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Chemical Data and Statistical Interpretations for Rocks and Ores
from the Ranger Uranium Mine N.T., Australia

by

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CHEMICAL DATA AND STATISTICAL INTERPRETATIONS FOR ROCKS AND ORES
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ABSTRACT

Analytical results for 61 elements in 370 samples from the Ranger Mine area are reported. Most of the rocks come from drill core in the Ranger No. 1 and Ranger No. 3 deposits, but 20 samples are from unmineralized drill core more than 1 km from ore. Statistical tests show that the elements Mg, Fe, F, Be, Co, Li, Ni, Pb, Sc, Th, Ti, V, Cl, As, Br, Au, Ce, Dy, La Sc, Eu, Tb, Yb, and Tb have positive association with uranium, and Si, Ca, Na, K, Sr, Ba, Ce, and Cs have negative association. For most lithologic subsets Mg, Fe, Li, Cr, Ni, Pb, V, Y, Sm, Sc, Eu, and Yb are significantly enriched in ore-bearing rocks, whereas Ca, Na, K, Sr, Ba, Mn, Ce, and Cs are significantly depleted. These results are consistent with petrographic observations on altered rocks. Litho geochemistry can aid exploration, but for these rocks requires methods that are expensive and not amenable to routine use.

INTRODUCTION

Detailed geologic and geochemical description of unconformity-type uranium deposits are woefully lacking despite the economic importance of the deposits. In 1980, the U.S. Geological Survey embarked on a program designed to provide some of that missing data as a step toward improved uranium exploration and resource appraisal. In this bulky report, we present a large quantity of chemical data; we have attempted to provide as complete and unbiased a record as space will permit, some statistical calculations and brief interpretations that we hope will simplify and clarify the large data tables.

Two orebodies, Ranger No. 1 and Ranger No. 3, occur in lower Proterozoic metasedimentary rocks of the Cahill Formation (Eupene and others, 1975; Nash and Frishman, 1982). The two Ranger orebodies, along with neighboring deposits at Nabarlek, Jabiluka, and Koongarra, are in the Alligators River Uranium Field, located about 225 km east of Darwin, in the Northern Territory (fig. 1). This district contains at least 20 percent of the western world's low-cost uranium reserves (Eupene, 1980).

Sampling an ore deposit is a complex procedure that is highly debated. In the case of the Ranger deposits there were several factors, favorable and unfavorable, that ruled our sampling: (1) only drill core was available, and most of that was in or close to orebodies; (2) the core had been split and sampled previously, and we could take only relatively small samples; and (3) we were able to select from about 200 core holes with an aggregate length of more than 50 km, an excellent "exposure" of orebodies. Accordingly, we took about 900 grab samples representing part of roughly 5-10 cm of core and 80 composite samples comprised of small chips and chunks of core over a 1-15 m interval of core. The grab samples are not known to be representative of a larger volume of rock, although many were selected as being representative to our eyes. An advantage of the small grab samples is that they can be more reliably classified by rock and alteration type. Our mean chemical data compare fairly closely to the 1 m composite samples and averages given by Eupene (1980) except for the marble unit for which we restricted our samples to less chloritic material.

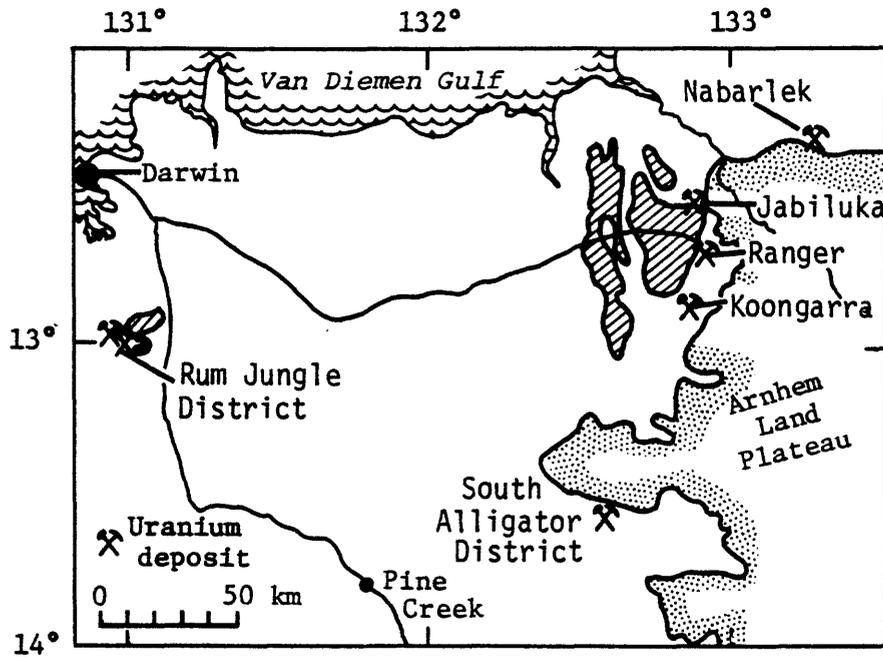


Figure 1.--Map of a portion of the Northern Territory, Australia showing the location of uranium mines and deposits. Archean-Lower Proterozoic granite gneiss domes are shown by diagonal ruling.

Acknowledgements. This study was made possible by the cooperation of Ranger Uranium Mines Pty. Ltd.; we thank them for their assistance and permission to sample drill core. The first two years of this project were funded by the National Uranium Resource Evaluation program of the U.S. Department of Energy, which also funded chemical analyses made at Oak Ridge Laboratories. We thank John Ahrendt and Ron Helgerson, Oak Ridge National Laboratory, and R. R. Wahl, U.S.G.S., for assistance with computer processing. Linda Gunderson, Buster Hunsaker, Gary Miller, Eric Tuppan and Robin Schurman are thanked for their careful work preparing samples for analysis. J. S. Leventhal and C. T. Pierson offered useful comments on the manuscript.

SAMPLING, SAMPLE PREPARATION AND ANALYTICAL METHODS

All samples for this study come from diamond drill core. Drill hole locations are shown in figure 2, with the exception of drill holes 96, NMF, and PMF which are outside of the orebodies and they are shown in figure 2 of Nash and Frishman (1982). Most core holes were drilled vertically, but six were inclined at about -70° . Sample locations given in Appendix I include our approximate corrections for drill hole deflection.

Some drill hole numbers and sample numbers have been changed because of computer limitations. Drill hole numbers, which are sample number prefixes, were changed for holes numbered above 100 as follows: drill hole 130 changed to 30, 138 to 38, 161 to 61 and 165 to 65. The second part of the eight-digit sample number is depth in the hole measured in meters.

Drill core samples of two types were collected: relatively small grab samples weighing about 50 to 400 grams, and composite chip and chunk samples of a specific lithology across a 1 to 15 m interval. The composite samples are labelled "C" in Appendix I and the depth is to the top of the sample interval.

Grab samples of core were cut with a saw and one portion of the sample was sent for preparation of a polished thin section. The other portion was cleaned on a diamond grinding wheel to remove any contaminants (traces of metal from the core barrel or saw blade, magic marker, etc.) and then crushed to pass a 100 mesh screen using a jaw crusher, pulverizers with ceramic plates, and final hand grinding with mortar and pestle. Great care was taken at all stages to avoid contamination. Splits of the sample were then analyzed

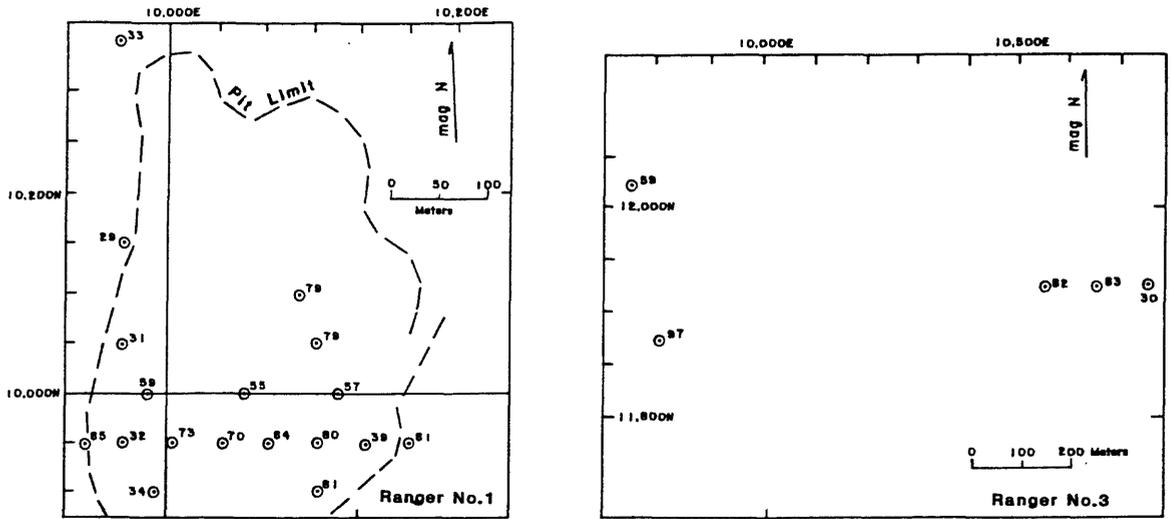


Figure 2.--Location of drill holes in Ranger No.1 (left) and Ranger No.3 (right) orebodies sampled for this study. Ranger No.3 is about 1.5 km north of Ranger No.1.

for major elements by X-ray fluorescence spectroscopy (XRF) and for minor elements by instrumental neutron activation analysis (INAA), and inductively coupled plasma spectrography (ICP). About one-third of the samples were also analyzed for fluorine and ferrous iron, and 50 samples were analyzed for gold by atomic absorption, and 4 by fire assay. Analyses for uranium by delayed neutron analysis and for total carbon and total sulfur by LECO^{1/} carbon and sulfur determinators, respectively (Stanton and others, 1983), are in progress and are not reported here.

XRF analyses were performed by the U.S. Geological Survey using a Phillips PW1600^{1/} wave length dispersive simultaneous X-ray spectrometer. Samples were ignited at 925°C, fused into a glass disc using a lithium tetraborate flux, and then analyzed. Further details of sample preparation and instrumental operating conditions can be found in Taggart and others (1981).

ICP and INAA analyses were done at the Oak Ridge National Laboratory operated by Union Carbide Corporation. ICP analyses were performed using a Jarrel-Ash^{1/} direct-reading spectrograph with an inductively coupled argon plasma source, and INAA analyses were performed on equipment developed at that laboratory. Details concerning the analytical procedures can be found in Cagle (1977), Bowman (1977), and Arndt and others (1980).

Fluorine determinations were by specific ion electrode, and ferrous iron by classical titration methods (Peck, 1964). Some gold analyses were by fire-assay/atomic absorption (Haffty and others, 1977), and others were by atomic absorption following solvent extraction (Ward and others, 1969).

^{1/} Use of trade names in this report is for descriptive purposes only and does not constitute endorsement by the U.S. Geological Survey.

ANALYTICAL DATA

Analytical data for 51 elements and 7 descriptive attributes are tabulated in Appendix I. Bulky as Appendix I is, the data has been condensed where possible and still convey unbiased information. A major problem has been selection of data from two or three methods of analysis as summarized in Table 1. Problems of precision, accuracy, and limit of detection vary with each element and method and are not completely evaluated at this time. Based on duplicate analyses of 30 samples we estimate the following precision for INAA (N) and ICP determinations:

0-5 percent: Ag, Be, Co, Cr, I-N, Li, Mn, Mn-N, Mo, Ni, V, V-N

5-10 percent: U-N, Ba, Cl-N, Co-N, Cr-N, Cs, La-N, Na-N, P, Sc-N, Sr, Th-N, Ti, Zn, Zr

10-20 percent: Ba-N, Br-N, Ce, Cu, La, Nb, Pb, Rb-N, Sc, Tm-N, W-N, Y, Zr-N

20-30 percent: Ce-N, Eu-N, Ho-N, Gd-N, Sb-N, Ta-N, Tb-N, Yb-N

30-45 percent: Au-N, In-N, Mo-N, Nd-N, Th, As-N, Ga-N, Sm-N

No data: Dy-N, Er-N, F, FeO, Hg-N, Ir-N, Lu-N, Pr-N

Major elements determined by XRF have a precision of better than 5 percent. For computations reported here we have favored results by XRF for major elements, and by ICP for many minor elements because the limit of detection was lower and thus produced fewer qualified data ("less than" values). Concentrations of several elements, such as Na, Ti, Mn, and P, were near or below the limit of detection by XRF; for these and similar elements we chose ICP results to avoid problems with qualified data in statistical calculations. Several elements are reported twice because we cannot evaluate which results are best. See also information in Appendix II.

Also included in Appendix I are data for sample locations and descriptive attributes. Sample locations are given in metric mine coordinates; absolute position is generally within less than one m and relative position in a drill hole is known to less than 0.1 m. Sample attributes are generally from megascopic features observed while logging core and most have been confirmed by petrographic and X-ray diffraction studies. The attributes lithology ("lithtype") and grade ("oretype") have been used to sort chemical data into subsets for statistical analyses.

Table 1.--Methods of analysis for 61 elements.
 [Underscored X denotes data reported in Appendix 1.]

Element	XRF	INAA	ICP	Other
3 Li			<u>X</u>	
4 Be			<u>X</u>	
5 B			<u>X</u>	
9 F				<u>X</u>
11 Na	X	<u>X</u>	<u>X</u>	
12 Mg	<u>X</u>	X	X	
13 Al	<u>X</u>	X	X	
14 Si	<u>X</u>			
15 P	<u>X</u>		<u>X</u>	
16 S				
17 Cl		<u>X</u>		
19 K	<u>X</u>	<u>X</u>	X	
20 Ca	<u>X</u>	X	X	
21 Sc		<u>X</u>	<u>X</u>	
22 Ti	<u>X</u>	<u>X</u>	<u>X</u>	
23 V		<u>X</u>	<u>X</u>	
24 Cr		<u>X</u>	<u>X</u>	
25 Mn	X	<u>X</u>	<u>X</u>	
26 FeO				<u>X</u>
TFe ₂ O ₃	<u>X</u>	X	X	
27 Co		<u>X</u>	<u>X</u>	
28 Ni			<u>X</u>	
29 Cu		X	<u>X</u>	
30 Zn		X	<u>X</u>	
31 Ga		<u>X</u>		
32 Ge				
33 As		<u>X</u>		
34 Se				
35 Br		<u>X</u>		
37 Rb		<u>X</u>		
38 Sr			<u>X</u>	
39 Y			<u>X</u>	

Table 1.--Methods of analysis for 61 elements.--Continued

Element	XRF	INAA	ICP	Other
40 Zr		<u>X</u>	<u>X</u>	
41 Nb			<u>X</u>	
42 Mo		X	<u>X</u>	
47 Ag			<u>X</u>	
49 In		X		
51 Sb		X		
53 I		X		
55 Cs		<u>X</u>		
56 Ba		<u>X</u>	<u>X</u>	
57 La		<u>X</u>	<u>X</u>	
58 Ce		<u>X</u>	<u>X</u>	
59 Or		<u>X</u>		
60 Nd		<u>X</u>		
62 Sm		<u>X</u>		
63 Eu		<u>X</u>		
64 Gd		X		
65 Tb		<u>X</u>		
66 Dy		<u>X</u>		
67 Ho		<u>X</u>		
68 Er		X		
69 Tm		X		
70 Yb		<u>X</u>		
71 Lu		<u>X</u>		
72 Hf			X	
73 Ta		<u>X</u>		
74 W		<u>X</u>		
75 Re				
77 Ir		X		
79 Au		<u>X</u>		<u>X</u>
80 Hg		<u>X</u>		
82 Pb			<u>X</u>	
90 Th		<u>X</u>	<u>X</u>	
92 U		<u>X</u>		

Gold Abundance and Distribution

Gold is known to be an important trace metal of Jabiluka where it will be a significant byproduct (Hegge, 1977). Eupene and others (1975) report that "minor native gold is present" in the No. 1 orebody, and we have seen a few scattered flakes of native gold in polished sections. Special chemical studies were made in an effort to obtain reliable gold values. Table 2 summarizes gold concentrations determined in splits of 50 samples by an atomic absorption method, and in 4 samples analyzed by a fire assay-atomic absorption method. The 50 samples cover a range of lithologies and uranium content. The results are in good agreement and seem to be reliable. The mean gold content (by INNA) in 191 samples is 0.303 ppm; 13 samples contained more than 1 ppm gold and the maximum concentration was 6.05 ppm. The high gold values occur in chlorite-muscovite-schist, chiefly in the Upper Mine Sequence. Most of the higher gold concentrations are in rocks from the No. 1 orebody, but several samples from No. 3 orebody contained concentrations in the range 0.7 to 2.1 ppm. There is no evidence in our sampling that gold could be an economic byproduct, but the enrichments in gold are geochemically interesting.

STATISTICAL ANALYSIS OF ROCK CHEMISTRY

In this section statistical summaries and interpretations are presented for several rock units. Data have been sorted by grade or lithology to make subsets that are more meaningful geologically and also have less chemical variability. Because of space limitations, we present the computations for only the five most important units: ore-bearing and barren rocks, Upper Mine Sequence (UMS), jasperoid, and Lower Mine Sequence chloritic marble. Interelement trends observed in these subsets are considered typical of most subsets.

Introductory Remarks on Statistical Analyses

The large and complex nature of the chemical data defy interpretation by simple methods such as "eyeballing." Statistical analyses of several types have been employed in an effort to simplify and emphasize elemental relations. We do not consider the statistical computations to be interpretations by themselves; rather, we use them to identify key relations and to raise questions that need geochemical answers. We report some statistical matrices

Table 2.--Gold content of rocks from the Ranger Mine area
 [INAA, gold analysis by instrumental neutron
 activation analysis, Oak Ridge Laboratories;
 AAS, atomic absorption spectroscopy by Reinhardt
 Leinz, USGS; FA, fire assay and atomic absorption
 spectroscopy by Leon Bradley, Joe Haffty, Bob
 Moore, and Paul Briggs, USGS.] L, less than
 value shown; N, not detected at value shown.

Sample	INAA ppm	AAS ppm	FA ppm
29-34.6	0.11	0.26	
32-28.4	0.03	N (.04)	
32-69.7	0.92	0.70	
33-123.7	0.00	N (.02)	
34-25C	0.10	N (.1)	
34-93C	0.03	N (.04)	
55-146C	0.35	0.26	0.29
56-49.6	0.08	0.08	
57-99C	0.02	N (.02)	
64-182.5	1.03	1.24	
70-26.4	0.11	0.14	
70-160C	0.13	0.12	
73-50C	0.03	N (.04)	
73-64.4	0.00	N (.04)	
73-70C	0.06	0.08	
73-71.3	0.64	0.66	
73-103C	0.19	0.16	
78-20C	0.03	0.04	
78-28.0	0.00	2.50	2.32
78-37C	0.07	0.10	0.07
79-220C	0.00	0.02	
79-241.3	0.01L	N (.02)	
80-8C	0.03	N (.04)	
80-36C	1.64	0.72	
80-38.1	0.37	0.30	
80-48C	0.01	N (.1)	
80-75C	0.07	0.20	
80-122C	0.02	N (.04)	
80-146.1	0.01	N (.02)	
80-178C	0.05	N (.1)	
80-205.8	0.01	N (.02)	
81-183C	0.03	0.04	
82-407.25	0.00	N (.02)	
83-99.6	0.06	N (.04)	
83-127.0	0.01	N (.02)	
83-268.1	0.02	N (.02)	
83-385.9	0.00	N (.04)	
83-456.0	0.00	N (.04)	
96-282C	0.01	N (.05)	
96-309.7	0.01L	N (.02)	
138-12C	0.03	N (.04)	
138-42C	0.02	0.24	
138-118.2	0.00	N (.04)	
138-139.0	0.00	N (.04)	
138-196C	0.01L	N (.02)	
138-252.1	0.00	N (.02)	
161-34C	0.03	N (.1)	0.05L
161-105.6	0.02	N (.04)	
161-161.3	0.00	N (.02)	
161-275.1	0.01L	N (.02)	

here for their possible descriptive value, but we trust only the statistics that are consistent with independently derived geochemical theory or geologic observation.

Statistical summaries of 14 lithologic groups are presented to provide a brief tabulation of data. For elements having no qualified data (i.e. no "less than" or "greater than" values), standard arithmetic mean and standard deviation are computed. For elements determined by INAA with a variable limit of detection, arithmetic mean is calculated from the unqualified determinations. The mean for elements with a specific limit of detection, chiefly minor elements determined by ICP, was calculated by a method of extrapolating beyond the limit of detection to an estimated mean (Cohen, 1959).

Correlation analysis has been used to examine the joint variation or association of elements. The computer program utilized (STATPAC D101, VanTrump and Miesch, 1977) computes the linear correlation coefficient for two elements from valid pairs of data. Many statistics programs have difficulties with qualified data. The correlation coefficients were calculated for data from samples for which there were valid (non-qualified) determinations for both elements. For some elements, such as the rare earth elements, fewer than 50 percent of the samples had values reported, but at least an estimate could be made from the valid pairs. The bottom part of the correlation matrix (tables 3, 5, 8, 11, and 14) indicates the number of samples utilized in the computation.

To provide a general measure of importance of the correlation coefficient we have noted those significant at the 95 percent level of confidence, although we recognize that this is not a rigorous test. It is important to note that the magnitude of the correlation coefficient alone is not a measure of the probability of interdependence. For large populations, the correlation coefficient can be relatively small and still be significant. For the 95 percent level of significance, the following values of r are significant (Dixon and Massey, 1957, p. 200, p. 468):

<u>N (pairs)</u>	<u>r</u>
5	.878
10	.632
20	.444
50	.279
100	.196
250	.124

Unless mentioned otherwise, "significant" means the 95 percent level. For simplicity, we place no added emphasis on relative values of correlation coefficients such as those significant at the 99 percent level. A list of the significant correlations of an element, such as uranium, resembles closely the associations selected by factor analysis.

Factor analysis has been utilized to examine relations between elements as simplified groups. The R-mode analysis (Davis, 1973) was run for 48 to 50 elements using STATPAC program D0096 (VanTrump and Miesch, 1977) that utilizes a correlation matrix as input. Normally, the recommended correlation matrix is one generated from variables having no qualified data, which was less than 20 for the subsets used here. Consequently, we utilized the correlation matrices, described above, calculated from variables having some qualified data, but the qualified data itself was not used in the calculations. This matrix is generally not recommended because it does not have the correct grammian properties for factor analysis, but to us is useful because the data set is more complete. The factor analysis may therefore lack some statistical rigor, but the results, in our opinion, are generally reasonable and geochemically plausible.

Some explanation of terms used in factor analysis may help the reader. Factors are vectors used to represent information. The factor loading, a number ranging from +1 to -1, is proportional to the amount of element variance represented. Communality is the sum of the squares of the factor loadings for a variable and ranges from 0 to 1. The communality expresses the amount of information on a variable carried by a factor model and increases as additional factors are utilized. Several of the elements in the Ranger data, such as As, B, Cu, W, and Zn, tend to have low communalities until more than about eight factors are used, at which point they tend to emerge alone on a factor. Other elements such as Ca and P tend to have low communalities until a factor is defined which permits them both to load very high. The number of factors used and rotation of factors are subjective matters (Davis, 1973).

One rule is to have the number of factors equal to the number of eigenvalues greater than 1, and another is to have the factor model contain more than a certain fraction of the variance in the dataset. For some subsets these rules indicate that more than 10 factors should be used. Because the goal of factor analysis is to simplify relations, we have used models with 5 or 6 factors, which result in loss of 10 to 40 percent of information. We have examined models with 3 to 10 factors for many subsets but present here only models with 5 or 6 factors as a compromise and for uniformity. Many types of factor analysis can be made (Davis, 1973); we present rotated solutions in which the vectors are nonorthogonal, and which forces the vector through the variable with highest loading thus giving it a new loading of 1.00. Variables with a loading of unity are convenient names for the factor.

Multiple regression is a multivariate technique that many recommend for evaluating the relations of dependent variables to an independent variable. Calculations by STATPAC program D0094 (VanTrump and Miesch, 1977) show useful information about the amount of variance explained by a dependent variable and ranks the dependent variables. However, the program accepts no qualified data and eliminates any sample containing qualified data. As a consequence either many samples or many variables are eliminated. The results of the multiple regression computation thus are not easily compared with other tests, notably for elements such as the rare earths.

The t-test is a useful statistical test for significant differences between two groups, such as ore-bearing versus barren rocks. Several tests were made of various ore types (Appendix I) with no regard for lithology, and the best test was made of ore versus barren subsets of the UMS chloritic schist lithology because this reduced compositional variance or "noise". The modified t-test (Natrella, 1963) used here is calculated from the mean, variance, and number of samples in each subset or population and tests if the populations have similar means (or if the means are significantly different). We used a program based upon Natrella's formula and written by C. T. Pierson and R. R. Wahl, U.S. Geological Survey.

Ore-Bearing Samples

A subset of 149 samples termed "ores" was defined on the basis of field-measured radioactivity equivalent to about 250 ppm or more uranium; these

samples are coded 4 to 7 in column "oretype" (Appendix I). Most of the samples are chlorite-rich UMS schists, but many other units are represented. Linear correlation (table 3) indicates that the elements F, Be, Co, Li, Na, Ni, Pb, Sc, Th, Ti, V, Y, Sr, Cl, As, Br, Au, Ce, Dy, La, Sc, Eu, Tb, Yb, and Ta have significant (at 95 percent confidence level) positive correlations with uranium, and Si and K have significant negative correlations with uranium. Multiple regression of 27 elements against uranium indicated that five elements--La, Pb, Ca, Sr, and Y--explain 84.4 percent of the variance in U at 5 percent probability level. The regression weights^{1/} are: La, 0.43; Pb, 0.32; C, 0.30, Sr, -0.09; Y, -0.09. Many of the rare earth elements could not be included in the regression computation due to numerous qualified values. The factor model (table 4) indicates that uranium is on factor 1 with Sc as end member and including Th, Y, Na, Pb, Sc, Tb, Yb, Au, La, Eu, and As.

The most prominent feature of these statistics is the association of rare earth elements and gold with uranium. The same association was noted in other tests on uranium in subsets defined by lithology. The Th value that correlates highly with uranium is the ICP determination, but Th-N by INAA does not correlate highly with uranium. We suspect analytical error in one or both thorium determinations and do not have confidence in either presence or absence of a Th-U association. We are concerned that many of the U-associated elements are determined by INAA and may be subject to interference by high U contents--if so, many of the indicated associations of REE would be invalid. The Pb-U association presumably reflects radiogenic Pb. The REE- and Au-association with U (if real) could be caused by many processes in the complex history of these rocks, but we suspect it probably indicates this group of elements behaved similarly in transport and deposition in one or more stages of metamorphism and hydrothermal activity.

^{1/} Regression weights are similar to correlation coefficients and range from +1 to -1 in magnitude; they express the importance to the regression better than correlation coefficients because means and variances are adjusted to have equal relative weights for all variables.

	1	2	3	4	5	6	7	8	9	10
	SiO2X	Al2O3X	T-Fe2O3X	FeOX	MgOX	CaOX	K2OX	FX	B	BA
1 SiO2X	15.9770	-.6058*	-.6367*	-.7629*	-.8353*	-.3823*	.1518	-.5135*	-.1176	.0287
2 Al2O3X	149	4.7688	.1547	-.3269*	-.4320*	-.1925*	.4711*	.1799*	-.2553*	.2914*
3 T-Fe2O3X	149	149	5.2427	.5075*	.4606*	.0846	-.3116*	.0994	-.0142	-.1603
4 FeOX	59	59	59	1.8627	.7911*	.1505	-.5002*	.4519*	-.3190*	-.2915*
5 MgOX	149	149	149	59	5.6345	.2384	-.4693*	.4989*	-.0543	-.0930
6 CaOX	149	149	149	59	149	2.3033	-.1902*	.1703	-.1326	-.6185*
7 K2OX	149	149	149	59	149	149	1.3773	-.2072	.0827	-.1066
8 FX	60	60	60	56	60	60	60	.0391	.1041	.1781
9 B	136	136	136	54	136	136	136	55	285.7187	136.5402
10 BA	149	149	149	59	149	149	149	60	136	149
11 BE	149	149	149	59	149	149	149	60	133	146
12 CO	146	146	146	59	146	146	146	60	135	148
13 CR	148	148	148	58	148	148	148	59	134	147
14 CU	147	147	147	58	147	147	147	60	136	149
15 LI	149	149	149	59	149	149	149	60	136	149
16 MN	149	149	149	59	149	149	149	60	136	149
17 NA N	105	105	105	43	105	105	105	46	97	105
18 NI N	149	149	149	59	149	149	149	60	136	149
19 P	147	147	147	59	147	147	147	60	136	147
20 PB	144	144	144	58	144	144	144	59	134	149
21 SC	149	149	149	59	149	149	149	60	136	149
22 TH	140	140	140	56	140	140	140	60	131	140
23 TI	149	149	149	59	149	149	149	60	136	149
24 V	149	149	149	59	149	149	149	60	136	149
25 Y	149	149	149	59	149	149	149	60	136	149
26 ZN	149	149	149	59	149	149	149	60	136	149
27 ZR	149	149	149	59	149	149	149	60	136	149
28 SR	149	149	149	59	149	149	149	60	136	149
29 CE	82	82	82	25	82	82	82	27	79	82
30 CL N	78	78	78	29	78	78	78	27	68	78
31 U RT	149	149	149	59	149	149	149	60	136	149
32 GR N	91	91	91	38	91	91	91	37	83	91
33 AS N	43	43	43	16	43	43	43	16	39	43
34 BR N	48	48	48	17	48	48	48	15	43	48
35 W RT	100	100	100	41	100	100	100	42	90	100
36 AU N	118	118	118	49	118	118	118	47	107	118
37 RB N	77	74	74	37	74	74	74	38	73	74
38 CS N	86	86	86	39	86	86	86	40	82	86
39 CE N	40	40	40	14	40	40	40	12	35	40
40 TH N	133	133	133	51	133	133	133	51	121	133
41 DY N	37	37	37	14	37	37	37	13	34	37
42 LA N	136	136	136	53	136	136	136	53	124	136
43 ND N	19	19	19	13	19	19	19	14	18	19
44 SM N	64	64	64	29	64	64	64	28	55	64
45 SC N	136	136	136	54	136	136	136	54	124	136
46 EU N	117	117	117	49	117	117	117	48	107	117
47 TB N	66	66	66	31	66	66	66	30	62	66
48 YB N	93	93	93	43	93	93	93	43	86	93
49 TA N	57	57	57	30	57	57	57	30	54	57

Table 3.--Correlation matrix for ore-bearing samples. Number of samples = 149, number of variables = 49. *, correlation coefficient is significant at the 95 percent level of confidence. The upper half of the matrix contains the correlation coefficients, the lower half contains the number of valid sample pairs, and the diagonal contains the standard deviation of the variable for the valid pairs.

