2. *DATA REPORT:* MAJOR AND TRACE ELEMENT GEOCHEMISTRY OF SHIPBOARD SAMPLES FROM SITE 957, TAG HYDROTHERMAL FIELD, MID-ATLANTIC RIDGE[1]

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INTRODUCTION

Representative samples of drill core were collected from each of the five main areas drilled on the TAG (Trans-Atlantic Geotraverse) mound during Leg 158 (Humphris, Herzig, Miller, et al., 1996). In this report, we present the results of chemical analyses of 66 samples previously analyzed for Cu, Fe, Zn, Pb, Ag, and Cd by atomic absorption during Leg 158. Data are presented for an additional 38 elements plus total sulfur, loss on ignition, and the rare earth elements by a combination of optical emission spectrometry (ICP-ES), mass spectrometry (ICP-MS), and neutron activation (INAA). These data are discussed in detail in other chapters in this volume.

METHODS

Bulk Samples

Sulfide-bearing samples were collected for shipboard chemical analyses from each section of core. Detailed descriptions of the sampling methods and sample preparation were previously reported by the Shipboard Scientific Party (Humphris, Herzig, Miller, et al., 1996). Nine different lithologies from the five areas are represented in the bulk samples, including (1) cherty sulfide breccias and related surface materials, (2) red and gray cherts, (3) porous massive pyrite ± sphalerite, (4) massive granular pyrite, (5) massive pyrite breccias, (6) pyrite-anhydrite breccias, (7) pyrite-silica breccias, (8) silicified wallrock breccias, (9) chloritized basalt breccias. These sample types are described in detail in Humphris, Herzig, Miller, et al. (1996) and elsewhere in this volume.

All samples were crushed and pulverized to <63 µm in a hardened steel mill. This may have introduced a contamination of up to 75 ppm Cr in some samples (cf. Hickson and Juras, 1986). From about 50 cm^3 of material that was prepared, 1 g was taken for shipboard analyses, and the remainder was kept for more comprehensive shore-based analyses described here. The reported data include three duplicate analyses (laboratory duplicate) and three duplicate samples (sampling duplicates) for comparison of results. Three samples were prepared at different mesh sizes (–63 µm, 63–420 µm, +420 µm) to compare the grain-size distribution of different components.

Analysis of trace elements by inductively coupled plasma (ICP) spectrochemical techniques was based on the total dissolution of 1 g of sample using a mixed-acid digestion of nitric, hydrochloric, perchloric and hydrofluoric acids followed by a lithium metaborate fusion of any residual material. The dissolved samples and fusion melt were combined and diluted to a final volume of 100 mL in 10% hydrochloric acid. Analysis for the major elements by ICP was based on the fusion of 0.5 g of sample with a mixed lithium metaborate-tetraborate flux. The fusion melt was dissolved to give a final solution of 100 mL in 4% nitric acid. The dissolution method is modified from Bouvier (1991). The major elements and selected trace metals (Cu, Zn, Ni, Co, V, Ba, Sr, Be, Sc, Cr) were analyzed by emission spectrometry (ICP-ES). These data are listed in Tables 1 and 2. Total S was analyzed by combustion followed by infrared spectrophotometry (LECO). Loss on ignition (LOI) is determined by gravimetry at 900°C. For low-level traces (Ag, Pb, Cd, In, Mo, Tl, Ga, Rb, Cs, Nb, Ta, Zr, Hf, U, Th) analysis was performed by mass spectrometry (ICP-MS). These data are listed in Table 3. Determination limits for each method were calculated from a large number of replicate analyses of reference materials but may vary with sample matrix. The limits indicated for each element in the tables take into account errors arising from all aspects of the analytical methods.

Analysis of trace elements by neutron activation was carried out on 1-g samples, irradiated by thermal neutrons in a high-flux reactor. Concentrations of Au, Ag, As, Sb, Fe, Zn, Mo, Co, Se, Hg, Sn, W, Br, Ir, U and Th were determined by gamma-ray spectrometry using a solid-state detector and are reported in Table 4. This method is particularly sensitive for trace metals such as Au, Ag, As, Sb, Co, and Se, however, certain elements such as Ni, Sn, Ca, Sr, and Rb are not well activated and have reduced sensitivity (e.g., Hannington and Gorton, 1991, and references therein). INAA results for Ca, Ba, Na, Cr, Cs, Hf, Ni, Rb, Sc, Sr, Ta, Th, and the REEs (La, Ce, Nd, Sm, Eu, Tb, Yb, Lu) were at or below detection limits for this method in nearly all samples and are not reported. Several elements (Fe, Zn, Ag, Co, Mo, and U) were determined both by ICP and INAA with the same sensitivity, and both results are reported for comparison of the different methods.

Rare earth element concentrations (REE) were determined by ICP-MS, following the method used for trace elements, outlined above. These data are listed in Table 5.

Mineral Separates

Hand-picked concentrates of pyrite and chalcopyrite were prepared on board from intact drill core and analyzed separately by INAA, employing sample weights of 500–1000 mg. These data are listed in Table 6. Samples of pyrite and chalcopyrite were collected from eight different lithologies, mainly in the TAG-1 area (chalcopyrite from section 957B-1R-2, sample 1, is from a near-surface sample in the TAG-2 area). The lithologies sampled include (1) massive granular pyrite, (2) massive pyrite breccias, (3) pyrite-anhydrite breccias, (4) pyrite-silica breccias, (5) pyrite-silica-anhydrite breccias, (6) silicified wallrock breccias, (7) chloritized basalt breccias, and (8) coarse anhydrite veins, which crosscut all of the other lithologies. Results for selected trace elements are reported in Table 2. The quality of the separations is indicated by the high Fe (33.8–53.6 wt% Fe for pyrite and 28.0–49.9 wt% Fe for chalcopyrite) and the uniformly low Ca contents of the samples.

ACKNOWLEDGMENTS

This research was carried out jointly by the Geological Survey of Canada (GSC) and by the Technical University Bergakademie Freiberg (TUBAF). ICP-ES and ICP-MS analyses were conducted in the laboratories of the GSC under the direction of D.C. Gregoire and

[1]Herzig, P.M., Humphris, S.E., Miller, D.J., and Zierenberg, R.A. (Eds.), 1998. *Proc. ODP, Sci. Results*, 158: College Station, TX (Ocean Drilling Program).

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P. Belanger. INAA analyses were carried out by Activation Laboratories, Ancaster, Ontario, supported by a grant from the German Ocean Drilling Program to P.M. Herzig (TUBAF). This is GSC Contribution #1996367.

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Date of initial receipt: 29 May 1996
Date of acceptance: 23 December 1996
Ms 158SR-203

Table 1. Major element composition of samples from Site 957.

Core, section, interval (cm)	Piece	Depth (mbsf)	Area	Description
158-957A-				
3X-1, 4-8	1	10.00	TAG-2	Chert-sulfide breccia
158-957B-				
1R-1, 3-95	–63	0.00	TAG-2	Surface material
1R-1, 3-95	63-420	0.00	TAG-2	Surface material
1R-1, 3-95	+420	0.00	TAG-2	Surface material
1R-1, 3-95	+420	0.00	TAG-2	(Laboratory duplicate)
4R-1, 0-10	1	19.90	TAG-2	Altered basalt
158-957C-				
5N-1, 15-48	3,5,6	15.25	TAG-1	Pyrite-anhydrite breccia
5N-1, 15-48	3,5,6	15.25	TAG-1	(Sampling duplicate)
7N-1, 52-56	6F	20.04	TAG-1	Pyrite-anhydrite breccia
7N-2, 63-69	1E	21.45	TAG-1	Pyrite-anhydrite breccia
10N-1, 21-22	4	28.86	TAG-1	Pyrite-anhydrite breccia
11N-1, 58-61	3D	31.18	TAG-1	Pyrite-silica breccia
11N-3, 90-94	8C	34.50	TAG-1	Pyrite-silica breccia
12N-1, 53-59	6A	35.45	TAG-1	Pyrite-silica breccia
12N-2, 68-75	9	36.16	TAG-1	Pyrite-silica breccia
12N-3, 86-100	9	36.94	TAG-1	Pyrite-silica breccia
13N-1, 12-20	4	37.31	TAG-1	Pyrite-silica breccia
14N-1, 33-41	5	40.53	TAG-1	Pyrite-silica breccia
14N-2, 76.5-88	6	41.67	TAG-1	Pyrite-silica breccia
15N-1, 36-40	5	42.50	TAG-1	Pyrite-silica breccia
15N-2, 12-15	1B	43.28	TAG-1	Silicified wallrock breccia
15N-3, 132-150	11	45.54	TAG-1	Silicified wallrock breccia
15N-4, 8-10	1	45.70	TAG-1	Silicified wallrock breccia
16N-1, 118-125	15	47.39	TAG-1	Silicified wallrock breccia
16N-2, 14-23	2	47.75	TAG-1	Silicified wallrock breccia
16N-2, 94-95	9B	48.56	TAG-1	Silicified wallrock breccia
16N-2, 94-95	9B	48.56	TAG-1	(Laboratory duplicate)
158-957E-				
1R-1, 23-26	4	31.70	TAG-1	Pyrite-silica breccia
9R-1, 16-19	4	78.16	TAG-1	Silicified wallrock breccia
12R-1, 16-20	3	91.95	TAG-1	Silicified wallrock breccia
15R-1, 27-30	6	106.77	TAG-1	Chloritized basalt breccia
158-957F-				
1N-1, 32-35	8	1.41	TAG-1	Massive pyrite breccia
2N-1, 11-19	3	5.60	TAG-1	Massive pyrite breccia
158-957H-				
1N-1, 60-73	13	9.30	TAG-2	Massive pyrite breccia
5N-1, 61-64	6	27.30	TAG-2	Pyrite-silica breccia
6N-1, 14-19	3	31.34	TAG-2	Pyrite-silica breccia
158-957I-				
1N-1, 33-41	6	9.33	TAG-4	Massive porous pyrite+sphalerite
158-957K-				
1X-1, 24-29	4	0.21	TAG-4	Porous pyrite, red and grey chert
1N-1, 37-41	9	10.37	TAG-4	Massive porous pyrite+sphalerite
3X-1, 36-38	7	14.82	TAG-4	Massive pyrite breccia
158-957M-				
1R-1, 16-47	–63	0.00	TAG-4	Porous pyrite, red and grey chert
1R-1, 16-47	420–63	0.00	TAG-4	Porous pyrite, red and grey chert
1R-1, 16-47	+420	0.00	TAG-4	Porous pyrite, red and grey chert
1R-2, 8-12	3	0.63	TAG-4	Red chert
2R-1, 2-5	1	9.30	TAG-4	Massive porous pyrite+sphalerite
3R-1, 57-60	14	14.87	TAG-4	Massive pyrite, pyrite-silica breccias
3R-1, 123-125	28	15.49	TAG-4	Pyrite-silica breccia
3R-2, 1-4	1	15.80	TAG-4	Pyrite-silica breccia
5R-1, 90-92	15	25.18	TAG-4	Pyrite-silica breccia
7R-1, 0-4	1	34.30	TAG-4	Grey chert fragment
8R-1, 0-4	1	38.30	TAG-4	Massive granular pyrite
158-957O-				
2R-1, 22-24	5	8.10	TAG-5	Nodular, pyrite-anhydrite breccia
4R-1, 45-50	9	16.35	TAG-5	Pyrite-anhydrite breccia
158-957P-				
1R-1, 44-46	8	0.43	TAG-5	Pyrite-anhydrite breccia
5R-1, 9-13	2	21.57	TAG-5	Massive granular pyrite
5R-1, 9-13	2	21.57	TAG-5	(Laboratory duplicate)
9R-1, 11-13	2	40.19	TAG-5	Nodular, pyrite-silica breccia
10R-1, 1-3	1	45.10	TAG-5	Massive granular pyrite
12R-1, 15-100	–63	54.40	TAG-5	Pyrite, silica drill cuttings
12R-1, 15-100	420–63	54.40	TAG-5	Pyrite, silica drill cuttings
12R-1, 15-100	+420	54.40	TAG-5	Pyrite, silica drill cuttings
12R-2, 25-28	6	55.89	TAG-5	Pyrite-silica breccia
12R-4, 53-57	5	57.61	TAG-5	Massive granular pyrite
13W-1, 50-58	—	15.00	TAG-5	Pyrite, anhydrite, chert cuttings
13W 1+2, 0-150	—	15.00	TAG-5	(Sampling duplicate)
158-957Q-				
1R-1, 13-18	—	0.13	TAG-3	Fe-oxides and chert cuttings
1R-3, 70-100	—	3.75	TAG-3	Fe-oxides and chert cuttings
1R-3, 119-121	—	4.10	TAG-3	(Sampling duplicate)
2R-1, 0-4	1	9.50	TAG-3	Red chert fragment

Notes: * = major elements reported as oxides. ND = element not determined, < = values below reported detection, Fe_2O_3(T) = total Fe reported as Fe_2O_3, S(T) = total sulfur, LOI = loss on ignition.

