UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analyses for fluorine, mercury, silver, thorium, tungsten, and uranium in rocks from the Blue Joint Wilderness study area, Ravalli County, Montana, and the Blue Joint Roadless Area, Lemhi County, Idaho

By

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STUDIES RELATED TO WILDERNESS

The Wilderness Act (Public Law 88-577, September 3, 1964) and related acts require the U.S. Geological Survey and the U.S. Bureau of Mines to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Blue Joint Wilderness study area in the Bitterroot National Forest, Ravalli County, Montana, and the Blue Joint Roadless Area in the Salmon National Forest, Lemhi County, Idaho. The Blue Joint Roadless Area, Lemhi County, Idaho, was included in the River of No Return Wilderness by Public Law 96-312, July 23, 1980. The Blue Joint Wilderness study area, Ravalli County, Montana, was classified as a further planning area during the Second Roadless Area Review and Evaluation (RARE II) by the U.S. Forest Service, January 1979.

INTRODUCTION

In connection with the mineral evaluation of the Blue Joint Wilderness study area, Ravalli County, Montana, and the Blue Joint Roadless Area, Lemhi County, Idaho, 738 rock samples were collected for various types of chemical analysis. Listed in this report are 291 samples that were analyzed specifically for one or more of the following elements: fluorine, zinc, tungsten, mercury, silver, uranium, and thorium. Thirty-one element semiquantitative emission spectrographic data for these samples are reported by Mosier and others (1981). All the analyses were performed in Golden and Lakewood, Colorado, by the U.S. Geological Survey. The analytical data were entered into a computer storage system (RASS II) by Bert Coxe and Warren Rehn, and retrievals were completed by Bert Coxe using U.S. Geological Survey GRASP and STATPAC programs.

Geochemical samples were collected in the summer of 1979 by a U.S. Geological Survey field party consisting of W. Rehn, K. Lund, C. Holloway, M. Pawlowski, F. Mutschler, S. Azadian, P. Billings, H. Brandenburger, R. Bruce, B. Bye, G. Cotton, B. Coxe, W. R. Greenwood, T. Hanley, M. E. Koesterer, P. Miller, G. Shacter, G. Sims, and J. Scott.

LOCATION

The study area is located approximately 75 mi south of Missoula, Montana, adjacent to the Idaho-Montana border in the southern portion of the Bitterroot Mountains. Figure 1 shows the general location.

SAMPLE PREPARATION AND ANALYTICAL PROCEDURES

Samples were processed both in a mobile lab in the field and at U.S. Geological Survey labs in Golden, Colorado. Preparation consisted of crushing the rock samples in a jaw crusher, then pulverizing the samples to minus 100 mesh (0.149 mm) in a vertical grinder with ceramic plates.

Samples were analyzed for fluorine, zinc, silver, tungsten, and mercury by Belinda Arbogast, J. Lucas, and S. Royse. Analyses for fluorine were done by the ion specific method described by Hopkins (1977); zinc and silver by atomic absorption (Viets, 1978); tungsten by a colorimetric method modified from Quin and Brooks (1972); and mercury was analyzed instrumentally using a mercury vapor detector (Ward and others, 1969).

Samples were analyzed for uranium and thorium by H. T. Millard, Jr., M. Coughlin, B. Vaughn, M. Schneider, and W. Stang using delayed neutron activation (Millard, 1976). A discussion of the precision and accuracy of the U.S. Geological Survey delayed neutron activation method can be found in Stuckless and others (1977, p. 83-91).

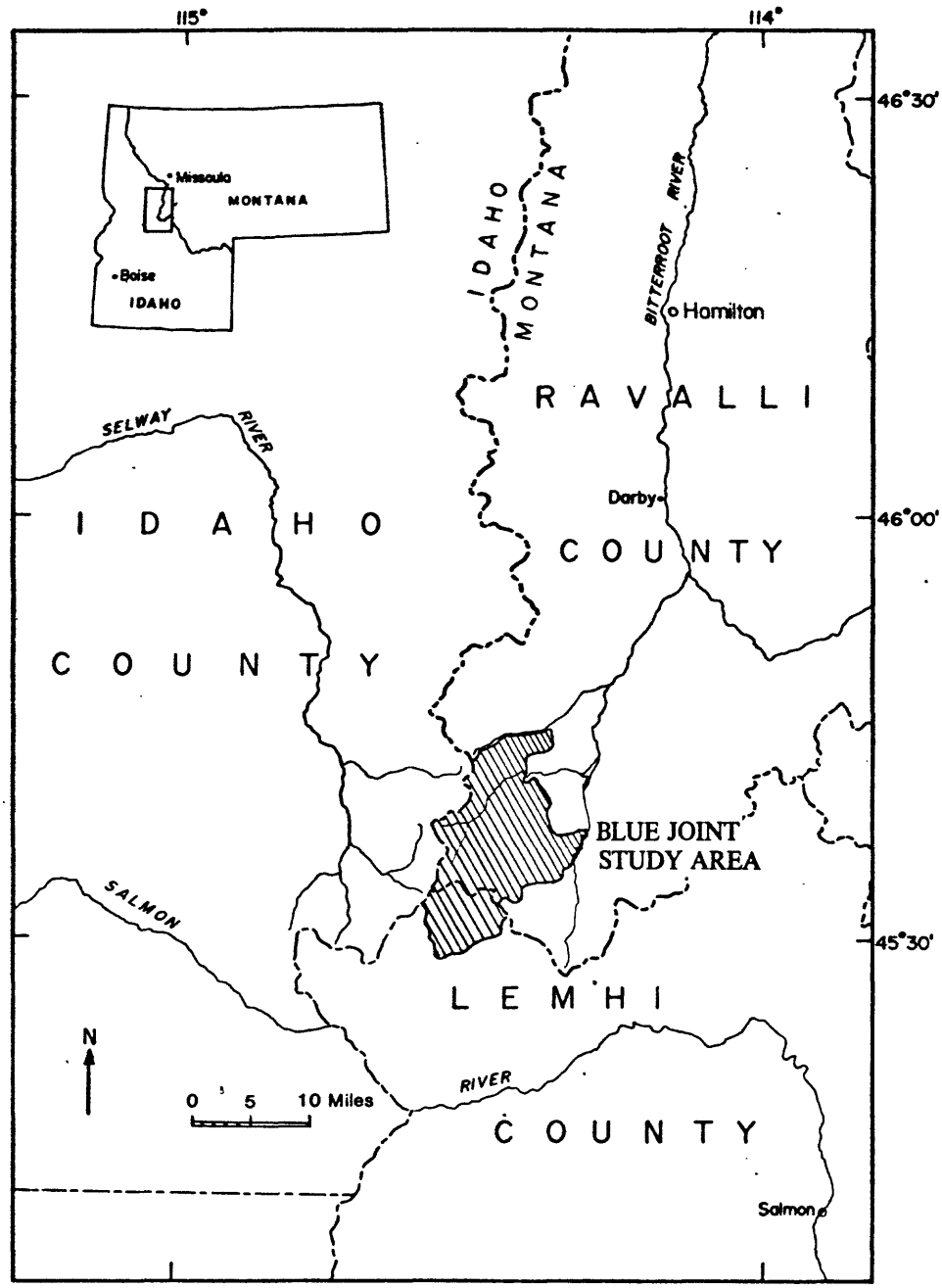

Figure 1.--Index map showing location of study area.