	11	12	13	14	15	16	17	18	19	20
	BE	CO	CR	CU	LI	MN	NA_M	NI	P	PR
1 S102X										
2 Al2O3X	-4.741	-6.979	-3.481	.0529	-5.276	-4.270	-3.422	-6.336	-1.891	-3.796
3 T-Fe2O3X	.4945	.4317	.4062	-.1011	.5039	-.1027	.0832	.4555	-.0815	.0595
4 FeOZ	.0974	.4690	-.1212	-.0036	.1731	-.1252	.3177	-.3240	.1070	-.1956
5 MgOZ	.3938	.8082	-.1340	-.1371	.3315	-.1941	-.0088	.6000	.2015	.3305
6 CaOZ	-.0070	.7107	-.2313	-.0692	.6111	.2860	.0873	.7194	.0923	.2320
7 K2OZ	-.0793	-.3128	-.0005	.0133	-.0974	.8692	.3121	-.0021	.4037	.0955
8 FX	.4684	-.1950	-.1675	-.0698	-.2257	-.1739	.0269	-.3652	-.1873	-.2123
9 B	.2290	-.0533	-.1041	-.0690	-.2397	-.1509	.6550	-.2666	-.6747	-.4466
10 BA	.3049	-.1846	.3328	-.0305	-.0309	-.0783	-.1571	-.0230	.4097	-.0121
11 BE	2.5189	.3064	.3261	.0464	-.0848	-.1951	-.2615	-.0072	-.1146	
12 CO	146	13.1201	.2942	-.0105	-.0313	-.0194	.2093	.3106	-.1859	.4550
13 CR	148	145	112.3366	-.0617	-.4853	-.1054	-.0860	-.3169	-.0891	.3270
14 CU	147	144	146	1173.3700	-.0224	-.0097	.0065	-.0336	-.0548	.0146
15 LI	149	146	148	147	58.9270	.0012	-.0200	.6979	-.0419	-.3558
16 MN	149	146	148	147	149	393.6257	.3707	.0242	.1457	.1713
17 NA_M	105	103	105	103	105	105	1619.6720	.0262	.3133	.5886
18 NI	149	146	148	147	149	105	48.3650	.0469	.3113	.3113
19 P	149	144	146	145	147	103	3067.6720	.0672	.1374	
20 PB	144	141	143	142	144	100	144	142	1838.7230	
21 SC	149	146	148	147	149	105	149	147	144	
22 TH	140	137	139	138	140	140	98	140	139	137
23 TI	149	146	148	147	149	149	105	149	147	144
24 V	149	146	148	147	149	149	105	149	147	144
25 Y	149	146	148	147	149	149	105	149	147	144
26 ZN	149	146	148	147	149	149	105	149	147	144
27 ZR	149	146	148	147	149	149	105	149	147	144
28 SR	149	146	148	147	149	149	105	149	147	144
29 CE	82	80	82	81	82	82	56	82	81	80
30 CL_M	78	77	78	76	78	78	67	78	76	74
31 U_NT	149	146	148	147	149	149	105	149	147	144
32 GA_M	91	90	91	89	91	91	69	91	89	88
33 AS_M	43	42	43	42	43	43	33	43	42	42
34 BR_M	48	47	48	47	48	48	39	48	46	46
35 W_NT	100	97	99	98	100	100	77	100	99	96
36 AU_M	118	117	117	116	118	118	86	118	116	114
37 RB_M	74	71	74	73	74	74	64	74	74	72
38 CS_M	86	83	86	85	86	86	74	86	86	83
39 CE_M	40	39	40	40	40	40	29	40	39	37
40 TH_M	133	130	133	131	133	133	96	133	131	128
41 DY_M	37	34	37	37	37	37	18	37	37	37
42 LA_M	136	133	135	134	136	136	98	136	134	131
43 ND_M	19	19	19	19	19	19	15	19	19	19
44 SM_M	64	64	64	62	64	64	48	64	63	60
45 SC_M	136	133	135	134	136	136	98	136	134	131
46 EU_M	117	114	116	115	117	117	83	117	116	114
47 TB_M	66	64	65	65	66	66	44	66	66	66
48 YB_M	93	90	92	91	93	93	70	93	92	92
49 TA_M	57	55	57	57	57	57	51	57	57	54

	21	22	23	24	25	26	27	28	29	30
	SC	TM	TI	V	Y	ZN	ZR	SR	CE	CL_M
1 S102X										
2 Al2O3X	-4.200	-3.455	-4.160	-.5307	-.2863	-.5315	-.2299	-.2354	-.2997	-.1992
3 T-Fe2O3X	.1561	-.0258	.6052	.4791	-.0812	.1535	.4430	.1696	.2156	-.2515
4 FeOZ	.2256	.3419	.0825	.3291	.1455	.3467	-.0238	-.0120	.1834	-.2009
5 MgOZ	.2374	.2215	.1375	.3268	.0391	.4225	-.1022	-.0267	.1845	-.3822
6 CaOZ	.2127	.1611	.2042	.4205	.1165	.4811	.1615	.0337	.1755	.0084
7 K2OZ	.0646	.1058	-.0987	-.1001	-.1799	.4388	-.1072	.2733	.1808	.0783
8 FX	-.1192	-.1952	-.3403	-.1221	-.1998	-.2299	.2123	.2224	.0618	-.3296
9 B	.5591	.5735	.1771	-.2969	-.5906	.2676	.0313	.3870	.3443	.0512
10 BA	.0382	-.0092	-.0250	.0654	.0234	-.0545	.1286	.3258	.2435	-.1825
11 BE	-.1736	-.1320	.3716	-.0217	.1856	-.1493	.1445	.4.71	.2037	-.2515
12 CO	.4295	.4707	.4272	.3290	.3567	.0992	.1707	.3741	.3173	-.0262
13 CR	-.2894	-.1877	-.3984	-.5189	.1455	.3028	.2460	.0147	.1128	-.0274
14 CU	-.2848	-.1289	-.6004	-.4016	.1451	.0839	.6541	.6071	.4727	-.0833
15 LI	-.0175	-.0220	-.1136	-.0430	.0390	.0132	-.1733	.0793	-.1476	.0823
16 MN	.3215	-.2178	-.4777	-.5846	.1827	-.1590	.2667	.0351	.0833	-.2356
17 NA_M	.1166	-.1356	-.0584	-.0537	.2062	.6158	-.1077	-.1868	.1166	-.0062
18 NI	.7337	.7416	-.2200	-.2156	.7751	.0208	.0941	.4124	.1092	-.1710
19 P	.3136	.1912	.4617	.7145	.1453	.2006	.3340	-.0559	.0387	.1140
20 PB	.2135	.2251	-.0155	.0177	.2686	.0564	.0536	.4942	.4633	.0772
21 SC	.8820	.8033	.4063	.4490	.7925	.1874	.0520	.2180	.1426	.2806
22 TH	14.1606	.9325	.4521	.4955	.9046	.0936	.1812	.3129	.2331	-.0696
23 TI	140	40.3722	.2491	.3031	.9219	.0717	.0372	.2833	.1723	.1146
24 V	149	140	961.6182	.6084	.2460	-.0022	.6329	.3567	.2822	-.2300
25 Y	149	140	80.1284	.3208	.1739	.3662	.0731	.1618	.0304	
26 ZN	149	140	149	149	54.9381	.0829	.0683	.3321	.1912	-.1521
27 ZR	149	140	149	149	85.6463	-.0852	.0445	.0200	-.0844	
28 SR	149	140	149	149	149	47.7343	.3665	.3289	-.1875	
29 CE	82	79	82	2	82	2	82	20.5880	.0082	
30 CL_M	78	69	78	78	78	78	78	39	71.7032	
31 U_NT	149	140	149	149	149	149	149	149	82	78
32 GA_M	91	86	91	91	91	91	91	91	47	60
33 AS_M	43	40	43	43	43	43	43	43	25	24
34 BR_M	48	42	48	48	48	48	48	48	25	42
35 W_NT	100	96	100	100	100	100	100	100	59	62
36 AU_M	118	110	118	118	118	118	118	118	63	69
37 RB_M	74	70	74	74	74	74	74	74	41	44
38 CS_M	86	81	86	86	86	86	86	86	47	53
39 CE_M	40	36	40	40	40	40	40	40	72	30
40 TH_M	133	125	133	133	133	133	133	133	72	70
41 DY_M	37	37	37	37	37	37	37	37	21	8
42 LA_M	136	127	136	136	136	136	136	136	74	78
43 ND_M	19	17	19	19	19	19	19	19	9	12
44 SM_M	64	60	64	64	64	64	64	64	34	42
45 SC_M	136	127	136	136	136	136	136	136	75	77
46 EU_M	117	112	117	117	117	117	117	117	68	64
47 TB_M	66	65	66	66	66	66	66	66	33	33
48 YB_M	93	89	93	93	93	93	93	93	48	53
49 TA_M	57	53	57	57	57	57	57	57	26	38

TABLE 3, CONTINUED

	31	32	33	34	35	36	37	38	39	40
	U_NT	GA_N	AS_N	BR_N	W_NT	AU_N	RB_N	CS_N	CE_N	TH_N
1 S102X	-.2683	-.1796	-.2094	-.0261	-.1273	.0622	.2267	-.1304	-.0561	-.2988
2 AL203X	-.0785	-.2521	-.3021	-.0732	-.1978	-.2197	.1297	-.3759	-.0767	.4665
3 T-Fe203X	.1617	.0540	-.0340	-.0243	.0961	-.0032	-.5069	-.1953	-.0705	.0557
4 FeOZ	.1705	.0069	-.1869	-.1066	-.1418	-.0789	-.2966	-.1111	-.2986	.0875
5 MgOZ	.1275	.1196	.0150	.0806	-.0393	-.0486	-.5009	-.0707	-.0335	-.2112
6 CaOZ	-.0866	-.0918	-.0974	.0894	-.0249	.0781	-.1410	-.0227	-.1166	-.1102
7 K2OZ	-.2289	.0547	.2167	-.1623	-.2397	-.1950	.6457	.5224	-.1142	-.1847
8 FZ	.5288	-.1004	.2125	.2762	.0159	-.0548	-.1134	.2396	-.1378	.0048
9 B	-.0244	-.0061	.2573	-.1592	.0152	-.0501	.0247	.2484	-.0854	-.0834
10 BA	.1533	-.1118	.1422	-.0511	.0166	.0891	.3907	.3544	-.0383	.0345
11 BE	.3417	.0311	.3294	-.0331	.1333	-.0132	.0986	.5050	.0292	.0940
12 CO	.2229	.2035	.1935	.0800	.1368	.0783	-.2942	-.1035	-.0228	.2686
13 CR	.1305	.1530	.2480	.0152	.0977	.0601	-.0113	.0453	.0242	.0952
14 CU	.0016	-.0154	.2379	.0890	.0358	.0091	.2468	.2299	-.0377	-.0880
15 LI	.2154	.1928	.2654	.0852	-.0163	-.0136	-.3384	.1359	-.1541	.2403
16 MN	.1458	-.0169	-.0388	-.0493	.0212	.0537	-.1744	-.0503	-.1104	-.0127
17 NA_N	.6987	-.0205	.3632	.0932	.3503	-.0110	.2020	.5415	-.0596	.2208
18 NI	.1802	.2681	.2963	.1526	-.0273	-.0128	-.3993	-.2091	.2971	.2695
19 P	.1482	-.0963	-.0912	.1051	-.0175	.1102	-.1469	-.0397	-.0947	-.1641
20 PB	.8276	.0660	.3740	.3415	.0339	.4868	.0794	.0593	.6957	-.0038
21 SC	.8950	.1088	.3094	.1529	.1345	.5530	-.0088	.0357	.3894	.2745
22 TH	.9230	.0866	.3894	.3650	.0178	.5345	.0640	-.0447	.6736	.3735
23 TI	.2272	.2441	.4559	-.0709	.2524	-.0351	.1666	.1782	.2094	.4012
24 V	.3265	.2839	.3201	.1747	.0740	-.2337	-.1521	-.0166	.4801	.3012
25 Y	.9345	.0183	.4487	.3449	.0577	.7819	-.1102	.0195	.7081	.1065
26 ZN	.0709	.0489	-.0315	.0829	.0511	.0481	-.2037	-.1521	-.1110	.1423
27 ZR	-.0100	.2383	.3552	-.0844	.1375	-.1410	.1321	-.0099	.0099	.3872
28 SR	.2245	-.1258	.1222	.1101	.0313	-.0023	.1925	.2700	-.1063	-.0135
29 CE	.1391	-.0995	-.0188	-.0158	.0030	.0192	-.1798	-.0724	-.0629	-.1070
30 CL_N	.3350	-.0310	.5333	-.0697	.5333	-.0697	.2465	-.3486	-.0896	.2040
31 U_NT	8283.5620	.0501	.3593	.3528	.0366	.7373	.0995	.0783	.7095	.1222
32 GA_N	.91	44.7345	.5571	.0173	.0645	-.0332	-.1057	-.0446	-.1997	.1174
33 AS_N	.43	.37	5.5877	.0272	.0633	.1725	-.0204	.1919	-.1689	.1775
34 BR_N	.48	.36	.12	2.3707	.1030	.2799	-.0266	-.0912	.8115	.0475
35 W_NT	100	.74	.34	.35	32.7256	-.0312	.2887	-.3495	.0699	-.1370
36 AU_N	118	.81	.40	.44	.88	.7805	-.1146	-.0640	.1608	-.0406
37 RB_N	.74	.56	.28	.26	.62	.65	71.7467	-.5137	-.2193	-.1083
38 CS_N	.86	.64	.35	.32	.70	.78	.71	2.8078	-.0149	.0218
39 CE_N	.40	.33	.12	.16	.29	.35	.27	.26	177.9082	-.0042
40 TH_N	.133	.90	.41	.48	.98	.113	.73	.84	.38	7.9017
41 DY_N	.37	.13	.11	.5	.18	.24	.13	.16	.6	.29
42 LA_N	.136	.91	.42	.48	.99	.116	.74	.85	.40	.133
43 ND_N	.19	.18	.11	.2	.17	.17	.16	.17	.5	.18
44 SM_N	.64	.55	.24	.23	.56	.58	.39	.43	.25	.63
45 SC_N	.136	.91	.43	.48	.99	.116	.74	.86	.40	.132
46 EU_N	.117	.77	.36	.37	.87	.102	.64	.74	.35	.113
47 TB_N	.66	.43	.27	.21	.46	.59	.36	.43	.18	.63
48 YB_N	.93	.67	.32	.33	.72	.82	.59	.67	.28	.91
49 TA_N	.57	.44	.20	.27	.45	.52	.49	.51	.23	.55

	41	42	43	44	45	46	47	48	49
	DY_N	LA_N	ND_N	SM_N	SC_N	EU_N	TB_N	YB_N	TA_N
1 S102X	-.3417	-.1428	-.1179	-.1096	-.4065	-.0581	-.0393	-.0702	-.0008
2 AL203X	.0802	-.0545	.1355	.0445	.4097	-.1826	-.1786	-.2081	.0546
3 T-Fe203X	.1726	.0844	-.0795	.0381	.1611	.0305	.0788	-.0466	.0041
4 FeOZ	.4439	.2140	.1202	-.1509	.1631	.1949	.2631	.0007	-.2478
5 MgOZ	.3289	.0511	.3043	.1308	.2636	.0990	.0578	-.0249	-.1321
6 CaOZ	.1062	.1250	-.2668	-.0766	-.0604	.0935	.0334	-.0370	.3409
7 K2OZ	-.2675	-.1542	-.1722	-.1492	.0632	-.2689	-.2565	-.1946	.0486
8 FZ	.5944	.0873	.3764	.0978	.1340	.1805	.0695	-.0345	.0681
9 B	.0282	-.0187	-.1959	-.0578	.0094	-.0815	-.0265	-.0811	.4007
10 BA	.3549	-.0354	-.2152	-.0892	.0870	-.0859	-.0763	.0051	.0346
11 BE	.5820	.1545	.4126	.0937	.2141	.0954	.0376	.0357	.1127
12 CO	.2449	.2394	.6020	.0823	.3542	.0242	-.0285	-.0407	.0735
13 CR	.0832	.2175	.2460	-.0373	.3758	.0501	.0297	-.1682	-.1146
14 CU	-.1373	.0826	.4038	-.0946	-.0072	.0928	.1034	.1518	-.1344
15 LI	.4974	.1211	.4697	.2216	.4001	-.1777	.1620	-.1276	-.0300
16 MN	.8416	.1509	.0719	-.0075	.0213	.1751	-.1316	.3482	.1518
17 NA_N	.3429	.0326	-.2281	-.0661	.2844	.0456	.0742	.2958	.3211
18 NI	.2172	.1647	.4865	.3014	.4298	.0927	.0271	.0472	-.0955
19 P	.0729	.1001	-.2498	-.0640	-.0544	.0119	-.0403	-.0323	.3681
20 PB	.6596	.6558	.3574	.1084	.5940	.4900	.5819	.6379	.2361
21 SC	.8441	.5923	.4419	.1007	.8657	.4301	.5316	.5219	.1434
22 TH	.9221	.7281	.3578	.3163	.5473	.6354	.6814	.6655	.1042
23 TI	.2507	.2210	.4407	.1637	.6073	.0202	-.0216	.0529	-.2236
24 V	.2028	.2763	.4088	.2366	.6735	.1700	.1205	.1409	-.0703
25 Y	.8458	.7098	.5461	.1804	.5653	.7692	.8413	.8055	.2539
26 ZN	.0964	.1015	.1289	-.0448	.1523	.1984	.1717	.1167	-.1580
27 ZR	.0200	.1174	.3321	-.0043	.3751	-.0033	-.1093	.0734	-.2704
28 SR	.2223	.2508	-.0826	.1295	.1561	.0078	-.0706	.1845	.2767
29 CE	.3704	.3193	.4153	.0317	.1818	.0255	-.0397	.0322	-.0683
30 CL_N	.7754	.1682	.15	.0062	-.0312	.3703	.4208	.0649	-.0279
31 U_NT	.9247	.7826	.4045	.1206	.5899	.7704	.8587	.7998	.2737
32 GA_N	.0181	.0324	.3421	.1154	.1681	-.0430	.1833	-.0731	-.0573
33 AS_N	.5583	.6573	.5159	-.0406	.3009	.2886	.3090	.6151	-.0807
34 BR_N	.7615	.3913	1.0000	.4716	.1614	.2813	.2671	.2975	.3648
35 W_NT	-.0737	.0098	.0647	-.0678	.1348	-.0998	.0709	.1677	.5605
36 AU_N	.6671	.5472	.6394	-.0309	.3979	.4680	.5002	.4779	.1225
37 RB_N	-.3068	-.0043	-.2166	.1563	.0257	.0161	-.0977	.1105	.1635
38 CS_N	-.0930	-.0449	-.1917	.0179	.1073	.1420	.1405	.1768	.4003
39 CE_N	.9556	.7040	.9721	.8265	.5027	.6456	.8219	.6072	.0738
40 TH_N	.1898	.1107	.2311	.0549	.3758	.0501	-.0297	-.0187	-.1389
41 DY_N	36.2633	.7504	1.0000	.0189	.4724	.6247	.7970	.7136	.2789
42 LA_N	.29	56.7674	.5146	.3719	.4724	.6247	.7970	.7031	.2920
43 ND_N	.2	.19	506.6968	.4311	.4394	.4774	.3164	.9132	-.0878
44 SM_N	.4	.63	.16	38.9729	.1768	.7581	.2181	.2180	.6612
45 SC_N	.29	.135	.19	.63	9.7072	.4868	.5882	.6233	.0581
46 EU_N	.27	.116	.17	.55	.116	3.1889	.9061	.8337	.1882
47 TB_N	.17	.65	.12	.34	.66	.62	2.4717	.8516	.4808
48 YB_N	.22	.92	.17	.49	.92	.84	.55	3.4620	.6027
49 TA_N	.8	.57	.12	.32	.57	.49	.30	.48	2.1137

TABLE 3, CONTINUED

Variable

Factors

	1	2	3	4	5	6
21SC	1.00000	-.00000	.00000	-.00000	-.00000	-.00000
31U_NT	.96801	-.09755	.02534	.05211	.19742	.15645
22TH	.95763	.02417	-.23061	-.03198	.14479	.08488
25Y	.93513	.06132	-.31792	.06572	.20380	.16111
17NA_N	.86592	.00593	.11416	.07091	.33519	-.55313
20PB	.81001	.08977	-.12862	-.04445	.16675	.12978
45SC_N	.73855	-.15353	.38303	-.26029	-.02052	.21876
47TB_N	.70324	-.06506	-.38152	-.35545	.37275	.29056
48YB_N	.66942	-.27380	-.21284	-.20851	.37329	.37723
36AU_N	.55129	-.11402	-.50840	.03513	-.10105	.29698
42LA_N	.53030	-.05917	-.26490	.04251	.12514	.44243
46EU_N	.52816	-.01180	-.34903	-.25292	.37463	.39217
33AS_N	.49268	-.34940	.38496	-.01313	-.11008	.20718
5MgOX	-.00000	1.00000	-.00000	-.00000	-.00000	.00000
4FeOX	.30006	.94024	-.14167	-.15215	-.18168	-.25515
26ZN	.12079	.70770	-.19451	-.09022	.17382	-.16949
12CO	.07215	.70750	.24639	-.12094	-.04588	.12030
6CaOX	-.02114	.68607	-.55264	.42229	.33460	-.30468
3T-Fe2O3X	.29736	.68111	-.08044	-.18075	-.00160	-.26548
16MN	.13762	.65633	-.52692	.27815	.27943	-.21144
18NI	.01048	.62532	.29672	-.16361	-.09071	.29429
8FX	.34903	.50770	-.17504	.47897	.16296	-.21007
15LI	-.01129	.40281	.35227	.00591	-.01486	.35489
10BA	.20580	-.60133	.40132	.45198	-.09213	-.06237
1S1O2X	-.28146	-.81556	-.27530	-.04358	-.11500	.21819
37RB_N	.27801	-.86458	.65842	-.20603	.37149	-.18674
7K2OX	.00810	-.90390	.87001	.07384	.01858	-.11010
2Al2O3X	.00000	-.00000	1.00000	-.00000	-.00000	.00000
23TI	.31065	-.25079	.83117	.09313	-.25040	.19322
38CS_N	.20897	-.43968	.47763	-.07006	.58077	-.23553
27ZR	.02389	-.21558	.62325	.28855	-.39986	.23285
40TH_N	.35449	-.12787	.57001	-.27554	-.14857	-.01826
35W_NT	.14744	-.21217	.53102	-.23369	.48827	-.13769
24V	.30255	.20084	.47187	-.15494	-.08962	.25584
32GA_N	.07708	-.08096	.40816	-.28821	-.07351	.19861
30CL_N	-.26884	.19321	-.68907	.34139	.02815	.55513
28SR	.00000	.00000	.00000	1.00000	.00000	-.00000
29CE	-.18450	.25788	-.16884	.96718	-.27425	.23003
19P	-.11052	.50562	-.46963	.82670	.13419	-.14064
13CR	-.00041	-.02788	.38226	.57154	-.32179	.24127
9B	-.17565	-.00903	.13450	.52001	.21798	-.06971
11BE	.11971	.12313	.38109	.39549	.13522	.13148
49TA_N	-.00000	-.00000	.00000	-.00000	1.00000	.00000
44SM_N	-.16214	-.00536	.18572	-.31892	.65148	.49670
14CU	-.05362	-.10547	.04083	-.07222	.26451	.09425
43ND_N	-.00000	-.00000	-.00000	.00000	-.00000	1.00000
39CE_N	.27405	-.23478	-.06957	-.34008	.40691	.76367
34BR_N	-.20614	.09766	-.32525	.16158	.39893	.72417
41DY_N	.51517	.27814	-.55612	.35977	.11141	.56361

Table 4.--Factor matrix for ore-bearing samples. This six factor oblique projection model contains 68.0 percent of the total compositional information. Number of samples = 221, number of variables = 49.

The apparent absence of a clear uranium-major element association is perplexing and unexpected as many observers have noted a consistent association of uranium with chloritic-altered schists. This dataset comprises mixed lithologies, hence there is high chemical variance that probably complicates the statistical computations. Other subsets, described ahead, show clearer major element trends. The negative associations of Si and K with U probably relate to alteration such as chloritization. The apparent independence of U relative to major elements such as Al, Mg, and Ca presumably is the statistical expression of the geologic observation that many chloritic rocks contain very little uranium, and that some of the units which are essentially always barren, like the dolomite and magnesite marbles, are very high in Mg and Ca. Computations on subsets composed of ore-bearing vs. barren pelitic lithologies using student t-tests on the mean of each population show that, at the 99 percent confidence level, the ores contain significantly more Mg, reflecting the formation of chlorite, and less Ca, probably reflecting the destruction of plagioclase, than do the barren pelites.

A few brief comments can be made on the factor analysis results (table 4). Factor 2 appears to reflect chiefly chlorite and elements contained in it. The presence of Co, Ni, and Zn in the "chlorite factor" is unusual as they usually are in a group of chalcophile elements. The negative loadings of Ba, Si, Rb, and K suggest that these elements are removed when Mg-Fe-etc. are added, as would be consistent with petrographic evidence for chlorite replacement of feldspars and biotite. Factor 3 with Al, Ti, Cs, Zr, Th, W, V, and Ga seem to be a group largely explained by clay minerals, possibly with adsorbed constituents, characteristic of pelitic rocks. Factor 4 is somewhat of an artificial mix of elements, judging by the observations that with more factors the group splits apart, and some of the elements have low communalities. Factors 5 and 6 are probably explained by crystal-chemical properties of similar elements, but the mineralogical residence is not known. Cu and Br have low communalities, which mean they are essentially forced onto these factors but would be on other factors if the model had more.

Barren Samples

A subset of 224 samples containing less than about 250 ppm U based on field measurements of radioactivity constitutes a dataset complimentary to the ore set previous discussed. The subset contains samples from all 14 types of

lithology, and includes fresh as well as altered rocks. There is some uranium enrichment in these "barren" rocks, but by position and grade they contrast with ore. The correlation matrix for 50 elements in 221 samples is in table 5, and the factor analysis of this matrix is in table 6. Uranium has significant positive correlation with Co, Ni, Pb, Th, V, Y, Zn, Au, Nd, Sc, Eu, Tb, and Yb. As mentioned before, the INAA determinations may be influenced by uranium to produce an artificial correlation. Multiple regression tests with U as the dependent variable did not work well, probably because of the generally low association of elements with U. A test with 27 elements on 101 of 221 samples (the others were eliminated because of qualified data) resulted in four elements (La, P, Cu, and Ce) explaining 48 percent of the variance in U (not a good regression). The regression weights are: Ce, 1.00; Cu, -0.58; La, 0.32; and P, 0.30. Factor analysis (table 6) produced a factor that contained uranium along with Nd, Tb, Eu, Y, Pb, Yb, Au, and P. These elements, with the exception of Nd, P and Zn, are also statistically associated with U in the ore-bearing samples. Because we cannot objectively specify how much uranium was originally in the rocks, and how much uranium and other elements was introduced, we cannot make more specific comments about the behavior of uranium-associated elements in these rocks. One interpretation based on the element associations is that they reflect introduction of small amounts of uranium and other metals because the associations resemble those in ore-bearing rocks. Another interpretation is that the element associations reflect behavior during sedimentation or diagenesis.

The factor analysis (table 6) shows associations that are both similar and dissimilar to those of the ore-bearing dataset. Factor 2, headed by Al, carries Ti, V, and Ga, but also contains Fe, Be, Co, Zn, Cr; this suite possibly reflects pre-metamorphic clays and adsorbed elements. Factor 3 appears to reflect "carbonate" minerals; the association of Cl and Br with Ca here and in tests on marble samples, suggests the association may reflect carbonate diagenesis. Factor 4 may reflect elements occurring together in heavy minerals. Factor 5 seems to reflect elements found in feldspars plus some elements with low communalities that do not fit any factor very well. In a 7 factor model, Mg emerges as the end member of a factor with strong negative loadings of Ca, Sr, and Co, an inverse relationship that may relate to the presence and absence of magnesite.

	1	2	3	4	5	6	7	8	9	10
	SiO2X	Al2O3X	T-Fe2O3X	FeOx	MgOx	CaOx	K2Ox	FX	B	BA
1 SiO2X	23.5023	.3185 *	-.2233 *	-.3314 *	-.8210 *	-.6638 *	.4153 *	-.4967 *	.0195	.3054 *
2 Al2O3X	224	6.3039	.1181	.3389 *	-.3493 *	-.5336 *	.4810 *	.2873 *	.2261 *	.2844 *
3 T-Fe2O3X	224	224	6.6046	.1444	.0228	-.0737	-.1838	.3443 *	-.1938 *	-.0796
4 FeOx	79	79	79	2.1900	.4149 *	-.0427	-.2921 *	.3671 *	-.2941 *	-.1171
5 MgOx	224	224	224	79	10.2270	.2964	-.6094 *	.4612 *	-.0643	-.4797 *
6 CaOx	224	224	224	79	224	7.5461	-.2603 *	.0852	-.0684	-.1412
7 K2Ox	224	224	224	79	224	224	2.1391 *	-.1459	-.0723	-.6473 *
8 FX	72	72	72	72	72	72	72	.0649	.0353	-.1712 *
9 B	150	150	150	60	150	150	150	56	131.0747	-.2187 *
10 BA	217	217	217	78	217	217	217	72	150	220.2072
11 BE	207	207	207	77	207	207	207	72	150	205
12 CO	198	198	198	73	198	198	198	67	136	195
13 CR	207	207	207	73	207	207	207	68	142	205
14 CU	217	217	217	78	217	217	217	71	146	212
15 LI	222	222	222	79	222	222	222	72	150	217
16 MN	222	222	222	79	222	222	222	72	150	217
17 NA_M	193	193	193	72	193	193	193	68	142	191
19 NI_M	214	214	214	78	214	214	214	71	144	209
20 P	212	212	212	77	212	212	212	71	147	208
21 PB	136	136	136	53	136	136	136	46	106	135
22 SC	213	213	213	77	213	213	213	71	147	208
23 TH_M	170	170	170	67	170	170	170	61	126	167
24 TI	218	218	218	77	218	218	218	71	150	216
25 V	212	212	212	77	212	212	212	70	143	208
26 Y	216	216	216	77	216	216	216	70	145	211
27 ZN	210	210	210	78	210	210	210	72	149	207
28 ZR	209	209	209	76	209	209	209	72	146	207
29 SR	222	222	222	79	222	222	222	72	150	217
30 CE	123	123	123	47	123	123	123	43	86	122
31 CL_M	155	155	155	57	155	155	155	52	114	153
32 U_NT	222	222	222	79	222	222	222	72	150	217
33 GA_M	137	137	137	57	137	137	137	52	101	134
34 AS_M	32	32	32	12	32	32	32	9	23	32
35 BR_M	122	122	122	37	122	122	122	35	78	118
36 W_NT	123	123	123	45	123	123	123	40	77	119
37 AU_M	136	136	136	43	136	136	136	39	88	131
38 RB_M	125	125	125	54	125	125	125	53	104	125
39 CS_M	157	157	157	64	157	157	157	62	122	156
40 CE_M	179	179	179	68	179	179	179	63	119	176
41 TH_M	217	217	217	77	217	217	217	71	148	212
43 LA_M	219	219	219	78	219	219	219	71	147	214
44 ND_M	39	39	39	18	39	39	39	17	25	39
45 SM_M	171	171	171	58	171	171	171	53	109	166
46 SC_M	222	222	222	79	222	222	222	72	150	217
47 EU_M	192	192	192	71	192	192	192	65	126	187
48 TB_M	76	76	76	31	76	76	76	27	50	73
49 YB_M	128	128	128	48	128	128	128	43	79	124
50 TH_M	44	44	44	29	44	44	44	28	29	43
51 YA_M	121	121	121	58	121	121	121	55	94	120

Table 5.--Correlation matrix for barren samples. Number of samples = 221, number of variables = 49. *, correlation coefficient is significant at the 95 percent level of confidence. The upper half of the matrix contains the correlation coefficients, the lower half contains the number of valid sample pairs, and the diagonal contains the standard deviation of the variable for the valid pairs.