Table 1 (continued).

Core, section, interval (cm)	Element*:	SiO_2	TiO_2	Al_2O_3	Fe_2O_3(T)	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	S(T)	LOI
	Method:	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	LECO	
	Detection limit:	0.50%	0.02%	0.20%	0.01%	0.01%	0.04%	0.01%	0.01%	0.05%	0.01%	0.1%	0.1%
158-957A-													
3X-1, 4-8		54.00	<0.02	0.31	26.4	0.01	0.26	0.62	0.62	0.11	0.32	ND	13.6
158-957B-													
1R-1, 3-95		13.50	0.03	0.68	42.9	0.01	0.54	0.44	1.02	0.09	0.10	33.0	20.5
1R-1, 3-95		8.40	<0.02	0.33	44.0	0.01	0.31	0.80	0.64	0.05	0.06	39.0	22.7
1R-1, 3-95		35.00	<0.02	0.28	28.5	0.01	0.41	1.66	0.73	0.07	0.05	25.5	16.4
1R-1, 3-95		34.80	<0.02	0.27	28.4	0.01	0.40	1.63	0.42	0.13	0.05	26.0	14.1
4R-1, 0-10		31.60	1.92	16.80	15.6	0.06	23.10	0.13	0.51	0.06	0.02	ND	11.0
158-957C-													
5N-1, 15-48		0.88	<0.02	<0.20	58.7	0.01	0.05	0.30	0.09	<0.05	0.01	53.3	33.4
5N-1, 15-48		0.54	<0.02	<0.20	60.5	0.01	0.05	0.31	0.10	<0.05	0.02	53.3	33.2
7N-1, 52-56		1.21	<0.02	<0.20	47.0	<0.01	<0.04	7.26	0.06	<0.05	0.01	45.8	25.3
7N-2, 63-69		2.18	<0.02	<0.20	35.6	<0.01	<0.04	14.90	0.10	<0.05	0.02	41.2	18.9
10N-1, 21-22		12.20	<0.02	<0.20	46.8	<0.01	<0.04	4.45	0.12	<0.05	<0.01	44.2	25.8
11N-1, 58-61		6.21	<0.02	<0.20	46.1	<0.01	<0.04	6.96	0.09	<0.05	0.01	45.1	26.0
11N-3, 90-94		3.60	<0.02	<0.20	53.5	0.01	0.09	1.98	0.08	<0.05	0.02	47.9	28.4
12N-1, 53-59		5.66	0.04	0.45	51.1	0.01	0.27	3.43	0.15	<0.05	0.01	46.5	27.7
12N-2, 68-75		1.65	<0.02	<0.20	48.9	<0.01	0.08	7.03	0.13	<0.05	0.01	47.6	26.9
12N-3, 86-100		24.60	0.04	0.48	32.9	<0.01	0.34	6.39	0.23	<0.05	<0.01	33.6	19.7
13N-1, 12-20		1.06	<0.02	<0.20	57.3	0.01	0.15	2.49	0.07	<0.05	<0.01	51.9	30.2
14N-1, 33-41		4.11	<0.02	0.38	52.9	0.01	0.38	3.85	0.10	<0.05	0.02	48.4	28.6
14N-2, 76.5-88		15.10	<0.02	0.26	50.9	0.01	0.13	1.87	0.12	<0.05	0.02	44.5	27.6
15N-1, 36-40		13.50	0.02	0.31	48.4	0.01	0.15	3.00	0.11	<0.05	0.02	44.2	25.9
15N-2, 12-15		42.10	0.08	0.70	29.6	<0.01	0.12	3.84	0.16	<0.05	0.01	27.5	16.4
15N-3, 132-150		23.60	<0.02	<0.20	40.3	<0.01	0.09	4.31	0.14	<0.05	<0.01	37.7	21.6
15N-4, 8-10		19.60	0.03	0.41	23.9	<0.01	0.17	15.80	0.13	<0.05	0.01	31.4	13.2
16N-1, 118-125		7.82	<0.02	<0.20	51.6	0.01	0.10	1.89	0.12	<0.05	0.01	45.8	27.5
16N-2, 14-23		16.00	0.03	0.45	50.8	0.01	0.15	0.62	0.16	<0.05	0.01	43.4	26.8
16N-2, 94-95		41.30	<0.02	<0.20	37.0	<0.01	<0.04	0.29	0.06	<0.05	<0.01	31.8	19.4
16N-2, 94-95		41.00	<0.02	<0.20	36.8	<0.01	<0.04	0.29	0.08	<0.05	0.01	32.9	19.2
158-957E-													
1R-1, 23-26		49.80	<0.02	<0.20	27.8	<0.01	<0.04	2.91	0.09	<0.05	0.01	25.7	14.7
9R-1, 16-19		29.60	0.02	0.22	43.1	0.01	<0.04	0.09	0.12	<0.05	0.01	35.4	23.1
12R-1, 16-20		4.57	0.03	0.51	57.1	<0.01	<0.04	0.14	0.13	<0.05	0.02	48.9	29.4
15R-1, 27-30		32.70	0.02	0.26	41.6	<0.01	<0.04	0.26	0.10	<0.05	0.01	37.1	22.1
158-957F-													
1N-1, 32-35		<0.50	<0.02	<0.20	43.0	<0.01	0.09	7.98	0.11	<0.05	0.01	43.8	25.3
2N-1, 11-19		<0.50	<0.02	0.20	52.5	0.01	<0.04	4.45	0.08	<0.05	0.01	48.5	27.3
158-957H-													
1N-1, 60-73		<0.50	<0.02	<0.20	42.5	<0.01	<0.04	9.04	0.11	<0.05	0.01	44.4	22.0
5N-1, 61-64		19.40	0.03	0.46	48.0	0.01	0.06	0.79	0.16	<0.05	0.01	42.3	25.6
6N-1, 14-19		33.80	<0.02	<0.20	39.1	0.01	0.05	0.09	0.08	<0.05	<0.01	33.5	19.5
158-957I-													
1N-1, 33-41		<0.50	<0.02	<0.20	59.0	0.01	<0.04	0.08	0.08	<0.05	0.02	50.7	33.5
158-957K-													
1X-1, 24-29		6.28	<0.02	<0.20	54.1	0.01	<0.04	0.09	0.10	<0.05	0.03	46.4	31.9
1N-1, 37-41		<0.50	<0.02	<0.20	59.3	0.01	<0.04	0.10	0.04	<0.05	0.02	52.4	33.1
3X-1, 36-38		0.61	<0.02	<0.20	56.4	0.01	<0.04	0.07	0.06	<0.05	0.01	51.9	33.6
158-957M-													
1R-1, 16-47		6.04	<0.02	<0.20	68.8	0.04	0.56	0.35	0.70	0.19	0.60	5.01	11.8
1R-1, 16-47		6.63	<0.02	<0.20	67.6	0.04	0.57	0.36	0.56	0.17	0.62	1.33	12.1
1R-1, 16-47		6.87	<0.02	<0.20	68.9	0.05	0.60	0.34	0.76	0.18	0.61	0.64	10.2
1R-2, 8-12		77.40	0.03	<0.20	16.1	<0.01	0.12	0.07	0.06	<0.05	<0.01	ND	5.9
2R-1, 2-5		0.55	<0.02	<0.20	59.1	<0.01	0.24	0.06	0.05	<0.05	0.02	ND	30.8
3R-1, 57-60		3.09	<0.02	<0.20	56.3	0.01	<0.04	0.08	0.08	<0.05	0.01	46.0	31.0
3R-1, 123-125		22.00	<0.02	<0.20	45.3	0.01	<0.04	0.07	0.04	<0.05	0.02	39.8	24.8
3R-2, 1-4		32.80	<0.02	<0.20	39.1	<0.01	<0.04	0.07	0.07	<0.05	<0.01	34.0	20.1
5R-1, 90-92		45.60	0.04	0.48	32.3	<0.01	<0.04	0.07	0.12	<0.05	<0.01	28.0	16.8
7R-1, 0-4		76.60	0.03	0.42	15.2	<0.01	0.10	0.06	0.03	<0.05	<0.01	ND	7.8
8R-1, 0-4		14.00	<0.02	<0.20	51.4	0.01	<0.04	0.08	0.06	<0.05	0.01	44.9	27.2
158-957O-													
2R-1, 22-24		<0.50	<0.02	<0.20	42.7	<0.01	<0.04	10.80	0.10	<0.05	0.01	44.6	22.1
4R-1, 45-50		<0.50	<0.02	0.24	54.2	<0.01	<0.04	3.33	0.06	<0.05	<0.01	50.6	28.7
158-957P-													
1R-1, 44-46		<0.50	<0.02	<0.20	32.9	<0.01	<0.04	16.10	0.09	<0.05	0.01	41.4	17.7
5R-1, 9-13		<0.50	<0.02	<0.20	54.4	<0.01	<0.04	4.59	0.08	<0.05	0.01	51.7	30.3
5R-1, 9-13		<0.50	<0.02	<0.20	54.7	<0.01	<0.04	4.65	0.07	<0.05	0.01	52.4	30.1
9R-1, 11-13		16.40	<0.02	0.21	51.7	<0.01	0.08	0.07	0.06	<0.05	0.01	44.9	26.7
10R-1, 1-3		<0.50	<0.02	0.20	58.7	0.01	0.06	0.33	0.08	<0.05	0.02	52.8	30.9
12R-1, 15-100		3.12	<0.02	<0.20	26.5	0.01	0.10	0.98	0.40	<0.05	0.02	44.2	23.9
12R-1, 15-100		4.03	<0.02	<0.20	30.7	0.01	0.09	2.67	0.33	<0.05	0.01	44.9	24.1
12R-1, 15-100		11.30	0.03	0.33	43.7	0.01	0.10	2.71	0.16	0.05	0.01	41.3	22.3
12R-2, 25-28		48.20	0.13	1.13	31.6	<0.01	0.05	0.08	0.18	0.05	<0.01	27.5	16.7
12R-4, 53-57		5.26	<0.0	20.44	56.6	0.01	0.09	0.11	0.09	<0.05	0.02	49.6	29.9
13W-1, 50-58		2.88	<0.02	<0.20	55.6	0.01	0.07	0.30	0.21	0.06	0.01	49.4	28.2
13W 1+2, 0-150		3.82	<0.02	0.23	52.4	<0.01	0.27	0.45	0.27	<0.05	0.03	ND	28.7
158-957Q-													
1R-1, 13-18		59.90	0.05	<0.20	20.8	0.13	0.29	0.20	0.38	0.07	0.08	ND	10.0
1R-3, 70-100		16.40	<0.02	<0.20	46.5	0.01	0.06	0.19	0.19	0.05	0.03	41.2	23.0
1R-3, 119-121		80.10	<0.02	<0.20	13.5	<0.01	0.20	0.15	0.54	0.07	<0.01	ND	5.9
2R-1, 0-4		92.70	<0.02	<0.20	5.49	<0.01	0.15	0.06	0.06	<0.05	<0.01	ND	2.8

Table 2. Trace element composition of samples from Site 957, TAG hydrothermal field, Mid-Atlantic Ridge.