EXPLANATION OF DATA TABLES

Table 1 summarizes the analytical data for all elements analyzed. All values are shown in parts per million. Qualifying codes n and l are used for values less than the lower quantifiable limit of detection; n indicates the element was not detected and l indicates the element was detected but the concentration was too low to quantify. The lower detection limit is given where the qualifying codes n and l are reported.

The first digit (9) of each sample number has been left off the sample location map. Rock types are field designations.

STATISTICS

Histograms and frequency distributions were computer generated for uranium, thorium, fluorine, and zinc and are shown on figures 2, 3, 4, and 5, respectively. The mean, standard deviation, and number of observations--qualified and unqualified--for all of the elements are shown in table 2.

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Ward, F. N., Nakagawa, H. M., Haits, T. F., and Van Sickle, G. H., 1969, Atomic absorption methods of analysis useful in geochemical exploration: U.S. Geological Survey Bulletin 1289, 45 p.

Table 1.--Analyses of rock samples for fluorine, mercury, silver, thorium, tungsten, uranium, and zinc from the Blue Joint Wilderness study area, Montana, and Blue Joint Roadless area, Idaho

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9BB018A	GRANITE	45.698	-114.433	29.0	5.38	100.	1.	75.	0.02l	
9BB031A	PORPHYRITIC RHYOLITE	45.690	-114.491	21.1	6.55	400.	1.	35.	0.02	
9BB047A	PORPHYRITIC GRANITE	45.671	-114.419	26.5	6.25	200.	1.	35.	0.02l	
9BB048A	PORPHYRITIC GRANITE	45.680	-114.408	23.0	5.07	200.	1.	25.	0.02l	
9BB050A	PORPHYRITIC RHYOLITE	45.689	-114.419	36.8	7.20	300.	1.	40.	0.02l	
9BB051A	PORPHYRITIC GRANITE	45.680	-114.431	29.1	5.49	100.	1.	25.	0.02n	
9BB052A1	GRANITE	45.688	-114.441	21.3	4.29	200.	1.	30.	0.02	
9BB052A2	GRANITE	45.688	-114.441	21.8	5.19	200.	1.	110.	0.02	
9BB052A2	GRANITE	45.688	-114.441	22.0	5.17	200.	1.	110.	0.02l	
9BB053A1	PORPHYRITIC GRANITE	45.688	-114.440	31.3	6.40	200.	1.	50.	0.02l	
9BB059A	PORPHYRITIC GRANITE	45.618	-114.464	24.1	4.91	400.	2.n	35.	0.02n	
9BB060A	PORPHYRITIC GRANITE	45.609	-114.478	18.8	4.79	300.	2.n	30.	0.02n	
9BB062A	PORPHYRITIC GRANITE	45.601	-114.493	23.0	5.10	200.	1.	45.	0.02n	
9BB064A	PORPHYRITIC GRANITE	45.590	-114.503	21.4	4.35	200.	2.n	20.	0.02n	
9BB065A	GRANITE	45.574	-114.454	24.8	6.77	400.	2.n	15.	0.02n	
9BB067A	GRANITE	45.581	-114.446	26.4	7.97	200.	2.l	15.	0.02n	
9BC001A	GRANITE	45.737	-114.433	23.8	3.88	100.l	1.	65.	0.02n	
9BC008A	GRANITE	45.757	-114.421	26.7	3.39	500.	2.l	70.	0.02n	
9CH002A	GRANITE	45.708	-114.619	42.5	3.07	100.l	2.l	35.	0.02n	
9CH003A	GRANITE	45.708	-114.592	30.7	5.48	100.	2.l	60.	0.02n	
9CH003B	GRANITE	45.708	-114.592	23.1	3.74	100.l	2.n	45.	0.02n	
9CH006A	GRANITE	45.743	-114.442	23.1	4.31	800.	1.	55.	0.02n	
9CH006B	PORPHYRITIC GRANITE	45.743	-114.442	19.8	4.14	800.	1.	70.	0.02n	
9CH029A	PORPHYRITIC GRANITE	45.754	-114.521	39.5	8.34	300.	2.l	20.	0.02n	
9CH032A	PORPHYRITIC GRANITE	45.757	-114.497	39.0	5.81	100.l	2.l	25.	0.02n	
9CH033A	GRANITE	45.758	-114.483	27.3	3.31	100.l	2.n	75.	0.02n	
9CH034A	SYENITE	45.756	-114.467	12.0	1.71	400.	2.n	95.	0.02n	
9CH035B	PORPHYRITIC RHYOLITE	45.727	-114.422	25.9	5.60	100.	2.	60.	0.02n	
9CH035B	PORPHYRITIC RHYOLITE	45.727	-114.422			300.	1.	50.	0.02n	
9CH035C	GRANITE	45.727	-114.422	19.1	3.63	600.	2.l	60.	0.02n	
9CH035D	RHYOLITE	45.727	-114.422	10.4	3.10	100.	2.	40.	0.02n	
9CH037A1	PORPHYRITIC RHYOLITE	45.652	-114.542	27.5	5.19	200.	2.	45.	0.02n	
9CH037A2	PORPHYRITIC RHYOLITE	45.652	-114.542	23.9	5.00	100.	1.	35.	0.02l	
9CH037A2	PORPHYRITIC RHYOLITE	45.652	-114.542	24.6	4.77	200.	1.			
9CH037B	PORPHYRITIC RHYOLITE	45.652	-114.542	3.1	0.78	100.l	2.l	10.	0.02n	
9CH037C	GRANITE	45.652	-114.542	23.5	5.01	100.l	5.	35.	0.02n	
9CH038A	PORPHYRITIC GRANITE	45.656	-114.550	28.8	5.60	100.n	2.l	25.	0.02n	
9CH051A	PORPHYRITIC RHYOLITE	45.711	-114.472	29.0	4.60	900.	1.	20.	0.02n	
9CH052A	HOT SPRINGS DEPOSIT	45.708	-114.471	24.9	7.07	100.	2.n	15.	0.02n	
9CH057A	PORPHYRITIC GRANITE	45.661	-114.506	12.2	3.23	100.	3.	15.	0.02n	
9CH058A	PORPHYRITIC RHYOLITE	45.663	-114.504	22.3	4.03	100.l	2.l	10.	0.02n	
9CH059A	PORPHYRITIC RHYOLITE	45.666	-114.501	13.6	2.99	100.l	5.	10.	0.02n	
9CH060A	HOT SPRINGS DEPOSIT	45.670	-114.500	16.4	5.62	400.	3.	10.	0.02n	