	11	12	13	14	15	16	17	19	20	21
	BE	CO	CR	CU	LI	MN	NA_M	NI	P	PB
1 S102X	-.0621	-.1753	.1579	-.0995	-.0244	-.5879	.2134	-.0436	-.1406	-.0103
2 AL2O3X	.4024	.4339	.3274	-.1172	.4680	-.4494	.1520	.4385	-.0886	-.0177
3 T-Fe2O3X	-.1044	-.3792	-.1421	-.0019	.1108	-.0034	-.0457	-.2354	-.1146	-.0512
4 FeOZ	-.1072	.8280	-.1701	-.0904	.3693	-.0038	-.0628	-.4684	-.1373	-.0103
5 MgOZ	-.1080	-.1994	-.1794	-.0695	-.1993	.5036	-.3994	-.2263	-.0586	-.0787
6 CaOZ	-.1871	-.1798	-.2124	-.0419	-.2771	.4220	-.0479	-.2887	-.3744	-.0517
7 K2OZ	-.0351	-.3271	-.1533	-.0701	-.2276	-.1866	-.4199	-.3569	-.1025	-.1492
8 FX	.6956	.2433	-.1008	-.0573	.3934	-.0327	-.0044	-.3049	.4450	-.0605
9 B	.2305	-.0975	-.0841	-.0600	-.1833	-.2006	-.1264	-.0066	-.1242	-.1181
10 BA	-.1463	-.2743	-.0137	-.0493	-.0327	.0550	-.6136	-.3428	-.0949	-.0655
11 BE	2.8371	.2382	.0830	-.0567	-.4762	-.1957	-.0464	.3126	-.0392	.0287
12 CO	189	14.1556	.1551	-.0336	.3627	-.1440	.7186	.1886	-.0503	-.1832
13 CR	197	191	82.0855	-.0644	.1185	-.2037	-.1426	.2128	-.0191	.0723
14 CU	202	202	202	1256.1970	-.0491	-.0290	-.0404	-.0434	-.0139	.0622
15 LI	207	198	207	217	72.9565	-.2370	-.2426	.5338	-.0558	-.0753
16 MN	207	198	207	217	222	483.9580	.1232	-.2851	-.0888	-.0748
17 NA_M	184	171	181	189	193	6759.5680	1232	-.2900	-.0623	-.0748
18 NI	199	197	203	209	214	185	184	45.6242	-.0066	.2456
19 NI	200	190	198	207	212	212	184	8239.7500	.0078	76.6807
20 P	132	120	127	134	136	136	118	129	129	131
21 PB	201	193	204	208	213	213	152	167	162	114
22 SC	163	153	165	168	170	170	190	210	209	135
23 TH	206	196	207	213	218	218	184	208	202	129
24 TI	199	198	204	207	212	212	187	208	206	135
25 V	201	192	201	212	210	210	187	202	205	135
26 Y	202	191	198	206	209	209	184	202	203	129
27 ZN	200	188	200	204	209	209	184	202	205	135
28 ZR	207	198	207	217	222	222	193	214	212	119
29 SR	207	198	207	217	222	222	105	121	119	87
30 CE	120	114	122	120	123	123	105	121	119	88
31 CL_M	145	141	144	151	155	155	144	152	142	136
32 U_NT	207	198	207	217	222	222	193	214	212	134
33 GA_M	134	132	131	135	137	137	124	137	133	79
34 AS_M	31	29	31	31	32	32	28	31	30	18
35 BR_M	111	108	110	119	122	122	109	119	113	61
36 W_NT	113	116	118	122	123	123	103	121	116	72
37 AU_M	125	125	125	132	136	136	118	133	127	69
38 RB_M	123	108	117	124	125	125	122	119	122	89
39 CS_M	154	139	148	153	157	157	153	151	153	96
40 CE_M	166	161	167	175	179	179	159	173	171	104
41 TH_M	204	194	206	212	217	217	190	210	207	133
43 LA_M	204	196	205	214	219	219	190	212	209	134
44 ND_M	38	36	39	38	39	39	37	39	38	22
45 SM_M	157	155	162	167	171	171	147	167	162	99
46 SC_M	207	198	207	217	222	222	193	214	212	136
47 EU_M	178	170	180	188	192	192	164	186	184	115
48 TB_M	49	65	73	75	76	76	65	75	74	52
49 YB_M	117	112	122	126	128	128	110	123	121	78
50 TH_M	43	39	41	43	44	44	39	43	44	28
51 TA_M	120	110	115	119	121	121	113	117	119	77

	22	23	24	25	26	27	28	29	30	31
	SC	TH	TI	V	Y	ZN	ZR	SR	CE	CL_M
1 S102X	.0536	-.1688	.0804	.0541	-.0827	-.0858	.2643	-.0937	.1535	-.5879
2 AL2O3X	.4452	.3016	.3852	.5253	-.0457	.2816	.4233	-.1488	-.4758	-.1483
3 T-Fe2O3X	-.2669	-.0087	-.1444	.3456	.0832	.2829	-.0299	.0057	-.0150	-.1386
4 FeOZ	-.0189	-.0589	-.1776	.2501	-.0544	.3971	-.2235	-.0549	-.0701	-.3420
5 MgOZ	-.2277	-.2493	-.2167	-.1097	-.0636	.0759	-.3375	-.2833	-.1235	-.7746
6 CaOZ	-.0957	-.2009	-.1248	-.2206	-.1976	-.1040	-.2845	-.0813	-.1418	-.2535
7 K2OZ	-.2846	-.4685	-.2909	.0707	.0315	-.1707	.4577	.3495	-.0473	-.4936
8 FX	-.0742	-.0242	-.0638	-.1243	-.0318	-.1827	-.2446	-.1428	-.2069	-.1005
9 B	-.2062	-.0624	-.1473	-.1493	-.1426	-.2042	-.0509	-.0450	-.1080	-.1916
10 BA	-.1843	-.4117	-.2392	-.0888	.2309	.0287	.4259	.7443	-.0998	-.0937
11 BE	-.1006	-.0677	.0998	.2253	-.1553	.1031	-.0833	-.1293	-.0374	-.1382
12 CO	.2096	-.0907	.1715	.5405	-.0330	.4573	-.0119	-.1206	.0813	-.2258
13 CR	.6223	-.0844	.5335	.5699	.0442	.1148	.2409	-.0086	.2223	-.0471
14 CU	-.0523	-.0393	-.0418	.0582	-.0016	.0030	.0068	-.0473	-.0287	-.1368
15 LI	.0214	-.0526	.0187	-.1798	-.1371	-.1743	-.0317	-.1890	-.1246	.5069
16 MN	.0296	-.1288	.0108	-.2008	-.0949	-.0368	-.1976	-.1137	-.0093	.2322
17 NA_M	.0608	-.1057	-.1802	-.0538	-.1597	.0648	-.0581	-.0560	-.0166	-.2183
18 NI	.1091	-.1638	.0354	.4704	-.0844	.3634	-.0539	-.0783	-.0300	-.0738
19 NI	.0506	-.0177	-.0446	-.0057	.5613	.0539	-.0560	-.2523	-.0480	-.0424
20 P	.0155	-.1135	-.0578	.1852	.3885	.2251	-.2224	-.0361	-.1112	-.0623
21 PB	5.5001	.0716	-.7977	-.7220	.2636	.2224	.3361	-.2434	.0443	-.1914
22 SC	168	168	167	.0098	.3422	.0699	.7406	.1932	.2825	-.0302
23 TH	210	9.0534	168	1964.2270	.6683	.2069	.2488	.3931	.3126	-.1665
24 TI	206	166	209	64.9587	.1190	.4204	.2068	.0112	.0459	.2073
25 V	207	166	212	206	206	8.2858	.1564	.1421	.3050	.1260
26 Y	205	166	208	201	204	48.3767	.0572	.0860	.0649	-.4883
27 ZN	205	166	208	201	203	203	58.8177	.2354	.4883	-.693
28 ZR	213	170	218	.712	216	210	209	5.9701	.3515	-.1744
29 SR	122	105	123	.22	118	141	146	105.3363	.74	268.2783
30 CE	149	120	152	150	150	147	155	123	123	155
31 CL_M	213	170	218	212	216	210	209	222	123	115
32 U_NT	137	106	135	136	134	134	133	137	67	28
33 GA_M	31	23	32	31	32	31	29	32	18	103
34 AS_M	115	89	119	114	120	110	111	122	42	89
35 BR_M	119	94	120	122	122	113	113	123	56	109
36 W_NT	129	96	132	131	134	125	124	136	89	82
37 AU_M	122	106	125	117	121	124	123	125	96	113
38 RB_M	153	127	156	149	152	154	154	157	110	123
39 CS_M	172	136	177	171	173	169	168	179	123	153
40 CE_M	212	170	214	208	211	206	207	217	122	135
41 TH_M	210	168	215	210	213	207	206	219	122	26
43 LA_M	38	34	39	38	38	37	38	39	105	116
44 ND_M	166	129	168	166	165	161	161	171	123	155
45 SM_M	213	170	218	212	216	210	210	192	114	129
46 SC_M	185	148	189	184	187	180	181	192	76	42
47 EU_M	75	65	74	73	76	74	71	76	51	77
48 TB_M	124	104	125	122	125	120	120	128	83	28
49 YB_M	43	33	44	42	44	43	44	44	32	77
50 TH_M	119	101	119	117	117	120	118	121	69	87

TABLE 5, CONTINUED

	32 U_NT	33 GA_N	34 AS_N	35 BR_N	36 V_NT	37 AU_N	38 RB_N	39 CS_N	40 CE_N	41 TH_N
1 S102X	-.0044	-.0734	-.0317	-.4773	-.0065	.1665	.2051	.0939	.1029	-.1961
2 AL203X	-.0573	-.1343	-.0588	-.4271	-.0263	-.0115	.3094	-.1667	-.2472	-.3759
3 Y-Fe2O3X	.0809	.0333	.1367	-.2645	.2266	.0228	-.0355	-.0458	-.0409	.0505
4 FeOx	.0086	.0594	-.1657	-.0742	-.0352	-.2049	.0973	-.0025	-.0302	-.0067
5 MgOx	.0345	.0732	-.1966	.2015	-.1141	-.2334	-.5017	-.1869	-.1355	-.2482
6 CaOx	-.0507	-.0190	-.0483	.7180	.0321	-.0370	-.1029	-.0401	-.1443	-.2381
7 K2Ox	-.0959	.0330	.1131	-.2350	-.1296	.1150	.6890	.2867	.1768	-.4216
8 Fz	.1644	.6586	-.4110	.1899	.0919	-.2042	.0216	-.0081	-.1783	-.1204
9 B	-.0697	.0533	-.1788	-.1575	-.0211	.0606	-.1846	.0206	.0583	-.1101
10 BA	-.0380	-.0249	-.1568	-.2177	.1556	-.0101	.4544	.0927	.2350	-.4124
11 BE	.0107	.8163	-.1255	-.1279	.0145	-.0463	-.0108	.1202	-.0613	-.0158
12 CO	.1715	.0586	.2588	-.1889	-.0045	.0090	-.0695	-.1395	-.1107	-.0372
13 CR	.0340	-.0105	-.0293	-.2125	-.0070	.1317	-.0601	-.0219	.0862	-.0109
14 CU	.0312	-.0137	.6175	.1375	-.0130	.2294	-.0688	-.0254	.0048	-.0418
15 LI	.0418	-.1710	-.1541	-.1011	-.0575	-.1011	-.3433	-.0497	-.0076	-.0626
16 MN	-.0694	-.0437	-.0166	-.3042	-.0202	-.0250	-.1033	.0129	-.0602	-.1940
17 NA_N	-.0466	-.0429	.0546	-.0295	.2143	-.0806	.4323	-.2365	.0915	.0600
19 NI	.1670	.0228	-.0092	-.2340	-.0962	-.0776	-.3297	-.1733	.0015	-.0458
20 P	.0340	.0068	.0673	-.1420	.0279	.0640	-.0566	-.0705	-.0087	-.0542
21 PB	.8113	.0406	-.0605	.2363	-.0686	.2030	-.0334	-.1255	.0636	.0184
22 SC	.1187	.0254	-.0598	-.1644	.0953	.4391	-.0292	.0065	.1633	.0863
23 TH	.1783	-.0315	-.0912	-.1871	.0532	.2087	.3462	-.0278	.3111	.8709
24 TI	.0056	.0691	-.0281	-.1735	.0064	.3043	.0201	.0341	.1392	.1221
25 V	.2341	.0099	-.0134	-.2807	-.0241	.3353	-.0060	.0120	.0860	.0329
26 Y	.3553	-.0474	.0426	.1840	.0197	.2563	.1951	-.0816	.1902	.1557
27 ZN	.2531	-.0010	-.0698	-.2355	.0077	.0648	.0934	-.0028	.1633	.0562
28 ZR	-.0719	-.0711	.2473	-.2884	.1656	-.0058	.0892	-.1045	.5582	.8096
29 SR	-.0810	-.0756	.0629	.1478	.1531	-.0508	.2034	.0492	.4054	.2007
30 CE	-.0681	-.1879	-.1312	-.1533	.0752	-.0793	-.0104	-.1721	-.0091	.3614
31 CL_N	-.0757	-.0632	-.0400	-.0755	-.0725	-.0094	-.0091	-.1614	-.0427	-.2590
32 U_NT	507.2310	-.0207	-.0402	.0775	-.0261	.3062	-.0479	-.0549	.1006	.0342
33 GA_N	137	356.9180	-.0990	.0280	.1927	-.0281	-.0932	-.0339	-.0502	.0118
34 AS_N	32	26	11.2579	.4821	.4144	.0994	.6262	.3108	.2313	.0558
35 BR_N	122	90	19	3.3688	.1911	.0025	-.2199	-.2211	-.0568	-.2012
36 U_NT	123	92	22	76	33.2504	-.0419	.0038	.0776	.1262	.1405
37 AU_N	136	100	26	99	87	.2746	.0911	.0077	-.0266	-.0242
38 RB_N	125	75	17	52	57	55	77.8731	.4994	.0221	.2356
39 CS_N	157	101	23	81	78	88	119	5.0574	-.0964	-.0742
40 CE_N	179	109	23	99	99	105	114	137	89.3272	.4676
41 TH_N	217	136	31	120	121	132	125	155	176	13.6705
43 LA_N	219	136	32	122	123	135	122	154	178	214
44 ND_N	39	22	3	18	16	22	28	30	37	39
45 SM_N	171	106	2	93	97	103	96	120	150	169
46 SC_N	222	137	32	122	123	136	125	157	179	217
47 EU_N	192	117	28	104	112	114	111	135	161	190
48 YB_N	76	37	8	34	42	36	45	53	68	76
49 YB_N	128	67	15	63	73	68	79	94	115	127
50 TH_N	44	29	4	25	21	24	33	37	41	44
51 YA_N	121	86	18	62	66	69	85	103	99	119

	43 LA_N	44 ND_N	45 SM_N	46 SC_N	47 EU_N	48 TB_N	49 YB_N	50 TH_N	51 YA_N
1 S102X	-.0669	-.1017	-.0576	-.0110	-.0475	-.0558	-.1262	-.2173	-.1128
2 AL203X	.1280	.0779	.1477	.5831	.0879	.1793	.3418	.5264	.1089
3 T-Fe2O3X	-.0028	.1952	.0624	.2737	.5166	.3611	.2418	.3356	.2603
4 FeOx	-.0901	.0324	.0692	.1538	.1209	.1987	.0968	.2093	.3949
5 MgOx	-.0670	-.0217	-.0931	-.1098	-.0595	.0026	-.1330	-.1901	.1606
6 CaOx	-.0929	.1579	-.1025	-.1872	-.0300	.0105	-.1869	-.2125	-.0851
7 K2Ox	-.0600	-.0687	.1883	-.1493	-.0625	-.1128	.0747	-.0192	-.2253
8 Fz	-.2008	-.0431	-.0930	-.0269	-.0164	-.0157	.0804	.2062	.1573
9 B	-.1024	-.0728	.0773	-.1454	-.0885	-.0281	-.0614	.2158	.1934
10 BA	-.1003	.0213	.1206	.0876	.0667	-.1069	.2397	.0474	-.2107
11 BE	-.0514	.0604	-.1091	.1958	-.0726	.0633	.1044	.5677	.2475
12 CO	-.0368	.2269	.0005	.4322	-.1801	.4554	.2194	.4037	.3364
13 CR	.2351	.0621	.0572	.5782	.1335	.1571	.1698	.1810	-.1633
14 CU	-.0317	-.0534	.0695	-.0594	-.0144	.0873	.0182	-.1329	-.0406
15 LI	-.0372	.0099	-.0608	.1760	-.0105	.1560	.1847	.3208	-.1753
16 MN	-.0619	-.1408	-.0599	-.0789	-.0864	-.2276	-.1466	-.4032	-.1048
17 NA_N	.0045	-.0825	.0664	.0229	.1287	-.1823	.0203	-.1294	-.1647
19 NI	-.0086	.1678	-.0328	.3446	.1360	.3728	.3677	.5861	.1019
20 P	.0079	.3582	.0319	.1183	.4315	.418	.1697	.3142	.0493
21 PB	.0490	.9289	.0976	.0690	.4888	.5936	.5733	.0358	-.1083
22 SC	.1096	.4462	.0456	.8464	.1489	.2927	.3154	.2548	-.1622
23 TH	.2254	.3959	.2389	.0707	.1441	.2828	.2567	.1618	-.1620
24 TI	.0478	.0759	.0293	.7562	.0756	.1522	.1958	.1446	-.2291
25 V	.0790	.4288	.0208	.8337	.2669	.3945	.3028	.4292	-.0730
26 Y	.1553	.7751	.4042	.2580	.4307	.5594	.4742	-.1204	-.2880
27 ZN	.1177	.5518	-.0474	.4225	.2348	.2874	.2831	.2567	.0210
28 ZR	.4023	.0584	.3360	.3156	.0462	.1020	.1639	.2185	-.2959
29 SR	.3348	.0107	.2151	.1563	.1322	-.0746	.1057	.0214	-.1589
30 CE	.9645	.0586	.4564	.0099	.0527	-.0325	-.1438	.1200	-.2154
31 CL_N	-.1278	-.2082	-.1078	-.1719	-.0648	-.2223	-.2185	-.3057	.0432
32 U_NT	.0291	.9151	.0421	.1776	.5604	.6489	.5227	.0807	-.0459
33 GA_N	-.0381	.0346	.2489	.0505	-.0460	.2193	.3144	.6663	.2657
34 AS_N	.0850	-.2569	.4939	.0443	.0787	-.0981	-.0643	-.2729	-.1574
35 BR_N	.1218	-.1600	.1652	-.2401	.0277	-.2410	-.2031	-.2231	.1321
36 U_NT	-.1027	-.1328	.4663	.0157	.0672	-.0994	.0683	.3560	.2921
37 AU_N	-.0187	.6803	.0612	.2628	.2048	.3524	.2129	-.1325	-.0900
38 RB_N	-.0722	-.0464	-.0258	-.0671	-.0117	.0360	.0552	-.0029	-.0700
39 CS_N	-.1188	-.2549	-.0579	.0314	-.1607	-.1105	-.0591	.0150	.1061
40 CE_N	.8290	.1063	.4673	.1808	-.2126	-.2277	.0770	.0441	-.1689
41 TH_N	.3087	.0427	.3028	.1342	.1097	.1764	.1812	.1755	-.2260
43 LA_N	89.2082	.1284	.4791	.1241	.1632	.2089	-.0242	-.0164	-.1391
44 ND_N	39	393.2930	.2910	.4024	.9411	.9257	.8497	.4912	.1208
45 SM_N	171	33	5.6697	.0596	.2386	.2917	.1657	.0022	-.1683
46 SC_N	219	39	171	7.6873	.3208	.5129	.4470	.3299	-.1343
47 EU_N	191	36	150	192	1.1504	.6423	.4842	.0191	-.2047
48 YB_N	76	17	60	76	74	.7005	.5758	.5718	.1530
49 YB_N	127	29	105	128	120	64	1.0013	.8398	.0767
50 TH_N	44	15	36	44	42	22	31	1.0912	.4594
51 YA_N	119	26	85	121	107	48	72	31	2.6889

TABLE 5, CONTINUED

Variable	Factors				
	1	2	3	4	5
42ND_N	1.00000	.00000	.00000	.00000	-.00000
46TB_N	.76497	.29194	-.00149	.08682	-.23864
45EU_N	.76270	-.02721	.18984	.16298	.09508
25Y	.75231	-.17556	.45460	.22563	.44120
31U_NT	.69189	-.13105	-.09812	-.03164	-.06983
20PB	.67316	-.21453	-.12344	-.01860	-.13776
47YB_N	.63717	.41822	.04148	-.06513	-.02357
36AU_N	.49698	-.17438	-.07008	-.29127	.42275
19P	.34319	.11649	.29508	.01144	-.08355
2A1203%	.00000	1.00000	.00000	-.00000	.00000
48TM_N	.11941	.99712	.03152	.00258	-.50019
11BE	-.18785	.97904	.22350	-.13925	-.57712
12CO	.13436	.92737	.19691	.02470	-.73625
24V	.34467	.92254	.21256	-.30165	-.04047
8FZ	-.11023	.91160	.66830	-.10125	-.69980
44SC_N	.41038	.90114	.36528	-.22433	.15876
32GA_N	-.08963	.74580	.40968	.12545	-.42453
4FeO%	-.01048	.74561	.36444	.04943	-.71131
21SC	.38135	.71202	.40642	-.27547	.43162
23TI	.23490	.67062	.42124	-.26440	.53025
3T-Fe2O3%	.22505	.58769	.29102	-.00730	-.27724
26ZN	.32372	.57936	.23214	-.01701	-.21157
13CR	.14259	.50370	-.00083	-.16287	.14228
9B	-.13306	.21110	-.15375	-.09214	-.10537
14CU	.06851	-.21663	-.05053	.06294	.05299
30CL_N	-.00000	.00000	1.00000	-.00000	-.00000
6CaO%	.14886	-.27440	.73607	.01242	.03198
34BR_N	.05109	-.28800	.72345	.25815	-.04380
16MN	.01555	-.17097	.67087	-.02701	.17573
35W_NT	-.03131	.28952	.44381	.35133	.09081
19SiO2%	-.05760	-.28634	-.84409	-.06901	.51720
29CE	-.00000	-.00000	.00000	1.00000	-.00000
41LA_N	.14925	-.05100	.09543	.96133	.03726
39CE_N	.18547	.02903	.12809	.95375	.15458
43SM_N	.25564	-.03205	.25043	.78525	.15334
40TH_N	.12894	.03140	-.07021	.65709	.34077
27ZR	.13889	.10142	-.06289	.62198	.49147
22TH	.30376	-.10977	-.06305	.48644	.47481
7K2O%	.00000	.00000	.00000	-.00000	1.00000
10BA	.12010	-.05264	.22688	.18332	.95138
17NA_N	.04382	.01599	.45763	-.00701	.81610
37RB_N	.05499	-.01263	.21062	-.07443	.79109
28SR	.14662	.12415	.63025	.38183	.71703
33AS_N	.03877	-.16893	.25019	.33942	.38785
38CS_N	-.16090	.14211	.05875	-.31420	.36969
49TA_N	-.19470	.47903	.04511	-.13985	-.64270
15LI	-.13385	.73339	-.08781	-.00719	-.76889
18NI	.06566	.80281	-.14967	-.05677	-.88568
5MgO%	-.09242	.19110	.36018	.07136	-.88583

Table 6.--Factor matrix for barren samples. This five factor oblique projection model contains 51.0 percent of the total compositional information. Number of samples = 221, number of variables = 49.

Upper Mine Sequence

This subset consists of 136 samples of chlorite muscovite schist. This unit is the chief ore host and many of these samples are uranium rich (mean content 1665 ppm U; table 7); a more representative value of 3100 ppm U is given by Eupene (1980). However, this subset is defined by stratigraphy not uranium content.

Correlation analysis (table 8) indicates that 19 elements have significant positive association with uranium: Be, Co, Cr, Li, Ni, Pb, Th (by ICP but not by INAA), V, Y, Zn, Cl, Br, Au, Rb, La, Nd, Sm, Sc, Eu, Tb, and Yb, K have significant negative association. This suite is generally similar to that of the ore-bearing subset and likewise highlighted by REE and Au. Factor analysis of the correlation matrix (table 9) shows that uranium projects strongly (0.91) on factor 1 which also contains Tb, Yb, Y, Eu, Au, Pb, Nd, Th, La, and Ta.

The UMS unit is pervasively chloritized and cut by several generations of chlorite veins (Nash and Frishman, 1982). The major element chemistry and statistical analysis (tables 8 and 9) show that the chloritized schists have lost Si, Ca, Na, and K relative to the precursor biotite schist (see also Nash and Frishman, 1982), and gained Fe and Mg. These trends show up in correlation analysis (table 8) as significant negative correlation coefficients as between Si and total Fe, FeO, and Mg, and opposite loading on factor 3 (table 9).

A possible end member of the chloritization process (or processes) is a dark rock of virtually pure chlorite. Multiple regression of 28 elements against U in 10 samples of chlorite rocks shows that only two elements, Mg and Au, explain 99.9 percent of the variance in U; the regression weights are Mg, 1.00, and Au, 0.05. Very few REE were included in this analysis, which possibly explains their absence from the regression equation. Although the Mg-Au-U association is neat and strong in the chlorite rocks, the general situation is not so simple as statistics and rocks show that there are many Mg-Fe-Al-rich chloritic rocks that contain very little uranium.

Chloritic Marble

A relatively small tonnage of uranium occurs in marble with chlorite bands or beds; the chlorite probably represents both retrograde replacement of

Table 7.--Statistical summary for Upper Mine Sequence schists--N=136
 [*--Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.		Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>						
1 SiO2%	62.64	0.107	02	9.28	90.10	136
2 Al2O3%	14.13	.369	01	1.24	27.60	136
3 T-Fe2O3%	4.70	.239	01	.78	16.80	136
4 FeO%	2.84	.169	01	.54	10.42	45
5 MgO%	8.30	.446	01	.44	21.40	136
6 CaO%	0.68	.332	01	.01	37.90	136
7 K2O%	1.78	.149	01	.01	7.22	136
8 TiO2%	.45	.176	00	.01	1.06	136
9 F%	.07	.199	-1	.03	.11	46
<u>Minor elements in parts per million</u>						
10 B*	84.5	0.117	03	11.0	784.0	126
11 Ba	147.5	.209	03	5.0	910.0	136
12 Be	3.5	.138	01	1.0	9.0	136
13 Co*	20.0	.116	02	5.0	64.0	132
14 Cr*	67.5	.473	02	1.0	358.0	
15 Cu*	289.0	.163	04	2.0	17877.0	133
16 Li	96.5	.496	02	19.0	359.0	136
17 Mn	138.5	.177	03	17.0	1353.0	136
18 Na-N	2509.9	.618	04	53.0	27100.0	94
19 Nb*	5.0	.268	01	4.0	14.0	98
20 Ni*	67.6	.446	02	7.0	222.0	135
21 P*	1237.1	.858	04	47.0	9890.0	134
22 Pb*	297.7	.593	03	10.0	3043.0	127
23 Sc	9.9	.511	01	1.0	37.0	136
24 Th*	15.5	.123	02	2.0	89.0	130
25 Ti	1543.5	.709	03	24.0	3726.0	136
26 V*	120.4	.714	02	4.0	393.0	135
27 Y	18.5	.188	02	1.0	145.0	136
28 Zn	59.0	.462	02	12.0	422.0	136
29 Zr*	80.9	.268	02	8.0	166.0	135
30 Sr	20.8	.513	02	1.0	278.0	136
31 Ce*	8.6	.439	02	10.0	130.0	82
32 Cl-N*	62.6	.133	03	54.1	440.0	84
33 U-N	1664.7	.329	04	.11	24300.0	136
34 Ga-N	24.2	.533	02	2.8	432.0	84
35 As-N	6.3	.111	02	18.0	50.3	39
36 Br-N	2.6	.216	01	.24	9.3	55
37 W-N*	3.7	.428	02	1.2	207.0	89
38 Au-N*	.64	.532	00	.0	3.24	97
39 Rb-N	137.2	.777	02	13.0	387.0	95
40 Sb-N	2.02	.148	01	.92	4.17	4
41 Cs-N	4.57	.347	01	.77	27.40	99
42 Ce-N	93.64	.141	03	.60	633.0	59
43 Th-N	16.04	.831	01	.53	64.7	135
44 Dy-N	23.99	.204	02	2.8	70.0	22
45 La-N	38.81	.474	02	.86	268.0	
46 Nd-N	548.92	.665	03	5.0	2300.0	21
47 Sm-N	10.37	.356	02	.07	264.0	77
48 Sc-N	15.30	.759	01	.86	46.0	134
49 Eu-N	1.99	.298	01	.03	21.5	106
50 Tb-N	1.94	.256	01	.30	16.0	52
51 Yb-N	2.77	.274	01	.39	18.0	85
52 Tm-N	1.75	.802	00	.60	3.78	19
53 Ta-N	1.67	.119	01	.40	5.13	66

	1	2	3	4	5	6	7	8	9	10
	SiO2X	Al2O3X	T-Fe2O3X	FeOX	MgOX	CaOX	K2OX	FZ	B	BA
1 SiO2X	10.6744									
2 Al2O3X		3.4906								
3 T-Fe2O3X			2.3960							
4 FeOX				1.6880						
5 MgOX					4.4579					
6 CaOX						3.3199				
7 K2OX							1.4938			
8 FZ								0.0199		
9 B									112.4859	
10 BA										209.2313
11 BE										
12 CO										
13 CR										
14 CU										
15 LI										
16 NH										
17 NA_N										
18 NB										
19 NI										
20 P										
21 PB										
22 SC										
23 TH										
24 TI										
25 V										
26 Y										
27 ZN										
28 ZR										
29 SR										
30 CE										
31 CL_N										
32 U_NT										
33 GA_N										
34 AS_N										
35 BR_N										
36 W_NT										
37 AU_N										
38 RB_N										
39 CS_N										
40 CE_N										
41 TH_N										
42 LA_N										
43 WD_N										
44 SH_N										
45 SC_N										
46 EU_N										
47 TB_N										
48 YB_N										
49 TH_N										
50 TA_N										

Table 8.--Correlation matrix for Upper Mine Sequence schists. Number of samples = 136, number of variables = 50. *, correlation coefficient is significant at the 95 percent level of confidence. The upper half of the matrix contains the correlation coefficients, the lower half contains the number of valid sample pairs, and the diagonal contains the standard deviation of the variable for the valid pairs.