Core, section, interval (cm)	Piece	Depth (mbsf)	Element:	Cu	Zn	Ni	Co	Ba	Sr	V	Be	Sc	Cr*
			Method:	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES	ICP-ES
			Detection limit:	10 ppm	5 ppm	10 ppm	5 ppm	10 ppm	20 ppm	5 ppm	0.5 ppm	0.5 ppm	10 ppm
158-957A-													
3X-1, 4-8	1	10.00		3300	19000	<10	10	40	<20	240	0.5	0.8	21
158-957B-													
1R-1, 3-95	–63	0.00		120000	15000	<10	68	80	24	400	<0.5	4.5	63
1R-1, 3-95	63-420	0.00		118000	30000	<10	51	90	38	200	<0.5	3.8	51
1R-1, 3-95	+420	0.00		73000	26000	<10	40	60	73	150	<0.5	2.4	43
1R-1, 3-95	+420	0.00		73000	26000	<10	39	60	72	150	<0.5	2.5	31
4R-1, 0-10	1	19.90		34	210	150	45	<30	<20	220	0.9	37	330
158-957C-													
5N-1, 15-48	3,5,6	15.25		7800	490	<10	420	130	<20	11	<0.5	4.4	29
5N-1, 15-48	3,5,6	15.25		7900	490	<10	420	120	<20	12	<0.5	4.4	26
7N-1, 52-56	6F	20.04		45000	270	<10	270	90	350	5	<0.5	3.5	27
7N-2, 63-69	1E	21.45		34000	300	<10	130	70	570	6	<0.5	2.9	18
10N-1, 21-22	4	28.86		19000	260	<10	160	80	180	<5	<0.5	3.3	22
11N-1, 58-61	3D	31.18		23000	180	<10	130	80	250	6	<0.5	3.4	21
11N-3, 90-94	8C	34.50		54000	640	<10	170	100	83	<5	<0.5	3.9	19
12N-1, 53-59	6A	35.45		31000	650	<10	220	100	160	11	<0.5	3.7	30
12N-2, 68-75	9	36.16		18000	1600	<10	170	90	290	<5	<0.5	3.3	22
12N-3, 86-100	9	36.94		24000	73	<10	260	70	290	12	<0.5	2.5	32
13N-1, 12-20	4	37.31		19000	730	<10	160	100	100	6	<0.5	4.3	22
14N-1, 33-41	5	40.53		17000	320	<10	160	100	140	9	<0.5	4.0	22
14N-2, 76.5-88	6	41.67		2100	410	<10	250	90	69	<5	<0.5	3.8	28
15N-1, 36-40	5	42.50		5700	500	<10	230	90	110	6	<0.5	3.8	23
15N-2, 12-15	1B	43.28		96	31	<10	380	60	160	13	<0.5	2.4	48
15N-3, 132-150	11	45.54		12000	44	<10	300	80	160	<5	<0.5	3.2	24
15N-4, 8-10	1	45.70		14000	40	<10	150	60	620	6	<0.5	2.4	17
16N-1, 118-125	15	47.39		33000	350	<10	150	90	64	<5	<0.5	4.2	25
16N-2, 14-23	2	47.75		14000	130	<10	370	100	20	8	<0.5	4.1	32
16N-2, 94-95	9B	48.56		1100	41	<10	240	70	<20	<5	<0.5	2.9	27
16N-2, 94-95	9B	48.56		1100	40	<10	230	70	<20	<5	<0.5	2.8	25
158-957E-													
1R-1, 23-26	4	31.70		580	45	<10	240	60	130	<5	<0.5	2.4	30
9R-1, 16-19	4	78.16		6100	120	<10	350	80	<20	5	<0.5	3.4	28
12R-1, 16-20	3	91.95		38000	150	<10	310	110	<20	11	<0.5	4.7	28
15R-1, 27-30	6	106.77		300	120	<10	380	80	<20	<5	<0.5	3.4	20
158-957F-													
1N-1, 32-35	8	1.41		49000	290	<10	350	80	450	<5	<0.5	4.1	<10
2N-1, 11-19	3	5.60		40000	300	<10	210	100	190	13	<0.5	4.3	18
158-957H-													
1N-1, 60-73	13	9.30		63000	150	<10	170	80	460	11	<0.5	3.9	12
5N-1, 61-64	6	27.30		4500	200	<10	350	90	39	10	<0.5	3.7	35
6N-1, 14-19	3	31.34		38000	150	<10	220	80	<20	5	<0.5	3.3	28
158-957I-													
1N-1, 33-41	6	9.33		1300	34000	<10	30	100	<20	<5	<0.5	4.4	22
158-957K-													
1X-1, 24-29	4	0.21		390	29000	<10	15	100	<20	<5	<0.5	4.2	19
1N-1, 37-41	9	10.37		10000	7200	<10	51	130	<20	8	<0.5	4.7	24
3X-1, 36-38	7	14.82		710	37000	19	49	110	<20	<5	<0.5	4.6	27
158-957M-													
1R-1, 16-47	–63	0.00		2400	2100	<10	14	560	58	140	0.6	1.1	14
1R-1, 16-47	420–63	0.00		1700	590	<10	12	160	48	160	0.8	0.9	<10
1R-1, 16-47	+420	0.00		860	500	<10	8	380	52	160	0.7	0.9	<10
1R-2, 8-12	3	0.63		74	190	<10	<5	<30	<20	7	0.9	<0.5	<10
2R-1, 2-5	1	9.30		44000	450	<10	120	<30	<20	9	<0.5	0.5	<10
3R-1, 57-60	14	14.87		3500	41000	<10	74	170	<20	7	<0.5	4.8	24
3R-1, 123-125	28	15.49		15000	7600	<10	200	110	<20	12	<0.5	3.8	28
3R-2, 1-4	1	15.80		36000	330	<10	370	80	<20	<5	<0.5	3.0	19
5R-1, 90-92	15	25.18		13000	410	<10	250	70	<20	26	<0.5	2.5	36
7R-1, 0-4	1	34.30		1900	380	14	68	<30	<20	<5	0.5	<0.5	<10
8R-1, 0-4	1	38.30		18000	6300	<10	220	150	<20	16	<0.5	3.9	26
158-957O-													
2R-1, 22-24	5	8.10		34000	330	<10	200	80	680	<5	<0.5	3.7	13
4R-1, 45-50	9	16.35		28000	360	<10	240	110	140	27	<0.5	4.6	18
158-957P-													
1R-1, 44-46	8	0.43		42000	96	<10	190	70	830	<5	<0.5	3.3	11
5R-1, 9-13	2	21.57		1700	720	<10	310	100	170	<5	<0.5	4.1	15
5R-1, 9-13	2	21.57		1600	700	<10	300	100	170	<5	<0.5	3.8	14
9R-1, 11-13	2	40.19		15000	280	<10	310	100	<20	<5	<0.5	3.7	18
10R-1, 1-3	1	45.10		33000	260	<10	380	120	24	<5	<0.5	4.9	16
12R-1, 15-100	–63	54.40		122000	4500	<10	200	270	50	20	<0.5	4.1	50
12R-1, 15-100	420–63	54.40		92000	3100	<10	230	140	140	13	<0.5	3.9	32
12R-1, 15-100	+420	54.40		76000	2500	<10	240	100	150	19	<0.5	3.6	26
12R-2, 25-28	6	55.89		360	85	<10	500	60	<20	21	<0.5	2.4	31
12R-4, 53-57	5	57.61		25000	160	<10	510	100	<20	35	<0.5	4.2	21
13W-1, 50-58	—	15.00		64000	1500	<10	350	110	<20	8	<0.5	4.2	18
13W 1+2, 0-150	—	15.00		67000	1800	<10	270	<30	<20	15	<0.5	<0.5	15
158-957Q-													
1R-1, 13-18	—	0.13		32000	6000	<10	19	<30	24	54	0.8	<0.5	11
1R-3, 70-100	—	3.75		63000	3600	<10	120	90	<20	12	<0.5	3.6	29
1R-3, 119-121	—	4.10		5400	2800	<10	8	<30	<20	17	1.4	<0.5	<10
2R-1, 0-4	1	9.50		130	820	35	<5	<30	<20	6	1.5	<0.5	14

Notes: * = high values for Cr indicate contamination during grinding in steel mill (see text for discussion). ND = element not determined; < = values below reported detection.

Table 3. Trace element composition of samples from Site 957.

