20	17	17	22	24
NA2O %	0.13	4.0	2.2	0.23	0.90	1.9	0.57	1.8	0.46	0.40
K2O %	0.15	0.21	0.16	0.17	0.16	0.12	0.13	0.18	0.13	0.12
TIO2 %	0.0060	< 0.0053	< 0.0053	0.0073	0.0075	0.014	0.016	0.013	0.023	0.0087
P2O5 %	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
MNO %	0.018	0.035	< 0.00013	0.019	0.019	1.8	1.2	1.4	1.4	1.3

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. CALCIUM AND STRONTIUM(SPECTRUM #16) AND SILICON(SPECTRA #'S 16,17,18) WERE DETERMINED VISUALLY.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. PAGE 14-A

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1316 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.# IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #	LG6	LG7	LG8	LG9	LG10	LG11	LG12	OL1	OL2	OL3
SAMPLE	X-131604	X-131605	X-131606	X-131607	X-131608	X-131609	X-131610	X-131611	X-131612	X-131613
SPECTRUM	4	5	6	7	8	9	10	11	12	13
SI %	0.68	1.1	0.38	0.29	0.47	0.40	0.32	0.042	0.057	0.074
AL %	0.39	0.64	0.16	0.078	0.16	0.23	0.095	< 0.046	< 0.046	< 0.046
FE %	2.1	1.6	1.9	2.4	1.7	0.89	0.83	0.35	1.3	1.4
MG %	7.2	8.6	6.2	9.4	8.1	8.7	7.0	6.5	7.3	6.4
CA %	15	18	15	18	10	20	14	14	17	12
NA %	0.39	0.53	0.38	0.62	0.65	0.25	1.7	0.52	0.61	0.40
K %	0.18	0.18	0.12	0.099	0.13	0.15	0.15	0.099	0.087	< 0.068
TI %	0.017	0.023	0.0080	0.0068	0.0069	0.0098	0.0047	< 0.0032	0.0033	0.0038
P %	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
MN %	1.3	1.5	0.86	1.2	1.2	0.85	0.93	0.37	0.83	0.87
AG PPM	1.3	1.6	0.38	< 0.10	< 0.10	0.31	< 0.10	< 0.10	0.40	1.0
AS PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B PPM	29	41	31	57	47	24	41	5.5	5.0	15
BA PPM	220	190	95	150	130	180	230	250	170	89
BE PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BI PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
CD PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
CE PPM	< 63	< 63	< 63	< 63	< 43	< 63	< 63	< 63	< 63	< 63
CO PPM	4.0	7.9	4.0	1.4	1.8	2.9	1.3	1.1	3.5	4.6
CR PPM	8.2	14	5.0	3.3	5.5	6.8	2.9	1.4	1.7	2.7
CU PPM	320	15	220	7.7	7.8	7.2	4.1	7.8	25	300
DY PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
GD PPM	< 15	< 15	< 15	< 15	< 15	H	H	H	< 15	< 15
GE PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA PPM	13	20	< 10	15	11	< 10	< 10	< 10	< 10	< 10
LI PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN PPM	13000	15000	8600	12000	12000	8500	9300	3700	8300	8700
MO PPM	24	24	10	11	25	14	4.5	1.7	3.4	4.2
NB PPM	< 3.2	< 3.2	< 3.2	3.8	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
ND PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI PPM	19	40	39	8.8	16	15	5.4	5.4	4.3	3.7