	11	12	13	14	15	16	17	18	19	20
	BE	CO	CR	CU	LI	MN	NA_M	NB	NI	P
1 S102X	-.3624	-.6506	-.3657	-.1724	-.5399	-.0687	.0915	-.0929	-.6094	-.4398
2 Al2O3X	.5251	-.3061	-.3873	-.2658	-.3483	-.0657	.0970	.1245	.3143	-.2051
3 T-Fe2O3X	-.0249	-.7388	-.2756	-.0191	-.3930	-.2886	-.0487	-.0461	-.4758	.0996
4 FeOx	-.0544	-.7371	-.0640	-.0640	-.4107	-.3598	-.1995	-.0563	-.4247	-.0021
5 MgOx	-.2414	-.7020	-.2251	-.1616	-.7284	-.2098	-.4649	-.3244	-.8594	-.0109
6 CaOx	-.1535	-.0601	-.0949	-.0330	-.1694	-.1303	.7924	-.3367	-.1660	.9527
7 K2Ox	-.0955	-.3983	-.0871	-.1007	-.4411	-.3060	.4746	.4444	-.5469	-.1208
8 Fx	-.2468	-.0123	-.1659	-.0279	-.1015	-.3138	.2221	-.2117	-.0693	.2802
9 B	-.3855	-.1082	-.1994	-.0992	-.0210	-.2067	-.1580	-.2108	-.0360	-.2647
10 BA	-.1420	-.3634	-.0415	-.0507	-.3342	-.5795	-.8028	-.6444	-.4882	-.0706
11 BE	1.3823	.3562	.2947	-.0509	.4663	-.1349	-.0607	-.0799	-.4597	-.0874
12 CO	132	11.1089	.3186	-.0445	.5831	-.0972	-.2932	-.2395	-.7239	-.0094
13 CR	135	132	46.8683	-.0939	.3079	.0278	-.1336	-.1359	-.2960	-.0137
14 CU	133	129	132	1625.8120	-.1129	-.0733	-.0592	-.0839	-.0615	-.0312
15 LI	136	132	135	133	49.5949	-.0643	-.2986	-.1480	-.8206	-.1229
16 MN	136	132	135	133	136	177.0618	.107	.6090	-.2202	-.0289
17 NA_M	107	106	106	104	107	107	6179.9690	.5610	-.4498	-.0455
18 NB	98	95	97	96	98	98	83	2.1918	-.3132	.2014
19 NI	135	132	135	135	135	135	106	97	44.1719	-.0883
20 P	134	130	133	131	134	134	105	98	133	8574.3910
21 PB	127	123	126	124	127	127	99	90	126	125
22 SC	136	132	135	133	136	136	107	98	135	134
23 TH	130	127	130	127	130	130	103	95	130	128
24 TI	136	132	135	133	136	136	107	98	135	134
25 V	135	132	135	132	135	135	106	97	135	133
26 Y	136	132	135	133	136	136	107	98	135	134
27 ZN	136	132	135	133	136	136	106	98	134	134
28 ZR	135	131	134	132	135	135	106	98	135	134
29 SR	136	132	135	133	136	136	107	98	135	134
30 CE	82	80	82	80	82	82	62	67	82	82
31 CL_M	84	85	84	82	84	84	75	61	84	82
32 U_NT	136	132	135	133	136	136	107	98	135	134
33 GA_M	84	83	84	82	84	84	68	60	84	83
34 AS_M	39	38	39	38	39	39	32	24	39	37
35 BR_M	55	54	55	54	55	55	47	41	55	53
36 U_NT	89	86	87	89	89	89	70	64	89	89
37 AU_M	97	96	97	95	97	97	77	69	97	95
38 RB_M	95	91	94	93	95	95	84	75	94	94
39 CS_M	99	95	98	97	99	99	88	77	98	98
40 CE_M	59	58	59	58	59	59	48	47	59	58
41 TH_M	135	131	134	132	135	135	106	97	134	133
42 LA_M	133	130	133	130	133	133	104	96	133	131
43 ND_M	21	21	21	21	21	21	18	17	21	21
44 SR_M	77	77	77	74	77	77	62	55	77	75
45 SC_M	134	130	133	131	134	134	105	97	133	132
46 EU_M	106	103	106	103	106	106	79	81	106	105
47 TB_M	52	50	52	50	52	52	38	35	52	52
48 YB_M	85	82	85	82	85	85	69	64	85	84
49 TH_M	19	19	19	19	19	19	17	15	19	19
50 TA_M	66	63	65	66	66	66	60	56	65	65

	21	22	23	24	25	26	27	28	29	30
	PB	SC	TH	TI	V	Y	ZN	ZR	SR	CE
1 S102X	-.1276	-.3556	-.2402	-.3307	-.5024	-.1172	-.2022	-.2093	.0125	.0185
2 Al2O3X	-.0534	-.2849	-.0941	-.5910	-.3986	-.0939	.0303	.4375	-.1116	.1186
3 T-Fe2O3X	-.1945	-.2210	-.1367	-.1715	-.3516	-.1058	.2337	.1461	-.0102	.1243
4 FeOx	-.2223	-.2445	-.2382	-.2192	-.2782	-.1253	.2372	.3113	-.1230	.1262
5 MgOx	-.1360	-.2115	-.1822	-.0274	-.5221	-.0489	-.1177	-.1509	-.3838	-.2701
6 CaOx	-.0859	-.0571	-.0914	-.0730	-.1650	-.0578	-.0759	-.2306	-.2794	-.0511
7 K2Ox	-.2208	-.0331	-.1506	-.4366	-.2537	-.1606	-.0829	-.1928	-.4405	.6120
8 Fx	-.0659	.0096	-.0934	-.1706	-.0033	-.0014	.2045	.0096	-.1525	.0802
9 B	-.0329	.1086	-.0366	-.0908	-.1250	-.0779	-.1376	-.1044	-.1403	-.0069
10 BA	-.1037	.0045	-.0124	-.4457	-.2849	.0146	.0929	.1196	-.8184	-.5745
11 BE	.3435	.4647	.4610	.2933	-.5236	-.2764	.0232	-.2301	-.2488	-.2488
12 CO	.2410	.3204	.2559	.1343	.5310	.1366	.1726	.2319	-.2650	-.1837
13 CR	.3407	.4982	-.1142	.4700	-.5797	-.1262	.1737	.1379	-.0646	.1256
14 CU	-.1056	-.0433	-.0080	-.1216	-.0786	.0511	.0227	-.0566	-.0500	-.2077
15 LI	-.3336	.4546	.4364	.2815	.6220	-.2306	.1732	-.2745	-.2999	-.2999
16 MN	-.0194	-.0291	.0444	.3514	-.1430	.0453	.1780	-.0162	.5458	.5326
17 NA_M	-.1670	-.0348	.3194	-.3569	.0215	-.1606	-.0583	-.0583	.6503	.6503
18 NB	-.1292	-.0334	-.1451	-.3878	-.2421	-.0642	.1464	.1520	.5278	.4476
19 NI	-.2635	-.3490	-.2779	-.0999	-.212	-.1462	-.1158	-.1162	-.3917	-.3801
20 P	-.0453	-.0206	-.0697	-.1540	-.0972	-.0760	-.0178	-.2153	-.0741	-.0223
21 PB	579.1909	.7800	.6859	-.2446	-.4082	-.8335	-.2264	-.0407	-.1476	-.2285
22 SC	127	5.1113	.7408	-.5505	-.5837	-.7628	.2969	.143	-.0501	-.1368
23 TH	122	130	11.7491	.2789	-.3236	-.7610	.2307	-.2275	-.0403	-.1324
24 TI	127	134	130	708.5479	-.3256	-.2212	.1291	.3016	-.4057	-.3359
25 V	126	135	130	135	70.4312	.2959	.2927	.1467	-.2943	-.3078
26 Y	127	136	130	136	135	18.8361	.2681	.0047	-.0182	-.1660
27 ZN	127	136	130	136	135	136	46.2438	.0500	.0893	-.808
28 ZR	126	135	129	135	134	135	13	25.8316	-.0437	.2197
29 SR	127	136	130	136	135	136	136	135	51.2558	.6254
30 CE	78	82	79	82	82	82	82	82	82	32.0824
31 CL_M	76	84	80	84	84	84	84	84	84	42
32 U_NT	127	136	130	136	135	136	136	135	136	82
33 GA_M	77	84	82	84	84	84	84	84	84	44
34 AS_M	38	39	38	39	39	39	39	38	39	20
35 BR_M	50	55	52	55	55	55	55	54	55	27
36 U_NT	86	89	86	89	89	89	89	89	89	57
37 AU_M	90	97	93	97	97	97	97	96	97	54
38 RB_M	88	95	92	95	94	95	95	95	95	60
39 CS_M	92	99	96	99	99	99	99	99	99	60
40 CE_M	52	59	56	59	59	59	59	59	59	38
41 TH_M	126	135	129	135	134	135	135	134	135	81
42 LA_M	124	133	128	133	133	133	133	132	133	80
43 ND_M	19	21	20	21	21	21	21	21	21	14
44 SR_M	69	77	75	77	77	77	77	76	77	47
45 SC_M	125	134	128	134	133	134	134	133	134	81
46 EU_M	101	106	104	106	106	106	106	106	106	71
47 TB_M	52	52	50	52	52	52	52	52	52	52
48 YB_M	80	85	82	85	85	85	85	85	85	31
49 TH_M	18	19	19	19	19	19	19	19	19	15
50 TA_M	60	66	63	66	65	66	66	66	66	37

TABLE 8, CONTINUED

	31 CL_N	32 U_NT	33 GA_N	34 AS_N	35 BR_N	36 U_NT	37 AU_N	38 RB_N	39 CE_N	40 CE_N
1 S102X	-2527	-0948	-1175	-0984	-1435	-0091	-0887	-1235	-0044	-1263
2 AL203X	-4040	-0885	-2116	-0226	-3688	-1505	-2964	-2373	-2618	-0371
3 T-Fe203X	-0450	-1060	-0501	-2317	-0271	-0940	-0916	-2745	-1922	-0753
4 FeOx	-3183	-2189	-0032	-3113	-0822	-1229	-1250	-0546	-0947	-2400
5 MgOx	-0165	-1553	-1011	-1417	-0683	-1599	-0212	-5650	-3819	-1227
6 CaOx	-0907	-0753	-0514	-0393	-0516	-0256	-0091	-1646	-1695	-0772
7 K2Ox	-4059	-2358	-0205	-1266	-3597	-2956	-2135	-6895	-5206	-0861
8 FX	-0453	-0180	-2101	-1286	-0964	-0650	-2574	-2088	-2509	-0448
9 B	-2160	-0640	-0282	-0430	-2495	-0070	-1172	-1476	-1358	-0408
10 BA	-2363	-0987	-1491	-0152	-1365	-1127	-1246	-3898	-2321	-0032
11 BE	-2286	-2835	-0691	-0702	-2019	-0694	-0613	-3747	-4717	-2740
12 CO	-1422	-2312	-1312	-3616	-0542	-0550	-0327	-0914	-1625	-0823
13 CR	-1327	-2005	-1274	-0830	-0335	-0606	-0000	-0142	-2416	-1345
14 CU	-4737	-0259	-0644	-5594	-3696	-1059	-1134	-3713	-0285	-0265
15 LI	-1267	-3226	-1820	-1158	-0336	-1025	-1147	-3713	-2229	-2597
16 MN	-0140	-0068	-0490	-0181	-1513	-1731	-1928	-1754	-1763	-0462
17 NA_N	-0913	-1713	-0663	-0414	-0617	-1481	-1029	-3484	-4179	-2410
18 NB	-0655	-0603	-0401	-0808	-0560	-1749	-1846	-3535	-2362	-0296
19 NI	-0770	-2274	-2153	-1736	-1115	-1328	-0899	-3372	-1738	-3012
20 P	-0972	-0465	-0534	-0651	-2421	-0470	-0058	-1084	-0688	-0669
21 PB	-2220	-8046	-0078	-1111	-3508	-0465	-5490	-0182	-0522	-6632
22 SC	-1204	-7710	-0261	-0216	-0804	-0161	-5007	-0328	-0307	-4950
23 TH	-0119	-8346	-0650	-0187	-0777	-0113	-3871	-1437	-0351	-4833
24 TI	-3055	-1746	-2020	-0634	-2445	-1467	-1051	-1518	-1708	-1700
25 V	-0757	-3616	-2453	-0455	-0718	-0879	-0622	-1273	-0285	-5067
26 Y	-2014	-8871	-0331	-0830	-3250	-0136	-5503	-1048	-0362	-6775
27 ZN	-0484	-2705	-0826	-0770	-1405	-0748	-3666	-0482	-0083	-1510
28 ZR	-0331	-0373	-2100	-2614	-0908	-0827	-0947	-1575	-1030	-0489
29 SR	-0653	-1399	-1001	-0325	-0513	-1073	-0299	-2068	-1733	-0123
30 CE	-1912	-1912	-1367	-1367	-2484	-3197	-0921	-1917	-2304	-0582
31 CL_N	65.0499	3485	-0180	-0601	-4496	-0298	2564	-2745	-0888	-1823
32 U_NT	84	3286.2090	-0032	-0401	-3620	-0520	-6059	-0185	-0497	-1271
33 GA_N	63	84	45.7158	-1933	-0776	-0798	-0691	-0883	-0328	-2327
34 AS_N	24	39	32	11.1236	-7536	-0803	-1297	-2466	-3097	-3021
35 BR_N	50	55	43	14	2.1618	-0251	-4064	-0732	-2573	-5834
36 U_NT	57	89	63	28	34	37.7806	-0662	-2866	-1341	-0037
37 AU_N	67	97	70	35	46	70	-4934	-0782	-0475	-0274
38 RB_N	58	95	63	31	37	69	77.6681	-6211	-6211	-2002
39 CS_N	64	99	67	33	42	68	73	92	3.4653	-1322
40 CE_N	39	59	40	33	25	36	38	51	50	141.2118
41 TH_N	84	135	84	39	55	89	97	95	99	59
42 LA_N	83	133	84	39	55	89	97	95	97	59
43 ND_N	11	21	16	8	5	15	16	20	19	10
44 SM_N	52	77	56	23	32	50	56	58	60	44
45 SC_N	83	134	84	39	55	88	96	95	99	59
46 EU_N	60	106	64	31	37	75	77	76	78	48
47 TB_N	24	52	29	23	16	35	36	39	41	22
48 YB_N	50	85	56	31	34	61	64	69	71	18
49 TM_N	11	19	14	5	9	14	13	18	19	14
50 YA_N	46	66	44	21	35	46	48	60	62	37

	41 TH_N	42 LA_N	43 ND_N	44 SM_N	45 SC_N	46 EU_N	47 TB_N	48 YB_N	49 TR_N	50 TA_N
1 S102X	-2748	-0772	-3947	-1677	-4243	-0497	-0223	-0255	-3985	-0979
2 AL203X	-4652	-0273	-0780	-0448	-3314	-2127	-3338	-1608	-0443	-1632
3 T-Fe203X	-1367	-1567	-5539	-1728	-2637	-0826	-0303	-0019	-3920	-0509
4 FeOx	-2030	-1810	-3157	-0793	-2569	-1741	-2995	-1708	-2153	-3023
5 MgOx	-1792	-1160	-4928	-2319	-2873	-1374	-1656	-0733	-2716	-0429
6 CaOx	-1223	-0211	-1345	-0482	-0480	-0001	-0376	-0371	-1977	-0593
7 K2Ox	-1983	-0522	-4277	-1797	-0392	-2729	-3493	-1649	-0486	-0511
8 FX	-0554	-0604	-2513	-0040	-0487	-1750	-2687	-0139	-1818	-0327
9 B	-1149	-0189	-1678	-0704	-0885	-0846	-0473	-6129	-2464	-0034
10 BA	-1094	-0828	-1230	-0702	-1049	-0733	-2123	-0257	-0906	-0609
11 BE	-1938	-1652	-2252	-2826	-4318	-1042	-0000	-2010	-1146	-2447
12 CO	-2049	-1265	-7558	-1199	-3581	-0569	-0144	-0778	-3490	-1032
13 CR	-0916	-2335	-2328	-0226	-4911	-0574	-1175	-1585	-1631	-0540
14 CU	-1565	-0060	-2566	-0173	-0837	-0714	-0533	-2553	-0456	-2764
15 LI	-1816	-0473	-2855	-3087	-3971	-1786	-1386	-1530	-2050	-0609
16 MN	-0358	-1070	-2002	-0338	-0595	-0438	-0162	-0132	-0436	-0110
17 NA_N	-0459	-2300	-2005	-1922	-1778	-1300	-2089	-0453	-2423	-1200
18 NB	-1872	-0850	-2459	-1665	-0956	-0117	-0931	-0360	-7367	-1204
19 NI	-1091	-0318	-5028	-3126	-3796	-1204	-0575	-0997	-2392	-0062
20 P	-1728	-0081	-1583	-0362	-0017	-0257	-0717	-0111	-0866	-0827
21 PB	-1479	-6115	-7065	-3590	-5928	-6896	-6955	-7589	-2995	-3313
22 SC	-1118	-5847	-7432	-2250	-8812	-6413	-6894	-7641	-2675	-3068
23 TH	-3792	-6602	-6845	-4812	-5533	-7132	-7273	-7814	-2953	-0663
24 TI	-1716	-2584	-1837	-1354	-4045	-0124	-1777	-0240	-1077	-0975
25 V	-077	-2336	-5008	-2965	-6667	-2501	-1365	-2574	-2533	-0773
26 Y	-0103	-0333	-8187	-5031	-6153	-8422	-8761	-9099	-2981	-3194
27 ZN	-0718	-2020	-5290	-0200	-2971	-1855	-1200	-2181	-2525	-0115
28 ZR	-4820	-1385	-148	-0419	-1027	-0727	-1916	-0561	-0630	-1722
29 SR	-0697	-1155	-1978	-0684	-1356	-0636	-1980	-1022	-0318	-900
30 CE	-2320	-3192	-1690	-1100	-1707	-1288	-2712	-1534	-1709	-0976
31 CL_N	-2081	-0143	-0920	-1504	-0433	-4154	-8125	-0996	-1388	-1557
32 U_NT	-0415	-6583	-8935	-4009	-6483	-8702	-9043	-9343	-3262	-2919
33 GA_N	-0441	-0319	-2018	-1795	-0889	-0723	-0656	-0945	-3535	-0606
34 AS_N	-0595	-3271	-2333	-1515	-0565	-1135	-2163	-5912	-3509	-0432
35 BR_N	-1597	-3813	-9654	-7467	-0340	-5647	-4114	-5083	-1411	-2387
36 U_NT	-1396	-0889	-0985	-0655	-0049	-1653	-0278	-1155	-2809	-3820
37 AU_N	-0634	-3803	-6615	-0748	-4604	-5900	-6063	-7143	-6504	-0535
38 RB_N	-1781	-0406	-2359	-0934	-0115	-0078	-1865	-0739	-0610	-1829
39 CS_N	-0461	-0365	-3452	-0998	-0922	-0632	-0350	-0932	-1552	-0032
40 CE_N	-0219	-6283	-0514	-813	-5776	-7194	-4747	-4918	-2454	-6025
41 TH_N	8.3098	-1584	-3514	-0291	-2593	-0224	-2026	-1731	-0858	-1214
42 LA_N	133	47.4001	-2669	-3690	-4985	-5470	-5571	-6575	-3294	-0644
43 ND_N	21	21	664.6021	-3103	-7217	-7941	-7772	-9354	-5433	-6913
44 SM_N	77	77	19	35.6243	-3137	-8389	-0222	-2666	-2964	-1926
45 SC_N	134	132	21	77	7.5907	-6285	-6820	-7013	-3299	-2986
46 EU_N	106	106	18	60	105	2.9804	-9539	-8710	-2456	-2456
47 TB_N	52	52	12	31	52	49	2.5615	-9108	-4653	-5894
48 YB_N	85	85	19	52	84	74	45	2.7380	-4334	-4669
49 TM_N	19	19	7	14	19	18	12	17	-8017	-4248
50 YA_N	66	65	15	42	66	54	28	52	15	1.1946

TABLE 8, CONTINUED
29

Variable	Factors					
	1	2	3	4	5	6
47TB_N	1.00000	.00000	-.00000	-.00000	.00000	-.00000
48YB_N	.92387	.19628	-.01326	.26997	.20531	-.06280
32U_NT	.90824	.10420	.11989	.32961	.04568	-.18389
26Y	.88707	.24923	.06147	.35116	.06122	-.05007
46EU_N	.88408	.14152	.06173	.16703	.25017	-.00786
37AU_N	.78289	.23517	.14874	-.25952	-.03063	-.08486
21PB	.77766	.05126	.10546	.40175	.04796	-.14922
43ND_N	.74331	-.20996	.54339	-.01171	.39649	.00467
23TH	.68161	.22634	.24910	.46669	-.00749	-.25984
42LA_N	.60036	.38205	.12970	.27819	.20652	-.20772
50TA_N	.39085	.02518	-.21302	.13447	.33136	-.01977
10BA	-.00000	1.00000	.00000	.00000	-.00000	-.00000
17NA_N	-.03136	.97759	.06563	-.06988	.23219	.33147
7K2Ox	-.26149	.87735	-.38776	.48102	-.07528	-.03510
29SR	-.05204	.85294	.10843	-.13925	.08311	.15826
18NB	.01746	.79284	.19533	-.10951	.37165	.14721
30CE	-.16072	.75087	.18686	-.12859	.12390	-.07048
16MN	.02693	.73352	.35443	-.17543	.12106	.06287
38RB_N	-.08259	.67710	-.34057	.47956	.24083	.05113
19NI	-.07511	-.73358	.65624	.29197	.29710	-.19760
4FeOx	.00000	-.00000	1.00000	-.00000	-.00000	-.00000
3T-Fe2O3x	-.06022	-.26611	.95653	-.14995	.34298	-.00277
12CO	-.10046	-.51077	.82537	.18287	.38188	-.14199
5MgOx	-.06185	-.75980	.80241	.04084	.10080	-.11983
15LI	.02150	-.48872	.61645	.38429	.06114	-.22039
27ZN	.26280	.16761	.38207	.01250	.06151	.01117
1SiO2x	.17901	.15295	-.81806	-.42947	-.14482	-.32502
11BE	-.00000	.00000	-.00000	1.00000	.00000	-.00000
2Al2O3x	-.40279	.21822	.35053	.80421	-.03961	-.21313
22SC	.69614	.22078	.26218	.70627	-.23951	-.16139
45SC_N	.57519	.09176	.26958	.70159	-.07760	-.11551
24TI	-.03441	.55429	.29989	.64954	-.04124	-.19558
25V	.11707	-.36232	.42473	.64311	.12963	-.16745
9B	-.09128	-.04882	-.42481	.62823	-.35107	.23799
39CS_N	-.10827	.56046	-.34537	.61361	.05903	.34995
13CR	.02923	.04073	.33993	.60005	-.07931	.00634
31CL_N	.35271	-.25058	-.11280	-.45743	.44305	.04249
34AS_N	.00000	-.00000	-.00000	.00000	1.00000	.00000
35BR_N	.40133	-.25636	.00461	-.35777	.92144	.06592
44SM_N	.24208	-.03261	.11264	.26981	.67379	-.06619
49TM_N	.31941	.20222	.56797	-.14916	.59332	-.03741
14CU	.08051	-.13905	-.17392	-.19815	.54295	.01962
40CE_N	.45841	.12638	-.09946	.51630	.54222	-.16155
33GA_N	-.16430	-.17909	.19789	.09594	.43958	-.23928
36W_NT	-.08726	.29693	-.06598	.13300	.30097	-.12514
20P	.00000	.00000	-.00000	.00000	.00000	1.00000
6CaOx	-.01672	.31606	.12714	-.12565	.11885	.99791
8FX	-.16455	.27903	.09442	.31231	.11589	.47648
41TH_N	-.18567	.17887	.33356	.22765	.02566	-.43722
28ZR	-.19420	.07161	.34900	.19126	.23079	-.54012

Table 9.--Factor matrix for Upper Mine Sequence schists. This six factor oblique projection model contains 67.3 percent of the total compositional information.

biotitic bands or beds, as well as introduced vein-like alteration (Nash and Frishman, 1982). This subset consists of 28 samples with a mean uranium content of 562 ppm (table 10). As expected from the mineralogy, content of Si, Al, and Fe are higher than clean marble, and content of most minor elements is higher too (compare tables 8 and 19).

Correlation analysis (table 11) indicates that 12 elements have significant positive association with uranium: Co, Mn, P, Pb, Sc, Th, Y, Zn, La, Eu, Tb, and Yb. Factor analysis (table 12) of the correlation matrix highlights most of these elements and also points to an association of U with FeO and Mn. These elements have been mentioned before as uranium-associated. Although the LMS chloritic marble unit is not typically ore-bearing, the chloritic marble subset is enriched in U and the U-associated elements (compare means in table 10 and 21), thus the group probably reflects epigenetic mineralizing processes. The similarity of this suite with that in the higher grade rocks suggests the mineralizing process was basically the same in these carbonate rocks as in typical chlorite-muscovite schists.

The major elements Si, Al, Fe, Mg, and Ca behave independently in this subset with only Si-Ca having a significant negative association. In factor analysis Mg is loaded fairly equally on four of six factors (table 12) and has different sign than Ca. The inverse Mg-Ca relation probably reflects a combination of Mg enrichment as magnesite and chlorite, and inverse mass relation of dolomite vs. magnesite and chlorite. The major element variation seems to be of little importance to uranium as U behaves independently of major elements (table 11), except possibly FeO.

Jasperoid

This subset consists of 28 samples of very siliceous rocks meeting megascopic field criteria for jasperoid. The rocks contained variable amounts of chlorite and hematite, and many of the samples contain more uranium (average 3849 ppm, table 13) than typical intercepts of jasperoid (less than 500 ppm).

Correlation analysis (table 14) indicates that 18 elements are significantly associated with uranium (at 95 percent level of confidence): Ba, Li, Mn, Na, Pb, Sc, V, Y, As, Au, Ce, La, Sm, Sc, Eu, Tb, Yb, and Th by both ICP and INAA. This suite is basically the same as in other ore-types.

Table 10.--Statistical summary for Lower Mine Sequence chloritic marble--N=28
 [*Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	20.94	0.134 02	1.27	49.10	28
2 Al2O3%	6.27	.591 01	.14	19.90	28
3 T-Fe2O3%	6.61	.151 02	.56	82.80	28
4 FeO%	2.71	.190 01	.01	5.09	6
5 MgO%	24.61	.843 01	2.90	38.20	28
6 CaO%	11.13	.995 01	.06	29.80	28
7 K2O%	.59	.156 01	.01	7.91	28
8 TiO2%	.20	.199 00	.01	.65	28
9 F%	.14	.151 00	.05	.41	5
<u>Minor elements in parts per million</u>					
10 B*	52.1	0.722 02	10	167	13
11 Ba*	33.5	.104 03	2	522	26
12 Be*	2.76	.682 01	1	33	25
13 Co*	14.3	.116 02	5	48	26
14 Cr*	31.9	.376 02	1	136	25
15 Cu	89.5	.303 03	2	1600	28
16 Li	78.6	.928 02	3	403	28
17 Mn	1018.1	.863 03	94	4235	28
18 Na-N	500.6	.438 03	92.0	1800.0	19
19 Nb*	5.52	.514 01	4	20	19
20 Ni*	32.9	.327 02	3	118	27
21 P*	412.2	.111 04	38	4269	26
22 Pb*	354.5	.775 03	10	2062	12
23 Sc*	3.96	.457 01	1	18	24
24 Th*	4.38	.133 02	2	51	20
25 Ti*	596.2	.807 03	22	2982	27
26 V*	32.0	.305 02	2	115	27
27 Y	12.5	.212 02	1	94	28
28 Zn*	42.1	.124 03	2	620	25
29 Zr*	19.3	.274 02	3	116	23
30 Sr	22.1	.311 02	3	171	28
31 Ce	24.5	.288 02	10	56	13
32 Cl-N	458.0	.370 03	76.3	1200.0	17
33 U-N	562.0	.204 04	.70	9000.0	28
34 Ga-N	338.8	.116 04	7.70	4204.0	13
35 As-N	--	--	--	--	0
36 Br-N	5.29	.417 01	.50	12.6	20
37 W-N	26.11	.631 02	.22	263.0	18
38 Au-N	.02	.497 -1	.00	.20	16
39 Rb-N	72.38	.815 02	11.0	260.0	8
40 Sb-N	--	--	--	--	0
41 Cs-N	7.43	.103 02	.80	34.6	11
42 Ce-N	23.72	.293 02	2.05	141.0	24
43 Th-N	6.29	.512 01	.18	20.1	25
44 Oy-N	--	--	--	--	0
45 La-N	20.93	.284 02	.73	139.0	27
46 Nd-N	36.75	.311 02	14.0	81.0	4
47 Sm-N	2.22	.166 01	.25	5.1	22
48 Sc-N	6.28	.462 01	.14	14.7	27
49 Eu-N	.69	.122 01	.12	6.21	25
50 Tb-N	.90	.899 00	.17	3.50	12
51 Yb-N	.83	.492 00	.30	1.83	20
52 Tm-N	.53	.287 00	.30	.90	4
53 Ta-N	2.14	.325 01	.--	7.93	5

	1	2	3	4	5	6	7	8	9	10
	SiO2X	Al2O3X	T-Fe2O3X	FeOX	MgOX	CaOX	K2OX	B	BA	BE
1 SiO2X	13.4560	.6899 *	-.2020	.4132	-.0439	-.5850 *	.5362 *	.4627	.4342 *	.3943 *
2 Al2O3X	28	5.9137	-.0965	.6029	-.3267	-.3432	.5881 *	.8391 *	.4704 *	.6078 *
3 T-Fe2O3X	28	28	15.0972	-.6533	-.5179 *	-.2197	-.0580	.2765	-.0327	.2715
4 FeOX	6	6	6	1.9015	-.0407	-.7149	.4198	.3428	-.3461	-.1867
5 MgOX	28	28	28	6	8.4286	-.3509	-.5127	-.6171 *	-.5040 *	-.2085
6 CaOX	28	28	28	6	28	9.9499	-.0407	-.1446	-.8112	-.2729
7 K2OX	28	28	28	6	28	28	1.5583	.6388 *	.9762 *	-.2249
8 B	13	13	13	4	13	13	13	46.1932	.5363	-.7265 *
9 BA	26	26	26	6	26	26	26	13	102.5519	.0469
10 BE	25	25	25	5	25	25	25	13	24	6.6651
11 CO	26	26	26	6	26	26	26	13	25	25
12 CR	25	25	25	5	25	25	25	12	24	24
13 CU	28	28	28	6	28	28	28	13	26	25
14 LI	28	28	28	6	28	28	28	13	26	25
15 MN	28	28	28	6	28	28	28	13	26	25
16 NA_M	19	19	19	4	19	19	19	11	18	18
17 NB	19	19	19	4	19	19	19	10	17	16
18 NI	27	27	27	6	27	27	27	12	25	24
19 P	26	26	26	6	26	26	26	12	24	23
20 PB	12	12	12	3	12	12	12	6	12	11
21 SC	24	24	24	5	24	24	24	12	22	23
22 TH	20	20	20	5	20	20	20	10	19	18
23 TI	27	27	27	6	27	27	27	13	26	25
24 V	27	27	27	6	27	27	27	13	26	25
25 Y	28	28	28	6	28	28	28	13	26	25
26 ZN	25	25	25	6	25	25	25	13	23	23
27 ZR	23	23	23	5	23	23	23	12	22	22
28 SR	28	28	28	6	28	28	28	13	26	25
29 CE	13	13	13	2	13	13	13	5	13	13
30 CL_M	17	17	17	2	17	17	17	10	16	15
31 U_NT	28	28	28	6	28	28	28	13	26	25
32 DR_M	20	20	20	3	20	20	20	8	19	18
33 W_NT	18	18	18	4	18	18	18	8	17	16
34 RB_M	8	8	8	3	8	8	8	4	8	8
35 CS_M	11	11	11	3	11	11	11	7	11	11
36 CE_M	24	24	24	5	24	24	24	11	23	22
37 TH_M	25	25	25	5	25	25	25	11	23	23
38 LA_M	27	27	27	6	27	27	27	12	25	24
39 SH_M	22	22	22	4	22	22	22	9	20	19
40 SC_M	27	27	27	6	27	27	27	12	25	24
41 EU_M	25	25	25	5	25	25	25	11	23	23
42 TB_M	12	12	12	3	12	12	12	5	11	11
43 YB_M	20	20	20	3	20	20	20	8	19	19

Table 11.--Correlation matrix for Lower Mine Sequence chloritic marble. Number of samples = 28, number of variables = 43. *, correlation coefficient is significant at the 95 percent level of confidence. The upper half of the matrix contains the correlation coefficients, the lower half contains the number of valid sample pairs, and the diagonal contains the standard deviation of the variable for the valid pairs.