Core, section, interval (cm)	Piece	Depth (mbsf)	Element:	Pb	Cd	Ag	In	Mo	Tl
			Method:	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS
			Detection limit:	0.5 ppm	0.5 ppm	0.1 ppm	0.05 ppm	0.1 ppm	0.05 ppm
158-957A-									
3X-1, 4-8	1	10.00		300	47	69	2.5	47	4.4
158-957B-									
1R-1, 3-95	–63	0.00		430	46	160	15	75	3.6
1R-1, 3-95	63–420	0.00		580	110	210	18	55	5.0
1R-1, 3-95	+420	0.00		300	100	190	11	41	3.8
1R-1, 3-95	+420	0.00		310	110	200	12	45	3.8
4R-1, 0-10	1	19.90		6	<0.5	0.4	0.4	0.8	0.11
158-957C-									
5N-1, 15-48	3,5,6	15.25		33	0.7	2.2	0.32	69	2.3
5N-1, 15-48	3,5,6	15.25		33	0.6	2.3	0.33	70	2.3
7N-1, 52-56	6F	20.04		27	<0.5	1.3	0.49	72	2.2
7N-2, 63-69	1E	21.45		22	0.7	2.2	0.40	52	1.3
10N-1, 21-22	4	28.86		30	<0.5	1.4	0.24	49	1.4
11N-1, 58-61	3D	31.18		22	<0.5	0.9	0.36	54	1.6
11N-3, 90-94	8C	34.50		23	0.8	1.3	0.58	100	2.5
12N-1, 53-59	6A	35.45		21	0.6	1.2	0.35	76	2.8
12N-2, 68-75	9	36.16		32	1.7	1.2	0.72	79	3.6
12N-3, 86-100	9	36.94		7	<0.5	0.6	0.23	49	0.55
13N-1, 12-20	4	37.31		32	1.0	0.7	0.22	85	4.4
14N-1, 33-41	5	40.53		17	<0.5	0.4	0.27	85	2.1
14N-2, 76.5-88	6	41.67		19	0.5	0.7	0.13	62	1.8
15N-1, 36-40	5	42.50		16	0.8	1.2	0.18	80	1.6
15N-2, 12-15	1B	43.28		8	<0.5	1.1	<0.05	19	0.34
15N-3, 132-150	11	45.54		14	<0.5	0.7	0.08	42	0.79
15N-4, 8-10	1	45.70		8	<0.5	0.7	0.14	32	0.83
16N-1, 118-125	15	47.39		45	<0.5	1.4	0.37	65	3.5
16N-2, 14-23	2	47.75		32	<0.5	0.9	0.20	52	2.0
16N-2, 94-95	9B	48.56		7	<0.5	0.5	<0.5	37	0.49
16N-2, 94-95	9B	48.56		6	<0.5	0.4	<0.5	41	0.48
158-957E-									
1R-1, 23-26	4	31.70		4	<0.5	0.3	0.08	22	0.22
9R-1, 16-19	4	78.16		26	<0.5	0.6	0.07	118	1.4
12R-1, 16-20	3	91.95		11	<0.5	1.3	0.34	90	2.1
15R-1, 27-30	6	106.77		18	<0.5	0.6	<0.5	62	0.94
158-957F-									
1N-1, 32-35	8	1.41		24	0.7	3.5	0.85	73	1.7
2N-1, 11-19	3	5.60		31	<0.5	3.0	0.72	69	2.0
158-957H-									
1N-1, 60-73	13	9.30		11	<0.5	4.6	1.9	43	0.78
5N-1, 61-64	6	27.30		13	<0.5	1.0	0.32	60	2.7
6N-1, 14-19	3	31.34		14	0.6	5.8	1.8	51	0.93
158-957I-									
1N-1, 33-41	6	9.33		150	55	19	0.50	170	20
158-957K-									
1X-1, 24-29	4	0.21		270	70	24	0.09	110	30
1N-1, 37-41	9	10.37		170	18	18	1.2	100	18
3X-1, 36-38	7	14.82		230	200	19	2.1	86	17
158-957M-									
1R-1, 16-47	–63	0.00		160	5.8	4.1	0.30	39	1.6
1R-1, 16-47	420–63	0.00		130	1.0	1.0	0.11	32	0.39
1R-1, 16-47	+420	0.00		65	0.8	0.5	<0.5	30	0.19
1R-2, 8-12	3	0.63		71	0.3	2.4	0.19	17	2.7
2R-1, 2-5	1	9.30		83	4.3	22	4.4	71	3.2
3R-1, 57-60	14	14.87		150	56	20	0.33	93	10
3R-1, 123-125	28	15.49		54	27	11	0.53	89	3.7
3R-2, 1-4	1	15.80		32	0.8	1.4	1.0	76	2.4
5R-1, 90-92	15	25.18		22	0.7	9.3	0.68	37	1.0
7R-1, 0-4	1	34.30		16	2.2	0.5	0.38	12	0.53
8R-1, 0-4	1	38.30		83	12	7.5	1.5	97	3.7
158-957O-									
2R-1, 22-24	5	8.10		21	0.5	0.9	0.44	70	1.4
4R-1, 45-50	9	16.35		36	0.6	1.3	1.1	86	2.3
158-957P-									
1R-1, 44-46	8	0.43		11	<0.5	0.6	0.39	54	0.84
5R-1, 9-13	2	21.57		24	0.7	0.6	<0.5	90	4.4
5R-1, 9-13	2	21.57		22	0.8	0.6	0.09	94	4.4
9R-1, 11-13	2	40.19		27	0.5	1.2	0.19	92	2.0
10R-1, 1-3	1	45.10		20	<0.5	1.7	0.41	84	2.7
12R-1, 15-100	–63	54.40		93	16	11	4.7	100	3.7
12R-1, 15-100	420–63	54.40		77	11	8.7	3.2	87	3.9
12R-1, 15-100	+420	54.40		57	8.8	7.4	2.5	82	3.7
12R-2, 25-28	6	55.89		49	<0.5	0.4	<0.5	29	2.3
12R-4, 53-57	5	57.61		15	<0.5	2.0	0.73	210	1.6
13W-1, 50-58	—	15.00		45	4.2	5.8	1.9	94	4.2
13W-1+2, 0-150	—	15.00		51	8.8	5.4	2.4	91	3.4
158-957Q-									
1R-1, 13-18	—	0.13		150	24	4.8	2.8	30	2.1
1R-3, 70-100	—	3.75		44	13	4.4	2.6	54	2.0
1R-3, 119-121	—	4.10		12	21	3.3	2.9	8.1	0.60
2R-1, 0-4	1	9.50		29	2.5	24	0.16	15	0.18

Note: ND = element not determined; < = indicates values below reported detection.

Table 3 (continued).

Core, section, interval (cm)	Piece	Depth (mbsf)	Element:	Ga	Rb	Cs	Nb	Ta	Zr	Hf	U	Th
			Method:	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS
			Detection limit:	0.1 ppm	0.05 ppm	0.02 ppm	0.05 ppm	0.2 ppm	0.5 ppm	0.05 ppm	0.2 ppm	0.02 ppm
158-957A-												
3X-1, 4-8	1	10.00		46	0.81	0.04	0.39	<0.2	6.4	0.10	10	0.18
158-957B-												
1R-1, 3-95	–63	0.00		58	0.67	0.03	0.57	0.2	12	0.21	30	0.32
1R-1, 3-95	63-420	0.00		78	0.37	<0.02	0.26	<0.2	5.9	0.11	17	0.14
1R-1, 3-95	+420	0.00		62	0.37	0.02	0.20	0.3	3.8	0.06	13	0.10
1R-1, 3-95	+420	0.00		61	0.40	0.02	0.21	<0.2	4.0	0.06	12	0.11
4R-1, 0-10	1	19.90		18	0.27	<0.02	3.20	0.2	<100	3.40	8.5	0.20
158-957C-												
5N-1, 15-48	3,5,6	15.25		1.6	<0.05	<0.02	0.06	0.7	1.2	<0.05	16	<0.02
5N-1, 15-48	3,5,6	15.25		1.5	0.06	<0.02	0.06	0.5	1.4	<0.05	16	<0.02
7N-1, 52-56	6F	20.04		1.6	<0.05	<0.02	<0.05	0.4	0.6	<0.05	9.5	<0.02
7N-2, 63-69	1E	21.45		3.0	0.05	<0.02	0.06	0.2	0.8	<0.05	8.6	<0.02
10N-1, 21-22	4	28.86		1.7	0.11	<0.02	0.06	0.2	0.9	<0.05	12	<0.02
11N-1, 58-61	3D	31.18		2.5	0.06	<0.02	<0.05	0.3	0.7	<0.05	10	<0.02
11N-3, 90-94	8C	34.50		4.1	<0.05	<0.02	<0.05	0.3	0.7	<0.05	6.2	<0.02
12N-1, 53-59	6A	35.45		1.7	<0.05	<0.02	0.10	<0.2	2.0	0.05	2.8	<0.02
12N-2, 68-75	9	36.16		2.7	<0.05	<0.02	<0.05	<0.2	<0.5	<0.05	4.5	<0.02
12N-3, 86-100	9	36.94		2.8	0.06	<0.02	0.09	<0.2	2.2	0.05	9.9	<0.02
13N-1, 12-20	4	37.31		1.5	<0.05	<0.02	0.05	<0.2	0.7	<0.05	2.5	<0.02
14N-1, 33-41	5	40.53		1.1	0.08	<0.02	<0.05	<0.2	<0.5	<0.05	2.0	<0.02
14N-2, 76.5-88	6	41.67		0.8	<0.05	<0.02	<0.05	<0.2	0.7	<0.05	4.5	<0.02
15N-1, 36-40	5	42.50		1.2	0.06	<0.02	0.06	<0.2	1.2	<0.05	6.5	<0.02
15N-2, 12-15	1B	43.28		0.7	0.13	<0.02	0.15	<0.2	4.4	0.12	2.4	<0.02
15N-3, 132-150	11	45.54		0.7	0.06	<0.02	<0.05	0.2	0.8	<0.05	2.3	<0.02
15N-4, 8-10	1	45.70		1.1	0.07	<0.02	0.07	<0.2	1.9	0.05	2.0	<0.02
16N-1, 118-125	15	47.39		3.1	0.06	<0.02	<0.05	<0.2	<0.5	<0.05	5.6	<0.02
16N-2, 14-23	2	47.75		2.3	0.05	<0.02	0.10	1.9	4.8	0.15	13	<0.02
16N-2, 94-95	9B	48.56		0.6	0.07	<0.02	<0.05	<0.2	<0.5	<0.05	2.3	<0.02
16N-2, 94-95	9B	48.56		0.7	<0.05	<0.02	0.05	<0.2	1.2	<0.05	2.2	<0.02
158-957E-												
1R-1, 23-26	4	31.70		0.5	0.06	<0.02	<0.05	<0.2	<0.5	<0.05	2.0	<0.02
9R-1, 16-19	4	78.16		0.8	0.06	<0.02	0.07	<0.2	1.4	<0.05	2.8	<0.02
12R-1, 16-20	3	91.95		2.0	0.06	<0.02	0.06	<0.2	1.5	<0.05	5.2	<0.02
15R-1, 27-30	6	106.77		0.4	<0.05	<0.02	<0.05	0.2	1.3	<0.05	3.6	<0.02
158-957F-												
1N-1, 32-35	8	1.41		2.4	0.06	<0.02	<0.05	1.7	1.2	<0.05	7.1	<0.02
2N-1, 11-19	3	5.60		2.9	<0.05	<0.02	<0.05	<0.2	<0.5	<0.05	20	<0.02
158-957H-												
1N-1, 60-73	13	9.30		3.3	0.06	<0.02	<0.05	<0.2	<0.5	<0.05	5.7	<0.02
5N-1, 61-64	6	27.30		1.7	0.09	<0.02	0.10	0.3	2.1	<0.05	3.7	<0.02
6N-1, 14-19	3	31.34		2.8	0.08	<0.02	0.06	<0.2	2.5	0.05	7.7	<0.02
158-957I-												
1N-1, 33-41	6	9.33		16	0.17	0.05	<0.05	<0.2	<0.5	<0.05	1.5	<0.02
158-957K-												
1X-1, 24-29	4	0.21		23	0.10	<0.02	0.05	<0.2	<0.5	<0.05	1.9	<0.02
1N-1, 37-41	9	10.37		15	0.05	<0.02	<0.05	<0.2	<0.5	<0.05	12	<0.02
3X-1, 36-38	7	14.82		95	0.06	<0.02	0.06	<0.2	<0.5	<0.05	9.6	<0.02
158-957M-												
1R-1, 16-47	–63	0.00		4.5	0.86	0.03	0.26	0.2	16	0.32	11	0.12
1R-1, 16-47	420–63	0.00		3.0	0.76	0.02	0.16	0.2	11	0.20	11	0.05
1R-1, 16-47	+420	0.00		2.3	0.74	<0.02	0.12	<0.2	13	0.27	10	0.03
1R-2, 8-12	3	0.63		0.5	0.10	<0.02	0.09	<0.2	0.8	<0.02	2.5	<0.02
2R-1, 2-5	1	9.30		22	0.06	<0.02	0.13	<0.2	0.3	<0.02	11	<0.02
3R-1, 57-60	14	14.87		8.8	<0.05	<0.02	0.06	<0.2	<0.5	<0.05	9.0	<0.02
3R-1, 123-125	28	15.49		9.4	0.05	<0.02	0.07	<0.2	0.6	<0.05	13	<0.02
3R-2, 1-4	1	15.80		3.7	0.06	<0.02	0.06	<0.2	<0.5	<0.05	12	<0.02
5R-1, 90-92	15	25.18		3.9	0.08	<0.02	0.12	<0.2	2.2	0.05	12	<0.02
7R-1, 0-4	1	34.30		0.9	0.07	<0.02	0.22	<0.2	0.6	<0.02	2.6	<0.02
8R-1, 0-4	1	38.30		3.2	0.06	<0.02	0.06	<0.2	0.6	<0.05	39	<0.02
158-957O-												
2R-1, 22-24	5	8.10		2.1	<0.05	<0.02	<0.05	<0.2	<0.5	<0.05	6.0	<0.02
4R-1, 45-50	9	16.35		6.0	0.06	<0.02	<0.05	0.2	<0.5	<0.05	12	<0.02
158-957P-												
1R-1, 44-46	8	0.43		1.5	0.08	<0.02	<0.05	<0.2	14	0.27	2.4	<0.02
5R-1, 9-13	2	21.57		0.5	<0.05	<0.02	<0.05	<0.2	<0.5	<0.05	2.9	<0.02
5R-1, 9-13	2	21.57		0.6	<0.05	<0.02	0.05	<0.2	<0.5	<0.05	2.8	<0.02
9R-1, 11-13	2	40.19		1.1	<0.05	<0.02	<0.05	<0.2	<0.5	<0.05	14	<0.02
10R-1, 1-3	1	45.10		1.5	<0.05	<0.02	<0.05	0.2	<0.5	<0.05	21	<0.02
12R-1, 15-100	–63	54.40		17	0.14	<0.02	0.07	<0.2	1.3	<0.05	6.1	0.03
12R-1, 15-100	420–63	54.40		12	0.14	<0.02	0.06	<0.2	0.7	<0.05	5.5	0.02
12R-1, 15-100	+420	54.40		9.8	0.11	<0.02	0.08	<0.2	1.7	<0.05	5.9	<0.02
12R-2, 25-28	6	55.89		1.2	0.10	<0.02	0.19	<0.2	7.9	0.21	3.9	<0.02
12R-4, 53-57	5	57.61		3.0	0.08	<0.02	0.06	<0.2	3.9	0.08	24	<0.02
13W-1, 50-58	—	15.00		6.7	0.10	<0.02	0.16	0.4	0.5	<0.05	5.6	0.02
13W-1+2, 0-150	—	15.00		8.9	0.09	<0.02	0.14	<0.2	1.0	0.02	5.0	<0.02
158-957Q-												
1R-1, 13-18	—	0.13		21	0.22	<0.02	0.12	<0.2	1.8	0.03	7.1	0.03
1R-3, 70-100	—	3.75		7.7	0.10	<0.02	0.06	<0.2	<0.5	<0.05	7.3	<0.02
1R-3, 119-121	—	4.10		5.4	0.12	<0.02	0.07	<0.2	1.0	<0.02	7.2	<0.02
2R-1, 0-4	1	9.50		14	0.08	<0.02	0.14	<0.2	0.6	<0.02	2.5	<0.02

Table 4. Trace element composition of samples from Site 957.