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 14-8

FIELD #	LG6	LG7	LG8	LG9	LG10	LG11	LG12	OL1	OL2	OL3
SAMPLE	X-131604	X-131605	X-131606	X-131607	X-131608	X-131609	X-131610	X-131611	X-131612	X-131613
SPECTRUM	4	5	6	7	8	9	10	11	12	13
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	170	140	350	260	96	57	26	100	210	340
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	2.7	6.5	6.5	1.0	2.4	3.3	1.2	1.3	1.9	1.3
SN PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	5.4	< 1.5	< 1.5	< 1.5
SR PPM	470	470	390	500	520	670	510	520	430	520
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	41	21	26	29	< 4.6	< 4.6	< 4.6	< 4.6	15	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	29	43	28	28	27	22	21	11	30	24
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	8.8	14	9.9	4.9	4.6	4.2	3.4	1.6	1.9	< 1.5
YB PPM	0.84	1.4	0.70	0.60	0.33	0.34	0.27	< 0.15	0.18	< 0.15
ZN PPM	1800	1300	910	2900	1500	460	370	570	650	780
ZR PPM	73	100	39	77	74	38	42	17	41	38
MAJORS RECALCULATED AS OXIDES										
SIO2 %	1.5	2.4	0.81	0.62	1.0	0.86	0.69	0.090	0.12	0.16
AL2O3 %	0.74	1.2	0.30	0.15	0.30	0.44	0.18	< 0.087	< 0.087	< 0.087
FE2O3 %	3.0	2.3	2.7	3.4	2.4	1.3	1.2	0.50	1.9	2.0
MGO %	12	14	10	16	13	14	12	11	12	11
CAO %	21	25	21	25	14	28	20	20	24	17
NA2O %	0.53	0.71	0.51	0.84	0.88	0.34	2.3	0.70	0.82	0.54
K2O %	0.22	0.22	0.15	0.12	0.16	0.18	0.18	0.12	0.11	< 0.082
TIO2 %	0.028	0.038	0.013	0.011	0.012	0.016	0.0078	< 0.0053	0.0055	0.0063
P2O5 %	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
MNO %	1.7	1.9	1.1	1.6	1.6	1.1	1.2	0.48	1.1	1.1

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. CALCIUM DETERMINED VISUALLY IN SPECTRUM #8.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. PAGE 15-A

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IH59 PLATE NO. CE-1316 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IH59 D. W. COLIGHTLY (PROJECT LEADER)

FIELD #		OL4	OL5	OL6	OL7	OL8	OL9	OL10	DARHIB1-1	DARHIB2-2	DARHIB3-3
SAMPLE		X-131614	X-131615	X-131616	X-131617	X-131618	X-131619	X-131620	X-131621	X-131622	X-131623
SPECTRUM		14	15	16	17	18	19	20	21	22	23
SI	%	0.13	0.068	0.49	0.32	0.071	0.066	0.15	28	4.0	18
AL	%	< 0.046	< 0.046	0.29	0.17	< 0.046	< 0.046	< 0.046	0.053	0.24	0.057
FE	%	1.3	1.2	2.3	2.6	0.56	0.44	0.40	6.1	14	16
MG	%	8.6	7.4	14	9.2	7.9	7.3	10	9.7	1.8	4.4
CA	%	14	16	20	18	13	13	17	0.087	0.50	0.11
NA	%	0.45	0.15	> 0.46	0.11	0.37	0.14	0.24	H	H	H
K	%	0.17	0.15	0.15	0.13	0.16	0.16	< 0.068	0.30	< 0.068	< 0.068
TI	%	< 0.0032	< 0.0032	0.015	0.0089	< 0.0032	< 0.0032	< 0.0032	0.0042	0.019	< 0.0032
P	%	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
MN	%	1.1	1.1	1.3	0.95	0.41	0.43	0.70	0.030	0.051	0.022
AG	PPM	1.6	< 0.10	1.9	< 0.10	< 0.10	< 0.10	< 0.10	700	1000	500
AS	PPM	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	40	9.4	20	10	< 4.6	< 4.6	5.5	< 6.8	< 6.8	< 6.8
BA	PPM	74	110	100	140	12	20	110	< 2.2	16	2.8
BE	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BI	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	58	530	38
CD	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	520	3000	750
CE	PPM	< 63	< 63	< 63	< 63	< 63	< 63	< 63	< 43	< 43	51
CO	PPM	< 1.0	1.3	6.8	8.0	1.3	< 1.0	< 1.0	7.1	3.5	16
CR	PPM	2.2	2.5	12	4.0	1.7	1.5	1.5	2.1	10	2.3
CU	PPM	520	340	39	190	6.8	4.0	6.8	> 3200	> 3200	> 3200
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	6.8	52	12
GD	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
GE	PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	H
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MN	PPM	11000	11000	13000	9500	4100	4300	7000	300	510	220
MO	PPM	6.1	5.0	8.5	4.5	4.1	5.3	5.1	170	620	38
NB	PPM	< 3.2	< 3.2	3.8	< 3.2	< 3.2	< 3.2	< 3.2	3.3	4.6	3.9
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	< 1.5	7.9	8.5	13	1.9	< 1.5	4.0	9.5	54	8.3