	11	12	13	14	15	16	17	18	19	20
	CO	CR	CU	LI	MN	NA_M	NB	NI	P	PB
1 S102X	-.0786	.7456	-.1088	.5583	-.4905	.3706	.4263	.1944	.0250	-.3403
2 AL2O3X	.2364	.9133	-.0972	.7835	-.3223	.2891	.6767	.5067	.3119	.1106
3 T-Fe2O3X	-.0952	.5800	-.0122	-.0984	-.1145	-.0199	.0180	-.0871	-.0070	-.0582
4 FeOX	.6226	.4748	.6340	.3838	.5081	.4617	.4236	.7214	.7094	.6489
5 MgOX	-.0137	-.5095	-.1890	-.0485	.1862	-.5003	-.3365	.0230	-.1732	-.1238
6 CaOX	.0886	-.3991	-.1216	-.3924	.2612	.0582	-.3155	-.1890	.0605	.5039
7 K2OX	-.2160	.6305	-.0951	.1068	-.3187	.7521	.5146	-.0851	.0161	-.1668
8 B	.1109	.5952	-.0843	.4539	-.3696	.3251	.8039	.0404	.3751	-.1889
9 BA	-.2572	.5839	-.0956	-.0271	-.2641	.7880	.4322	-.1360	-.0804	-.1689
10 BE	.1756	.3048	-.0760	.5578	-.3029	-.1876	.6447	.2209	.5033	.4623
11 CO	10.9182	.1991	-.1635	.1941	.3175	-.5307	.3569	.6329	.4291	.6858
12 CR	24	34.3220	-.1295	.6569	-.3333	.3583	.5917	.5340	.1133	.0375
13 CU	26	25	302.6382	-.1368	.4483	-.2170	.1365	-.0867	.1060	.8836
14 LI	26	25	28	92.8257	-.3383	-.2057	.2932	-.5303	-.1715	-.0049
15 MN	26	25	28	28	863.4829	-.3163	-.0426	.1238	.5316	.8502
16 NA_M	18	17	19	19	19	439.7837	.2485	-.3264	-.2239	-.3054
17 NB	17	17	19	19	19	12	4.1025	.4162	.6214	.9499
18 NI	25	25	27	27	27	18	19	31.7890	.3002	.6686
19 P	24	23	26	26	26	17	17	25	1086.5750	.9311
20 PB	12	10	12	12	12	7	9	11	10	774.8403
21 SC	23	23	24	24	24	17	16	24	23	9
22 TH	18	19	20	20	20	14	14	20	18	12
23 TI	26	25	27	27	27	18	18	26	25	12
24 V	26	25	27	27	27	18	19	27	26	12
25 Y	26	25	28	28	28	19	16	24	24	11
26 ZN	24	22	25	25	25	16	15	23	22	9
27 ZR	22	23	23	23	23	16	16	19	27	12
28 SR	26	25	28	28	28	19	19	27	26	12
29 CE	13	13	13	13	13	11	8	13	11	7
30 CL_M	15	15	17	17	17	14	13	16	15	7
31 U_NT	26	25	28	28	28	19	19	27	26	12
32 BR_M	18	18	20	20	20	16	12	19	19	7
33 W_NT	17	15	18	18	18	14	11	17	16	7
34 RB_M	8	8	8	8	8	8	6	8	6	3
35 CS_M	11	11	11	11	11	9	11	9	9	4
36 CE_M	23	21	24	24	24	19	15	23	22	10
37 TH_M	23	24	25	25	25	18	17	25	25	9
38 LA_M	25	24	27	27	27	19	18	26	25	11
39 SM_M	20	19	22	22	22	19	18	24	21	8
40 SC_M	25	24	27	27	27	19	18	24	23	10
41 EU_M	23	23	25	25	25	18	16	24	23	10
42 TB_M	11	11	12	12	12	9	6	12	11	5
43 YB_M	19	18	20	20	20	16	12	19	18	9

	21	22	23	24	25	26	27	28	29	30
	SC	TH	TI	V	Y	ZN	ZR	SR	CE	CL_M
1 S102X	.3340	-.0358	.5875	.2846	-.1413	-.0803	.4892	.2952	.8195	-.6216
2 AL2O3X	.5497	.2406	.8395	.6145	.7618	.0690	.5528	.3910	.7037	-.4290
3 T-Fe2O3X	.8302	.7019	-.1002	.6282	-.0233	.0015	.1487	-.0708	.3458	-.5246
4 FeOX	.9332	.8431	.6487	-.1371	.6506	.6554	.7076	.4192	1.0000	-1.0000
5 MgOX	-.4581	-.2598	-.4718	-.6600	-.0858	-.2032	-.3125	-.5419	-.7784	-.2235
6 CaOX	-.1136	.0352	-.1003	-.2866	.1390	.2376	-.1253	.1595	.0850	.7286
7 K2OX	.3360	-.0166	.7923	.3235	-.0677	-.0417	.2852	.9090	.6737	-.2235
8 B	.2499	-.1493	.8550	.5160	-.1962	-.0842	.0682	.5432	.6640	-.1388
9 BA	.2961	-.0413	.6623	.2592	-.0634	-.0736	.1956	.9633	.5858	-.1877
10 BE	.1593	-.0281	.5997	.4775	-.1083	-.0041	.0341	.0094	.5908	-.2404
11 CO	.5255	-.6557	.0770	.1952	.4763	.2718	-.0559	-.2097	-.2478	-.0217
12 CR	.5822	.2391	.7031	.8463	.0749	.0475	.5013	.5411	.7094	-.6331
13 CU	.1867	.0052	-.1266	-.1239	-.0956	.1144	-.1094	-.1076	-.2044	-.2676
14 LI	.1586	.0240	.3915	.4449	-.0991	-.0024	.3850	-.0782	.4568	-.3110
15 MN	.2800	.5331	-.2758	-.1536	.7008	-.7298	-.2184	-.1880	-.5539	-.4111
16 NA_M	.4410	.3516	.5113	.2606	-.0110	-.1741	.4282	.7845	.3372	-.2380
17 NB	.6256	.3309	.7834	.4435	.3083	-.1229	-.0077	.4221	.4978	-.3365
18 NI	.5062	.3138	.2196	.3852	.3154	.2164	.1612	-.1116	-.0785	-.2703
19 P	.5564	.6331	.4288	.3219	.6779	.7642	.0842	-.0296	-.1959	-.1249
20 PB	.7601	.9169	.1317	.3564	.9895	.7678	-.0114	-.0982	-.4419	.0042
21 SC	4.1380	.8016	.5312	.7658	.7016	.4959	.2703	.2854	.5852	-.3400
22 TH	18	11.8937	.2261	.6257	.9215	.5894	.2708	-.0121	.3817	-.4463
23 TI	23	19	791.7764	.5223	.1032	.1362	.4891	.6285	.6229	-.4177
24 V	23	19	27	29.6479	.2627	.2527	.5528	.2159	.7660	-.5504
25 Y	24	20	27	24	21.2193	.7041	.0483	-.0141	.0557	-.2259
26 ZN	23	18	24	24	25	120.8281	.1228	-.0116	.4879	-.4818
27 ZR	22	18	23	23	23	22	23.8968	.1584	.2814	-.4930
28 SR	24	20	27	27	28	25	23	31.0976	.5548	-.1279
29 CE	12	10	13	13	13	12	12	13	15.4306	.0039
30 CL_M	14	13	16	16	17	14	13	17	9	370.0024
31 U_NT	24	20	27	27	28	25	23	28	13	17
32 BR_M	17	15	19	19	20	17	16	20	9	14
33 W_NT	15	12	17	17	18	16	13	18	8	12
34 RB_M	7	7	8	8	8	7	7	8	7	6
35 CS_M	10	10	11	11	11	10	10	11	8	9
36 CE_M	21	17	23	23	24	22	19	24	13	16
37 TH_M	23	19	24	24	25	22	22	25	13	16
38 LA_M	23	19	26	26	27	24	22	27	13	17
39 SM_M	19	14	21	21	22	20	18	22	11	13
40 SC_M	23	19	26	26	27	24	22	27	13	17
41 EU_M	22	19	24	24	25	22	21	25	12	16
42 TB_M	11	9	11	11	12	11	10	12	7	6
43 YB_M	18	15	19	19	20	18	16	20	12	13

TABLE 11, CONTINUED

	31	32	33	34	35	36	37	38	39	40
	U_NT	BR_N	W_NT	RB_N	CS_M	CE_N	TH_N	LA_N	SM_N	SC_N
1 SiO2X	-.1278	-.4387	-.0031	.6261	-.2345	.1644	.6791	-.0322	-.0389	.5045
2 Al2O3X	.1037	-.2105	-.1941	.6021	-.0693	.0710	.8709	-.0345	-.1243	.7872
3 T-Fe2O3X	.0383	-.4411	-.2535	.4173	-.1190	-.0675	.7430	-.1047	-.3446	-.0584
4 FeOZ	.6121	-.5163	-.5772	-.7373	-.7225	.5137	.9507	-.6740	-.9569	-.9519
5 MgOZ	-.1360	-.5339	-.3250	-.8960	-.2559	.1096	-.3568	-.0263	-.1968	-.1894
6 CaOZ	.1357	.6359	-.1516	.0564	.1266	-.2718	-.4504	-.0111	-.8219	-.3833
7 K2OZ	-.1061	-.0700	-.0762	-.9802	.4127	.2228	.3887	.0683	-.0606	-.4379
8 B	-.1458	-.1285	-.6599	-.2742	-.1498	.0639	.5127	-.2050	-.1867	.5914
9 BA	-.1134	-.0659	-.1579	-.9674	-.3902	.2143	.3046	-.0588	-.0569	.3567
10 BE	-.0437	-.1737	.0103	-.0491	-.0178	-.0911	.3702	-.1245	-.1232	.4247
11 CO	.5521	-.0412	-.2768	-.0973	-.3833	-.1312	.2048	-.0798	-.3331	.3271
12 CR	.1147	-.3568	-.2976	.8634	-.0922	.0380	.8716	-.0358	-.1126	.7734
13 CU	.0918	.2688	-.0474	-.1283	-.1250	.8363	-.0483	.0561	.3557	.3280
14 LI	-.0394	-.1488	-.1491	-.0859	-.1560	-.0634	.8033	-.0837	-.1591	.6034
15 MN	.6435	.2416	-.0650	-.4180	-.3293	.4156	-.1244	.6525	-.2672	.1378
16 NA_N	-.2537	-.0096	.0394	.6606	.4132	.5020	.1648	.0511	-.0969	.2422
17 NB	.3342	-.3922	-.0208	.4150	-.0584	-.0266	.4793	-.0382	.0094	.5268
18 NI	.3548	-.2868	-.3145	.0949	-.2850	-.2849	.5640	-.0299	-.2613	.5319
19 P	.6906	-.1318	-.2461	-.1576	-.1917	-.1283	.3433	.5745	-.0294	.4080
20 PB	.9865	-.1870	-.2320	.3305	-.2928	.1161	.4132	.8940	-.4724	.4771
21 SC	.7446	-.2283	.4403	.8520	-.0791	.3595	.6693	.3529	-.0405	.8549
22 TH	.9470	-.0268	-.2647	.3309	-.1766	-.0270	.4876	.8090	-.0735	.4410
23 TI	.1212	-.2433	-.1609	-.7309	-.3348	.0317	.5697	.0432	-.1494	.6008
24 V	.3482	-.3052	.0684	.5726	-.2189	-.0491	.8833	.0375	-.1129	.5687
25 Y	.9764	-.1916	-.2494	.5280	-.2250	.1727	.2091	.9190	.5951	.2647
26 ZN	.6838	-.2193	.0209	-.3801	-.1440	.0412	.3662	.8178	-.1988	.4089
27 ZR	.0936	-.0330	-.1227	.0161	-.0028	-.0489	.5256	-.0259	-.2416	.3293
28 SR	-.0565	.1663	-.0267	.8962	.2792	.1449	.2302	.0481	-.0761	.2795
29 CE	-.3549	.5273	.1269	.6740	.0702	.1848	.6422	.4083	-.1123	.5099
30 CL_N	.0102	.9243	-.5061	-.3842	-.5303	-.0457	-.5216	.0652	-.0423	-.4396
31 U_NT	2035.6320	.0594	-.1185	-.2537	-.2593	.0131	.2657	.8344	.3512	.3064
32 BR_N	20	4.1771	.6758	-.6524	-.5185	.2559	-.2483	.0125	-.1290	-.3227
33 W_NT	18	15	63.1296	-.4381	-.1722	.1387	-.2472	-.0659	.5531	-.3142
34 RB_N	8	5	7	81.4966	.4485	.5959	.6052	.5699	.3536	.6423
35 CS_N	11	8	7	7	10.3167	.2849	-.0631	-.0238	-.1680	-.1301
36 CE_N	24	19	8	8	11	29.3320	.0584	.2914	.5410	.4539
37 TH_N	25	19	16	8	11	22	5.1172	.2356	-.0376	.8516
38 LA_N	27	20	18	8	11	24	25	28.4002	.6741	-.2709
39 SM_N	22	16	15	6	8	20	20	22	1.6622	.1374
40 SC_N	27	20	18	8	11	24	25	27	22	4.6217
41 EU_N	25	20	16	7	10	22	24	25	20	25
42 TB_N	12	7	2	2	4	11	12	12	8	12
43 YB_N	20	17	14	6	8	20	19	20	17	20

	41	42	43
	EU_N	TB_N	YB_N
1 SiO2X	-.1746	-.1611	-.0170
2 Al2O3X	-.0844	-.2068	.1868
3 T-Fe2O3X	.3572	.6343	.3205
4 FeOZ	.6341	.9617	.6142
5 MgOZ	-.0989	-.1703	.2437
6 CaOZ	.1122	.0504	.4872
7 K2OZ	-.0806	-.2357	.2062
8 B	-.2007	.0673	.1118
9 BA	-.0850	-.3301	.2357
10 BE	-.1055	.3832	-.0598
11 CO	.0662	.4372	.0012
12 CR	-.0751	.1516	.2248
13 CU	.2751	.3379	.3941
14 LI	-.1306	.0450	-.0749
15 MN	.8294	.9370	.5093
16 NA_N	-.1609	-.4506	.0450
17 NB	.0293	.6921	.1723
18 NI	.0888	.4355	.0920
19 P	.6869	.9331	-.0984
20 PB	.9913	.9555	.7522
21 SC	.4656	.8038	.2645
22 TH	.7767	.8797	.0068
23 TI	-.0051	.7184	-.0049
24 V	.2007	.6938	.0647
25 Y	.9642	.9111	.6179
26 ZN	.9296	.9287	.0119
27 ZR	-.0112	.4286	-.2787
28 SR	-.0578	-.1370	-.1757
29 CE	.0443	-.2746	-.0103
30 CL_N	.3420	-.1551	-.0789
31 U_NT	.9468	.9159	.5972
32 BR_N	.1530	-.3148	.0923
33 W_NT	-.1400	-.4820	-.2261
34 RB_N	.2759	1.0000	.4964
35 CS_N	-.1911	-.9488	-.3105
36 CE_N	.6059	.7077	.5751
37 TH_N	.2394	.7008	.3357
38 LA_N	.9001	.8739	.4317
39 SM_N	.7875	.7949	.7580
40 SC_N	.3750	.6889	.5516
41 EU_N	1.2156	.9423	.3581
42 TB_N	12	.8994	.5986
43 YB_N	20	11	.4917

TABLE 11, CONTINUED

Variable

Factors

	1	2	3	4	5	6
8B	1.00000	-.00000	-.00000	.00000	.00000	.00000
2Al2O3X	.96787	.23941	.00827	-.07222	-.49260	-.12928
14LI	.94036	.23846	-.47518	.01507	-.67974	-.09039
10BE	.93558	.24348	-.42893	.00743	-.34824	.08407
17NB	.79164	.38748	-.02527	-.00039	-.27983	-.03387
40SC_N	.70452	.48095	.12726	.15969	-.55845	-.30419
12CR	.69460	.10121	.20531	-.12755	-.47159	.17206
37TH_N	.68586	.42230	.03029	-.11124	-.54424	.24986
23TI	.67213	.18992	.33935	-.20742	-.18220	-.07664
1SiO2X	.66501	-.12265	.14462	.10458	-.56214	-.26891
20PB	.00000	1.00000	-.00000	.00000	-.00000	-.00000
42TB_N	.16106	.96663	-.04051	.18314	-.27363	.28142
31U_NT	-.09278	.86197	-.03498	-.10552	.04127	.26944
19P	.32107	.83030	-.20894	-.24594	-.02587	.24860
25Y	-.22237	.77518	.24211	-.01746	.19467	.17233
4FeOx	.13580	.77491	.60408	-.49438	-.37049	-.51083
22TH	-.22745	.75855	.25939	-.50553	.05381	.62969
11CO	.31763	.71254	-.43937	-.31145	-.29167	.10230
41EU_N	-.29162	.70080	.25961	.19102	.25536	.14246
15MN	-.36811	.69866	-.02623	.15189	.20900	-.11676
26ZN	-.30784	.67599	.34144	-.42070	.12379	.28857
21SC	.27968	.58520	.33630	-.21149	-.01094	.40730
38LA_N	-.35819	.56067	.44796	.08673	.21147	.03539
34RB_N	.00000	.00000	1.00000	.00000	-.00000	-.00000
16NA_N	-.18858	-.35513	.96224	-.21866	.34807	-.09324
9BA	.17874	-.29939	.82521	-.02308	.21023	-.27121
28SR	.13253	-.22003	.81196	-.13914	.37547	-.19847
7K2OX	.34841	-.24018	.74340	-.01708	.13508	-.27162
35CS_N	-.30980	-.29217	.68747	-.29534	-.02878	-.28315
29CE	.52461	-.04302	.52489	-.30246	.28690	.16491
39SM_N	.00000	.00000	-.00000	1.00000	-.00000	.00000
43YB_N	.20101	.29455	.12723	.77505	-.27522	-.46614
36CE_N	.02578	.03688	.45465	.69809	.00661	-.63878
27ZR	.19403	.13481	.17084	-.39302	-.23633	.21562
32BR_N	-.00000	-.00000	.00000	-.00000	1.00000	-.00000
30CL_N	-.12372	-.04736	-.16726	.17570	.93369	-.05733
6CaOx	-.57397	.17482	.41153	-.72466	.91150	.11565
33W_NT	.23547	-.18946	-.15246	.15520	.71104	.35833
18NI	.50589	.60659	-.41522	-.23243	-.63313	.03924
5MgOx	-.17325	-.00718	-.51404	.49697	-.72455	-.61379
3T-Fe2O3X	-.00000	.00000	-.00000	-.00000	-.00000	1.00000
24V	.49726	.27339	.06358	-.23428	-.17021	.71357
13CU	.15233	.31369	-.06289	.55371	-.09104	-.61336

Table 12.--Factor matrix for Lower Mine Sequence chloritic marble. This six factor oblique projection model contains 91.1 percent of the total compositional information.

Table 13.--Statistical summary for jasperoid samples.--N=28
 [*Mean estimated by Cohen's technique.--Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
Major elements in weight percent					
1 SiO2%	78.22	0.959 01	59.00	97.50	28
2 Al2O3%	5.95	.274 01	1.06	11.00	28
3 T-Fe2O3%	3.59	.208 01	0.96	7.98	28
4 FeO%	1.83	.101 01	0.30	2.88	6
5 MgO%	5.98	.312 01	0.27	12.70	28
6 CaO%	0.88	.125 01	0.05	6.08	28
7 K2O%	0.09	.202 00	0.01	0.93	28
8 TiO2%	0.13	.123 00	0.01	0.49	28
9 F%	0.07	.610 -1	0.03	0.18	5
Minor elements in parts per million					
10 B*	14.9	0.403 02	10	95	18
11 Ba	45.7	.324 02	13	134	28
12 Be	2.4	.134 01	1	6	28
13 Co*	16.0	.951 01	4	37	27
14 Cr	51.7	.386 02	4	162	28
15 Cu	797.5	.243 04	3	9519	28
16 Li	60.5	.316 02	10	143	28
17 Mn	88.1	.402 02	20	197	28
18 Na-N	234.3	.329 03	81.4	1600	23
19 Nb*	4.7	.115 01	4	6	3
20 Ni	47.2	.313 02	6	123	27
21 P	2444.4	.361 04	65	16765	28
22 Pb*	211.1	.104 04	10	3683	20
23 Sc	7.18	.769 01	1	29	28
24 Th*	12.2	.283 02	2	111	23
25 Ti	423.1	.361 03	44	1628	28
26 V	72.2	.573 02	9	298	28
27 Y	29.0	.493 02	1	220	28
28 Zn	51.5	.337 02	7	147	28
29 Zr*	21.9	.193 02	2	74	27
30 Sr	6.54	.340 01	2	17	28
31 Ce	14.0	.522 01	10	24	9
32 Cl-N	207.87	.986 02	57.50	478.5	21
33 U-N	3849.2	.833 04	1.20	34400.0	28
34 Ga-N	25.83	.132 02	7.80	53.0	19
35 As-N	1.52	.167 01	0.09	5.0	9
36 Br-N	3.03	.261 01	0.35	11.6	17
37 W-N	5.24	.389 01	0.80	12.4	20
38 Au-N	0.54	.122 01	0.00	6.05	25
39 Rb-N	41.00	--	41.0	410.0	1
40 Sb-N	--	--	--	--	0
41 Cs-N	1.66	.886 00	0.30	3.03	12
42 Ce-N	45.53	.139 03	1.34	489.0	12
43 Th-N	5.69	.466 01	0.58	19.3	24
44 Dy-N	18.22	.237 02	3.00	71.9	8
45 La-N	27.58	.533 02	0.44	242.0	24
46 Nd-N	3.50	.707 00	3.00	4.00	2
47 Sm-N	1.71	.330 01	0.21	15.00	19
48 Sc-N	8.20	.792 01	0.62	35.70	25
49 Eu-N	1.89	.352 01	0.04	16.40	22
50 Tb-N	1.91	.214 01	0.20	7.50	14
51 Yb-N	4.27	.571 01	0.40	18.10	14
52 Tm-N	0.90	-	0.90	0.90	1
53 Ta-N	1.18	.779 00	0.50	3.10	11

	1	2	3	4	5	6	7	8	9	10
	SiO2X	Al2O3X	T-Fe2O3X	FeOX	MgOX	CaOX	K2OX	B	BA	BE
1 SiO2X	9.5894									
2 Al2O3X		2.7454								
3 T-Fe2O3X			2.0786							
4 FeOX				1.0055						
5 MgOX					3.1252					
6 CaOX						1.2475				
7 K2OX							2.019			
8 B								27.7372		
9 BA									32.3704	
10 BE										1.3452
11 CO										
12 CR										
13 CU										
14 LI										
15 MN										
16 NA_N										
17 NI_N										
18 P										
19 PB										
20 SC										
21 TH										
22 TI										
23 V										
24 Y										
25 ZH										
26 ZR										
27 SR										
28 CL_N										
29 U_NT										
30 GA_N										
31 AS_N										
32 M_NT										
33 AU_N										
34 CS_N										
35 CE_N										
36 TH_N										
37 LA_N										
38 SW_N										
39 SC_N										
40 EU_N										
41 FB_N										
4 YB_N										

Table 14.--Correlation matrix for jasperoid samples. Number of samples = 28, number of variables = 42. *, correlation coefficient is significant at the 95 percent level of confidence. The upper half of the matrix contains the correlation coefficients, the lower half contains the number of valid sample pairs, and the diagonal contains the standard deviation of the variable for the valid pairs.

	11	12	13	14	15	16	17	18	19	20
	CO	CR	CU	LI	MN	NA_M	NI	P	PB	SC
1 S102X	-.8544	-.3782	-.3747	-.7126	-.5811	-.3272	-.8133	-.0837	-.6759	-.5383
2 AL2O3X	.8404	.2847	.2907	.7346	.5028	.2700	.8060	-.1382	.6002	-.9903
3 T-Fe2O3X	.5240	.1932	.4301	.4249	.4956	-.0148	.4405	-.0487	.2294	-.3514
4 FeOx	.7500	.2350	.2095	.1833	-.0985	.2071	.6730	.2060	.4562	-.3078
5 MgOx	.9212	.4151	.2712	.6029	.4486	.3149	.9253	-.1277	.6810	-.3562
6 CaOx	-.1364	.2951	.0047	-.1501	-.0236	-.0517	-.1132	.9892	-.1700	-.1106
7 K2Ox	.1689	-.1211	-.0990	.1698	-.1845	-.0038	.0589	-.0744	.0207	.0316
8 B	.3192	-.0423	-.1590	.6290	.2893	.3823	.3980	-.3101	.5401	.4609
9 BA	-.1653	-.0487	.0302	.1471	-.0397	-.1509	-.2684	.0677	.1110	.4455
10 BE	.4425	.4799	.0912	.6092	.3413	.3405	.5948	.1670	.5886	.3214
11 CO	9.0946	.2898	.3283	.5205	.2626	.4702	.9048	-.1772	.6238	-.3900
12 CR	27	38.5822	-.0271	.0272	.0356	-.1799	.4605	.2568	.0749	-.0135
13 CU	27	28	2434.2050	.4552	.2151	.9375	.1808	.0066	.0745	.1624
14 LI	27	28	28	31.6163	.6421	.5539	.4983	-.1822	.6677	.6288
15 MN	27	28	28	28	40.1875	.2346	.2158	-.0244	.4485	.5208
16 NA_M	22	23	23	23	23	329.2822	.4992	-.1295	.9218	.8168
17 NI	27	27	27	27	27	22	29.6444	-.1719	.7078	-.3193
18 P	27	28	28	28	28	23	27	3613.2030	-.2384	-.1339
19 PB	19	20	20	20	20	15	19	20	917.4946	.8527
20 SC	27	28	28	28	28	23	27	28	20	7.6983
21 TH	22	23	23	23	23	18	22	23	20	23
22 TI	27	28	28	28	28	23	27	28	20	28
23 V	27	28	28	28	28	23	27	28	20	28
24 Y	27	28	28	28	28	23	27	28	20	28
25 ZN	27	28	28	28	28	23	27	28	20	28
26 ZR	26	27	27	27	27	22	26	27	20	27
27 SR	27	28	28	28	28	23	27	28	20	28
28 CL_M	20	21	21	21	21	20	20	21	13	21
29 U_NT	27	28	28	28	28	23	27	28	20	28
30 GA_M	19	19	19	19	19	17	19	19	11	19
31 AS_M	8	9	9	9	9	9	8	9	4	9
32 W_NT	19	20	20	20	20	19	19	20	12	20
33 AU_M	24	25	25	25	25	21	24	25	17	25
34 CS_M	12	12	12	12	12	12	12	12	6	12
35 CE_M	12	12	12	12	12	11	12	12	5	12
36 TH_M	23	24	24	24	24	21	23	24	16	24
37 LA_M	23	24	24	24	24	21	23	24	16	24
38 SW_M	18	19	19	19	19	18	18	19	11	19
39 SC_M	24	25	25	25	25	22	24	25	17	25
40 EU_M	21	22	22	22	22	20	21	22	15	22
41 TB_M	14	14	14	14	14	11	14	14	12	14
42 YB_M	14	14	14	14	14	11	14	14	12	14

	21	22	23	24	25	26	27	28	29	30
	TH	TI	V	Y	ZN	ZR	SR	CL_M	U_NT	GA_M
1 S102X	.4754	-.5722	-.5096	-.3047	-.5341	-.5731	-.2890	.0198	-.3259	-.8480
2 AL2O3X	.2853	.5853	.4430	.1476	.5483	.6438	.1157	.0230	-.1574	.9328
3 T-Fe2O3X	.2508	.2743	.3511	.2285	.4555	.2379	.0586	-.0593	-.2576	.7419
4 FeOx	.0643	.3832	-.6121	-.5992	.1970	.7466	.3003	1.0000	-.4799	1.0000
5 MgOx	.2520	.6237	.4103	.0909	.4900	.6615	.1227	-.0618	-.1200	.8372
6 CaOx	-.1559	-.1221	-.0706	-.0534	.0844	.0478	.6277	.0528	-.1361	-.2270
7 K2Ox	-.0128	.3065	.0707	-.0222	.1242	.4096	.0448	.0664	-.0210	.3599
8 B	.4423	.5919	.3283	.2785	.1456	.4973	-.1571	.3572	.3362	.5220
9 BA	.4243	.0083	.3786	.5977	.0817	-.0152	.1291	-.2539	.5554	.0913
10 BE	.3719	.6273	.2296	.2055	.4631	.5618	.3524	-.2830	.2024	.4704
11 CO	.2341	.6157	.4226	.1141	.5043	.6485	.2511	-.0194	.1559	.8212
12 CR	-.0390	.2135	.1022	-.1040	.3412	.5497	.0477	-.3422	-.0564	.3246
13 CU	.0352	-.0976	.1344	-.1214	.2937	-.2101	.3615	.0233	.0460	.2669
14 LI	.5227	.4978	.4943	.4929	.3425	.2475	.2099	.1398	.4393	.5349
15 MN	.4487	.2599	.4349	.4812	.4033	.0282	-.0977	.0544	.4309	.1659
16 NA_M	.8956	.6205	.3202	.8307	-.3270	.1329	.3469	-.1799	.8981	-.4262
17 NI	.2403	.6916	.3312	.0363	.3814	.7480	.2641	-.0681	.0983	.8505
18 P	-.1727	-.1891	-.0966	-.0580	.1077	-.0082	.5892	.0713	-.1439	-.2548
19 PB	.8153	.7087	.5275	.6350	-.1417	.4458	.2515	.0541	.7253	.8586
20 SC	.9241	.4368	.7258	.8995	.0186	.1580	.1898	.2730	.9293	.6482
21 TH	26.3415	.2810	.4447	.7949	-.0994	.0329	.0774	.5636	.9594	.3949
22 TI	23	360.9480	.4705	.2791	-.1472	.7293	.2280	-.2592	.2492	.5789
23 V	23	28	57.2790	.7870	.2564	.3746	.0763	.0484	.5965	.8265
24 Y	23	28	28	49.3145	-.0099	.0124	.1158	.2930	.9111	.2865
25 ZN	23	28	28	28	33.7073	.3209	-.0925	-.1197	-.0831	.5664
26 ZR	23	27	27	27	27	18.6424	.1350	-.0997	.0071	.6886
27 SR	23	28	28	28	28	27	3.4046	.0318	.0558	.0370
28 CL_M	16	21	21	21	21	20	21	98.5577	.0780	.0652
29 U_NT	23	28	28	28	28	27	28	21	8331.3670	.3572
30 GA_M	14	19	19	19	19	18	19	18	19	13.2435
31 AS_M	6	9	9	9	9	8	9	8	9	7
32 W_NT	15	20	20	20	20	19	20	19	20	17
33 AU_M	20	25	25	25	25	24	25	20	25	19
34 CS_M	8	12	12	12	12	11	12	11	12	11
35 CE_M	8	12	12	12	12	11	12	11	12	11
36 TH_M	19	24	24	24	24	23	24	21	24	19
37 LA_M	19	24	24	24	24	23	24	21	24	19
38 SW_M	14	19	19	19	19	18	19	18	19	16
39 SC_M	20	25	25	25	25	24	25	21	25	19
40 EU_M	18	22	22	22	22	21	22	18	22	16
41 TB_M	12	14	14	14	14	13	14	10	14	9
42 YB_M	12	14	14	14	14	14	14	10	14	10