TABLE 1 - ANALYSES OF ROCK SAMPLES --Continued

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9CH061A	RHYOLITE	45.671	-114.501	26.6	5.18	100.l	2.	10.	0.02n	
9CH062A	PORPHYRITIC RHYOLITE	45.674	-114.501	28.5	5.63	100.l	2.	30.	0.02n	
9CH063A	RHYOLITE	45.678	-114.501	33.6	6.69	100.l	2.l	35.	0.02n	
9CH067A	RHYOLITE	45.693	-114.493	14.8	5.45	300.	1.	25.	0.02n	
9CH068A	TUFF	45.696	-114.485	19.9	5.31	200.	1.	5.l	0.02l	
9CH068B	RHYOLITE	45.696	-114.485	25.4	4.51	100.l	2.	35.	0.02n	
9CH071A	PORPHYRITIC RHYOLITE	45.690	-114.482	21.8	4.91	100.	3.	15.	0.02n	
9CH073A	HOT SPRINGS DEPOSIT	45.690	-114.479	28.6	6.45	100.l	2.l	15.	0.02n	
9CH075A	TUFF	45.688	-114.466	23.4	8.13	200.	10.	50.	0.14	
9CH075D	VEIN	45.688	-114.466	24.1	10.60	100.	2.	190.	0.12	
9CH077A	PORPHYRITIC RHYOLITE	45.679	-114.489	19.0	5.41	100.l	2.l	35.	0.02n	
9CH078A	PORPHYRITIC RHYOLITE	45.681	-114.485	16.8	3.49	100.l	2.	15.	0.02n	
9CH079A	TUFF	45.681	-114.483	16.7	4.08	200.	2.	35.	0.02n	
9CH082A	PORPHYRITIC RHYOLITE	45.696	-114.451	28.1	5.89	200.	1.	25.	0.02n	
9CH083A	PORPHYRITIC RHYOLITE	45.694	-114.448	28.8	5.99	100.l	2.l	35.	0.02l	
9CH084A	PORPHYRITIC RHYOLITE	45.693	-114.443	21.5	7.12	100.n	2.	10.	0.02n	
9CH085A	PORPHYRITIC GRANITE	45.695	-114.439	32.8	5.65	100.l	2.l	65.	0.02n	
9CH086A	PORPHYRITIC GRANITE	45.673	-114.494	26.1	5.35	200.	1.	35.	0.02n	
9CH087A	PORPHYRITIC RHYOLITE	45.674	-114.486	14.4	3.33	100.l	2.	35.	0.02n	
9CH089A	PORPHYRITIC RHYOLITE	45.673	-114.476	29.8	6.05	300.	1.	15.	0.02n	
9CH096A	PORPHYRITIC RHYOLITE	45.690	-114.468			200.	2.n	30.	0.02n	
9CH101A	TUFF	45.718	-114.466	31.2	7.51	300.	2.	50.	0.02n	
9CH103A	PORPHYRITIC RHYOLITE	45.707	-114.444	32.0	5.55	100.l	2.l	20.	0.02n	
9CH109A	RHYOLITE	45.722	-114.464	20.4	5.40	100.l	2.	25.	0.02	
9CH110A	GRANITE	45.728	-114.461	9.8	2.77	300.	2.n	50.	0.02n	
9CH116C	PORPHYRITIC RHYOLITE	45.724	-114.412	14.5	5.20			40.	0.02n	
9CH128A	PORPHYRITIC GRANITE	45.743	-114.391	24.6	4.44	200.	2.l	40.	0.02n	
9CH134A1	PORPHYRITIC RHYOLITE	45.694	-114.451	30.1	5.94	400.	1.	15.	0.02n	
9CH134A2	PORPHYRITIC RHYOLITE	45.694	-114.451	28.9	6.29	400.	1.	15.	0.02n	
9CH134A2	PORPHYRITIC RHYOLITE	45.694	-114.451	28.8	5.95	500.	1.	15.	0.02n	
9CH135A1	GRANITE	45.728	-114.461	21.8	3.26	300.	2.n	40.	0.02n	
9CH135A2	GRANITE	45.728	-114.461	9.0	2.55	200.	2.n	45.	0.02n	
9CH135A2	GRANITE	45.728	-114.461	10.3	2.31	300.	2.n	50.	0.02n	
9CH142A	PORPHYRITIC RHYOLITE	45.724	-114.441	20.6	7.98	200.	2.n	35.	0.02n	
9CH163A	PORPHYRITIC GRANITE	45.711	-114.495	17.6	5.11	200.	2.l	40.	0.02n	
9CH164A1	RHYOLITE	45.717	-114.483	12.6	4.01	100.	1.	10.	0.02n	
9CH165A1	RHYOLITE	45.717	-114.483	15.9	3.88	200.	1.	15.	0.02n	
9CH165A2	RHYOLITE	45.717	-114.483	12.8	4.75	100.	2.n	15.	0.02n	
9CH165A2	RHYOLITE	45.717	-114.483	14.7	4.61	100.	1.	15.	0.02n	
9CH167A	PORPHYRITIC GRANITE	45.726	-114.495	20.8	4.91	200.	2.l	45.	0.02n	
9CH168A	RHYOLITE	45.659	-114.504	19.5	5.51	100.l	5.	15.	0.02l	
9CH169A	VOLCANICLASTIC	45.659	-114.501	20.5	5.64	100.l	2.l	10.	0.02n	
9CH179A	PORPHYRITIC RHYOLITE	45.776	-114.413	20.5	4.56	100.	2.	30.	0.02n	
9CH180A1	PORPHYRITIC RHYOLITE	45.776	-114.413	20.5	4.65	100.	2.	35.	0.02n	
9CH180A2	PORPHYRITIC RHYOLITE	45.776	-114.413	19.4	4.67	100.	2.	30.	0.02n	
9CH180A2	PORPHYRITIC RHYOLITE	45.776	-114.413	19.9	4.74	100.l	2.	35.	0.02n	
9CH184A	PORPHYRITIC RHYOLITE	45.758	-114.417	23.0	4.65	200.	2.	200.	0.02n	
9CH189A	PORPHYRITIC RHYOLITE	45.761	-114.470	27.9	4.47	100.	2.l	25.	0.02n	
9CH192A	PORPHYRITIC RHYOLITE	45.757	-114.450	20.9	3.70	100.l	2.n	35.	0.02n	