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IH59 PAGE 15-B

FIELD #	OL4	OL5	OL6	OL7	OL8	OL9	OL10	DARHIB1-1	DARHIB2-2	DARHIB3-3
SAMPLE	X-131614	X-131615	X-131616	X-131617	X-131618	X-131619	X-131620	X-131621	X-131622	X-131623
SPECTRUM	14	15	16	17	18	19	20	21	22	23
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	320	290	220	240	79	38	60	1600	40000	1200
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	1.0	1.2	1.9	1.9	1.7	1.7	< 1.0	< 1.0	1.4	< 1.0
SN PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	4.7	27	15
SR PPM	720	510	870	550	310	530	3500	3.0	3.3	< 1.0
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
TL PPM	< 4.6	7.3	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TN PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	11	19	32	42	9.0	6.3	5.6	48	47	17
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y PPM	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.0	2.0	4.6	< 1.5
YB PPM	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
ZN PPM	850	400	440	450	120	170	260	100000	> 100000	> 100000
ZR PPM	74	66	96	50	14	14	31	< 3.2	< 3.2	< 3.2
MAJORS RECALCULATED AS OXIDES										
SIO2 %	0.28	0.15	1.1	0.69	0.15	0.14	0.32	60	8.6	39
AL203 %	< 0.087	< 0.087	0.55	0.32	< 0.087	< 0.087	< 0.087	0.10	0.45	0.11
FE203 %	1.9	1.7	3.3	3.7	0.80	0.63	0.57	8.7	20	23
MGO %	14	12	23	15	13	12	17	16	3.0	7.3
CAO %	20	22	28	25	18	18	24	0.12	0.70	0.15
NA2O %	0.61	0.20	> 0.62	0.15	0.50	0.19	0.32	H	H	H
K2O %	0.20	0.18	0.18	0.16	0.19	0.19	< 0.082	0.36	< 0.082	< 0.082
TIO2 %	< 0.0053	< 0.0053	0.025	0.015	< 0.0053	< 0.0053	< 0.0053	0.0070	0.032	< 0.0053
P205 %	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16	< 0.16
MNO %	1.4	1.4	1.7	1.2	0.53	0.56	0.90	0.039	0.066	0.028

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. CALCIUM AND STRONTIUM(SPECTRUM #16) AND ZINC(SPECTRA #'S 22,23) WERE DETERMINED VISUALLY.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED.

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. MOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1317 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		DARNIB4-4	DARNIB5-5	EMINE1-6	EMINE2-7	EMINE3-8	EMINE4-9	EMINE5-10	EMINE6-11	EMINE7-12	HAMATA1-13
SAMPLE		X-131705	X-131706	X-131707	X-131708	X-131709	X-131710	X-131711	X-131712	X-131713	X-131714
SPECTRUM		5	6	7	8	9	10	11	12	13	14
SI	%	11	21	13	4.1	4.1	1.9	11	8.4	4.3	19
AL	%	0.047	0.098	< 0.046	0.093	< 0.046	< 0.046	0.23	0.16	0.075	0.068
FE	%	4.8	9.2	5.0	4.2	5.0	4.6	6.8	7.2	6.3	7.2
MG	%	3.0	6.1	5.5	6.0	3.3	5.5	1.1	0.75	0.24	5.8
CA	%	2.5	0.70	0.70	0.41	2.2	3.2	0.70	0.41	1.0	4.0
NA	%	N	N	N	N	N	N	N	N	N	N
K	%	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068	< 0.068
TI	%	< 0.0032	0.0040	< 0.0032	0.010	0.0037	0.0062	< 0.0032	0.016	0.016	0.0041
P	%	< 0.068	< 0.068	0.091	0.39	< 0.068	0.75	0.18	0.17	< 0.068	< 0.068
MN	%	0.065	0.035	1.1	13	0.93	15	0.76	0.62	0.75	0.056
AG	PPM	300	70	150	300	150	400	300	450	150	60
AS	PPM	< 150	< 150	< 150	170	< 150	350	< 150	< 150	< 150	< 150
AU	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
B	PPM	< 4.6	< 6.8	< 4.6	15	< 4.6	13	< 6.8	22	6.7	< 6.8
BA	PPM	17	< 2.2	< 2.2	< 2.2	< 2.2	28	180	180	82	2.3
BE	PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
BI	PPM	260	15	14	20	42	20	26	30	< 10	< 10
CD	PPM	3000	940	610	250	1200	210	250	250	520	1200
CE	PPM	54	65	< 43	< 43	< 43	< 63	< 43	< 43	< 43	< 43
CO	PPM	3.0	1.9	< 1.0	< 1.0	< 1.0	< 1.0	3.2	6.4	1.0	20
CR	PPM	9.6	2.4	1.4	6.5	1.3	5.7	9.7	12	11	1.2
CU	PPM	> 3200	> 3200	> 3200	> 3200	> 3200	> 3200	> 3200	> 3200	> 3200	> 3200
DY	PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
ER	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
EU	PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
GA	PPM	44	12	15	13	15	5.7	11	13	23	4.9
GD	PPM	H	H	H	< 15	< 15	< 15	< 15	< 15	< 15	H
GE	PPM	1.6	< 1.5	3.4	23	1.5	< 1.5	9.5	18	11	< 1.5
HF	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
HO	PPM	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
IN	PPM	H	H	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	H
IR	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
LA	PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	13	< 10	< 10
LI	PPM	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
LU	PPM	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
MM	PPM	650	350	11000	130000	9300	150000	7600	6200	7500	560
MO	PPM	730	32	6.3	3.7	27	17	45	440	280	7.2
NB	PPM	< 3.2	< 3.2	< 3.2	12	< 3.2	13	< 3.2	< 3.2	< 3.2	4.3
ND	PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
NI	PPM	41	11	7.3	47	3.9	39	6.8	4.9	5.5	2.3