Core, section, interval (cm)	Piece	Depth (mbsf)	Element: Method: Detection limit:	Au INAA 5 ppb	Ag INAA 5 ppm	As INAA 2 ppm	Sb INAA 0.2 ppm	Mo INAA 5 ppm	Co INAA 5 ppm	Se INAA 5 ppm	Fe INAA 0.02%	Zn INAA 50 ppm	Hg INAA 1 ppm	Sn INAA 0.01%	W INAA 4 ppm	Br INAA 1 ppm	Ir INAA 5 ppm	U INAA 0.5 ppm
158-957A-																		
3X-1, 4-8	1	10.00		3200	66	55	12	40	13	5	20.5	30000	12	<0.04	<4	35	<7	8.7
158-957B-																		
1R-1, 3-95	–63	0.00		3200	170	60	16	79	51	<5	29.4	24000	<1	<0.03	<4	32	<6	12
1R-1, 3-95	420–63	0.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1R-1, 3-95	+420	0.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1R-1, 3-95	+420	0.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4R-1, 0-10	1	19.90		9	<5	<2	<0.2	5	49	<51	2.2	260	<1	<0.03	<4	14	<5	10
158-957C-																		
5N-1, 15-48	3,5,6	15.25		445	<5	51	0.6	100	430	<5	43.9	650	<1	<0.02	<4	<1	<5	12
5N-1, 15-48	3,5,6	15.25		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7N-1, 52-56	6F	20.04		195	<5	37	0.9	110	300	<5	34.9	370	<1	<0.02	<4	4	<5	9.2
7N-2, 63-69	1E	21.45		93	<5	33	0.6	86	140	<5	24.8	360	<1	<0.02	<4	2	<5	5.4
10N-1, 21-22	4	28.86		138	<5	36	<0.2	90	190	<5	35.6	300	<1	<0.01	<4	5	<5	9.3
11N-1, 58-61	3D	31.18		131	<5	27	0.7	67	130	<5	31.1	150	<1	<0.02	<4	3	<5	6.9
11N-3, 90-94	8C	34.50		235	<5	46	1.1	140	180	<5	37.8	710	<1	<0.02	<4	<1	<5	4.2
12N-1, 53-59	6A	35.45		119	<5	36	0.4	110	230	17	34.6	710	<1	<0.02	<4	4	<5	<0.5
12N-2, 68-75	9	36.16		234	<5	57	0.9	74	190	<5	33.8	1900	<1	<0.02	<4	<1	<5	3.7
12N-3, 86-100	9	36.94		<5	<5	26	<0.2	40	270	<5	21.6	89	<1	<0.02	<4	9	<5	8.1
13N-1, 12-20	4	37.31		191	<5	46	0.9	69	160	<5	35.1	860	<1	<0.02	<4	3	<5	2.7
14N-1, 33-41	5	40.53		66	<5	33	0.3	71	160	<5	32.8	300	<1	<0.02	<4	4	<5	<0.5
14N-2, 76.5-88	6	41.67		157	<5	48	0.7	55	250	19	33.4	520	<1	<0.02	<4	<1	<5	4.3
15N-1, 36-40	5	42.50		179	<5	44	0.6	71	240	23	31.7	460	<1	<0.02	<4	3	<5	4.8
15N-2, 12-15	1B	43.28		23	<5	9	<0.2	17	380	42	18.9	<50	<1	<0.02	<4	<1	<5	<0.5
15N-3, 132-150	11	45.54		29	<5	15	<0.2	34	310	27	25.5	<50	<1	<0.02	<4	4	<5	<0.5
15N-4, 8-10	1	45.70		17	<5	11	<0.2	58	170	16	18.8	68	<1	<0.01	<4	6	<5	1.7
16N-1, 118-125	15	47.39		161	<5	35	0.6	50	150	<5	32.7	300	<1	<0.02	<4	4	<5	3.9
16N-2, 14-23	2	47.75		114	<5	29	0.7	42	370	18	32.2	240	<1	<0.02	<4	5	<5	9.4
16N-2, 94-95	9B	48.56		81	<5	21	0.3	46	260	12	27.9	100	<1	<0.01	<4	3	<5	2.7
16N-2, 94-95	9B	48.56		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158-957E-																		
1R-1, 23-26	4	31.70		55	<5	14	0.2	31	250	15	21	69	<1	<0.01	<4	3	<5	1.5
9R-1, 16-19	4	78.16		182	<5	32	<0.2	160	360	<5	33.9	180	<1	<0.02	<4	6	<5	<0.7
12R-1, 16-20	3	91.95		87	7	26	0.8	130	330	86	45.8	210	<1	<0.01	<4	6	<5	4.3
15R-1, 27-30	6	106.77		58	<5	43	0.5	62	420	29	30.9	140	<1	<0.01	<4	2	<5	3.7
158-957F-																		
1N-1, 32-35	8	1.41		269	<5	49	1.0	82	390	42	30.3	280	<1	<0.02	<4	4	<5	4.4
2N-1, 11-19	3	5.60		329	<5	57	1.1	97	240	13	38.7	300	<1	<0.01	<4	<1	<5	15
158-957H-																		
1N-1, 60-73	13	9.30		809	7	27	0.6	73	200	16	33	170	<1	<0.01	<4	4	<5	4.3
5N-1, 61-64	6	27.30		128	<5	20	1.2	110	390	43	36.1	230	<1	<0.01	<4	5	<5	3.5
6N-1, 14-19	3	31.34		350	<5	32	0.8	72	260	15	30.5	75	<1	<0.01	<4	7	<5	4.9
158-957I-																		
1N-1, 33-41	6	9.33		431	<5	52	4.8	220	33	<54	4.5	35000	<1	<0.02	<4	7	<5	<0.8
158-957K-																		
1X-1, 24-29	4	0.21		409	<5	45	3.4	160	15	<54	0.9	30000	<1	<0.02	<4	8	<5	<0.9
1N-1, 37-41	9	10.37		830	<5	55	3.0	120	56	<5	46.7	8400	<1	<0.01	<4	4	<5	11
3X-1, 36-38	7	14.82		1500	<5	78	7.6	110	61	<5	43.6	39000	<1	<0.02	<4	6	<5	9.8
158-957M-																		
1R-1, 16-47	–63	0.00		183	<5	140	6.9	82	14	<55	4.0	2600	<1	<0.02	<4	86	<5	8.5
1R-1, 16-47	420–63	0.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1R-1, 16-47	+420	0.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1R-2, 8-12	3	0.63		135	<5	18	1.0	17	<5	<5	12.4	230	<1	<0.01	<4	9	<5	2.3
2R-1, 2-5	1	9.30		1770	19	140	6.5	86	180	<5	48.9	640	<1	<0.03	<4	<1	<5	16
3R-1, 57-60	14	14.87		1050	<5	65	3.5	150	83	<5	43.3	43000	<1	<0.01	<4	<2	<5	7.2
3R-1, 123-125	28	15.49		367	<5	49	1.7	130	220	<5	34.9	8600	<1	<0.01	<4	4	<5	10
3R-2, 1-4	1	15.80		504	<5	35	1.3	76	410	15	28.8	340	<1	<0.01	<4	3	<5	12
5R-1, 90-92	15	25.18		263	11	35	1.3	65	270	<5	25.1	490	<1	<0.02	<4	4	<5	12
7R-1, 0-4	1	34.30		199	<5	8	<0.2	9	100	<5	13.0	670	<1	<0.02	<4	9	<5	3.6
8R-1, 0-4	1	38.30		893	<5	65	3.7	180	230	<5	38.2	7100	<1	<0.01	<4	3	<5	30
158-957O-																		
2R-1, 22-24	5	8.10		150	<5	34	0.8	110	220	42	32.1	340	<1	<0.01	<4	4	<5	3.6
4R-1, 45-50	9	16.35		274	<5	61	1.6	130	270	45	43.7	390	<1	<0.01	<4	<1	<5	8.5
158-957P-																		
1R-1, 44-46	8	0.43		130	<5	30	0.6	57	220	30	25.5	91	<1	<0.01	<4	5	<5	2.5
5R-1, 9-13	2	21.57		213	<5	70	0.8	99	350	<54	2.6	750	<1	<0.01	<4	3	<5	2.8
5R-1, 9-13	2	21.57		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9R-1, 11-13	2	40.19		299	<5	46	1.3	99	310	14	37.1	370	<1	<0.01	<4	3	<5	13
10R-1, 1-3	1	45.10		193	<5	34	0.5	87	400	41	43	340	<1	<0.02	<4	<1	<5	18
12R-1, 15-100	–63	54.40		739	<5	74	2.5	130	230	34	37.6	5500	<1	<0.02	<4	20	<5	4.5
12R-1, 15-100	420–63	54.40		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12R-1, 15-100	+420	54.40		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12R-2, 25-28	6	55.89		51	<5	11	<0.2	33	550	33	24	160	1	<0.01	<4	2	<5	4.1
12R-4, 53-57	5	57.61		241	<5	51	1.0	210	570	43	43.6	190	<1	<0.02	<4	<1	<5	22
13W-1, 50-58	—	15.00		523	<5	63	1.3	130	380	50	42.5	1600	<1	<0.01	<4	15	<5	3.7
13W-1+2, 0-150	—	15.00		720	9	69	2.1	88	410	41	46.8	3000	6	<0.03	<4	22	<5	5.7
158-957Q-																		
1R-1, 13-18	—	0.13		1940	8	56	4.2	37	25	<51	8.0	9800	<1	<0.03	<4	26	<5	5.2
1R-3, 70-100	—	3.75		1110	<5	45	1.9	75	130	12	36.8	4400	<1	<0.01	<4	15	<5	5.4
1R-3, 119-121	—	4.10		1400	<5	13	1.3	7	10	<51	0.8	4600	<1	<0.02	<4	40	<5	6.4
2R-1, 0-4	1	9.50		885	27	10	1.7	6	<5	<5	4.21	1200	<1	<0.01	<4	10	<5	2.3

Note: ND = element not determined; < = values below reported detection.

Table 5. Rare earth element composition of samples from Site 957.