TABLE 1 - ANALYSES OF ROCK SAMPLES--Continued

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9CH199A	PORPHYRITIC RHYOLITE	45.652	-114.542	22.3	4.84	200.	2.	30.	0.02l	
9CH208A	PORPHYRITIC GRANITE	45.786	-114.526	24.1	3.96	100.l	2.l	30.	0.02n	
9CH209A1	PORPHYRITIC GRANITE	45.786	-114.526	24.3	3.74	100.l	1.	40.	0.02n	
9CH209A2	PORPHYRITIC GRANITE	45.786	-114.526	22.9	3.82	100.l	2.l	35.	0.02n	
9CH209A2	PORPHYRITIC GRANITE	45.786	-114.526	24.3	3.73	100.l	2.l	35.	0.02n	
9CH217A	PORPHYRITIC GRANITE	45.746	-114.494	23.1	4.22	200.	2.n	40.	0.02n	
9CH230A	SYENITE	45.749	-114.546	6.5	2.44	100.l	2.n	25.	0.02n	
9CH231A	SYENITE	45.787	-114.555	16.5	1.14	100.l	2.n	30.	0.02n	
9CH233B	PORPHYRITIC SYENITE	45.787	-114.528	18.2	2.67	100.	2.l	45.	0.02n	
9CH245A	PORPHYRITIC SYENITE	45.787	-114.552	14.9	1.74	100.n	2.l	55.	0.02n	
9CH246A	PORPHYRITIC GRANITE	45.777	-114.562	27.4	2.63	100.	2.n	40.	0.02n	
9CH247A	PORPHYRITIC GRANITE	45.770	-114.545	69.1	8.85	100.l	2.n	50.	0.02n	
9CH248A	GRANITE	45.764	-114.554	28.3	3.18	100.l	2.n	55.	0.02n	
9CH250A	GRANITE	45.758	-114.543	25.4	3.86	300.	2.n	30.	0.02n	
9KL010A	GRANITE	45.509	-114.546	17.3	4.45	200.	1.	25.	0.02n	
9KL049A	PORPHYRITIC GRANITE	45.537	-114.584	23.7	4.28	700.	1.	45.	0.02n	
9KL049B	PORPHYRITIC GRANITE	45.537	-114.584			800.	30.	25.		1.00
9KL050A1	PORPHYRITIC GRANITE	45.537	-114.584	25.2	5.61	300.	1.	50.	0.02n	
9KL050A2	PORPHYRITIC GRANITE	45.537	-114.584	26.3	4.57	500.	1.	40.	0.02n	
9KL050A2	PORPHYRITIC GRANITE	45.537	-114.584	26.6	4.56	600.	1.	40.	0.02n	
9KL051A	GRANITE	45.529	-114.569	20.1	4.59	600.	1.	50.	0.02n	
9KL052A1	GRANITE	45.529	-114.569	27.3	6.92	900.	1.	45.	0.02n	
9KL052A2	GRANITE	45.529	-114.569	25.7	6.38	1000.	1.	40.	0.02n	
9KL052A2	GRANITE	45.529	-114.569	24.6	6.05	900.	1.	40.	0.02n	
9KL054A	QUARTZITE	45.718	-114.500	8.9	2.89	100.l	2.l	20.	0.02n	
9KL055A	PORPHYRITIC RHYOLITE	45.729	-114.496	26.9	3.97	300.	2.l	35.	0.02n	
9KL056A	PORPHYRITIC RHYOLITE	45.733	-114.483	27.4	4.50	700.	2.l	55.	0.02n	
9KL057A	PORPHYRITIC RHYOLITE	45.732	-114.482	24.4	3.57	100.l	2.l	65.	0.02n	
9KL058A	PORPHYRITIC RHYOLITE	45.735	-114.471	30.2	4.87	100.	2.l	25.	0.02n	
9KL059A	PORPHYRITIC RHYOLITE	45.745	-114.452	21.1	3.54	100.l	2.l	25.	0.02n	
9KL060A1	PORPHYRITIC RHYOLITE	45.746	-114.436	16.7	2.67	100.l	2.l	35.	0.02n	
9KL060A2	PORPHYRITIC RHYOLITE	45.746	-114.436	17.1	2.74	100.l	2.l	35.	0.02n	
9KL060A2	PORPHYRITIC RHYOLITE	45.746	-114.436	17.5	3.24	100.	2.l	45.	0.02n	
9KL061A1	PORPHYRITIC RHYOLITE	45.746	-114.436	19.7	3.28	100.l	2.l	85.	0.02n	
9KL062A	PORPHYRITIC RHYOLITE	45.752	-114.374	23.7	5.08	300.	2.l	35.	0.02n	
9KL063A	GRANITE	45.533	-114.433	20.4	2.96	100.l	2.	40.	0.02n	
9KL064A	DIORITE	45.542	-114.410	2.6	0.54	100.n	2.	40.	0.02n	
9KL065A	DIORITE	45.549	-114.394	9.6	1.19	100.l	5.	65.	0.02l	
9KL066A	GNEISS	45.558	-114.358	1.6	0.44	100.l	2.l	10.	0.02n	
9KL067A	SCHIST	45.564	-114.325	13.4	2.45	100.	2.	25.	0.02n	
9KL068A	QUARTZITE	45.588	-114.319	3.8	0.83	100.l	2.l	5.l	0.02n	
9KL069A	QUARTZITE	45.609	-114.303	7.4	1.22	100.l	2.	5.	0.02n	
9KL070A	QUARTZITE	45.636	-114.293	3.6	0.48	100.n	2.l	5.l	0.02n	
9KL071A	WELDED TUFF	45.666	-114.302	28.3	6.35	100.n	2.	5.	0.02n	
9KL072A	QUARTZITE	45.694	-114.294	3.2	0.41	100.n	2.n	5.l	0.02l	
9KL073A	PORPHYRITIC RHYOLITE	45.710	-114.281	20.6	4.60	100.l	2.	35.	0.02n	
9KL074A	GRANITE	45.736	-114.280	24.8	7.16	800.	2.l	100.	0.02n	
9KL100A	GRANITE	45.540	-114.557	32.2	8.69	500.	2.l	45.	0.02n	
9KL101A	GRANITE	45.526	-114.544	25.4	5.64	200.	2.n	30.	0.02n	