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 16-B

FIELD #	DARHIB4-4	DARHIB5-5	EMINE1-6	EMINE2-7	EMINE3-8	EMINE4-9	EMINE5-10	EMINE6-11	EMINE7-12	HAMATA1-13
SAMPLE	X-131705	X-131706	X-131707	X-131708	X-131709	X-131710	X-131711	X-131712	X-131713	X-131714
SPECTRUM	5	6	7	8	9	10	11	12	13	14
OS PPM	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
PB PPM	18000	380	38000	26000	12000	70000	26000	18000	12000	720
PD PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PR PPM	< 68	H	< 68	< 68	< 68	< 68	< 68	< 68	< 68	H
PT PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
RE PPM	< 10	< 10	< 10	< 22	< 10	< 10	< 10	< 10	< 10	< 10
RH PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
RU PPM	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
SB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
SC PPM	1.3	1.1	< 1.0	1.5	1.5	2.2	1.0	1.5	1.7	1.5
SN PPM	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
SN PPM	9.6	16	2.3	< 1.5	< 1.5	< 1.5	9.5	14	18	4.6
SR PPM	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	7.9	7.8	1.5	< 1.0	< 1.0
TA PPM	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460	< 460
TB PPM	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
TH PPM	< 22	H	H	H	H	H	H	H	H	H
TL PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
TM PPM	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U PPM	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V PPM	110	42	7.8	79	5.6	79	82	100	76	9.9
W PPM	< 10	< 10	< 10	< 10	< 10	< 10	H	< 10	H	H
Y PPM	< 1.5	1.9	< 1.5	< 1.5	< 1.5	< 1.5	2.3	4.5	< 1.5	< 1.5
YB PPM	< 0.15	0.16	< 0.15	< 0.15	< 0.15	< 0.15	0.37	0.91	0.90	< 0.15
ZN PPM	> 100000	> 100000	> 100000	> 100000	> 100000	> 100000	> 100000	> 100000	> 100000	> 100000
ZR PPM	< 3.2	< 3.2	230	< 3.2	210	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2

MAJORS RECALCULATED AS OXIDES

SIO2 %	24	45	28	8.8	8.8	4.1	24	18	9.2	41
AL203 %	0.089	0.19	< 0.087	0.18	< 0.087	< 0.087	0.44	0.30	0.14	0.13
FE203 %	6.9	13	7.2	6.0	7.2	6.6	9.7	10	9.0	10
MGO %	5.0	10	9.1	10	5.5	9.1	1.8	1.2	0.40	9.6
CAO %	3.5	0.98	0.98	0.57	3.1	4.5	0.98	0.57	1.4	5.6
NA2O %	H	H	H	H	H	H	H	H	H	H
K2O %	< 0.082	< 0.082	< 0.082	< 0.082	< 0.082	< 0.082	< 0.082	< 0.082	< 0.082	< 0.082
TIO2 %	< 0.0053	0.0067	< 0.0053	0.017	0.0062	0.010	< 0.0053	0.027	0.027	0.0068
P2O5 %	< 0.16	< 0.16	0.21	0.89	< 0.16	1.7	0.41	0.39	< 0.16	< 0.16
MNO %	0.084	0.045	1.4	17	1.2	19	0.98	0.80	0.97	0.072

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.
2. 'H' DENOTES THE OCCURRENCE OF AN UNRESOLVED INTERFERENCE.
3. AG,ZN(SPECTRA #'S 5 THRU 14),CA(SPECTRA #'S 6,7,11),PB(SPECTRA #'S 5,7 THRU 13),SI(SPECTRA #'S 5,7,11) AND ZR (SPECTRA #'S 8, 10) WERE DETERMINED VISUALLY.