Core, section, interval (cm)	Piece	Depth (mbsf)	Element:	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y
			Method:	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS
			Detection limit:	0.1 ppm	0.1 ppm	0.02 ppm	0.1 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.05 ppm	0.02 ppm	0.02 ppm
158-957A-																		
3X-1, 4-8	1	10.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158-957B-																		
1R-1, 3-95	–63	0.00		1.8	4.7	0.86	4.1	1.30	4.0	1.4	0.21	1.0	0.18	0.42	0.07	0.39	0.06	4.2
1R-1, 3-95	420–63	0.00		1.0	2.6	0.47	2.3	0.81	2.2	0.81	0.11	0.57	0.09	0.23	0.04	0.21	0.03	2.3
1R-1, 3-95	+420	0.00		0.7	1.6	0.28	1.4	0.43	1.4	0.42	0.07	0.30	0.05	0.14	<0.02	0.13	<0.02	1.4
1R-1, 3-95	+420	0.00		0.7	1.6	0.28	1.5	0.43	1.2	0.40	0.06	0.30	0.05	0.13	0.02	0.12	<0.02	1.4
4R-1, 0-10	1	19.90		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158-957C-																		
5N-1, 15-48	3,5,6	15.25		<0.1	0.2	0.04	0.2	0.08	0.10	0.06	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.02	0.18
5N-1, 15-48	3,5,6	15.25		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7N-1, 52-56	6F	20.04		0.2	0.2	0.03	0.2	0.04	0.08	0.04	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	0.13
7N-2, 63-69	1E	21.45		0.2	0.6	0.10	0.5	0.10	0.26	0.07	<0.02	0.06	<0.02	0.02	<0.02	<0.05	<0.02	0.23
10N-1, 21-22	4	28.86		0.1	0.3	0.04	0.2	0.04	0.09	0.04	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	0.19
11N-1, 58-61	3D	31.18		0.1	0.3	0.05	0.2	0.05	0.11	0.06	<0.02	0.05	<0.02	<0.02	<0.02	<0.05	<0.02	0.18
11N-3, 90-94	8C	34.50		<0.1	0.1	0.02	0.1	0.02	0.04	0.03	<0.02	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.08
12N-1, 53-59	6A	35.45		0.1	0.3	0.04	0.2	0.05	0.07	0.06	<0.02	0.06	<0.02	0.04	<0.02	0.05	<0.02	0.39
12N-2, 68-75	9	36.16		0.1	0.3	0.05	0.2	0.05	0.12	0.04	<0.02	0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.12
12N-3, 86-100	9	36.94		0.2	0.4	0.07	0.4	0.10	0.14	0.10	<0.02	0.11	<0.02	0.05	<0.02	0.05	<0.02	0.52
13N-1, 12-20	4	37.31		<0.1	0.1	0.02	<0.1	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.06
14N-1, 33-41	5	40.53		<0.1	0.3	0.05	0.2	0.05	0.09	0.04	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	0.11
14N-2, 76.5-88	6	41.67		0.1	0.4	0.06	0.3	0.08	0.10	0.06	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	0.14
15N-1, 36-40	5	42.50		0.2	0.5	0.08	0.4	0.11	0.13	0.10	<0.02	0.06	<0.02	0.03	<0.02	<0.05	<0.02	0.31
15N-2, 12-15	1B	43.28		0.4	1.2	0.21	1.1	0.29	0.24	0.27	0.04	0.21	0.04	0.11	<0.02	0.11	<0.02	1.0
15N-3, 132-150	11	45.54		0.2	0.6	0.10	0.5	0.15	0.14	0.12	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.02	0.20
15N-4, 8-10	1	45.70		0.3	0.9	0.14	0.7	0.19	0.30	0.18	0.03	0.13	0.03	0.06	<0.02	0.07	<0.02	0.72
16N-1, 118-125	15	47.39		0.1	0.4	0.09	0.5	0.12	0.19	0.08	<0.02	0.05	<0.02	<0.02	<0.02	<0.05	<0.02	0.16
16N-2, 14-23	2	47.75		<0.1	0.3	0.05	0.2	0.07	0.06	0.07	<0.02	0.07	<0.02	0.05	<0.02	0.06	<0.02	0.38
16N-2, 94-95	9B	48.56		0.3	1.1	0.21	1.1	0.30	0.20	0.17	<0.02	0.07	<0.02	<0.02	<0.02	<0.05	<0.02	0.16
16N-2, 94-95	9B	48.56		0.3	1.1	0.20	1.1	0.29	0.19	0.17	<0.02	0.06	<0.02	<0.02	<0.02	<0.05	<0.02	0.19
158-957E-																		
1R-1, 23-26	4	31.70		0.2	0.9	0.16	0.9	0.22	0.13	0.12	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	0.11
9R-1, 16-19	4	78.16		0.2	0.6	0.11	0.6	0.17	0.07	0.11	<0.02	0.07	<0.02	0.03	<0.02	<0.05	<0.02	0.28
12R-1, 16-20	3	91.95		<0.1	0.2	0.03	0.2	0.06	0.03	0.06	<0.02	0.06	<0.02	0.04	<0.02	<0.05	<0.02	0.33
15R-1, 27-30	6	106.77		<0.1	0.3	0.05	0.3	0.11	0.06	0.09	<0.02	0.07	<0.02	0.04	<0.02	<0.05	<0.02	0.36
158-957F-																		
1N-1, 32-35	8	1.41		<0.1	0.1	<0.02	<0.1	0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.08
2N-1, 11-19	3	5.60		<0.1	0.3	0.06	0.2	0.07	0.14	0.06	<0.02	0.05	<0.02	0.02	<0.02	<0.05	<0.02	0.18
158-957H-																		
1N-1, 60-73	13	9.30		0.1	0.3	0.04	0.2	0.03	0.13	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.07
5N-1, 61-64	6	27.30		0.2	0.6	0.10	0.5	0.14	0.12	0.10	<0.02	0.09	<0.02	0.04	<0.02	<0.05	<0.02	0.39
6N-1, 14-19	3	31.34		0.6	1.8	0.28	1.3	0.28	0.31	0.23	0.03	0.10	<0.02	0.03	<0.02	<0.05	<0.02	0.29
158-957I-																		
1N-1, 33-41	6	9.33		<0.1	<0.1	<0.02	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.03
158-957K-																		
1X-1, 24-29	4	0.21		<0.1	<0.1	<0.02	<0.1	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.05	<0.02	0.04
1N-1, 37-41	9	10.37		<0.1	0.1	0.02	0.2	0.10	0.27	0.12	<0.02	0.09	<0.02	0.03	<0.02	<0.05	<0.02	0.31
3X-1, 36-38	7	14.82		<0.1	<0.1	0.02	0.2	0.15	0.36	0.14	0.02	0.10	<0.02	0.03	<0.02	<0.05	<0.02	0.32
158-957M-																		
1R-1, 16-47	–63	0.00		1.3	3.8	0.64	3.1	0.79	2.3	0.56	0.09	0.48	0.09	0.21	0.04	0.25	0.04	1.8
1R-1, 16-47	420–63	0.00		1.1	3.5	0.61	2.9	0.80	2.4	0.56	0.09	0.48	0.09	0.22	0.04	0.23	0.03	1.5
1R-1, 16-47	+420	0.00		1.1	3.5	0.62	2.9	0.77	2.4	0.57	0.09	0.45	0.09	0.20	0.04	0.23	0.03	1.6
1R-2, 8-12	3	0.63		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2R-1, 2-5	1	9.30		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3R-1, 57-60	14	14.87		<0.1	<0.1	<0.02	0.1	0.07	0.13	0.07	<0.02	0.07	<0.02	0.03	<0.02	<0.05	<0.02	0.26

Table 5 (continued).

Core, section, interval (cm)	Piece	Depth (mbsf)	Element:	La	Ce	Pr	Nd	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu	Y
			Method:	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS	ICP-MS
			Detection limit:	0.1 ppm	0.1 ppm	0.02 ppm	0.1 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.02 ppm	0.05 ppm	0.02 ppm	0.02 ppm
3R-1, 123-125	28	15.49		<0.1	0.3	0.06	0.3	0.19	0.35	0.22	0.04	0.21	0.03	0.07	<0.02	0.07	<0.02	0.70
3R-2, 1-4	1	15.80		0.3	1.4	0.27	1.6	0.47	0.45	0.32	0.04	0.17	0.02	0.04	<0.02	<0.05	<0.02	0.43
5R-1, 90-92	15	25.18		0.1	0.4	0.06	0.3	0.10	0.15	0.09	<0.02	0.11	0.02	0.06	<0.02	0.07	<0.02	0.48
7R-1, 0-4	1	34.30		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
8R-1, 0-4	1	38.30		<0.1	0.4	0.10	0.8	0.51	0.90	0.68	0.12	0.64	0.11	0.26	0.04	0.20	0.02	2.1
158-957O-																		
2R-1, 22-24	5	8.10		0.1	0.4	0.06	0.4	0.09	0.10	0.08	<0.02	0.06	<0.02	0.02	<0.02	<0.05	<0.02	0.23
4R-1, 45-50	9	16.35		<0.1	0.2	0.04	0.2	0.04	0.06	0.05	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	0.15
158-957P-																		
1R-1, 44-46	8	0.43		0.2	0.7	0.12	0.7	0.15	0.13	0.13	<0.02	0.08	<0.02	0.03	<0.02	<0.05	<0.02	0.31
5R-1, 9-13	2	21.57		0.1	0.4	0.07	0.4	0.12	0.08	0.12	<0.02	0.09	<0.02	0.03	<0.02	<0.05	<0.02	0.35
5R-1, 9-13	2	21.57		0.1	0.4	0.08	0.5	0.12	0.07	0.12	<0.02	0.08	<0.02	0.03	<0.02	<0.05	<0.02	0.36
9R-1, 11-13	2	40.19		<0.1	0.1	0.02	0.2	0.05	0.08	0.05	<0.02	0.05	<0.02	0.03	<0.02	<0.05	<0.02	0.21
10R-1, 1-3	1	45.10		<0.1	<0.1	<0.02	<0.1	0.02	0.02	0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.05	<0.02	0.11
12R-1, 15-100	–63	54.40		<0.1	0.3	0.04	0.2	0.05	0.04	0.05	<0.02	0.04	<0.02	0.03	<0.02	<0.05	<0.02	0.22
12R-0, 15-100	420–63	54.40		<0.1	0.3	0.04	0.2	0.06	0.05	0.06	<0.02	0.05	<0.02	0.03	<0.02	<0.05	<0.02	0.27
12R-1, 15-100	+420	54.40		0.1	0.4	0.06	0.3	0.09	0.07	0.10	<0.02	0.09	<0.02	0.05	<0.02	0.06	<0.02	0.54
12R-2, 25-28	6	55.89		0.3	0.9	0.17	1.0	0.34	0.23	0.36	0.05	0.32	0.06	0.18	0.03	0.19	0.03	1.9
12R-4, 53-57	5	57.61		<0.1	0.1	0.02	0.1	0.05	0.06	0.04	<0.02	0.05	<0.02	0.02	<0.02	<0.05	<0.02	0.18
13W-1, 50-58	—	15.00		<0.1	0.1	0.03	0.1	0.03	0.04	0.03	<0.02	0.04	<0.02	<0.02	<0.02	<0.05	<0.02	0.17
13W-1+ 2, 0-150	—	15.00		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
158-957Q-																		
1R-1, 13-18	—	0.13		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1R-3, 70-100	—	3.75		0.3	0.8	0.11	0.6	0.10	0.23	0.08	<0.02	0.06	<0.02	0.03	<0.02	<0.05	<0.02	0.31
1R-3, 119-121	—	4.10		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2R-1, 0-4	1	9.50		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note: ND = element not determined; < = values below reported detection.

Table 6. Selected major and trace element compositions of pyrite and chalcopyrite in samples from Site 957.