TABLE 1 - ANALYSES OF ROCK SAMPLES--Continued

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9KL103B	GRANITE	45.521	-114.557	25.1	4.33	600.	2.l	50.	0.02n	
9KL108A1	PORPHYRITIC GRANITE	45.508	-114.568	11.5	2.96	200.	2.n	30.	0.02n	
9KL109A1	PORPHYRITIC GRANITE	45.509	-114.568	16.9	2.68	300.	2.n	20.	0.02n	
9KL109A2	PORPHYRITIC GRANITE	45.509	-114.568	12.9	2.09	200.	2.n	25.	0.02n	
9KL109A2	PORPHYRITIC GRANITE	45.509	-114.568	13.4	2.16	300.	2.n	20.	0.02n	
9KL110A	PORPHYRITIC BASALT	45.505	-114.554	11.1	2.44	500.	2.l	85.	0.02n	
9KL111A	GRANITE	45.553	-114.532	17.1	4.05	100.	2.l	50.	0.02n	
9KL113A	PORPHYRITIC RHYOLITE	45.539	-114.530	24.5	3.96	100.l	2.l	45.	0.02n	
9KL116A1	GRANITE	45.516	-114.542	39.3	9.67	100.	2.n	10.	0.02n	
9KL116A2	GRANITE	45.516	-114.542	40.8	9.75	300.	2.n	5.	0.02n	
9KL116A2	GRANITE	45.516	-114.542	38.5	9.48	100.l	2.l	5.	0.02n	
9KL117A1	GRANITE	45.515	-114.541	34.8	13.60	100.l	2.l	5.l	0.02n	
9KL119A	PORPHYRITIC GRANITE	45.616	-114.527	20.2	4.55	100.	2.l	45.	0.02n	
9KL120A	PORPHYRITIC RHYOLITE	45.625	-114.514	23.5	5.64	400.	1.	40.	0.02n	
9KL131A	WELDED TUFF	45.653	-114.516	23.2	5.93	100.l	3.	30.	0.02n	
9KL132A	WELDED TUFF	45.661	-114.506	14.8	3.56	200.	7.	5.	0.02n	
9KL136A	GRANITE	45.500	-114.532	19.5	3.45	200.	2.n	25.	0.02n	
9KL137A	GRANITE	45.491	-114.539	13.1	2.18	200.	2.n	15.	0.02n	
9KL139A	PORPHYRITIC GRANITE	45.484	-114.553	13.0	1.97	200.	2.n	30.	0.02n	
9KL140A	PORPHYRITIC GRANITE	45.571	-114.505	34.0	9.99	100.	1.	20.	0.02n	
9KL141A	PORPHYRITIC GRANITE	45.562	-114.471	29.3	12.20	200.	2.l	15.	0.02n	
9KL142A	PORPHYRITIC GRANITE	45.548	-114.467	26.2	7.68	300.	1.	25.	0.02n	
9KL143A	GRANITE	45.537	-114.431	34.3	5.56	100.	1.	25.	0.02n	
9KL149A	GRANITE	45.671	-114.446	36.2	9.29	1100.	1.	40.	0.02n	
9KL153A	PORPHYRITIC RHYOLITE	45.689	-114.396	21.9	4.74	100.	2.l	50.	0.02n	
9KL164A	GRANITE	45.620	-114.487	57.3	6.92	200.	2.l	35.	0.02n	
9KL165A	PORPHYRITIC GRANITE	45.630	-114.486	27.1	6.56	300.	2.l	50.	0.02n	
9KL176A1	PORPHYRITIC RHYOLITE	45.602	-114.504	21.0	3.80	100.l	2.	55.	0.02n	
9KL177A1	PORPHYRITIC RHYOLITE	45.602	-114.504	21.9	3.51	100.l	2.l	65.	0.02n	
9KL177A2	PORPHYRITIC RHYOLITE	45.602	-114.504	22.2	3.80	100.	2.l	60.	0.02n	
9KL177A2	PORPHYRITIC RHYOLITE	45.602	-114.504	20.3	3.65	100.l	2.l	65.	0.02n	
9ME022A	GRANITE	45.670	-114.394	29.8	7.54	500.	1.	30.	0.04	
9ME023A	PORPHYRITIC GRANITE	45.680	-114.383	24.4	4.98	200.	1.	30.	0.02	
9MP028A	SYENITE	45.745	-114.759	12.8	2.09	100.l	2.l	50.	0.02n	
9MP028B	SYENITE	45.745	-114.759	32.6	3.50	200.		95.	0.02n	
9MP045A	GRANITE	45.724	-114.726	23.7	6.55	100.l	2.l	20.	0.02n	
9MP069A1	AMPHIBOLITE	45.631	-114.575	1.2n	0.33	100.l	2.l	15.	0.02n	
9MP069A2	AMPHIBOLITE	45.631	-114.575	1.6	0.33	100.l	2.l	15.	0.02n	
9MP069A2	AMPHIBOLITE	45.631	-114.575	1.2n	0.37	100.n	2.l	15.	0.02n	
9MP079A	QUARTZ DIORITE	45.599	-114.675	4.8	1.06	200.	2.l	40.	0.02n	
9MP120A	GRANITE	45.694	-114.560	25.1	7.73	100.	2.	40.	0.02l	
9MP123A	GRANITE	45.702	-114.628	41.8	3.42	100.l	2.l	30.	0.02n	
9MP138A	GRANITE	45.643	-114.658	23.5	7.19	800.	2.l	160.	0.02n	
9PB338A1	GRANITE	45.746	-114.456	31.4	4.93	100.	2.n	30.	0.02n	
9PB338A2	GRANITE	45.746	-114.456	30.0	4.50	100.	2.n	30.	0.02n	
9PB338A2	GRANITE	45.746	-114.456	29.3	4.60	200.	2.n	30.	0.02n	
9PB339A1	GRANITE	45.746	-114.456	28.5	3.94	100.	2.l	25.	0.02n	
9RB008A	DIORITE	45.726	-114.391	24.2	5.27	300.	1.	40.	0.02n	
9RB010A	GRANITE	45.736	-114.400	28.2	5.40	200.	1.	60.	0.02n	