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. PAGE 17-A

REPORT PROGRAM NO. 1280202 FOR: MOHAMED S. S. HOLYLE JOSEPH L. HARRIS (ANALYST)
JOB NO. IN59 PLATE NO. CE-1317 DATE: 09/17/80 W. B. CRANDELL (PLATE RECORDER)
SPEC.LAB.#IN59 D. W. GOLIGHTLY (PROJECT LEADER)

FIELD #		HANATA2-14	MAKAL15
SAMPLE		X-131715	X-131716
SPECTRUM		15	16
SI	%	11	30
AL	%	3.1	8.0
FE	%	7.1	6.3
MG	%	5.5	2.0
CA	%	0.020	6.1
NA	%	0.30	3.3
K	%	1.8	1.1
TI	%	0.13	0.45
P	%	< 0.068	0.22
MN	%	0.27	0.17
AG	PPM	3.7	0.40
AS	PPM	< 150	< 150
AU	PPM	< 10	< 10
B	PPM	< 6.8	< 6.8
BA	PPM	24	440
BE	PPM	< 1.0	< 1.0
BI	PPM	< 10	< 10
CD	PPM	< 32	< 32
CE	PPM	< 43	< 63
CO	PPM	29	33
CR	PPM	3.6	2.2
CU	PPM	370	120
DY	PPM	< 22	< 22
ER	PPM	< 10	< 10
EU	PPM	< 2.2	< 2.2
GA	PPM	25	21
GD	PPM	< 15	< 15
GE	PPM	< 1.5	< 1.5
HF	PPM	< 15	< 15
HO	PPM	< 6.8	< 6.8
IN	PPM	< 6.8	< 6.8
IR	PPM	< 15	< 15
LA	PPM	< 10	27
LI	PPM	< 68	< 68
LU	PPM	< 15	< 15
MN	PPM	2700	1700
MO	PPM	4.3	4.1
NB	PPM	4.4	21
ND	PPM	< 32	< 32
NI	PPM	7.2	7.4

TABLE 3. CONCENTRATIONS OF ELEMENTS DETERMINED BY DIRECT-CURRENT ARC EMISSION SPECTROGRAPHY--CONTINUED. JOB NO. IN59 PAGE 17-8

FIELD #		HAMATA2-14	MAKAL15
SAMPLE		X-131715	X-131716
SPECTRUM		15	16
OS	PPM	< 22	< 22
PB	PPM	130	53
PD	PPM	< 1.0	< 1.0
PR	PPM	< 68	< 68
PT	PPM	< 4.6	< 4.6
RE	PPM	< 10	< 10
RH	PPM	< 2.2	< 2.2
RU	PPM	< 2.2	< 2.2
SB	PPM	< 32	< 32
SC	PPM	15	12
SN	PPM	< 10	< 10
SM	PPM	< 1.5	4.5
SR	PPM	< 1.0	380
TA	PPM	< 460	< 460
TB	PPM	< 32	< 32
TH	PPM	< 22	< 22
TL	PPM	< 4.6	< 4.6
TM	PPM	< 4.6	< 4.6
U	PPM	< 320	< 320
V	PPM	180	110
W	PPM	< 10	< 10
Y	PPM	2.3	16
YB	PPM	0.23	3.8
ZN	PPM	930	300
ZR	PPM	19	140
MAJORS RECALCULATED AS OXIDES			
SIO2	%	24	64
AL203	%	5.9	15
FE203	%	10	9.0
MGO	%	9.1	3.3
CAO	%	0.028	8.5
NA20	%	0.40	4.5
K20	%	2.2	1.3
TIO2	%	0.22	0.75
P205	%	< 0.16	0.50
MNO	%	0.35	0.22

1. THE RELATIVE STANDARD DEVIATION FOR EACH REPORTED CONCENTRATION IS PLUS 50% AND MINUS 33%.