Core, section, interval (cm)	Piece	Depth (mbsf)	Area	Lithology	Grain Size	Description	Element: Fe	Zn	Au	Ag
							Method: INAA	INAA	INAA	INAA
							Detection limit: 0.02%	50 ppm	5 ppb	5 ppm
Chalcopyrite:										
158-957C-										
7N-1, 73-133	7-8	20.22	TAG-1	Pyrite-anhydrite breccia	Fine	Fragment adjacent to anhydrite vein	32.7	540	69	<5
7N-2, 0-75	1A-1E	21.00	TAG-1	Pyrite-anhydrite breccia	Fine	Intergrown with pyrite fragments	37.1	<50	82	<5
7N-2, 75-100	1F-1K	22.00	TAG-1	Pyrite-anhydrite breccia	Fine	Adjacent to anhydrite vein	33.4	320	55	<5
11N-1, 30-97	3A-3H	31.10	TAG-1	Pyrite-silica breccia	Fine	In massive anhydrite	28.0	85	52	<5
11N-1, 30-97	3A-3H	31.10	TAG-1	Pyrite-silica breccia	Fine	Pyrite-chalcopyrite vein selvage	35.7	200	77	<5
11N-2, 0-30	1A-1D	32.20	TAG-1	Pyrite-silica-anhydrite breccia	Fine	Replacing nodular pyrite	37.3	240	126	<5
11N-2, 60-75	1J-1K	32.75	TAG-1	Pyrite-silica-anhydrite breccia	Fine	Vein-related, replacing pyrite	37.3	270	109	<5
11N-3, 75-134	8-11	34.50	TAG-1	Pyrite-silica breccia	Fine	Chalcopyrite-pyrite vein-related	42.0	1000	263	<5
11N-3, 75-134	8-11	34.50	TAG-1	Pyrite-silica breccia	Fine	Massive chalcopyrite	34.5	<50	64	<5
12N-2, 0-67	1-8	36.00	TAG-1	Pyrite-silica-anhydrite breccia	Fine	In anhydrite vein	33.7	<50	97	<5
12N-2, 67-140	9-17	36.30	TAG-1	Pyrite-silica-anhydrite breccia	Fine	In massive anhydrite	31.1	210	66	<5
12N-3, 0-100	1-9	36.75	TAG-1	Pyrite-silica-anhydrite breccia	Fine	In massive anhydrite	35.1	220	74	<5
13N-1, 0-58	1-10	37.50	TAG-1	Pyrite-silica breccia	Fine	In anhydrite vein	38.9	440	41	<5
13N-2, 0-62	1-4	38.75	TAG-1	Pyrite-silica-anhydrite breccia	Fine	Selvage of anhydrite vein	34.4	60	44	<5
14N-1, 40-74	6-10	40.75	TAG-1	Pyrite-silica breccia	Fine	In anhydrite vein	31.3	<50	55	<5
14N-2, 0-63	1-3	41.20	TAG-1	Pyrite-silica breccia	Fine	In anhydrite vein	33.0	85	57	<5
15N-2, 0-34	1A-1G	43.25	TAG-1	Silicified wallrock breccia	Fine	Pyrite-anhydrite vein in silica	30.2	<50	<5	<5
15N-2, 34-150	2-8	44.00	TAG-1	Silicified wallrock breccia	Fine	Pyrite-anhydrite vein in silica	29.3	95	42	<5
16N-1, 66-141	9-17	47.10	TAG-1	Silicified wallrock breccia	Fine	In anhydrite vein and selvage	42.1	<50	85	<5
158-957E-										
1R-1, 0-20	1-3	31.60	TAG-1	Pyrite-silica breccia	Fine	Selvage of anhydrite vein	41.0	<50	65	<5
3R-1, 0-21	1-4	41.75	TAG-1	Pyrite-silica breccia	Fine	Chalcopyrite-pyrite, vein-related	39.6	130	138	<5
6R-1, 0-40	1-8	63.50	TAG-1	Pyrite-silica breccia	Fine	Massive pyrite-chalcopyrite	49.9	400	472	<5
9R-1, 0-27	1-5	78.00	TAG-1	Silicified wallrock breccia	Fine	Massive pyrite-chalcopyrite	49.7	310	238	<5
158-957F-										
1N-1, 0-30	1-7	0.75	TAG-1	Massive pyrite breccia	Fine	Massive chalcopyrite	32.2	1200	335	<5
1N-1, 31-74	8-10	1.35	TAG-1	Massive pyrite breccia	Fine	Fragment in sandy pyrite	40.5	170	299	<5
Pyrite:										
158-957B-										
1R-2, 0-10	1	1.03	TAG-2	Massive pyrite breccia	Medium	Massive, granular pyrite	4.56	150	71	<5
158-957C-										
4W-1, 3-8	2	10.52	TAG-1	Porous nodular pyrite breccia	Medium	Nodular pyrite	43.4	750	300	5
5N-1, 0-25	1-4	15.00	TAG-1	Pyrite-anhydrite breccia	Medium	Nodular pyrite	45.2	310	342	<5
7N-1, 0-69	1-6G	19.55	TAG-1	Pyrite-anhydrite breccia	Medium	Halo of anhydrite vein	33.8	660	80	<5
7N-1, 0-69	1-6G	19.55	TAG-1	Pyrite-anhydrite breccia	Medium	Nodular pyrite	43.7	300	153	<5
7N-1, 73-133	7-8	20.22	TAG-1	Pyrite-anhydrite breccia	Medium	Nodular pyrite	42.1	1000	177	<5
7N-2, 0-75	1A-1E	21.00	TAG-1	Pyrite-anhydrite breccia	Coarse	clast or fragment	44.1	240	168	<5
7N-2, 75-100	1F-1K	22.00	TAG-1	Pyrite-anhydrite breccia	Medium	Nodular pyrite	43.5	880	229	<5
7N-3, 30-66	4A-4D	22.85	TAG-1	Pyrite-anhydrite breccia	Coarse	Nodular pyrite	41.3	290	187	<5
8W-1, 0-5	1	19.50	TAG-1	Pyrite-anhydrite breccia	Medium	Nodular pyrite	41.2	370	152	<5
9X-1, 4-10	2	24.40	TAG-1	Pyrite-anhydrite breccia	Medium	Nodular pyrite	41.1	630	125	<5
10N-1, 17-27	4A-4B	28.86	TAG-1	Pyrite-anhydrite breccia	Coarse	Granular, euhedral aggregates	40.2	290	138	<5
11N-1, 0-30	1-3A	30.80	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Nodular pyrite	43.2	390	84	<5
11N-1, 30-97	3A-3H	31.10	TAG-1	Pyrite-silica breccia	Medium	Nodular pyrite	39.3	490	97	<5
11N-2, 0-30	1A-1D	32.20	TAG-1	Pyrite-silica-anhydrite breccia	Coarse	Nodular pyrite	39.1	480	139	<5
11N-2, 30-60	1E-1I	32.50	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Granular, euhedral aggregates	40.2	330	183	<5
11N-2, 60-75	1J-1K	32.75	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Granular, euhedral, vein-related	43.3	700	164	<5
11N-3, 0-57	1-5C	33.75	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Nodular pyrite, vein-related	45.2	940	168	<5
12N-1, 0-68	1-6	35.35	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Granular, euhedral aggregates	44.2	100	131	<5
12N-2, 0-67	1-8	36.00	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Nodular pyrite	44.1	510	225	<5
12N-2, 67-140	9-17	36.30	TAG-1	Pyrite-silica breccia	Medium	Granular, euhedral aggregates	43.9	190	117	<5
12N-3, 0-100	1-9	36.75	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Granular, euhedral aggregates	39.3	360	143	<5
13N-1, 0-58	1-10	37.50	TAG-1	Pyrite-silica breccia	Fine	Halo of anhydrite vein	43.7	640	160	<5
13N-1, 58-140	11-22	38.00	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Granular, euhedral aggregates	40.4	560	171	<5
13N-2, 0-62	1-4	38.75	TAG-1	Pyrite-silica-anhydrite breccia	Medium	Granular, euhedral aggregates	39.0	190	150	<5
14N-1, 40-74	6-10	40.75	TAG-1	Pyrite-silica breccia	Medium	Brecciated, pyrite, silica, anhydrite	39.3	670	144	<5
14N-2, 0-63	1-3	41.20	TAG-1	Pyrite-silica breccia	Medium	Brecciated, pyrite, silica, anhydrite	42.3	1100	151	<5
15N-1, 0-55	1-7	42.50	TAG-1	Pyrite-silica breccia	Medium	Brecciated, massive pyrite	39.1	1100	176	<5
15N-1, 55-120	8-11	42.75	TAG-1	Silicified wallrock breccia	Medium	Adjacent to thin anhydrite vein	42.7	830	350	<5
15N-2, 0-34	1A-1G	43.25	TAG-1	Silicified wallrock breccia	Medium	Nodular pyrite, silica, anhydrite	37.7	180	48	<5
15N-2, 34-150	2-8	44.00	TAG-1	Silicified wallrock breccia	Medium	Nodular pyrite, silica, anhydrite	48.1	620	149	<5
15N-3, 0-120	1-9	44.75	TAG-1	Silicified wallrock breccia	Medium	Halo of anhydrite vein	45.3	400	92	<5
15N-3, 120-150	10-11	45.50	TAG-1	Silicified wallrock breccia	Medium	Brecciated, pyrite-anhydrite	49.4	630	146	<5
15N-4, 0-51	1-4	45.90	TAG-1	Silicified wallrock breccia	Coarse	Nodular pyrite	49.2	130	23	<5
16N-1, 4-59	2-7	46.50	TAG-1	Silicified wallrock breccia	Coarse	Nodular pyrite	53.6	<50	58	<5
16N-1, 66-141	9-17	47.10	TAG-1	Silicified wallrock breccia	Medium	Brecciated halo of anhydrite vein	51.2	790	231	<5
16N-2, 0-88	1-8	48.00	TAG-1	Silicified wallrock breccia	Medium	Brecciated halo of anhydrite vein	51.5	150	110	<5
158-957E-										
1R-1, 0-20	1-3	31.60	TAG-1	Pyrite-silica breccia	Coarse	Granular, euhedral aggregates	47.2	280	234	<5
2R-1, 0-42	1-7	37.25	TAG-1	Pyrite-silica breccia	Coarse	Granular, euhedral aggregates	52.6	220	113	<5
4R-1, 0-23	1-4	49.10	TAG-1	Pyrite-silica breccia	Coarse	Granular, euhedral aggregates	49.2	300	340	<5
5R-1, 0-44	1-8	58.75	TAG-1	Pyrite-silica breccia	Medium	Granular, euhedral aggregates	53.1	210	139	<5
5R-1, 0-44	1-8	58.75	TAG-1	Pyrite-silica breccia	Fine	Clasts or fragments	46.6	120	387	<5
7R-1, 0-33	1-6	68.45	TAG-1	Pyrite-silica breccia	Coarse	Nodular pyrite	50.4	25	51	<5
10R-1, 0-16	1-2	82.15	TAG-1	Silicified wallrock breccia	Medium	Massive pyrite+chalcopyrite	51.5	110	203	<5
11R-1, 0-54	1-10	87.30	TAG-1	Pyrite-silica breccia	Medium	Halo of anhydrite vein	46.2	410	332	<5
12R-1, 0-46	1-7	92.00	TAG-1	Silicified wallrock breccia	Medium	Halo of anhydrite vein	49.9	470	258	<5
14R-1, 0-54	1-11	101.75	TAG-1	Pyrite-silica breccia	Fine	Disseminated matrix pyrite	47.1	160	149	<5
15R-1, 0-50	1-9	106.75	TAG-1	Chloritized basalt breccia	Medium	Clasts or fragments	50.2	210	238	<5

Table 6 (continued).