TABLE 1 - ANALYSES OF ROCK SAMPLES--Continued

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9RB011A	GRANITE	45.741	-114.394	23.6	5.53	300.	1.	35.	0.02n	
9RB012A	PORPHYRITIC RHYOLITE	45.708	-114.470	28.8	5.12	300.	1.	25.	0.02n	
9RB014A	PORPHYRITIC RHYOLITE	45.697	-114.457	28.3	5.06	200.	3.	15.	0.10	
9WR013A	PORPHYRITIC GRANITE	45.544	-114.519	36.6	15.00	200.	1.	30.	0.02	
9WR057A	BRECCIA	45.658	-114.506	6.6	1.52	300.	10.	55.	0.02n	
9WR057B	BRECCIA	45.658	-114.506	9.1	2.18	200.	20.	75.	0.02n	
9WR057D	BRECCIA	45.658	-114.506	6.4	1.47	300.	10.	70.	0.02n	
9WR058A	BRECCIA	45.659	-114.506	5.4	1.98	100.l	5.	35.	0.02	
9WR060A	VOLCANICLASTIC	45.659	-114.505	18.2	5.95	100.l	2.			
9WR060B	VOLCANICLASTIC	45.659	-114.505	15.4	4.53	100.l	2.l	20.	0.02n	
9WR062A	PORPHYRITIC RHYOLITE	45.659	-114.501	19.7	5.16	100.l	5.	15.	0.02n	
9WR063A	WELDED TUFF	45.659	-114.501	23.5	6.30	100.l	2.l	10.	0.02l	
9WR063B	WELDED TUFF	45.659	-114.501	37.6	19.30	100.l	2.l	40.	0.10	
9WR064A	PORPHYRITIC RHYOLITE	45.658	-114.501	20.1	4.88	100.l	2.	5.	0.02n	
9WR065A	PORPHYRITIC RHYOLITE	45.656	-114.499	23.6	6.67	100.	2.l	10.	0.02n	
9WR066A	PORPHYRITIC RHYOLITE	45.657	-114.497	27.4	5.16	100.	2.l	25.	0.02l	
9WR070A	GRANITE	45.645	-114.434	30.6	6.42	300.	1.	30.	0.06	
9WR071A1	GRANITE	45.637	-114.448	35.6	6.25	200.	1.	30.	0.02l	
9WR071A2	GRANITE	45.637	-114.448	34.9	6.27	400.	1.	30.	0.02n	
9WR071A2	GRANITE	45.637	-114.448	33.7	6.63	300.	1.	25.	0.04	
9WR072A1	GRANITE	45.638	-114.449	31.5	7.59	500.	2.	45.	0.04	
9WR076A	PORPHYRITIC RHYOLITE	45.646	-114.460	30.4	5.99	100.	1.	25.	0.02n	
9WR079A	GRANITE	45.655	-114.472	26.0	4.92	300.	1.	25.	0.02	
9WR082A	GRANITE	45.627	-114.457	23.9	4.40	300.	1.	15.	0.02	
9WR083A	GRANITE	45.637	-114.474	19.2	4.94	500.	1.	40.	0.02	
9WR084A	GRANITE	45.644	-114.482	22.9	3.74	100.l	1.	65.	0.02n	
9WR089A	GRANITE	45.573	-114.556	25.0	5.58	600.	1.	45.	0.02n	
9WR090A1	GRANITE	45.574	-114.555	24.7	5.23	400.	1.	55.	0.02n	
9WR090A2	GRANITE	45.574	-114.555	24.2	5.84	600.	1.	55.	0.02n	
9WR090A2	GRANITE	45.574	-114.555	24.4	5.80	600.	1.	55.	0.02n	
9WR091A	PORPHYRITIC GRANITE	45.577	-114.551	25.8	5.00	300.	2.	65.	0.02n	
9WR092A	PORPHYRITIC GRANITE	45.582	-114.540	30.5	6.04	200.	1.	30.	0.02n	
9WR103A	GRANITE	45.626	-114.436	25.5	6.75	400.	1.	50.	0.02n	
9WR108A	GRANITE	45.628	-114.412	28.3	7.26	800.	1.			
9WR116A	GRANITE	45.635	-114.417	38.8	11.00	900.	2.	30.	0.02n	
9WR119A	GRANITE	45.644	-114.408	19.5	6.13	300.	1.	30.	0.02n	
9WR121A	PORPHYRITIC GRANITE	45.654	-114.395	27.6	5.34	200.	1.	35.	0.02n	
9WR123A	PORPHYRITIC GRANITE	45.661	-114.386	23.9	5.85	300.	1.	40.	0.02n	
9WR130B	PORPHYRITIC GRANITE	45.649	-114.396	30.2	7.29	100.l	2.l	100.	0.02n	
9WR131A	QUARTZITE	45.647	-114.384	4.10	1.94	100.l	2.l	180.	0.2n	
9WR134A	GRANITE	45.563	-114.443	27.5	6.76	200.	1.	20.	0.02n	
9WR135A	PORPHYRITIC GRANITE	45.555	-114.456	28.5	6.49	200.	2.n	20.	0.02n	
9WR142A	PORPHYRITIC GRANITE	45.612	-114.450	17.0	4.24	200.	2.n	25.	0.02n	
9WR144A	PORPHYRITIC GRANITE	45.599	-114.469	25.9	5.83	200.	2.n	25.	0.02n	
9WR145A	PORPHYRITIC GRANITE	45.592	-114.481	22.4	5.01	200.	1.	40.	0.02n	
9WR146A	PORPHYRITIC RHYOLITE	45.584	-114.493	27.0	6.38	100.l	2.	30.	0.02n	
9WR147A	GRANITE	45.640	-114.422	21.3	4.49	500.	2.	40.	0.02l	
9WR148A	GRANITE	45.546	-114.549	22.1	11.20	300.	2.	50.	0.02n	
9WR150A1	GRANITE	45.640	-114.423	27.3	5.52	800.	2.l	35.	0.02n	