TABLE 14, CONTINUED

	31	32	33	34	35	36	37	38	39	40
	AS_N	W_MT	AU_N	CS_N	CE_N	TH_N	LA_N	SH_N	SC_N	EU_N
1 \$102X	-4.048	-5.599	.0624	.2692	-.1433	-.6790	-.2365	-.0574	-.5210	-.2257
2 AL2O3X	.2244	.5748	-.1370	-.1601	.1164	.7142	-.1873	-.0255	-.5240	.1583
3 T-Fe2O3X	.4689	.3475	-.0737	-.4043	.4383	.4676	.3573	-.0699	.3792	.3965
4 FeOX	-1.0000	.9965	-.7508	-.2354	-1.0000	-.1233	-.3163	-.7233	-.1843	-.8253
5 MgOX	.2802	.5164	-.1929	-.4172	-.1037	.6518	.0551	-.0965	.4622	.0189
6 CaOX	.2391	.0988	-.0596	-.1304	-.0711	-.1108	-.0402	.0201	-.0890	-.0254
7 K2OX	.8681	.5265	-.0862	.2580	-.1032	.2855	.0078	.1163	.0810	-.0670
8 B	-.5466	.3070	.1055	.0294	.7847	-.1719	.1561	.1340	.0422	.0553
9 BA	.0613	.3535	.5724	.5823	.2380	.0449	.2077	.7701	-.0366	.1381
10 BE	-.1255	.6424	-.0693	.0218	.3137	.4201	.3619	.0145	.2861	.3211
11 CO	.4139	.5783	-.1456	-.1788	-.2737	.5566	-.0874	-.0499	.3676	-.1618
12 CR	-.0262	.4190	-.2214	-.3040	-.2983	.0732	-.2066	-.1635	-.0824	-.1744
13 CU	.4276	-.1570	.0119	.0815	.9057	.3929	.1805	.7884	.1857	.1918
14 LI	-.1386	.4370	.2793	-.0469	.6015	.5925	.4787	.3816	.5193	.4396
15 MN	-.1376	.1778	.2677	-.1044	.7421	.2757	.5488	.2445	.4144	.6260
16 NA_N	-.1708	-.0483	.1118	-.4642	.5026	.2757	.5871	-.0328	.5169	.3054
17 NI	.0316	.5672	-.2512	-.4456	-.2453	-.6136	-.0443	-.1830	.3987	-.1320
18 P	.2359	.0756	-.0519	.1490	-.0886	-.1312	-.0536	.0222	-.1150	-.0297
19 PB	.8216	.6647	.5417	.1278	.9994	.8599	.7581	.9566	.8973	.5157
20 SC	.7277	.5180	.8468	.0370	.6714	.6855	.5591	.9280	.7638	.5196
21 TH	.5726	.3787	.8082	.0190	.9443	.5785	.7275	.9511	.7061	.5739
22 TI	.3347	.7800	.0666	.0235	.3335	.5519	.3201	.2746	.4442	.2493
23 V	.2016	.3738	.7680	-.1897	.2734	.5967	.3045	.8405	.5081	.2669
24 Y	.8927	.3901	.9432	.1881	.9656	.3963	.8366	.9941	.5607	.8747
25 ZN	-.2446	.4654	-.0667	.1327	.1359	.2402	.0634	-.0516	.0682	.0748
26 ZR	.4914	.7997	-.1146	-.3231	-.1175	.4778	.0186	.0686	.3608	-.0562
27 SR	.3087	.1750	.0011	-.2989	-.1432	.3264	.1432	.1175	.2930	.0325
28 CL_N	-.2699	-.3411	.6116	-.5336	-.7500	.0847	-.1616	.2057	.1954	-.1350
29 U_NT	.7750	.3909	.9045	.1540	.9997	.6341	.9569	.9829	.6754	.8516
30 GA_N	-.0054	.4799	-.1286	-.3626	-.3000	.8479	.3438	.1646	.7705	.1664
31 AS_N	1.6674	.7027	-.4481	.1597	.2435	.3862	.3481	.3923	.5236	.3058
32 W_NT	9	3.8982	1.2202	.0675	.8143	-.0820	.4494	.9534	.1615	.4887
33 AU_N	9	20	12	7	139.7063	.3350	.9994	.1402	.7955	.9930
34 CS_N	6	12	12	8856	.7002	-.2552	.3466	.1267	-.0269	.3533
35 CE_N	5	11	12	7	139.7063	.3350	.9994	.1402	.7955	.9930
36 TH_N	8	19	23	11	12	4.6561	.4387	.4853	.7959	.3185
37 LA_N	8	19	23	11	12	24	53.3445	.7648	.7192	.9646
38 SH_N	8	16	18	10	11	18	18	3.3035	.2312	.6344
39 SC_N	9	20	24	12	12	24	24	18	7.9175	.5837
40 EU_N	8	17	21	10	11	21	21	16	22	3.5166
41 YB_N	5	9	13	5	5	13	13	8	14	13
42 YB_N	3	9	13	7	6	13	13	8	14	13

	41	42
	TB_N	YB_N
1 \$102X	-.4290	-.0712
2 AL2O3X	.3357	.0571
3 T-Fe2O3X	.5193	.1541
4 FeOX	-.9854	-.8793
5 MgOX	-.1794	-.0908
6 CaOX	-.1943	-.2094
7 K2OX	-.1160	-.1697
8 B	.0444	-.0049
9 BA	.1825	.0383
10 BE	.3417	.1703
11 CO	.0624	-.2513
12 CR	-.2284	-.4215
13 CU	.3411	.1278
14 LI	.6839	.4685
15 MN	.6935	.4141
16 NA_N	.7836	.9308
17 NI	.0770	-.1582
18 P	-.1995	-.2301
19 PB	.5554	.7585
20 SC	.6840	.6071
21 TH	.6091	.7872
22 TI	.2512	.0700
23 V	.6140	.0709
24 Y	.9126	.7797
25 ZN	.2637	-.2455
26 ZR	-.1211	-.1821
27 SR	.0602	.0862
28 CL_N	-.1291	.6518
29 U_NT	.8343	.8969
30 GA_N	.3400	.1631
31 AS_N	.8603	.9081
32 W_NT	.1547	.2126
33 AU_N	.4791	.4853
34 CS_N	.377	.1408
35 CE_N	.9963	.9997
36 TH_N	.4296	.4462
37 LA_N	.9402	.9615
38 SH_N	.8733	.7706
39 SC_N	.6970	.8183
40 EU_N	.9169	.8791
41 YB_N	2.1398	.9066
42 YB_N	11	5.7143

TABLE 14, CONTINUED
40

Variable	Factors					
	1	2	3	4	5	6
35CE_N	1.00000	-0.00000	0.00000	0.00000	-0.00000	0.00000
16NA_N	.92853	-.37479	.63487	-.08383	.47851	.42373
37LA_N	.73139	.06137	.05592	.03234	.19408	.24329
41TB_N	.64923	.31472	-.28153	-.26542	.10472	.30169
40EU_N	.64521	.08152	-.12565	-.10631	.07465	.26968
14LI	.64205	.43581	.25104	.02229	.11514	-.05039
42YB_N	.62735	.00213	-.22486	-.25580	.59910	.42726
19PB	.61508	.36279	.33630	.20582	.36336	.37061
15MN	.59232	.41129	-.06947	-.30362	.00206	-.12626
29U_NT	.56734	.22857	-.10104	.26602	.46602	.30455
24Y	.52550	.19742	-.10226	.31772	.45521	.33599
13CU	.52481	-.14524	.27363	-.42016	.02737	.31353
39SC_N	.46529	.37567	.20194	-.23500	.20279	.44340
30GA_N	-0.00000	1.00000	-0.00000	-0.00000	0.00000	0.00000
23V	.10105	.75063	-.30129	.30635	.19648	.01616
5MgOZ	.19922	.65930	.29949	-.27254	-.15163	.10912
2Al2O3Z	.29447	.64883	.34050	-.07613	-.16316	.04123
36TH_N	.28867	.57484	.08589	-.09733	.13286	.25903
17NI	.15620	.57017	.39435	-.12579	-.11192	.08881
11CO	.11193	.55230	.38010	-.07748	-.10787	.18488
1SiO2Z	-.36954	-.50935	-.43396	.13212	.13224	-.24339
34CS_N	.44837	-.69781	.51863	.53574	-.25609	.14896
18P	.08469	-.83678	.79917	.35407	-.17192	.52762
4FeOZ	-0.00000	0.00000	1.00000	0.00000	0.00000	-0.00000
27SR	.35168	-.71361	.95969	.28492	.04682	.67349
6CaOZ	.12655	-.85002	.88181	.37393	-.15936	.54628
10BE	.51182	.07632	.76138	.37705	-.28864	.08639
32W_NT	.15236	.22603	.63545	.56305	-.32255	.39560
22TI	.30936	.36812	.45567	.35419	-.12790	.13488
26ZR	-.09161	.44515	.44634	.39081	-.23225	.18292
9BA	0.00000	-0.00000	0.00000	1.00000	-0.00000	-0.00000
7K2OZ	-.20447	.08730	.29239	.68388	-.12266	.17909
8B	.38559	.42735	.28074	.59323	.14599	-.46521
38SM_N	.21284	.22284	-.23765	.54525	.52620	.36343
3T-Fe2O3Z	.26996	.52153	.03117	-.55792	-.15451	.17467
28CL_N	0.00000	-0.00000	0.00000	0.00000	1.00000	-0.00000
33AU_N	.31612	.19348	-.38217	.47558	.70877	-.16352
21TH	.59117	.21800	.08784	.27687	.67064	.24115
20SC	.46057	.41802	-.00721	.30759	.49785	.29380
12CR	-.14147	.17087	.32163	.15173	-.43248	.08278
25ZN	.10787	.44283	.13184	-.01302	-.52628	-.17763
31AS_N	-0.00000	-0.00000	0.00000	-0.00000	0.00000	1.00000

Table 15.--Factor matrix for jasperoid samples. This six factor oblique projection model contains 89.5 percent of the total compositional information. Number of samples = 28, number of variables = 42.

Factor analysis of the correlation matrix (table 15) shows that uranium is associated chiefly with two factors (groups); one headed by Ce with a U loading of 0.57, also contains Na, La, Tb, Eu, Li, Yb, Pb, Mn, Y, Cu, and Sc, and the other headed by Cl, contains Au, Th, and Sc and carries U with a loading of 0.47. Although the factor model for U in jasperoid differs from other ore types, the chief elemental associations are similar to ore-bearing sets, notably in the REE and Au association (although the Au association is weak here).

The origin of the jasperoid is problematical (Eupene, 1980; Nash and Frishman, 1982), and the major element data offer no easy explanations. In the correlation analysis (table 12), Si is seen to have negative correlations with many elements, such as Al, Fe, Mg, and no significant positive correlations. This behavior of Si also has been observed in other Ranger data subsets. The implication is that no other major or minor elements were introduced along with silica. The significant negative correlations of Al, total Fe, and Mg with Si probably chiefly reflects the inverse mass relation of chlorite and quartz in these rocks rather than removal of these elements during silicification, although that probably happened as well (Nash and Frishman, 1982).

Chemical Differences in Ore

Major element composition of seven subsets defined by uranium grade and position (oretype, Appendix I) were compared using a t-test and most elements were found to be not significantly different. This surprising result probably is caused by the high chemical variance of the mixed lithologies in each ore type. Some important differences were highlighted. Total iron, expressed as Fe_2O_3 , is significantly higher in ore-bearing rocks compared to barren. Total iron is also significantly higher in medium grade versus low grade, and high grade versus medium grade subsets. The alkalis Ca, Na, and K, are significantly depleted in ores relative to barren rocks remote from ore zones. Differences in Si, Al, Fe, Ti, Mn, F, and P are not significantly different between ore and barren rocks although some elements like P appear to be enriched in higher grades of ore. Comparison of Ca and Mg in barren rocks remote from ore and in barren rocks within ore bodies show that Mg is significantly higher and Ca lower in barren rocks near ore; this might be

explained by more magnesite relative to dolomite near ore. The enrichment in iron and depletion in alkalis is consistent with lithologic observations.

More meaningful t-tests were run on 94 ore-grade versus 42 barren (less than about 250 ppm U) samples of UMS schist because the major element composition was more homogenous. The alkalis Ca, K, Na, Sr, and Ba are significantly depleted in ores, but Li is significantly enriched in ores. Mg is significantly enriched in ore but Fe is not significantly different. Mn, Ce, and Cs, are also significantly depleted in ore. The minor elements Cr, Ni, Pb, V, Y, Sm, Sc, Eu, and Yb are significantly enriched in ores. Some elements of interest (Au, Th, Co, and Cu) are not significantly different in the two groups. These results are generally similar to those produced by correlation and regression analyses but we cannot explain the differences.

Summary data for eleven other rock types are in tables 16 to 26 but will not be discussed.

DISCUSSION

Chemical analyses of host rocks and ores at Ranger confirm lithologic observations on rock compositions and point out key chemical variables. The alkali and alkaline earth metals Ca, K, Na, Sr, Ba, and Cs are depleted in ore-bearing rocks during chloritization of feldspars and biotite. Several statistical tests indicate significant Mg and Fe enrichment in ores. Comparison of barren rocks near ore with barren rocks remote from ore suggests that the Mg:Ca ratio is higher near ore as would occur with enrichment of magnesite relative to dolomite in marble. The minor elements Cr, Ni, Pb, V, Y, Sm, Sc, Eu, and Yb, are enriched in ore.

Several statistical tests demonstrate significant positive association of some REE with uranium. Ce, Sm, Sc, Eu, Tb, and Yb are enriched about two-fold relative to barren, unaltered rocks. This is significant statistically, but changes of a few ppm are not the sort we would recommend for routine geochemical exploration. Nd is enriched about 20-fold in ore to hundreds of ppm and may be the best single REE guide.

Native gold occurs erratically in chloritic schist and several statistical tests demonstrate a significant positive association with uranium. Gold is notoriously difficult to sample because of its particulate

Table 16.--Statistical summary for diabase samples.--N=4
 [*Mean estimated using Cohen's Technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	41.4	.832 01	30.0	47.8	4
2 Al2O3%	16.5	.231 01	14.4	19.3	4
3 T-Fe2O3%	12.0	.392 01	6.39	14.9	4
4 FeO%	6.25	.305 01	4.09	8.41	2
5 MgO%	14.6	.942 01	6.42	25.84	
6 CaO%	4.85	.469 01	.24	8.91	4
7 K2O%	.65	.732 00	.01	1.43	4
8 TiO2%	1.58	.817 00	.56	2.28	4
9 F%	.11	.042 00	.07	.14	2
<u>Minor elements in parts per million</u>					
10 B	88.5	.133 03	21.0	156.0	2
11 Ba	125.7	.133 03	3.00	280.0	4
12 Be*	1.67	.486 01	5.00	7.00	2
13 Co	43.7	.921 01	37.0	57.0	4
14 Cr	312.2	.408 03	101.0	925.0	4
15 Cu	49.5	.254 02	13.0	68.0	4
16 Li	98.5	.928 02	27.0	223.0	4
17 Na-N	8715.0	.916 04	590	16700.0	4
18 Mn	676.2	.582 03	158.0	1255.0	4
19 Nb	9.75	.359 01	5.00	13.0	4
20 Ni	131.0	.774 02	62.0	202.0	4
21 P	1643.2	.196 04	632.0	4591.0	4
22 Pb	311.0	.402 03	15.0	878.0	4
23 Sc	23.0	.115 02	6.00	32.0	4
24 Th*	10.2	.224 02	3.00	40.00	3
25 Ti	6875.2	.501 04	798.0	11238.0	4
26 V	268.5	.562 02	185.0	302.0	4
27 Y	39.5	.477 02	13.0	111.0	4
28 Zn	103.2	.554 02	42.0	174.0	4
29 Zr	177.0	.210 03	48.0	492.0	4
30 Sr	116.0	.107 03	6.00	217.0	4
31 Ce*	28.6	.285 02	34.0	60.0	3
32 Cl-N*	94.6	.758 03	566.0	950.6	2
33 U-N	1962.7	.318 04	.40	6670.0	4
34 Ga-N	52.0	--	52.0	52.0	1
35 As-N	--	--	--	--	0
36 Br-N	--	--	--	--	0
37 W-N	--	--	--	--	0
38 Au-N	.02	--	.02	.02	1
39 Rb-N	94.5	.289 02	74.0	115.0	2
40 Sb-N	--	--	--	--	0
41 Cs-N	2.21	--	2.21	2.21	1
42 Ce-N	29.6	.227 01	28.0	31.2	2
43 Th-N	8.64	.101 02	1.02	22.6	4
44 Dy-N	42.0	--	42.0	42.0	1
45 La-N	51.1	.630 02	14.0	145.0	4
46 Nd-N	--	--	--	--	0
47 Sm-N	3.18	.459 00	2.86	3.51	2
48 Sc-N	30.7	.139 02	10.3	41.8	4
49 Eu-N	2.27	.223 01	.95	5.61	4
50 Tb-N	1.30	--	1.30	1.30	1
51 Yb-N	4.63	.551 01	1.20	1.10	3
52 Tm-N	--	--	--	--	0
53 Ta-N	--	--	--	--	0

Table 17.--Statistical summary for Kombiliqie Formation samples--N=18
 [*Mean estimated using Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	68.1	0.168 02	32.2	87.8	18
2 Al2O3%	11.4	.641 01	3.23	22.8	18
3 T-Fe2O3%	3.97	.273 01	.53	11.0	18
4 FeO%	2.49	.192 01	.99	6.80	8
5 MgO%	8.05	.456 01	1.06	19.7	18
6 CaO%	.57	.152 01	.01	6.15	18
7 K2O%	1.36	.162 01	.01	4.98	18
8 TiO2%	.37	.344 00	.05	1.21	18
9 F%	.05	.150 -1	.03	.07	8
<u>Minor elements in parts per million</u>					
10 B*	70.2	0.318 03	18.0	714.0	11
11 Ba	149.4	.277 03	11.0	1131.0	18
12 Be	3.11	.330 01	1.00	13.0	18
13 Co*	22.1	.186 02	6.00	72.0	17
14 Cr	170.7	.195 03	27.0	784.0	18
15 Cu	114.5	.194 03	2.00	621.0	18
16 Li	68.5	.448 02	7.00	175.0	18
17 Na-N	227.4	.205 03	58.6	630.0	17
18 Mn	85.3	.458 02	19.0	183.0	8
19 Nb*	3.30	.336 01	4.00	11.0	8
20 Ni	57.0	.409 02	3.00	184.0	18
21 P*	1211.7	.532 04	36.0	19744.0	15
22 Pb*	414.6	.783 03	10.0	2387.0	9
23 Sc	6.44	.591 01	1.00	24.0	18
24 Th*	11.3	.204 02	2.00	77.0	15
25 Ti	1293.0	.121 04	168.0	4316.0	18
26 V	69.5	.450 02	15.0	186.0	18
27 Y*	20.3	.393 02	1.00	142.0	13
28 Zn	43.7	.299 02	5.00	132.0	18
29 Zr	107.0	.788 02	15.0	299.0	18
30 Sr	43.6	.485 02	1.00	162.0	18
31 Ce*	156.8	.234 03	10.0	658.0	16
32 Cl-N*	61.5	.674 02	44.0	230.0	14
33 U-N	1212.8	.415 04	1.50	17700.0	18
34 Ga-N*	13.3	.256 02	9.00	68.00	10
35 As-N	4.38	.549 01	.30	12.0	4
36 Br-N	0.89	.469 00	.38	1.67	6
37 W-N	13.92	.118 02	4.12	34.5	7
38 Au-N*	.24	.551 00	.01	1.84	11
39 Rb-N	61.1	.410 02	13.0	137.0	8
40 Sb-N	1.90	--	1.90	1.90	1
41 Cs-N	1.57	.142 01	.40	5.40	10
42 Ce-N	193.7	.209 03	5.60	638.0	14
43 Th-N	12.1	.113 02	1.26	45.6	17
44 Dy-N	40.3	.568 02	7.40	106.0	3
45 La-N	179.6	.219 03	3.76	674.0	17
46 Nd-N	124.8	.157 03	9.26	430.0	6
47 Sm-N	10.0	.165 02	.22	62.8	14
48 Sc-N	6.66	.500 01	1.31	16.6	17
49 Eu-N	1.09	.821 00	.12	3.28	13
50 Tb-N	1.19	.275 00	1.00	1.39	2
51 Yb-N	1.11	.779 00	.30	2.52	9
52 Tm-N	2.18	--	2.18	2.18	1
53 Ta-N	.64	.269 00	.40	1.10	5

Table 18.---Statistical summary for granitic dike samples--N=18
 [*Mean estimated using Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	59.3	0.118 02	30.3	74.8	18
2 Al2O3%	15.8	.299 01	11.7	23.8	18
3 T-Fe2O3%	5.42	.362 01	.23	13.1	18
4 FeO%	3.59	.281 01	.25	10.3	10
5 MgO%	9.70	.578 01	.37	21.3	18
6 CaO%	.63	.120 01	.17	5.45	18
7 K2O%	1.59	.230 01	.01	8.07	18
8 TiO2%	.01	.000 00	.01	.01	18
9 F%	.07	.027 00	.04	.12	10
<u>Minor elements in parts per million</u>					
10 B*	279.0	0.779 03	12.0	3148.0	16
11 Ba	47.6	.548 02	5.00	227.0	18
12 Be	4.83	.238 01	1.00	11.0	18
13 Co*	22.8	.184 02	14.0	64.0	15
14 Cr*	5.06	.225 02	1.0	79.0	13
15 Cu*	47.1	.212 03	2.0	877.0	17
16 Li	108.9	.732 02	5.0	269.0	18
17 Mn	154.5	.151 03	26.0	727.0	18
18 Na-N	4335.6	.821 04	86.2	25000.0	17
19 Nb*	9.49	.564 01	4.00	19.0	15
20 Ni*	54.3	.396 02	4.00	117.0	16
21 P	1729.8	.327 04	444.0	14740.0	18
22 Pb*	50.9	.313 03	13.0	1105.0	14
23 Sc*	3.97	.516 01	1.00	18.0	16
24 Th*	.66	.888 01	2.00	18.0	8
25 Ti*	26.2	.110 02	13.0	47.0	17
26 V*	44.5	.551 02	8.00	185.0	15
27 Y*	8.74	.138 02	1.00	46.0	17
28 Zn	48.0	.263 02	5.00	106.0	18
29 Zr	24.1	.264 02	2.00	121.0	18
30 Sr	7.66	.556 01	2.00	22.0	18
31 Ce	16.8	.120 02	10.0	38.0	5
32 Cl-N*	117.7	.177 03	72.0	540.8	13
33 U-N	662.4	.169 04	3.23	6100.0	18
34 Ga-N*	33.4	.235 02	25.0	67.0	10
35 As-N	1.90	--	1.90	1.90	1
36 Br-N*	1.06	.212 01	1.40	4.30	11
37 W-N*	8.80	.101 02	1.60	16.0	2
38 Au-N*	.02	.822 00	0.00	2.81	13
39 Rb-N	170.0	.113 03	27.0	379.0	12
40 Sb-N	--	--	--	--	0
41 Cs-N	10.0	.674 01	1.17	23.7	15
42 Ce-N	5.02	.476 01	.90	15.7	12
43 Th-N*	.87	.226 01	.43	7.00	13
44 Dy-N	23.0	--	23.0	23.0	1
45 La-N	20.3	.432 02	.460	162.0	
46 Nd-N	32.0	.325 02	9.00	55.00	2
47 Sm-N	.43	.224 00	.14	.67	4
48 Sc-N	5.54	.460 01	.55	18.3	18
49 Eu-N	.46	.786 00	.00	2.70	13
50 Tb-N	1.47	1.11 01	.18	2.40	4
51 Yb-N	.64	.477 00	.16	1.30	5
52 Tm-N	2.14	.934 00	.40	3.30	7
53 Ta-N	6.13	4.98 00	.50	19.7	17

Table 19.--Statistical summary for Hangingwall schist samples--N=19
 [*Mean estimated using Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	66.9	0.841 01	52.3	83.3	19
2 Al2O3%	16.0	.409 01	8.20	22.8	19
3 T-Fe2O3%	3.29	.241 01	.77	9.61	19
4 FeO%	1.75	.182 01	.15	6.31	11
5 MgO%	3.50	.250 01	.43	11.7	19
6 CaO%	.49	.775 00	.01	3.50	19
7 K2O%	4.01	.153 01	1.45	6.81	19
8 TiO2%	.86	.746 00	.17	2.58	19
9 F%	.05	.024 -1	.03	.12	11
<u>Minor elements in parts per million</u>					
10 B*	58.0	0.158 03	28.0	360.0	13
11 Ba	396.3	.302 03	24.0	1115.0	19
12 Be	3.10	.148 01	1.00	6.00	19
13 Co*	8.63	.835 01	4.00	27.0	15
14 Cr	136.4	.134 03	5.00	497.0	19
15 Cu	29.5	.358 02	3.00	139.0	19
16 Li	65.4	.431 02	17.0	181.0	19
17 Mn	319.4	.525 03	23.0	2043.0	19
18 Na-N	432.0	.647 03	18.2	2090.0	18
19 Nb*	7.49	.268 01	5.00	13.0	17
20 Ni	34.2	.272 02	5.00	132.0	19
21 P	585.6	.602 03	64.0	2108.0	19
22 Pb*	12.6	.137 02	10.0	34.0	14
23 Sc	12.6	.922 01	3.00	34.0	19
24 Th	12.9	.537 01	4.00	25.0	19
25 Ti	3323.6	.302 03	694.0	10675.0	19
26 V	109.2	.987 02	14.0	370.0	19
27 Y	9.31	.391 01	3.00	19.0	19
28 Zn	26.9	.173 02	6.00	59.0	19
29 Zr	108.2	.453 02	41.0	230.0	19
30 Sr	39.0	.589 02	4.00	249.0	19
31 Ce*	51.6	.308 02	11.0	107.0	18
32 Cl-N	134.4	.582 02	60.3	232.0	9
33 U-N	28.5	.557 02	2.50	196.0	19
34 Ga-N	40.3	.206 02	20.0	78.3	14
35 As-N	2.19	.135 01	.90	3.59	3
36 Br-N	1.65	.781 00	.90	3.12	6
37 W-N	6.10	.433 01	1.90	14.4	11
38 Au-N	.37	.761 00	.00	2.06	7
39 Rb-N	150.8	.521 02	56.8	244.0	19
40 Sb-N	--	--	--	--	0
41 Cs-N	4.56	.169 01	2.10	8.50	19
42 Ce-N	63.5	.378 02	3.87	135.0	18
43 Th-N	15.0	.680 01	2.61	24.8	19
44 Dy-N	--	--	--	--	0
45 La-N	37.3	.216 02	1.35	80.5	19
46 Nd-N	44.4	.909 01	35.0	59.0	5
47 Sm-N	3.11	.231 01	.27	8.45	17
48 Sc-N	15.8	.964 01	3.82	35.7	19
49 Eu-N	.60	.351 00	.20	1.73	19
50 Tb-N	.74	.217 00	.30	1.10	13
51 Yb-N	1.61	.438 00	.93	2.40	16
52 Tm-N	1.45	.508 00	.70	2.07	5
53 Ta-N	1.26	.864 00	.50	4.19	16

Table 20.--Statistical summary for carbonaceous schist samples--N=4
 [*Mean estimated using Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	51.9	0.138 02	36.3	63.8	4
2 Al2O3%	14.5	.263 01	10.7	16.5	4
3 T-Fe2O3%	7.89	.472 01	2.79	13.2	4
4 FeO%	4.12	.313 01	1.90	6.34	2
5 MgO%	12.2	.415 01	7.48	17.6	4
6 CaO%	.12	.540 -1	.05	.18	4
7 K2O%	1.29	.161 01	.03	3.42	4
8 TiO2%	.49	.119 00	.32	.58	4
9 F%	.09	.140 -1	.08	.11	2
<u>Minor elements in parts per million</u>					
10 B*	12.7	.196 02	10.0	38.0	3
11 Ba	83.2	.105 03	8.0	235.0	4
12 Be	4.00	.816 00	3.00	5.00	4
13 Co	37.7	.211 02	14.0	61.0	4
14 Cr	170.7	.152 03	50.0	394.0	4
15 Cu	34.7	.395 02	7.00	93.0	4
16 Li	123.2	.292 02	100.0	166.0	4
17 Mn	93.7	.327 02	55.0	133.0	4
18 Na-N	762.5	.619 02	325.0	1200.8	4
19 Nb	9.00	--	9.00	9.00	1
20 Ni	102.0	.402 02	60.0	143.0	4
21 P	221.0	.619 02	137.0	286.0	4
22 Pb	1619.5	.136 04	14.0	3326.0	4
23 Sc	17.2	.585 01	10.0	24.0	4
24 Th	33.7	.199 02	9.00	57.0	4
25 Ti	1992.5	.492 03	1385.0	2504.0	4
26 V	127.2	.362 02	73.0	148.0	4
27 Y	33.5	.221 02	5.00	59.0	4
28 Zn	43.5	.201 02	28.0	73.0	4
29 Zr	70.7	.128 02	60.0	87.0	4
30 Sr	8.50	.251 01	6.00	12.0	4
31 Ce*	.57	.353 02	13.0	44.0	2
32 Cl-N	98.0	--	98.0	98.0	1
33 U-N	10025.9	.816 04	3.7	19700.0	4
34 Ga-N	31.0	.283 01	29.0	33.0	2
35 As-N	--	--	--	--	0
36 Br-N	--	--	--	--	0
37 W-N	28.6	.292 02	8.00	49.3	2
38 Au-N	.73	.354 -1	.70	.75	2
39 Rb-N	156.0	--	156.0	156.0	1
40 Sb-N	--	--	--	--	0
41 Cs-N	9.39	.989 01	2.40	16.3	2
42 Ce-N	44.8	--	44.8	44.8	1
43 Th-N	9.35	.421 01	6.51	14.2	3
44 Dy-N	51.8	.185 02	39.8	73.2	3
45 La-N	116.7	.118 03	34.8	253.0	3
46 Nd-N	9.00	--	9.00	9.00	1
47 Sm-N	--	--	--	--	0
48 Sc-N	14.3	.210 01	12.3	16.5	3
49 Eu-N	1.18	.115 01	.37	2.00	2
50 Tb-N	.70	--	.70	.70	1
51 Yb-N	3.49	.221 01	1.55	5.90	3
52 Tm-N	--	--	--	--	0
53 Ta-N	2.10	--	2.10	2.10	1