Core, section, interval (cm)	Element:	As	Sb	Mo	Co	Se	Ni	Ca	Sr	Rb	Na	Br	U	Zn
	Method:	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA	INAA
	Detection limit:	2 ppm	0.2 ppm	5 ppm	5 ppm	5 ppm	5 ppm	50 ppm	1%	500 ppm	30 ppm	500 ppm	1 ppm	0.5 ppm
Chalcopyrite:														
158-957C-														
7N-1, 73-133		10	<0.2	16	67	24	80	2	<500	<30	230	6	5.0	<0.5
7N-2, 0-75		25	<0.2	56	190	<5	120	3	<500	<30	660	12	0.7	<0.5
7N-2, 75-100		12	<0.2	26	150	37	70	1.5	<500	<30	410	5	6.4	<0.5
11N-1, 30-97		<2	<0.2	38	120	140	50	1	<500	<30	380	5	<0.5	<0.5
11N-1, 30-97		21	0.4	120	140	16	<50	1	<500	<30	210	<1	<0.5	<0.5
11N-2, 0-30		21	0.5	95	170	17	<50	1	<500	<30	290	3	3.7	<0.5
11N-2, 60-75		20	<0.2	110	190	24	<50	2	<500	<30	200	2	<0.5	<0.5
11N-3, 75-134		44	1.3	180	190	13	<50	1	<500	<30	180	<1	4.0	<0.5
11N-3, 75-134		10	0.5	79	150	2.5	70	1.5	<500	<30	350	5	<0.5	<0.5
12N-2, 0-67		8	<0.2	140	210	31	70	1.5	<500	<30	690	7	0.4	<0.5
12N-2, 67-140		8	<0.2	60	200	68	<50	3	<500	<30	320	4	<0.5	<0.5
12N-3, 0-100		16	0.4	71	170	25	<50	1	<500	<30	410	<1	2.5	<0.5
13N-1, 0-58		18	0.9	150	220	30	70	1.5	<500	90	370	7	<0.5	<0.5
13N-2, 0-62		8	0.3	110	260	38	<50	1	<500	<30	230	<1	<0.5	<0.5
14N-1, 40-74		4	<0.2	67	240	48	<50	1	<500	<30	660	5	<0.5	<0.5
14N-2, 0-63		5	<0.2	46	160	45	<50	1	<500	<30	180	<1	<0.5	<0.5
15N-2, 0-34		<2	<0.2	<5	160	29	90	1	<500	<30	180	<1	2.7	<0.5
15N-2, 34-150		3	<0.2	31	140	30	60	1	450	<30	570	5	<0.5	<0.5
16N-1, 66-141		14	<0.2	49	250	35	70	3	650	<30	440	7	<0.5	<0.5
158-957E-														
1R-1, 0-20		10	<0.2	200	230	<5	80	1.5	700	<30	1580	10	<0.5	<0.5
3R-1, 0-21		18	0.9	90	150	28	80	1.5	700	<30	680	11	9.3	<0.5
6R-1, 0-40		64	0.4	96	160	<5	80	1.5	<500	<30	1150	9	12	<0.5
9R-1, 0-27		46	1.1	120	190	<5	60	1	<500	<30	780	8	<0.5	<0.5
158-957F-														
1N-1, 0-30		8	1.1	210	180	1000	40	<1	500	<30	1110	7	<0.5	1.6
1N-1, 31-74		19	0.5	120	320	900	110	1.5	1200	<30	670	17	0.6	<0.5
Pyrite:														
158-957B-														
1R-2, 0-10		17	<0.2	92	240	<5	80	2	<500	<30	260	<1	<0.5	<0.5
158-957C-														
4W-1, 3-8		51	1.8	120	400	28	70	2	<500	<30	570	4	10	<0.5
5N-1, 0-25		57	0.4	67	280	22	50	1	<500	<30	460	<1	11	<0.5
7N-1, 0-69		13	<0.2	70	94	53	80	2	<500	<30	790	11	0.5	<0.5
7N-1, 0-69		40	0.8	93	420	21	60	1.5	<500	<30	490	4	5.7	<0.5
7N-1, 73-133		54	1.0	190	170	<5	50	1	<500	<30	650	5	11	<0.5
7N-2, 0-75		44	0.8	82	300	17	50	1	<500	<30	540	4	13	<0.5
7N-2, 75-100		38	0.7	140	210	17	60	1.5	<500	<30	330	<1	9.2	<0.5
7N-3, 30-66		42	0.9	85	400	20	<50	1	<500	<30	290	4	7.9	<0.5
8W-1, 0-5		36	<0.2	110	310	25	<50	1	<500	50	430	<1	5.7	<0.5
9X-1, 4-10		36	<0.2	110	240	20	60	2	<500	<30	470	<1	0.5	<0.5
10N-1, 17-27		36	0.4	71	520	31	<50	1	<500	<30	280	<1	5.6	<0.5
11N-1, 0-30		29	<0.2	68	450	36	90	2	<500	<30	470	<1	0.5	<0.5
11N-1, 30-97		29	0.5	150	210	18	<50	1	<500	<30	420	3	15	<0.5
11N-2, 0-30		34	0.8	110	150	<5	50	1.5	<500	<30	350	4	2.7	<0.5
11N-2, 30-60		42	0.7	98	310	25	50	1	<500	<30	300	3	4.5	<0.5
11N-2, 60-75		30	0.7	150	300	22	<50	1	<500	<30	260	4	1.9	<0.5
11N-3, 0-57		44	<0.2	150	330	23	50	2	<500	<30	400	5	4.5	<0.5
12N-1, 0-68		24	0.4	140	410	36	50	1	<500	<30	460	4	4.0	<0.5
12N-2, 0-67		33	0.6	120	450	37	50	1	<500	<30	760	7	4.3	<0.5
12N-2, 67-140		43	0.6	95	260	17	330	2	<500	<30	180	<1	<0.5	<0.5
12N-3, 0-100		40	0.6	76	250	26	<50	2	<500	<30	470	5	3.2	<0.5
13N-1, 0-58		34	1.1	200	160	10	<50	1	<500	<30	220	<1	2.9	<0.5
13N-1, 58-140		52	1.0	120	210	11	<50	<1	<500	<30	230	2	2.8	<0.5
13N-2, 0-62		41	0.7	84	210	<5	<50	1	<500	<30	150	<1	3.5	<0.5
14N-1, 40-74		34	0.6	83	160	13	<50	1	<500	<30	390	3	3.9	<0.5
14N-2, 0-63		47	1.0	80	180	<5	440	1.5	<500	<30	290	<1	3.6	<0.5
15N-1, 0-55		59	0.9	130	230	16	400	<1	<500	50	290	<1	4.6	<0.5
15N-1, 55-120		52	0.9	120	200	<5	510	1	<500	<30	280	<1	6.2	<0.5
15N-2, 0-34		16	0.7	56	770	52	80	1	<500	<30	280	<1	<0.5	<0.5
15N-2, 34-150		53	1.0	97	270	10	<50	<1	<500	<30	600	4	4.9	<0.5
15N-3, 0-120		35	0.6	80	310	22	50	1	<500	50	880	5	3.2	<0.5
15N-3, 120-150		38	0.6	93	240	20	50	1	<500	<30	510	5	3.1	<0.5
15N-4, 0-51		19	<0.2	58	800	51	60	1	<500	<30	490	4	11	<0.5
16N-1, 4-59		36	<0.2	35	830	85	90	1.5	<500	<30	290	7	<0.5	<0.5
16N-1, 66-141		58	1.7	100	190	15	60	1	<500	<30	200	4	7.6	<0.5
16N-2, 0-88		43	<0.2	41	1200	59	70	1	<500	<30	350	5	<0.5	<0.5
158-957E-														
1R-1, 0-20		53	1.0	75	260	23	50	3	<500	<30	410	5	7.3	<0.5
2R-1, 0-42		38	0.7	120	660	77	80	1	<500	<30	780	8	<0.5	<0.5
4R-1, 0-23		63	1.2	110	470	26	70	1	<500	<30	310	6	13	0.9
5R-1, 0-44		37	0.8	61	770	46	100	1.5	<500	<30	420	<1	0.25	<0.5
5R-1, 0-44		46	0.8	95	450	26	70	1	<500	<30	450	7	8.8	<0.5
7R-1, 0-33		26	0.7	42	900	65	80	1	1200	<30	810	7	<0.5	<0.5
10R-1, 0-16		21	<0.2	61	67	<5	80	1.5	<500	<30	470	7	<0.5	<0.5
11R-1, 0-54		41	0.7	120	410	28	60	1	<500	<30	210	3	<0.5	<0.5
12R-1, 0-46		45	0.7	130	300	25	60	2	<500	<30	680	<1	5.9	<0.5
14R-1, 0-54		66	0.8	130	540	53	60	1	<500	<30	550	5	<0.5	<0.5
15R-1, 0-50		29	0.7	120	710	130	60	1	<500	<30	490	5	<0.5	<0.5

Table 6 (continued).

Core, section, interval (cm)	Piece	Depth (mbsf)	Area	Lithology	Grain Size	Description	Element: Fe Method: INAA Detection limit: 0.02%	Zn INAA 50 ppm	Au INAA 5 ppb	Ag INAA 5 ppm
15R-1, 0-50	1-9	106.75	TAG-1	Chloritized basalt breccia	Medium	Clasts or fragments	50.2	210	238	<5
16R-1, 0-20	1-3	111.15	TAG-1	Silicified wallrock breccia	Medium	Quartz-pyrite veins	41.3	460	82	<5
17R-1, 0-47	1-7	116.20	TAG-1	Silicified wallrock breccia	Medium	Quartz-pyrite veins	45.7	250	95	<5
18R-1, 0-20	1-3	120.80	TAG-1	Chloritized basalt breccia	Medium	Quartz-pyrite veins	48.8	600	202	<5
158-957F-										
1N-1, 31-74	8-10	1.35	TAG-1	Massive pyrite breccia	Medium	Fragment of sandy pyrite	48.6	400	460	<5
2N-1, 0-42	1-7	5.70	TAG-1	Massive pyrite breccia	Medium	Massive pyrite	45.8	1100	427	<5
158-957G-										
1N-1, 0-40	1-7	12.20	TAG-1	Massive granular pyrite	Fine	Massive, colloform pyrite	49.1	4500	491	<5
2N-1, 0-12	1-2	16.50	TAG-1	Massive granular pyrite	Medium	Massive, fragmental pyrite	47.3	940	530	<5
3N-1, 0-30	1	21.00	TAG-1	Pyrite-anhydrite breccia	Coarse	Clast or fragment	49.4	280	352	<5
3N-1, 30-77	2-6	21.30	TAG-1	Pyrite-anhydrite breccia	Fine	Clast or fragment	50.7	450	206	<5

Table 6 (continued).

Core, section, interval (cm)	Element: / Method: / Detection limit:	As INAA 2 ppm	Sb INAA 0.2 ppm	Mo INAA 5 ppm	Co INAA 5 ppm	Se INAA 5 ppm	Ni INAA 5 ppm	Ca INAA 50 ppm	Sr INAA 1%	Rb INAA 500 ppm	Na INAA 30 ppm	Br INAA 500 ppm	U INAA 1 ppm	Zn INAA 0.5 ppm
15R-1, 0-50		29	0.7	120	710	130	60	1	<500	<30	490	5	<0.5	<0.5
16R-1, 0-20		46	0.8	78	520	42	<50	<1	<500	<30	380	2	3.3	<0.5
17R-1, 0-47		22	<0.2	35	820	110	70	<1	<500	<30	1500	2	<0.5	<0.5
18R-1, 0-20		52	1.2	160	470	76	70	3	<500	<30	570	6	4.0	<0.5
158-957F-														
1N-1, 31-74		81	2.7	130	300	<5	60	1	<500	80	440	5	30	<0.5
2N-1, 0-42		62	2.5	110	370	<5	60	1	<500	<30	340	5	13	<0.5
158-957G-														
1N-1, 0-40		48	2.9	110	34	<5	70	1	<500	<30	380	7	<0.5	0.9
2N-1, 0-12		78	2.1	170	110	<5	50	1	<500	<30	710	6	21	<0.5
3N-1, 0-30		72	1.7	110	180	<5	50	2	<500	<30	430	<1	16	<0.5
3N-1, 30-77		64	1.3	80	470	15	60	1	<500	<30	460	4	4.7	<0.5