TABLE 1 - ANALYSES OF ROCK SAMPLES--Continued

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9WR150A2	GRANITE	45.640	-114.423	27.3	5.61	700.	2.l	45.	0.02n	
9WR150A2	GRANITE	45.640	-114.423	24.9	5.37	600.	2.l	30.	0.02n	
9WR151A	GRANITE	45.639	-114.421	31.8	6.01	600.	2.l	30.	0.02n	
9WR152A	PORPHYRITIC RHYOLITE	45.659	-114.503	19.3	5.86	100.l	2.l	55.	0.02l	
9WR153A	GRANITE	45.563	-114.569	19.4	3.41	300.	2.l	40.	0.02n	
9WR154A	GNEISS	45.544	-114.407	1.1n	0.14	100.n	2.l	10.	0.02n	
9WR155A	GNEISS	45.544	-114.414	2.2	0.47	100.l	2.l	20.	0.02n	
9WR155B	GNEISS	45.544	-114.414	1.3n	0.52	100.l	2.l	20.	0.02n	
9WR156A	PORPHYRITIC GRANITE	45.543	-114.443	22.9	6.24	500.	2.l	20.	0.02n	
9WR157A	PORPHYRITIC GRANITE	45.566	-114.494	25.0	6.11	300.	2.n	25.	0.02n	
9WR158A1	PORPHYRITIC GRANITE	45.575	-114.482	25.1	5.99	200.	2.n	25.	0.02n	
9WR158A2	PORPHYRITIC GRANITE	45.575	-114.482	23.4	5.73	200.	2.n	25.	0.02n	
9WR158A2	GRANITE	45.575	-114.482	24.1	5.62	200.	2.l	35.	0.02n	
9WR159A	PORPHYRITIC GRANITE	45.576	-114.481	22.1	5.72	100.	2.l	25.	0.02n	
9WR160A	PORPHYRITIC GRANITE	45.582	-114.468	35.2	6.54	300.	2.l	45.	0.02n	
9WR161A1	PORPHYRITIC GRANITE	45.583	-114.467	38.7	6.49	500.	2.n	45.	0.02n	
9WR161A2	PORPHYRITIC GRANITE	45.583	-114.467	39.3	7.40	300.	1.	40.	0.02n	
9WR161A2	PORPHYRITIC GRANITE	45.583	-114.467	36.1	8.17	500.	2.l	35.	0.02n	
9WR162A	PORPHYRITIC DACITE	45.597	-114.451	26.8	4.25	200.	2.l	40.	0.02n	
9WR164A	PORPHYRITIC GRANITE	45.602	-114.442	23.0	4.19	100.l	1.	220.	0.02n	
9WR172A	DIORITE	45.578	-114.397	7.9	1.93	200.	2.n	60.	0.02n	
9WR175A	PORPHYRITIC GRANITE	45.557	-114.478	23.3	6.28	100.	2.n	40.	0.02n	
9WR177A	GRANITE	45.546	-114.496	23.7	6.16	200.	2.n	25.	0.02n	
9WR179A	GRANITE	45.536	-114.505	24.1	6.43	200.	2.l	30.	0.02n	
9WR180A	GRANITE	45.527	-114.523	45.2	17.40	100.l	2.l	5.	0.02n	
9WR183A	PORPHYRITIC GRANITE	45.537	-114.489	36.3	7.53	200.	2.l	30.	0.02n	
9WR184A	PORPHYRITIC GRANITE	45.529	-114.496	25.7	6.14	500.	1.	30.	0.02n	
9WR185A	PORPHYRITIC GRANITE	45.519	-114.508	21.9	3.61	100.	1.	35.	0.02n	
9WR186A	PORPHYRITIC RHYOLITE	45.509	-114.518	30.9	4.65	200.	2.l	25.	0.02n	
9WR187A	GRANITE	45.537	-114.454	26.6	5.95	100.	2.l	45.	0.02n	
9WR188A	GRANITE	45.530	-114.471	57.5	9.13	200.	2.l	30.	0.02n	
9WR189A	GRANITE	45.521	-114.485	26.7	8.22	200.		35.	0.02n	
9WR190A	PORPHYRITIC RHYOLITE	45.511	-114.499	37.2	6.07	100.	2.l	30.	0.02n	
9WR192A	PORPHYRITIC RHYOLITE	45.501	-114.508	36.0	5.65	200.	2.n	25.	0.02n	
9WR193A	PORPHYRITIC RHYOLITE	45.490	-114.513	29.9	4.48	200.	2.n	35.	0.02n	
9WR195A	PORPHYRITIC GRANITE	45.528	-114.449	26.2	5.85	200.	2.n	25.	0.02n	
9WR196A	PORPHYRITIC GRANITE	45.521	-114.461	35.2	4.57	300.	2.n	30.	0.02n	
9WR198A1	GRANITE	45.511	-114.471	45.9	12.20	100.l	1.	10.	0.02n	
9WR198A2	GRANITE	45.511	-114.471	39.2	14.10	100.l	2.	10.	0.02n	
9WR198A2	GRANITE	45.511	-114.471	42.2	13.40	100.l	1.	40.	0.02n	
9WR199A	GRANITE	45.511	-114.471	41.0	10.90	100.	2.n	5.	0.02n	
9WR200A	PORPHYRITIC GRANITE	45.501	-114.485	17.9	3.00	100.	2.l	20.	0.02n	
9WR222A	PORPHYRITIC RHYOLITE	45.655	-114.503			100.l	2.	5.l		0.05l
9WR224A	PORPHYRITIC GRANITE	45.638	-114.488	25.7	3.91	200.	2.	55.	0.02n	
9WR224C	PORPHYRITIC GRANITE	45.638	-114.488			100.l	1.n	30.		0.05l
9WR244B	GRANITE	45.518	-114.537			100.l	1.n	20.		0.05n
9WR244C	GRANITE	45.518	-114.537			100.l	1.n	30.		0.05n
9WR247B1	GRANITE	45.520	-114.537			800.	1.n	15.		0.05n
9WR248A	GRANITE	45.520	-114.537			1300.	1.n	25.		0.40

TABLE 1 - ANALYSES OF ROCK SAMPLES--Continued

Sample	Rock Type	Lat	Long	Th	U	F	W	Zn	Hg	Ag
9WR250A	GRANITE	45.527	-114.534			500.	1.n	30.		0.05n
9WR251A	GRANITE	45.528	-114.531			100.l	1.n	20.		0.05n
9WR252A	GRANITE	45.529	-114.531			300.	1.n	25.		0.05n
9WR253A	GRANITE	45.527	-114.533			100.l	1.n	5.l		0.05n
9WR266A	PORPHYRITIC DACITE	45.631	-114.407			200.	1.n	15.		0.05n
9WR267A	GRANITE	45.630	-114.407			100.l	1.	10.		0.05n
9WR304A	GRANITE	45.738	-114.405			300.	3.	15.		0.35
9WR305A	GRANITE	45.739	-114.405			100.	3.	20.		0.35