Table 21.--Statistical summary for Lower Mine Sequence marble--N=18
 [*Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	6.97	0.614 01	0.64	25.10	18
2 Al2O3%	1.18	.931 00	0.16	3.06	18
3 T-Fe2O3%	1.75	.872 00	0.24	3.28	18
4 FeO%	0.66	--	0.66	0.66	1
5 MgO%	29.61	.947 01	20.39	43.80	18
6 CaO%	16.58	.121 02	0.60	30.00	18
7 K2O%	.03	.337 -1	0.01	0.14	18
8 TiO2%	.03	.252 -1	0.01	0.09	18
9 F%	--	--	--	--	0
<u>Minor elements in parts per million</u>					
10 B	16.5	.919 01	10	23	2
11 Ba*	4.61	.593 01	2	22	14
12 Be*	1.43	.113 01	1	4	7
13 Co*	5.82	.355 01	4	15	13
14 Cr*	7.71	.636 01	4	20	14
15 Cu*	12.7	.147 02	2	53	16
16 Li	16.5	.119 02	1	45	17
17 Mn	1106.4	.814 03	264	3349	17
18 Na-N	244.2	.112 03	132.8	465.0	10
19 Nb*	3.92	.306 01	4	9	8
20 Ni	11.4	.124 02	2	56	17
21 P*	42.7	.142 03	13	476	12
22 Pb	20.0	.149 02	11	42	4
23 Sc*	2.08	.521 01	1	21	15
24 Th*	1.33	.359 01	3	8	7
25 Ti*	88.3	.914 02	13	301	15
26 V*	5.99	.250 01	3	10	16
27 Y	7.71	.556 01	1	19	17
28 Zn*	0.96	.109 02	2	21	8
29 Zr*	4.42	.489 01	2	14	12
30 Sr	15.5	.102 02	4	33	17
31 Ce	12.6	.321 01	10	17	5
32 Cl-N	877.9	.457 03	172.0	1400.0	9
33 U-N	23.0	.586 02	0.90	243.7	17
34 Ga-N	7.02	.486 01	2.0	13.8	5
35 As-N	0.32	--	0.32	0.32	1
36 Br-N	6.41	.568 01	0.44	16.40	16
37 W-N	1.73	.152 01	0.40	6.38	15
38 Au-N	0.056	.166 00	0.00	0.67	16
39 Rb-N	--	--	--	--	0
40 Sb-N	--	--	--	--	0
41 Cs-N	0.36	.218 00	0.09	0.70	6
42 Ce-N	8.79	.674 01	1.04	23.2	16
43 Th-N	1.56	.112 01	0.10	4.00	16
44 Dy-N	--	--	--	--	0
45 La-N	15.25	.171 02	1.07	50.6	17
46 Nd-N	25.0	.229 02	5.00	50.0	3
47 Sm-N	1.57	.136 01	0.03	4.74	16
48 Sc-N	2.49	.165 01	0.15	5.24	17
49 Eu-N	0.29	.234 00	0.05	0.92	17
50 Tb-N	0.54	.273 00	0.22	1.10	7
51 Yb-N	0.53	.392 00	0.15	1.55	13
52 Tm-N	0.84	.573 00	0.50	1.70	4
53 Ta-N	0.80	--	0.80	0.80	1

Table 22.--Statistical summary for lenticle schist samples--N=17
 [*Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	56.69	0.722 01	37.30	67.50	17
2 Al2O3%	18.12	.253 01	11.20	23.20	17
3 T-Fe2O3%	5.19	.196 01	3.19	10.10	17
4 FeO%	3.04	.878 00	1.97	5.08	15
5 MgO%	9.71	.289 01	6.12	16.50	17
6 CaO%	0.10	.908 -1	0.03	0.33	17
7 K2O%	0.29	.877 00	0.56	3.92	17
8 TiO2%	0.85	.991 -1	0.73	1.12	17
9 F%	0.08	.299 -1	0.03	0.12	15
<u>Minor elements in parts per million</u>					
10 B*	76.8	0.107 03	12	426.	16
11 Ba	197.4	.622 02	42.	290.	17
12 Be	3.29	.772 00	2	5	17
13 Co	23.65	.596 01	16	38	17
14 Cr	185.0	.842 02	133	497	17
15 Cu	37.9	.626 02	2	213	17
16 Li	95.8	.279 02	59	164	17
17 Mn	87.4	.611 02	34	245	17
18 Na-N	1518.3	.146 04	280	7000	17
19 Nb*	8.92	.299 01	4	15	16
20 Ni	70.5	.248 02	44	112	17
21 P	221.5	.226 03	77	812	17
22 Pb*	97.2	.315 03	12	1019	13
23 Sc	12.9	.282 01	9	19	17
24 Th*	9.80	.571 01	4	19	15
25 Ti	2605.3	.522 03	1704	3816	17
26 V	123.2	.342 02	81	202	17
27 Y	9.88	.825 01	3	27	17
28 Zn	58.5	.373 02	19	154	17
29 Zr	106.2	.166 02	83	153	17
30 Sr	11.4	.459 01	5	21	17
31 Ce*	3.12	.191 02	10	44	9
32 Cl-N	93.45	.404 02	40.0	178.0	11
33 U-N	686.54	.122 04	2.50	4650.0	17
34 Ga-N	44.0	.152 02	27.0	84.0	15
35 As-N	2.74	.509 00	2.38	3.10	2
36 Br-N	2.40	.226 01	0.80	4.00	2
37 W-N	29.35	.369 02	5.40	145.0	16
38 Au-N	0.15	.183 00	0.00	.54	14
39 Rb-N	104.1	.473 02	29.0	240.0	17
40 Sb-N	--	--	1.31	1.31	1
41 Cs-N	3.72	.384 01	1.20	17.2	15
42 Ce-N	20.95	.242 02	1.90	90.0	12
43 Th-N	15.60	.484 01	3.27	21.6	17
44 Dy-N	--	--	--	--	0
45 La-N	16.49	.119 02	1.50	43.4	16
46 Nd-N	252.0	.203 03	38.0	544.0	5
47 Sm-N	2.01	.157 01	0.35	5.65	13
48 Sc-N	19.72	.537 01	13.8	29.3	17
49 Eu-N	.67	.649 00	.10	2.29	17
50 Tb-N	1.08	.615 00	.40	2.0	6
51 Yb-N	2.33	.156 01	.90	7.02	14
52 Tm-N	1.82	.960 00	.90	3.60	6
53 Ta-N	1.90	.127 01	.70	6.0	15

Table 23.--Statistical summary for smeared rock samples--N=13
 [*Mean estimated using Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	54.2	.154 02	29.0	81.6	13
2 Al2O3%	14.9	.439 01	7.43	20.7	13
3 T-Fe2O3%	6.00	.225 01	1.84	10.6	13
4 FeO%	3.43	.169 01	1.06	5.84	6
5 MgO%	13.4	.757 01	1.12	24.6	13
6 CaO%	.95	.266 01	.01	9.82	13
7 K2O%	1.00	.132 01	.01	4.41	13
8 TiO2%	.40	.280 00	.01	.91	13
9 F%	.10	.26 -1	.06	.14	6
<u>Minor elements in parts per million</u>					
10 B*	56.6	0.472 02	12.0	140.0	12
11 Ba	68.8	.549 02	2.0	177.0	13
12 Be	4.69	.235 01	2.0	11.0	13
13 Co	26.8	.107 02	5.0	49.0	13
14 Cr	106.7	.736 02	8.0	297.0	13
15 Cu*	16.1	.124 02	3.00	36.0	12
16 Li	162.0	.145 03	38.0	589.0	13
17 Mn	126.2	.100 03	50.0	420.0	13
18 Na-N	439.3	.252 03	88.0	1000.0	12
19 Nb*	5.84	.365 01	4.00	14.0	10
20 Ni	92.2	.577 02	18.0	218.0	13
21 P	642.0	.448 03	175.0	1681.0	13
22 Pb*	244.6	.168 04	28.0	4707.0	9
23 Sc	11.0	.788 01	2.0	31.0	13
24 Th*	13.4	.229 02	2.0	78.0	11
25 Ti	1245.0	.704 03	126.0	2227.0	13
26 V	124.6	.721 02	25.0	294.0	13
27 Y	17.5	.162 02	2.0	47.0	13
28 Zn	73.0	.394 02	12.0	169.0	13
29 Zr	54.7	.286 02	10.0	94.0	13
30 Sr	5.30	.283 01	2.0	12.0	13
31 Ce	15.0	.424 01	11.0	20.0	4
32 Cl-N	170.1	.974 02	110.0	406.0	8
33 U-N	1993.9	.342 04	1.95	12200.0	13
34 Ga-N	37.6	.173 02	19.8	70.6	10
35 As-N	.77	.415 00	.17	1.33	5
36 Br-N	2.91	.133 01	1.32	4.40	8
37 W-N	13.5	.213 02	2.45	73.3	10
38 Au-N	.24	.356 00	.00	1.21	11
39 Rb-N	82.1	.614 02	.60	140.0	5
40 Sb-N	7.00	--	7.00	7.00	1
41 Cs-N	3.17	.313 01	.90	10.7	9
42 Ce-N	7.81	.644 01	2.28	18.8	6
43 Th-N	9.46	.708 01	2.60	21.7	12
44 Oy-N	47.0	--	47.0	47.0	1
45 La-N	16.3	.173 02	.11	48.3	12
46 Nd-N	--	--	--	--	0
47 Sm-N	2.10	.920 00	1.20	3.20	5
48 Sc-N	13.9	.723 01	4.62	23.7	12
49 Eu-N	1.53	.145 01	.21	4.90	12
50 Tb-N	2.50	.489 00	2.10	3.10	4
51 Yb-N	4.77	.236 01	1.56	7.43	5
52 Tm-N	7.20	.254 01	5.40	9.00	2
53 Ta-N	2.94	.232 01	.90	7.80	7

Table 24.--Statistical summary for chlorite rock samples--N=12
 [*Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	48.52	0.107 02	35.90	71.10	12
2 Al2O3%	14.33	.415 01	5.05	18.80	12
3 T-Fe2O3%	5.96	.449 01	2.10	19.00	12
4 FeO%	4.42	.206 01	2.00	6.67	5
5 MgO%	18.69	.622 01	6.98	27.90	12
6 CaO%	1.79	.431 01	0.12	15.40	12
7 K2O%	0.03	.338 -1	0.01	0.10	12
8 TiO2%	0.38	.213 00	0.01	0.65	12
9 F%	0.17	.783 -1	0.08	0.27	5
<u>Minor elements in parts per million</u>					
10 B*	41.3	0.126 03	17	317	8
11 Ba	27.1	.197 02	12	80	11
12 Be	5.1	.157 01	2	7	11
13 Co	27.2	.992 01	12	40	11
14 Cr	99.4	.568 02	17	222	11
15 Cu*	39.0	.133 03	4	424	10
16 Li	19.3	.102 03	57	346	11
17 Mn	102.2	.301 02	69	165	11
18 Na-N	183.1	.137 03	91	509	10
19 Nb*	7.6	.650 01	4	19	5
20 Ni	101.5	.289 02	60	148	11
21 P	5974.8	.156 05	180	52930	11
22 Pb*	41.8	.661 02	10	160	5
23 Sc	5.91	.524 01	20	21	11
24 Th*	6.34	.718 01	4	17	8
25 Ti	886.6	.438 03	40	1481	11
26 V	89.6	.451 02	28	189	11
27 Y	13.1	.228 02	1	80	11
28 Zn	64.9	.225 02	36	102	11
29 Zr	48.6	.199 02	2	74	11
30 Sr	8.54	.106 02	3	40	11
31 Ce*	26.7	.198 02	11	49	3
32 Cl-N	291.0	.159 03	85.00	696.00	10
33 U-N	200.43	.536 03	5.10	1810.00	11
34 Ga-N	32.7	.152 02	20.00	63.00	11
35 As-N	2.61	.296 01	0.54	6.0	3
36 Br-N	2.84	.156 01	0.44	5.23	9
37 W-N	8.61	.612 01	3.8	24.0	9
38 Au-N	0.06	.168 00	0.0	0.57	11
39 Rb-N	0.20	--	20.0	20.0	1
40 Sb-N	--	--	--	--	0
41 Cs-N	1.39	.632 00	0.68	2.45	9
42 Ce-N	15.85	.245 02	1.44	65.5	6
43 Th-N	8.68	.493 01	1.70	15.8	11
44 Dy-N	14.0	--	14.0	14.0	1
45 La-N	11.44	.189 02	0.63	62.90	11
46 Nd-N	200.0	--	200	200.0	1
47 Sm-N	1.64	.171 01	0.45	5.01	6
48 Sc-N	8.84	.699 01	3.30	27.60	11
49 Eu-N	1.30	.171 01	0.13	5.03	9
50 Tb-N	1.46	.605 00	0.77	1.90	3
51 Yb-N	1.17	.913 00	0.44	2.30	5
52 Tm-N	2.41	.214 01	0.90	3.92	2
53 Ta-N	4.14	.565 01	0.65	14.0	5

Table 25.--Lower Mine Sequence chlorite muscovite schist--N=35
 [*Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
Major elements in weight percent					
1 SiO2%	38.69	0.162 02	12.03	89.20	35
2 Al2O3%	16.94	.489 01	3.44	25.60	35
3 T-Fe2O3%	11.80	.101 02	1.03	56.80	35
4 FeO%	5.04	.246 01	0.70	9.69	14
5 MgO%	17.62	.659 01	4.35	26.39	35
6 CaO%	1.55	.318 01	0.12	17.53	35
7 K2O%	0.54	.138 01	0.01	6.11	35
8 TiO2%	0.57	.668 00	0.01	2.90	35
9 F%	0.13	.694 -1	0.03	0.27	11
Minor elements in parts per million					
10 B*	42.7	0.188 03	10	692	26
11 Ba	52.3	.758 02	3	336	35
12 Be	5.60	.381 01	1	22	35
13 Co	37.5	.170 02	4	79	35
14 Cr*	100.2	.813 02	1	279	34
15 Cu	93.5	.268 03	2	1585	35
16 Li	132.7	.661 02	41	333	35
17 Mn	230.7	.193 03	34	891	35
18 Na-N	1027.4	.322 04	64.0	15000.0	21
19 Nb*	3.35	.534 01	4	21	18
20 Ni	106.3	.645 02	13	341	35
21 P	3672.3	.766 04	135	40358	35
22 Pb*	74.5	.402 04	10	11426	27
23 Sc	16.8	.269 02	1	123	35
24 Th*	16.9	.890 02	2	371	27
25 Ti	1704.2	.277 04	16	13968	35
26 V	153.7	.107 03	5	432	35
27 Y	42.9	.967 02	1	484	35
28 Zn	134.4	.132 03	17	715	35
29 Zr*	53.9	.385 02	2	124	34
30 Sr	11.6	.159 02	1	86	35
31 Ce*	108.1	.117 05	10	469	18
32 Cl-N	161.6	.653 02	50.0	274.0	21
33 U-N	5372.1	.137 05	1.4	58100.0	35
34 Ga-N	49.6	.298 02	17.5	164.0	26
35 As-N	3.17	.329 01	0.58	9.0	7
36 Br-N	1.64	.108 01	0.50	4.54	12
37 W-N	17.53	.181 02	0.79	6.10	22
38 Au-N	0.16	.500 00	0.00	2.42	23
39 Rb-N	105.0	.672 02	32.0	208.0	7
40 Sb-N	--	--	--	--	0
41 Cs-N	3.76	.408 01	0.80	14.80	12
42 Ce-N	52.05	.122 03	.66	465.0	14
43 Th-N	11.30	.845 01	.20	35.8	31
44 Dy-N	86.52	.936 02	7.56	190.0	3
45 La-N	46.59	.127 03	0.24	684.0	31
46 Nd-N	430.50	.480 03	91.0	770.0	2
47 Sm-N	2.97	.327 01	0.23	12.4	221
48 Sc-N	17.22	.134 02	0.92	66.3	31
49 Eu-N	2.01	.233 01	0.08	9.86	28
50 Tb-N	2.05	.180 01	0.59	7.00	11
51 Yb-N	2.06	.123 01	0.42	4.53	12
52 Tm-N	3.93	.439 01	1.20	9.00	3
53 Ta-N	1.54	.908 00	0.70	4.50	16

Table 26.--Statistical summary for Footwall gneiss and schist samples--N=23
 [*Mean estimated by Cohen's technique. --Not calculated]

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values
<u>Major elements in weight percent</u>					
1 SiO2%	68.8	0.417 01	60.0	76.3	23
2 Al2O3%	14.5	.956 00	13.5	16.8	23
3 T-Fe2O3%	3.35	.230 01	.50	8.38	23
4 FeO%	2.82	.212 01	.65	6.45	7
5 MgO%	3.64	.226 01	.33	8.26	23
6 CaO%	.31	.258 00	.07	1.11	23
7 K2O%	4.78	.195 01	1.72	7.66	23
8 TiO2%	.30	.248 00	.01	.61	23
9 F%	.10	.980 -1	.03	.28	6
<u>Minor elements in parts per million</u>					
10 B*	32.5	.237 02	10.0	73.0	20
11 Ba	285.7	.168 03	58.0	628.0	23
12 Be	2.82	.119 01	1.00	5.00	23
13 Co*	6.70	.748 01	5.00	21.0	15
14 Cr*	29.2	.449 02	1.00	106.0	20
15 Cu	196.3	.797 03	2.00	3849.0	23
16 Li	53.0	.256 02	14.0	120.0	23
17 Mn	202.1	.169 03	40.0	644.0	23
18 Na-N	6313.9	.987 04	182.0	38400.0	23
19 Nb*	6.53	.533 01	4.00	17.0	17
20 Ni*	17.1	.200 02	2.00	51.0	20
21 P	674.1	.302 03	291.0	1450.0	23
22 Pb*	16.9	.187 02	10.0	55.0	18
23 Sc*	4.14	.312 01	1.00	10.0	22
24 Th*	14.0	.213 02	3.00	58.0	20
25 Ti	1368.7	.105 03	36.0	2754.0	23
26 V*	28.6	.397 02	2.00	90.0	19
27 Y	7.30	.462 01	2.00	22.0	23
28 Zn	38.6	.243 02	4.00	97.0	23
29 Zr	108.1	.102 03	6.00	325.0	23
30 Sr	35.6	.261 02	4.00	94.0	23
31 Ce*	44.7	.707 02	13.0	178.0	18
32 Cl-N	96.7	.351 02	46.0	181.0	13
33 U-N	14.7	.143 02	2.55	70.5	23
34 Ga-N	21.1	.117 02	4.80	40.0	8
35 As-N	2.74	--	2.74	2.74	1
36 Br-N	1.03	.772 00	.33	2.75	8
37 W-N	1.62	.283 -1	1.60	1.64	2
38 Au-N	.03	.487 -2	.00	.01	7
39 Rb-N	160.2	.545 02	44.0	251.0	23
40 Sb-N	--	--	--	--	0
41 Cs-N	4.71	.252 01	1.18	10.3	23
42 Ce-N	65.4	.744 02	1.66	275.0	23
43 Th-N	24.2	.308 02	.58	108.0	23
44 Dy-N	--	--	--	--	0
45 La-N	38.5	.393 02	.96	132.0	23
46 Nd-N	87.0	.963 02	21.8	250.0	6
47 Sm-N	4.15	.469 01	.12	15.3	19
48 Sc-N	5.62	.416 01	.57	12.1	23
49 Eu-N	.69	.591 00	.16	2.64	22
50 Tb-N	.78	.475 00	.20	1.70	12
51 Yb-N	.82	.394 00	.34	1.75	17
52 Tm-N	1.44	.703 00	.62	2.40	5
53 Ta-N	.81	.295 00	.40	1.30	13

nature; if larger samples were used a more consistent U:Au association might have emerged. Gold concentrations are too low to suggest it could be a byproduct, but the occurrence seems to be generally similar to that at Jabiluka where economic gold zones have been defined (Hegge, 1977).

The reasons for enrichment of Mg, Fe, Li, Cr, Ni, Pb, V, Y, Au, and some REE along with U at Ranger are presumed to be complex and beyond the scope of this paper. There also is abundant petrographic evidence for mobility of Si, P, and B, which, likewise, require explanation. McLennan and Taylor (1980) first described heavy REE enrichment in the Alligator River uranium field and proposed a very specific explanation, based only on REE data, that the observed REE enrichment could be explained by preferential carbonate complexing of heavy REE in oxidizing, low temperature hydrothermal solutions, at pH >7.5. This interpretation may be correct, but we suspect more factors are needed to explain complicated compositions and textures in these ores. Further study of mineral compositions and associations should provide better constraints for interpretation of rock chemistry and conditions of formation.

These chemical studies are part of a program designed to describe the geochemical character of unconformity-type deposits and interpret their genesis. Application of the results presented here to exploration is not straightforward. First, in our opinion there are no quick and easy chemical methods for use in exploration that can reliably distinguish these deposits from other uranium deposits. Second, if multi-element rock chemistry is attempted, the required methods will be expensive, or possibly not commercially available. The REE must be determined with precision and the INAA or mass spectrometric methods recommended by researchers are generally not available. Third, no zonation of pathfinder elements has been demonstrated at any unconformity-type deposit, thus uranium possibly is the most reliable guide to the deposits. In our opinion, geologic features should be studied first. Lithologic features such as Mg-Fe alteration can be refined by petrographic and X-ray diffraction methods more cost-effectively than by chemical analysis. High quality chemical studies could be applied at a later stage of exploration to characterize specific targets.

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Table 27.--Key to sample codes in Appendix I.

	Lithtype* Code
<u>Code</u>	<u>Meaning</u>
1	Diabase
2	Kombolgie Formation sandstone
3	Granitic dike
4	Hangingwall schist
5	Upper Mine schist
6	Carbonaceous schist
7	Lower Mine marble, unaltered
8	Chloritic Lower Mine marble
9	Lower Mine jasperoid
10	Lenticle schist
11	Shear zone rock
12	Massive chlorite rock or vein
13	Lower Mine chlorite-mica schist
14	Footwall gneiss and schist

Altype Code

1	White mica alteration
2	Retrograde or infiltration chlorite
3	Chlorite veins
4	Silicification ±chlorite
5	Hematitization ±chlorite
6	Unaltered
7	Deeply weathered or soil

Oretype Code

- 1 Barren >100 m from ore zone (<0.05% U₃O₈)
- 2 Barren 20-99 m from ore zone
- 3 Barren 0-19 from ore zone
- 4 0.05 to 0.20% U₃O₈
- 5 0.21 to 0.50% U₃O₈
- 6 >0.51% U₃O₈
- 7 Thin ore intercept remote from economic ore

Oxtype+ Code

- 1 Oxidized-limonitic
- 2 Oxidized-hematitic
- 3 Reduced-pyritic
- 4 Reduced-graphitic
- 5 Uncertain

* See Nash and Frishman (1982) for description of stratigraphy

+ Most samples presumed to be code 3 unless other minerals were visible

Table 28.---Information on elements not reported in Appendix 1

	Mean	St. dev.	Min.	Max.	No. of Unqualified Values	Avg. detection Limit
Ag	2.67	1.53	2	7	21	2*
Er-N	7700	15.1	54	34,700	5	2340
Hf	23.7	9.9	15	54	21	15*
Hg-N	2.48	3.22	0.60	7.30	4	6.1
Ho-N	9.00	18.08	0.29	68.0	14	44.8
I-N	14.52	12.00	1.90	32.70	5	18.8
In-N	0.31	0.39	0.05	1.00	6	0.62
Lu-N	0.13	0.12	0.04	0.22	2	0.37
Mo	11.6	15.7	4	65	22	4*
Sb-N	2.61	2.21	0.92	7.00	7	1.5

*Limit of detection is the same for all samples.

EXPLANATION FOR APPENDIX I

Sample numbers are listed in Appendix I by drillhole in order of depth in meters. The computer program used will accept a maximum of eight digits in the sample ID, therefore drillhole numbers were truncated to two digits. For ease of locating information on a particular sample, drillholes are listed in the truncated numerical order. Sample numbers followed by "c" indicate a sample composed of numerous small chips of core collected from an interval of from 1 to 15 meters.

Analyses in columns marked "%" are all by X-ray fluorescence spectroscopy except for FeO (done by titration) and F (ion specific electrode). In all other columns, analyses are reported in parts per million; columns marked "N" by instrumental neutron activation, unmarked columns by induction coupled plasma spectroscopy.

Columns marked "East" and "North" specify the sample location in a horizontal plane; figures are in meters and relate to the Ranger Mine Grid (see inset in figure 2 in Nash and Frishman, 1982). The column marked "Elev." gives sample elevation relative to 1,000 m below mean sea level (1,000 m was added to the true elevation of each sample to avoid having both positive and negative numbers in this column). All coordinates were corrected for drillhole deviation where necessary.

Columns marked "Lithtype", "Altype", "Oretype" and "Oxtype" denote the lithology, type of alteration, grade and position with respect to ore, and oxidation state of the sample. Assignment of a sample to any category was done on the basis of our drillhole logs, inspection of the core samples, and cursory transmitted and reflected light petrography. Table 25 is an explanation of the sample codes in Appendix I. Samples were also coded for the kind of sample preparation they received and other codes to check for any

possible systematic bias in the analyses but that information is not presented here.

For ten elements, Ag, Er, Hf, Hg, Ho, I, In, Lu, Mo by ICP, and Sb there are very few unqualified values. To save space, the data for these elements are summarized in Table 28 and are not reported in Appendix I.

Abbreviations: L, less than value shown; B, not determined.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies

SAMPLE	SiO2%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U N	As N	Au N
Ranger 19										
19 262C	63.80	15.70	5.06	3.95	2.26	2.98	4.14	6.60	2.50L	.02L
19 268.1	65.60	15.60	4.38	.00B	2.27	3.74	3.76	3.91	2.00L	.03L
19 268.5	66.20	15.70	4.41	.00B	2.13	3.72	3.72	4.14	2.00L	.02L
19 277.9	66.10	15.80	4.53	.00B	2.24	3.24	3.66	4.04	2.00L	.03L
19 285C	67.00	14.30	3.65	2.78	2.29	2.19	4.71	7.50	2.00L	.02L
19 302.5	56.30	19.10	7.29	.00B	3.82	.79	6.03	6.54	8.50	.02L
19 327.8	17.60	5.50	2.09	.00B	17.80	21.20	1.32	1.23	.40L	.01L
19 330.4	63.70	6.73	13.50	.00B	4.98	2.85	.42	19.10	.80L	.01L
19 337C	5.93	.84	.50	.00B	20.80	28.20	.14	3.20	.25L	.01L
19 339.1	4.14	.30	.24	.00B	21.00	29.50	.02L	3.83	.32	.00
19 351.0	6.13	.96	.72	.00B	20.90	28.20	.02L	41.00	.30L	.00
Ranger 1 Drillhole 29										
29 17.3	80.50	4.25	2.93	.00B	4.53	2.70	.02L	39.20	.30L	.44
29 34.6	66.50	11.80	4.92	.00B	7.88	.34	.44	4290.00	2.00L	.11
29 128.6	69.40	14.80	2.80	.00B	1.37	.52	6.61	9.30	1.00L	.10L
Ranger 3 Drillhole 130										
30 337.6	64.00	12.90	2.95	.00B	12.20	.09	.16	167.00	.80L	.01
30 343.5	44.10	20.40	9.27	.00B	9.04	.25	4.25	13.30	50.30	.02
30 344.5	55.80	15.50	5.40	.00B	13.70	.03	1.57	7.16	.90L	.00
30 348.5	86.90	1.24	4.72	.00B	.87	.04	.02L	310.00	43.20	.84
Ranger 1 Drillhole 31										
31 3C	56.70	17.60	5.52	.00B	8.05	.59	2.54	1300.00	2.10L	.96L
31 45C	51.10	21.00	5.16	3.01	11.40	.05	3.35	336.00	1.70L	.49
31 26.5	94.60	1.51	1.39	.00B	1.21	.13	.02L	696.00	.60L	.44
31 64.8	75.60	6.68	4.83	.00B	7.18	.98	.02L	406.00	.80L	1.35
31 85C	14.30	9.50	56.80	4.91	11.20	.90	.02L	188.00	1.60L	.04
31 85.4	74.30	6.68	6.06	.00B	5.02	1.03	.02L	9040.00	5.00L	1.20
Ranger 1 Drillhole 32										
32 18.8	75.20	10.30	4.15	.00B	5.15	.05	1.45	190.00	1.05	.45
32 28.4	28.30	20.40	16.80	10.42	21.40	.33	.02L	38.40	.78L	.03
32 35C	68.90	12.10	3.38	1.53	7.88	.16	1.23	35.00	2.10L	.03
32 42.6	9.28	6.57	7.05	.00B	7.28	37.90	.02L	279.30	.76L	.21
32 47.5	26.70	20.70	13.40	9.31	19.10	5.44	.14	12.80	2.30	.01L
32 64C	62.40	18.50	3.52	1.97	6.12	.04	3.40	477.00	1.70L	.09
32 69.7	88.50	3.74	1.25	.00B	2.71	.48	.02L	245.10	.17	.92
32 80.3	80.60	4.72	1.99	.30	4.17	.55	.07	26100.00	5.20L	6.05
32 91.7	30.90	21.50	8.45	4.96	24.70	.92	.02L	79.20	.60L	.01
Ranger 1 Drillhole 33										
33 27C	55.00	18.80	6.75	4.12	9.12	.03	3.35	5.40	1.70L	.05