Table 2.--Analytical range, mean, standard deviation, and qualified values for each element

[Values are in parts per million]

Element	Valid observations	Range		Mean	Standard deviation	Qualified values	
		Minimum	Maximum			n	l
Uranium	279	0.14	19.3	5.2	2.6	0	0
Thorium	275	1.6	69.1	24	9.3	4	0
Fluorine	202	100	1300	300	200	9	83
Tungsten	135	1	30	2.2	3.3	62	95
Zinc	288	5	220	37	28	0	7
Mercury	18	.02	.14	--	--	241	21
Silver	4	.35	1	--	--	9	2

Limit - Upper (ppm)	Obs Frq	Cum Frq	Per Frq %	Cum Frq %	Class Midpoint	Distribution
N	0	0	0.0	0.0		
L	0	0	0.0	0.0		
1.400E-01- 2.140E+00	26	26	9.3	9.3	1.140E+00	XX
2.140E+00- 4.140E+00	61	87	21.9	31.2	3.140E+00	XXXXX
4.140E+00- 6.140E+00	122	209	43.7	74.9	5.140E+00	XXXXXXXXXXX
6.140E+00- 8.140E+00	47	256	16.8	91.8	7.140E+00	XXXX
8.140E+00- 1.014E+01	11	267	3.9	95.7	9.140E+00	X
1.014E+01- 1.214E+01	4	271	1.4	97.1	1.114E+01	
1.214E+01- 1.414E+01	5	276	1.8	98.9	1.314E+01	
1.414E+01- 1.614E+01	1	277	0.4	99.3	1.514E+01	
1.614E+01- 1.814E+01	1	278	0.4	99.6	1.714E+01	
1.814E+01- 2.014E+01	1	279	0.4	100.0	1.914E+01	
G	0	279	0.0	100.0		
B	31	310				

Figure 2.--Histogram and frequency distributions for uranium.

Limit - Upper (ppm)	Obs Frq	Cum Frq	Per Frq %	Cum Frq %	Class Midpoint	Distribution
N	4	4	1.4	1.4		
L	0	4	0.0	1.4		
1.500E+00- 6.500E+00	12	16	4.3	5.7	4.000E+00	X
6.500E+00- 1.150E+01	12	28	4.3	10.0	9.000E+00	X
1.150E+01- 1.650E+01	21	49	7.5	17.6	1.400E+01	XX
1.650E+01- 2.150E+01	48	97	17.2	34.8	1.900E+01	XXXX
2.150E+01- 2.650E+01	85	182	30.5	65.2	2.400E+01	XXXXXXXX
2.650E+01- 3.150E+01	56	238	20.1	85.3	2.900E+01	XXXXX
3.150E+01- 3.650E+01	19	257	6.8	92.1	3.400E+01	XX
3.650E+01- 4.150E+01	14	271	5.0	97.1	3.900E+01	X
4.150E+01- 4.650E+01	5	276	1.8	98.9	4.400E+01	
4.650E+01- 5.150E+01	0	276	0.0	98.9	4.900E+01	
5.150E+01- 5.650E+01	0	276	0.0	98.9	5.400E+01	
5.650E+01- 6.150E+01	2	278	0.7	99.6	5.900E+01	
6.150E+01- 6.650E+01	0	278	0.0	99.6	6.400E+01	
6.650E+01- 7.150E+01	1	279	0.4	100.0	6.900E+01	
G	0	279	0.0	100.0		
B	31	310				

Figure 3.--Histogram and frequency distributions for thorium.

Limit - Upper (ppm)	Obs Frq	Cum Frq	Per Frq %	Cum Frq %	Class Midpoint	Distribution
N	9	9	3.1	3.1		X
L	83	92	28.2	31.3		XXXXXXX
1.000E+02- 2.000E+02	44	136	15.0	46.3	1.500E+02	XXXX
2.000E+02- 3.000E+02	68	204	23.1	69.4	2.500E+02	XXXXXX
3.000E+02- 4.000E+02	38	242	12.9	82.3	3.500E+02	XXX
4.000E+02- 5.000E+02	11	253	3.7	86.1	4.500E+02	X
5.000E+02- 6.000E+02	14	267	4.8	90.8	5.500E+02	X
6.000E+02- 7.000E+02	9	276	3.1	93.9	6.500E+02	X
7.000E+02- 8.000E+02	3	279	1.0	94.9	7.500E+02	
8.000E+02- 9.000E+02	8	287	2.7	97.6	8.500E+02	X
9.000E+02- 1.000E+03	4	291	1.4	99.0	9.500E+02	
1.000E+03- 1.100E+03	1	292	0.3	99.3	1.050E+03	
1.100E+03- 1.200E+03	1	293	0.3	99.7	1.150E+03	
1.200E+03- 1.300E+03	0	293	0.0	99.7	1.250E+03	
1.300E+03- 1.400E+03	1	294	0.3	100.0	1.350E+03	
G	0	294	0.0	100.0		
B	1	295				

Figure 4.--Histogram and frequency distributions for fluorine.

Limit - Upper (ppm)	Obs Frq	Cum Frq	Per Frq %	Cum Frq %	Class Midpoint	Distribution
N	0	0	0.0	0.0		
L	7	7	2.4	2.4		X
5.000E+00- 2.700E+01	105	112	35.6	38.0	1.600E+01	XXXXXXXXX
2.700E+01- 4.900E+01	123	235	41.7	79.7	3.800E+01	XXXXXXXXXX
4.900E+01- 7.100E+01	44	279	14.9	94.6	6.000E+01	XXXX
7.100E+01- 9.300E+01	5	284	1.7	96.3	8.200E+01	
9.300E+01- 1.150E+02	6	290	2.0	98.3	1.040E+02	X
1.150E+02- 1.370E+02	0	290	0.0	98.3	1.260E+02	
1.370E+02- 1.590E+02	0	290	0.0	98.3	1.480E+02	
1.590E+02- 1.810E+02	2	292	0.7	99.0	1.700E+02	
1.810E+02- 2.030E+02	2	294	0.7	99.7	1.920E+02	
2.030E+02- 2.250E+02	1	295	0.3	100.0	2.140E+02	
G	0	295	0.0	100.0		
B	0	295				

Figure 5.--Histogram and frequency distributions for zinc.