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 19-continued										
19 262C	16.	771.	876.	2.	2.60L	86.	103.00	500.0L	11.	13.80
19 268.1	10.L	792.	874.	2.	3.00L	78.	70.90	428.0L	10.	10.20
19 268.5	10.L	836.	897.	2.	2.00L	76.	76.30	410.0L	10.	10.30
19 277.9	13.	753.	888.	2.	3.00L	85.	81.70	410.0L	10.	10.90
19 285C	18.	569.	628.	3.	1.50	98.	115.00	420.0L	16.	20.00
19 302.5	34.	799.	860.	4.	2.00L	130.	121.00	672.0L	15.	15.20
19 327.8	57.	90.	842.L	1.	12.50	35.	31.80	1200.0	5.	6.22
19 330.4	10.L	80.	700.L	1.	1.00L	55.	46.00	165.0	15.	18.50
19 337C	10.L	8.	440.L	1.L	10.10	10.L	2.47	896.0	4.L	1.88
19 339.1	10.L	7.	600.L	1.L	11.50	10.L	1.04	1100.0	4.L	.66
19 351.0	10.L	8.	690.L	1.L	12.50	10.L	5.00L	1200.0	4.L	1.52
Ranger 1 Drillhole 29-continued										
29 17.3	15.	21.	130.L	1.	2.03	10.L	3.76	307.0	15.	18.10
29 34.6	54.	55.	11000.L	3.	4.61	14.	2000.00L	366.0	21.	41.30
29 128.6	19.	583.	630.	1.	1.00L	178.	170.00	240.0L	4.L	3.11
Ranger 3 Drillhole 130-continued										
30 337.6	32.	24.	224.L	4.	2.45	10.L	40.00L	228.0	19.	18.80
30 343.5	11.	178.	284.	5.	2.00L	51.	64.20	87.5	64.	81.50
30 344.5	26.	82.	110.	4.	1.86	53.	50.50	195.0	19.	23.40
30 348.5	10.L	44.	320.L	1.	8.53	10.L	10.00L	440.0	9.	12.80
Ranger 1 Drillhole 31-continued										
31 3C	197.	124.	3000.	4.	2.90L	67.	360.00L	200.0L	26.	30.50
31 45C	53.	236.	286.	3.	2.50L	10.L	94.00L	260.0L	24.	40.10
31 26.5	10.L	64.	1900.L	1.	.90	10.L	180.00L	120.0	4.	4.64
31 64.8	28.	28.	390.L	2.	2.60	10.L	100.00L	320.0	19.	19.90
31 85C	10.L	13.	420.L	2.	2.70L	10.L	52.00L	55.9	29.	38.50
31 85.4	51.	48.	16000.L	4.	20.00L	11.	489.00	380.0L	6.	15.10
Ranger 1 Drillhole 32-continued										
32 18.8	10.L	234.	415.	1.	.30L	10.L	23.40	136.0	12.	18.80
32 28.4	10.L	15.	220.L	3.	1.10L	25.	51.10	54.1	62.	103.00
32 35C	75.	33.	120.L	2.	2.50L	128.	266.00	114.0	14.	28.70
32 42.6	10.L	5.	260.L	2.	.89L	11.	18.80	260.0L	21.	35.00
32 47.5	15.	14.	502.L	3.	1.60L	63.	89.90	190.0	48.	54.80
32 64C	191.	245.	342.	3.	2.50L	21.	130.00L	124.0	16.	19.40
32 69.7	66.	21.	280.	1.	5.97	14.	61.00L	478.5	7.	7.10
32 80.3	41.	134.	50000.L	2.	23.00L	20.	.00B	898.0L	13.	32.30
32 91.7	15.	9.	546.L	4.	.50	10.L	30.00	119.0	33.	53.90
Ranger 1 Drillhole 33-continued										
33 27C	12.	241.	302.	3.	2.30L	10.	14.00	88.0L	24.	38.50

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	FZ	Ga N	Gd N	Ir N
Ranger 19										
19 262C	54.	63.20	7.56	9.	16.0L	.81	.07	.0B	8000.L	.01L
19 268.1	50.	49.10	4.40	2.	16.0L	1.80	.00B	.0B	2200.L	.01L
19 268.5	51.	49.90	4.40	9.	14.0L	1.87	.00B	.0B	2000.L	.01L
19 277.9	55.	55.70	4.10	2.L	14.0L	1.95	.00B	.0B	2000.L	.01L
19 285C	30.	35.20	7.07	26.	16.0L	.63	.09	29.6L	9000.L	.01L
19 302.5	48.	50.50	7.50	57.	26.0L	1.68	.00B	.0B	3000.L	.01L
19 327.8	28.	33.30	28.	9.	20.0L	1.53	.00B	.0B	1300.L	.00
19 330.4	38.	43.50	4.10	45.	16.0L	1.26	.00B	.0B	1600.L	.01L
19 337C	10.	5.11	.70	11.	3.0L	.05	.00B	1.9L	5000.L	.00
19 339.1	1.L	1.60	.10L	16.	12.0L	.09	.00B	.9B	840.L	.00
19 351.0	3.	5.40	.20L	23.	14.0L	.13	.00B	.0B	630.L	.00
Ranger 1 Drillhole 29										
29 17.3	36.	39.90	.40L	3.	2.7L	1.36	.00B	15.0	430.	.00
29 34.6	90.	219.00	4.00L	11.	20.0L	7.40	.00B	50.0L	11700.	.04L
29 128.6	7.	7.37	1.53	8.	7.0L	.88	.00B	.0B	970.L	.00
Ranger 3 Drillhole 130										
30 337.6	12.	16.90	1.00L	32.	4.0L	.30L	.00B	25.0	872.L	.01L
30 343.5	161.	187.00	7.68	282.	3.0L	1.01	.00B	31.0	1400.L	.02L
30 344.5	3.	13.10	2.57	204.	3.4L	1.00	.00B	24.4	5300.L	.00
30 348.5	1.	8.60	1.00L	17877.	3.8L	.40L	.00B	8.0L	1200.L	.01L
Ranger 1 Drillhole 31										
31 3C	88.	103.00	3.90	81.	8.0L	.19L	.09	49.6	5000.L	.13L
31 45C	189.	277.00	5.00	6.	4.0L	.39	.04	48.1	10000.L	.01L
31 26.5	12.	16.60	.50L	21.	3.0	.68	.00B	9.0L	680.L	.00
31 64.8	39.	40.30	3.0L	11.	3.9	1.83	.00B	25.0	1000.L	.00
31 85C	73.	110.00	2.40L	112.	8.0L	.55	.03	41.0	2000.L	.01L
31 85.4	31.	121.00	4.00L	59.	30.0	16.40	.00B	7.0L	47100.	.01L
Ranger 1 Drillhole 32										
32 18.8	8.	14.80	1.00	7.	3.8L	.98	.00B	20.8	5600.L	.01L
32 28.4	190.	305.00	2.00L	23.	1.8L	.24	.11	58.0	1200.L	.01L
32 35C	84.	151.00	4.30	6.	2.0L	.56	.03	40.0	6000.L	.01L
32 42.6	24.	34.70	1.90L	44.	16.0L	2.80	.00B	23.6	2600.L	.02L
32 47.5	99.	118.00	.90L	8.	10.0L	2.20	.00B	59.5	3500.L	.01L
32 64C	155.	180.00	2.80	51.	6.0L	.28	.03	34.0	4000.L	.01L
32 69.7	20.	23.60	.41L	3.	1.6L	.10	.00B	17.0	580.L	.00
32 80.3	34.	330.00L	13.00L	283.	71.9	19.00L	.00B	8.0L	66300.	.20L
32 91.7	109.	182.00	1.00L	41.	12.0L	1.61	.00B	72.9	3700.L	.01L
Ranger 1 Drillhole 33										
33 27C	166.	236.00	2.30	2.	6.0L	.35	.03	32.0	2000.L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
19 262C	45.	58.80	49.	442.	520.0	310.0L	19000.00	9.	66.00	12.
19 268.1	38.	42.50	45.	466.	541.0	25.0L	21000.00	8.	120.00L	11.
19 268.5	38.	47.10	36.	398.	476.0	16.0L	21300.00	8.	92.00L	11.
19 277.9	41.	45.70	37.	393.	466.0	19.0L	21500.00	9.	38.00L	7.
19 285C	50.	66.20	37.	645.	770.0	240.0L	12000.00	12.	65.00L	10.
19 302.5	19	69.40	61.	1353.	1600.0	17.0L	13900.00	14.	22.00L	11.
19 327.8	36.	45.20	66.	829.	1000.0	3.0L	438.00	5.	8.00L	6.
19 330.4	17.	23.60	43.	900.	1000.0	20.0L	320.00L	5.	12.00L	23.
19 337C	2.L	1.89	11.	364.	494.0	55.0L	162.00	8.	23.00L	3.
19 339.1	2.L	1.07	3.	445.	536.0	8.0L	260.00L	4.	2.00L	6.
19 351.0	2.L	2.17	15.	588.	702.0	9.0L	290.00L	6.	4.00L	3.
Ranger 1 Drillhole 29-continued										
29 17.3	5.	6.92	34.	103.	86.1	80.0L	95.00	4.L	11.00L	40.
29 34.6	2.	28.70	142.	107.	128.0	10000.0L	286.00	6.	430.00L	64.
29 128.6	78.	93.80	39.	168.	160.0	9.0L	13400.00	16.	47.00L	4.
Ranger 3 Drillhole 130-continued										
30 337.6	2.L	3.65	133.	63.	76.4	30.0L	286.00	7.	400.00L	94.
30 343.5	20.	39.50	55.	72.	90.0	34.0L	359.00	6.	80.00L	118.
30 344.5	22.	31.80	106.	76.	97.2	10.0L	303.00	4.	50.00L	81.
30 348.5	2.	5.43	19.	17.	21.8	10.0L	215.00	4.L	30.00L	21.
Ranger 1 Drillhole 31-continued										
31 3C	49.	72.40	81.	121.	140.0	688.0L	211.00	9.	525.00	77.
31 45C	2.	11.90	105.	75.	77.9	340.0	1100.00	7.	160.00	74.
31 26.5	11.	29.40	10.	44.	61.8	1300.0L	109.00	4.L	250.00L	6.
31 64.8	2.	12.00	61.	150.	147.0	800.0L	118.00	4.L	200.00L	44.
31 85C	2.L	10.10	41.	204.	265.0	473.0L	160.00L	9.	91.00	53.
31 85.4	3.	242.00	94.	197.	248.0	20000.0L	224.00L	4.L	2200.00L	22.
Ranger 1 Drillhole 32-continued										
32 18.8	4.	9.38	38.	93.	110.0	500.0L	488.60	4.L	160.00L	26.
32 28.4	30.	55.00	140.	224.	277.1	15.0L	58.90	4.	29.00L	118.
32 35C	93.	192.00	77.	61.	73.2	457.0L	91.00	4.L	53.00	58.
32 42.6	4.	18.50	35.	99.	115.0	740.0L	100.00L	11.	1000.00	27.
32 47.5	44.	68.50	145.	279.	335.0	30.0L	127.00L	4.	91.00L	102.
32 64C	6.	11.20	84.	51.	61.0	171.0	1500.00	10.	148.00	44.
32 69.7	5.	3.18	59.	60.	57.0	130.0L	191.70	4.L	180.00L	16.
32 80.3	2.	600.00L	84.	111.	139.0L	70000.0L	996.00L	4.L	7000.00L	27.
32 91.7	2.L	5.02	96.	223.	294.0	42.9	138.00L	4.	.40L	82.
Ranger 1 Drillhole 33-continued										
33 27C	3.	9.53	59.	186.	222.0	399.0L	1300.00	9.	38.00	49.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies

SAMPLE	P	Pb	Fr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 19										
19 262C	385.	28.	79.L	189.	9.	12.50	5.06	204.	.70	.50
19 268.1	401.	32.	72.L	148.	9.	10.70	3.70	246.	.50L	.30L
19 268.5	372.	28.	6.L	149.	9.	11.00	4.70	263.	.65	.70L
19 277.9	417.	27.	69.L	156.	9.	11.70	4.30	278.	1.00L	.76
19 285C	281.	24.	60.L	250.	6.	9.04	.16L	87.	3.90	.90
19 302.5	514.	46.	50.L	270.	9.	10.70	6.50	113.	1.40	.82
19 327.8	73.	10.L	9.L	37.L	3.	4.52	3.65	36.	.50L	.40
19 330.4	1252.	10.L	6.L	34.	4.	6.68	2.78	15.	.50L	.50L
19 337C	37.	10.L	4.L	3.L	1.	.75	.26	33.	.78L	.17L
19 339.1	55.	10.L	0.B	4.L	1.L	.15	.10L	16.	.05L	.06L
19 351.0	86.	10.L	0.B	3.L	1.L	.66	.25	16.	.50L	.10L
Ranger 1 Drillhole 29										
29 17.3	9467.	12.	5.L	14.L	3.	4.28	1.82	8.	.70	.95
29 34.6	890.	864.	14.L	100.L	16.	37.60	4.00L	4.	3.20L	7.20
29 128.6	1356.	41.	51.L	192.	3.	3.06	9.85	70.	.72	.82
Ranger 3 Drillhole 130										
30 337.6	212.	37.	10.L	4.L	6.	7.67	4.27	4.	4.00L	.80L
30 343.5	637.	65.	21.L	312.	9.	21.20	4.42	8.	8.00L	2.00L
30 344.5	75.	25.	11.	114.	4.	8.12	4.33	4.	5.00L	.40L
30 348.5	5.L	85.	16.L	37.L	1.	.86	8.64	5.	2.00L	.60L
Ranger 1 Drillhole 31										
31 3C	1897.	106.	24.L	98.	14.	18.60	1.30	25.	2.00	.94L
31 45C	126.	32.	25.L	183.	16.	29.30	.80	11.	1.80	1.30L
31 26.5	536.	59.	14.L	12.L	2.	2.09	.60L	5.	.30L	.37
31 64.8	3259.	87.	10.L	18.L	10.	10.30	1.98	5.	.60	1.28
31 85C	2037.	54.	11.L	100.L	8.	14.00	4.48	3.	4.50L	1.60L
31 85.4	2587.	682.	0.B	140.L	9.	21.90	17.00L	4.	.00B	7.50
Ranger 1 Drillhole 32										
32 18.8	203.	30.	7.L	64.	5.	8.78	1.13	4.	.90	.70
32 28.4	966.	10.L	10.L	64.L	9.	18.30	1.84	7.	1.50	1.30L
32 35C	620.	10.L	27.	86.	7.	15.80	.58	29.	1.80	.95L
32 42.6	98090.	49.	0.B	52.L	8.	14.90	.57	64.	.57L	3.30
32 47.5	13124.	26.	18.L	35.L	13.	25.10	4.21	19.	4.00L	.80L
32 64C	118.	304.	26.L	110.	14.	19.00	.36L	13.	1.20	.89L
32 69.7	1163.	33.	4.L	11.L	4.	5.60	.47	5.	1.40L	.20
32 80.3	1406.	1447.	0.B	400.L	27.	60.00L	15.00	6.	30.00L	.00B
32 91.7	2071.	27.	5.L	32.L	5.	17.50	.28	2.	1.10	1.70
Ranger 1 Drillhole 33										
33 27C	109.	10.L	0.B	130.	11.	21.00	1.90	16.	2.00	1.10L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 19-continued										
19 262C	16.	20.80	.52	2685.	1.30	46.	54.0	6.80L	18.	1.80
19 268-1	14.	14.80	.49	2755.	1.00L	46.	56.3	5.00L	16.	1.00L
19 268.5	10.	15.60	.51	2803.	1.00L	46.	57.4	4.00L	16.	1.40
19 277.9	17.	16.40	.53	2879.	1.00L	50.	40.5	5.00L	17.	1.40
19 285C	19.	23.60	.35	1660.	3.78	32.	36.0	207.00	14.	2.87
19 302.5	18.	22.30	.53	2673.	1.00L	77.	94.5	4.00L	14.	1.80
19 327.8	7.	4.84	.16	471.	.60L	20.	25.3	1.00L	16.	.88
19 330.4	7.	8.69	.26	1427.	1.00L	98.	105.0	3.00L	11.	1.04
19 337C	2.L	.63	.02L	95.	.50L	4.	11.0L	3.00	2.	.15
19 339.1	2.L	.20L	.02L	13.	.20L	2.L	11.0L	.50L	1.	.04L
19 351.0	3.	.72	.02L	56.	.30L	3.	8.0L	.60L	1.	.10L
Ranger 1 Drillhole 29-continued										
29 17.3	5.	4.78	.10	222.	1.00L	52.	53.7	3.06	21.	.90
29 34.6	18.	21.60	.43	1569.	11.00L	160.	238.0	7.60	53.	3.50L
29 128.6	58.	63.50	.58	2351.	1.00L	14.	10.0	3.00L	15.	.63
Ranger 3 Drillhole 130-continued										
30 337.6	18.	16.10	.24	920.	2.00L	71.	96.9	2.00L	8.	.60L
30 343.5	9.	21.60	.97	1791.	2.30	173.	198.0	3.00L	7.	1.00L
30 344.5	19.	26.90	.17	364.	3.00L	37.	40.3	2.00L	7.	.80L
30 348.5	6.	2.82	.02L	48.	2.00L	4.	25.4	2.00L	7.	.50L
Ranger 1 Drillhole 31-continued										
31 3C	16.	14.50	.57	2243.	3.00L	165.	241.0	5.40	12.	1.50
31 45C	9.	19.00	.92	2427.	3.20L	156.	198.0	19.00	9.	1.70
31 26.5	7.	.83	.02L	50.	.80L	24.	48.3	5.50	4.	.40L
31 64.8	6.	5.31	.08	382.	.50L	85.	105.0	2.00L	33.	1.93
31 85C	2.L	8.36	.14	723.	3.20L	232.	278.0	60.40	9.	1.50
31 85.4	22.	7.43	.11	643.	21.00L	96.	441.0	19.00L	79.	18.10
Ranger 1 Drillhole 32-continued										
32 18.8	15.	22.70	.17	622.	.15L	52.	67.9	4.05	9.	1.77
32 28.4	10.	17.90	.84	1109.	2.60L	134.	156.0	11.80	5.	1.68
32 35C	8.	30.30	.39	1144.	1.70	64.	76.0	17.00	4.	1.20
32 42.6	2.L	3.58	.08	245.	13.00L	38.	61.9	6.68	35.	2.64
32 47.5	10.	13.30	.67	1015.	2.50L	162.	196.0	23.40	20.	.90
32 64C	16.	13.70	.82	2541.	2.50L	115.	166.0	21.00	10.	2.10
32 69.7	13.	2.00	.02L	71.	.82L	38.	55.4	.80	4.	.17L
32 80.3	57.	12.00L	.11	571.	63.00L	298.	581.0	77.00L	220.	.008
32 91.7	7.	23.20	.44	644.	2.00L	130.	158.0	6.80	11.	2.14
Ranger 1 Drillhole 33-continued										
33 27C	4.	13.80	.87	2721.	3.60	92.	105.0	12.00	3.	2.20

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXTYPE
Ranger 19										
19 262C	86.	66.	640.	11000.000	17000.000	758.000	5.	6.	1.	3.
19 268.1	43.	60.	200.L	11000.000	17000.000	751.900	5.	6.	1.	3.
19 268.5	47.	60.	230.L	11000.000	17000.000	751.500	5.	6.	1.	3.
19 277.9	36.	66.	330.L	11000.000	17000.000	742.100	5.	6.	1.	3.
19 285C	48.	95.	340.	11000.000	17000.000	735.000	5.	6.	1.	3.
19 302.5	58.	107.	220.L	11000.000	17000.000	717.500	5.	6.	1.	3.
19 327.8	4.	19.	180.L	11000.000	17000.000	692.200	8.	6.	1.	3.
19 330.4	77.	42.	42.L	11000.000	17000.000	689.600	5.	6.	1.	3.
19 337C	2.L	5.	100.L	11000.000	17000.000	683.000	7.	6.	1.	3.
19 339.1	2.L	2.L	5.L	11000.000	17000.000	680.900	7.	6.	1.	3.
19 351.0	2.L	3.	95.L	11000.000	17000.000	669.000	8.	6.	1.	3.
Ranger 1 Drillhole 29										
29 17.3	62.	17.	120.L	9950.398	10150.200	1011.590	9.	4.	2.	1.
29 34.6	84.	70.	50000.L	9950.398	10150.200	994.290	5.	2.	7.	3.
29 128.6	44.	296.	388.	9950.398	10150.200	900.290	14.	6.	2.	3.
Ranger 3 Drillhole 130										
30 337.6	17.	111.	100.L	10750.000	11850.000	676.380	5.	2.	2.	4.
30 343.5	39.	109.	0.B	10750.000	11850.000	670.520	5.	2.	2.	4.
30 344.5	28.	103.	0.B	10750.000	11850.000	669.500	5.	2.	2.	4.
30 348.5	48.	2.L	14.L	10750.000	11850.000	665.520	5.	2.	2.	4.
Ranger 1 Drillhole 31										
31 3C	65.	97.	15000.L	9950.398	10150.200	1026.390	5.	1.	5.	1.
31 45C	51.	106.	1980.	9950.398	10150.200	984.390	10.	2.	4.	3.
31 26.5	13.	2.	8000.L	9950.102	10050.100	1002.890	9.	4.	4.	1.
31 64.8	82.	16.	4800.L	9950.102	10050.100	964.590	9.	4.	3.	1.
31 85C	212.	11.	2200.L	9950.398	10150.200	944.390	13.	5.	5.	2.
31 85.4	66.	18.	1000.L	9950.102	10050.100	943.990	9.	4.	6.	3.
Ranger 1 Drillhole 32										
32 18.8	38.	83.	871.	9950.000	9950.000	1009.700	5.	1.	5.	1.
32 28.4	127.	126.	938.	9950.000	9950.000	1000.100	5.	1.	5.	1.
32 35C	38.	91.	507.	9950.000	9950.000	993.500	5.	2.	3.	1.
32 42.6	58.	18.	1.L	9950.000	9950.000	985.900	5.	2.	3.	1.
32 47.5	165.	81.	1440.	9950.398	9950.000	981.000	13.	3.	3.	2.
32 64C	37.	104.	5600.L	9950.000	9950.000	964.500	10.	2.	5.	3.
32 69.7	25.	4.	370.	9950.000	9950.000	958.800	9.	4.	4.	1.
32 80.3	41.	25.	0.B	9950.000	9950.000	948.200	9.	4.	5.	1.
32 91.7	161.	56.	803.	9950.000	9950.000	936.800	13.	3.	4.	3.
Ranger 1 Drillhole 33										
33 27C	102.	107.	710.L	9949.398	10351.700	1003.360	10.	2.	2.	1.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	SiO2%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U N	As N	Au N
Ranger 1 Drillhole 33-continued										
33 27.7	57.00	18.90	6.35	.00B	8.55	.07	2.99	4.93	.70L	.00
33 123.7	72.20	14.90	1.60	.00B	1.69	.18	6.44	2.55	.20L	.00
Ranger 1 Drillhole 34										
34 6C	62.50	13.30	5.23	1.02	8.34	.08	.97	1800.00	2.00L	.84
34 14C	76.30	11.20	1.70	.00B	2.61	.73	2.70	739.00	1.10	.20
34 25C	81.80	2.60	1.21	.00B	2.02	6.08	.17	83.00	3.10	.20
34 53.3	35.90	15.70	19.00	.00B	17.30	1.24	.02L	1810.00	1.30	.57
34 64.0	68.42	6.34	6.70	.00B	6.35	.31	.03	34400.00	.00B	.00B
34 93C	62.10	14.80	2.85	1.60	12.40	.29	.51	22.00	.80L	.03
Ranger 1 Drillhole 38										
38 12C	63.70	15.20	5.02	1.31	5.47	.12	3.22	141.00	1.10L	.03
38 19C	63.90	16.10	2.65	1.58	7.27	.15	2.80	31.00	.54L	.01
38 19.9	75.20	11.80	2.63	.00B	4.28	.02L	2.25	9.10	.51L	.01
38 22.6	62.90	15.50	2.76	.00B	9.01	.14	2.12	18.10	.24	.00
38 23C	65.80	14.40	3.82	2.36	7.35	.06	1.86	436.00	.61L	.01
38 25.1	59.70	15.20	4.93	.00B	11.30	.14	.36	129.00	.69	.01
38 26.8	34.60	21.90	6.72	3.29	13.40	.04	3.06	2200.00	4.00L	.11
38 27.2	39.70	20.10	7.33	2.38	9.07	.07	1.38	10300.00	15.00	.20L
38 32C	63.70	14.10	3.91	2.38	9.07	.07	1.33	518.00	.65L	.01
38 42C	54.00	21.00	3.49	2.12	9.74	.16	3.03	116.00	.72L	.02
38 49.6	44.10	23.40	5.51	.00B	12.80	.18	2.51	398.00	18.90	.07
38 51.5	69.10	12.90	3.02	.00B	4.80	.06	2.35	3540.00	8.00	.08
38 54.2	66.60	13.40	4.98	.00B	7.45	.13	1.46	46.70	3.87	.02
38 62.2	65.50	14.60	3.16	.00B	8.23	.16	1.46	682.00	1.00L	.02L
38 66.6	73.30	10.40	3.67	.00B	7.41	.07	1.13	114.00	.18	.00
38 73.6	44.80	23.20	7.30	4.69	13.40	.02L	2.71	4.31	.34	.00
38 79.0	49.10	17.20	7.77	5.09	15.40	.29	.92	16.40	.33L	.00
38 100.4	34.60	19.10	9.11	4.90	18.40	.14	.38	14800.00	.00B	.00B
38 109.8	67.60	8.51	3.92	2.88	11.40	.73	.02	3.00	1.55	.01
38 118.2	69.20	8.16	5.44	.00B	10.40	.02L	.02L	1.20	2.31	.00
38 133C	41.40	.24	1.55	.00B	40.30	.86	.02L	24.00	.39L	.01
38 139.0	41.10	.14	4.31	.00B	33.40	.36	.02L	5.10	.17L	.00
38 163C	31.90	1.02	1.74	1.33	33.10	.85	.03	15.00	.52L	.01L
38 187C	63.90	16.50	2.79	1.90	7.48	.05	3.42	3.70	.71L	.01L
38 193.8	31.00	19.30	10.40	.00B	26.30	.13	.02L	13.20	.37L	.00
38 196C	13.40	4.48	2.78	2.07	33.90	5.30	.52	48.00	.68L	.01L
38 216C	6.54	1.72	1.14	.00B	21.30	25.80	.06	59.00	.53L	.02
38 234.2	35.40	17.50	5.56	.00B	24.10	2.13	.02L	3.40	.22L	.01
38 252.1	72.20	14.70	.80	.00B	2.00	.17	7.66	21.00	.30L	.00
Ranger 1 Drillhole 55										
55 7C	67.00	13.20	5.04	.00B	4.36	.04	1.89	1800.00	7.70	.29

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 1 Drillhole 33-continued										
33 27.7	15.	208.	297.	2.	.70L	11.	26.40	57.0	22.	23.70
33 123.7	50.	425.	395.	2.	1.06	10.L	1.66	190.0L	4.L	1.57
Ranger 1 Drillhole 34-continued										
34 6C	158.	119.	1600.	4.	3.20L	10.L	510.00L	124.0	29.	37.20
34 14C	369.	369.	1100.	3.	1.90L	17.	210.00L	100.0L	8.	9.70
34 25C	16.	78.	141.	3.	1.20L	17.	10.60	155.0	6.	8.42
34 53.3	25.	22.	6600.L	5.	2.20L	20.	470.00L	286.0L	40.	46.60
34 64.0	58.	107.	0.B	3.	.00B	10.	.00B	.08	19.	.00B
34 93C	133.	14.	150.L	4.	4.30	10.	6.10L	274.0	14.	16.70
Ranger 1 Drillhole 38-continued										
38 12C	71.	313.	501.	3.	1.50L	82.	95.70	130.0L	17.	20.00
38 19C	322.	67.	81.	4.	.90	42.	47.90	96.7	12.	16.20
38 19.9	42.	181.	192.	1.	.90	63.	76.30	69.2	12.	15.30
38 22.6	144.	29.	190.L	4.	1.11	10.L	7.70	196.0	15.	15.20
38 23C	84.	61.	323.	3.	2.40	10.	24.00L	143.0	22.	25.20
38 25.1	22.	23.	256.L	3.	3.52	13.	10.00L	234.0	23.	38.90
38 26.8	104.	131.	1900.	5.	7.00L	28.	536.00	326.0L	39.	51.50
38 27.2	164.	106.	14000.	7.	10.00L	11.	2700.00L	570.0L	42.	51.70
38 32C	64.	65.	357.	3.	2.60	10.	29.00L	191.0	23.	27.60
38 42C	157.	106.	211.	4.	2.70	57.	58.10	182.0	20.	23.30
38 49.6	134.	57.	11.	5.	.90L	21.	120.00L	189.2	36.	51.50
38 51.5	112.	186.	4700.	4.	4.00L	10.L	980.00L	290.0L	24.	28.30
38 54.2	57.	106.	526.L	2.	1.70	16.	5.30	318.0L	20.	24.40
38 62.2	215.	143.	461.	4.	2.00L	13.	160.00L	131.0	16.	19.30
38 66.6	43.	65.	174.	3.	1.75	10.L	36.00L	117.0	16.	21.20
38 73.6	56.	73.	183.L	6.	1.15	10.L	5.14	117.0	37.	51.10
38 79.0	20.	43.	220.L	5.	1.92	10.L	2.64	205.4	40.	57.40
38 100.4	132.	129.	18000.	12.	.00B	14.	.00B	900.0L	44.	.00B
38 109.8	10.L	23.	100.L	6.	2.64	10.L	3.08	224.0	26.	33.70
38 118.2	10.L	13.	100.L	2.	2.01	10.L	2.02	163.4	28.	39.60
38 133C	23.	3.	800.L	1.	2.20	10.L	7.99	200.0L	8.	12.60
38 139.0	11.	3.	490.L	1.	1.09	10.L	9.98	76.3	14.	18.20
38 163C	10.	7.	700.L	1.	3.40	10.L	14.50	180.0L	9.	15.40
38 187C	38.	235.	291.	3.	1.00L	44.	44.90	98.0	14.	16.10
38 193.8	10.	9.	160.L	8.	1.32	10.L	1.00L	126.5	65.	86.40
38 196C	10.L	57.	680.L	2.	4.54	12.	23.90	460.0L	12.	17.90
38 216C	10.	12.	700.L	1.	15.50	10.L	11.80	1200.0	4.	5.80
38 234.2	73.	9.	360.L	4.	4.36	10.L	3.45	322.3	24.	44.00
38 252.1	35.	204.	217.	2.	2.75	10.L	2.70	181.0	4.L	2.32
Ranger 1 Drillhole 55-continued										
55 7C	84.	137.	2700.	4.	3.40L	10.	510.00L	136.0	31.	40.90

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies--continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	FZ	Ga N	Gd N	Ir N
33 27.7	207.	209.00	1.20	4.	5.2L	.78	.00B	.0B	1100.L	.00
33 123.7	1.L	1.00L	2.91	11.	3.8L	2.64	.00B	15.0L	590.L	.00
Ranger 1 Drillhole 33--continued										
34 6C	51.	67.20	2.80	32.	40.0L	1.97	.04	49.0	11000.L	.01L
34 14C	134.	139.00	5.57	45.	8.0L	.65	.00B	8.0	4000.L	.01L
34 25C	93.	113.00	2.60	28.	2.0L	.42	.00B	7.8	470.L	.01L
34 53.3	131.	150.00	2.30	26.	14.0	5.03	.00B	63.0	15200.	.02L
34 64.0	74.	.00B	.00B	15.	.0B	.00B	.00B	.0B	0.B	.00B
34 93C	6.	4.82	7.55	3.	4.0L	.08	.05	25.0	2000.L	.00
Ranger 1 Drillhole 34										
38 12C	56.	62.30	3.38	17.	6.0L	.74	.06	20.0	3000.L	6700.00L
38 19C	57.	67.90	13.90	68.	4.0L	.10L	.08	39.2	4000.L	.01L
38 19.9	7.	10.90	5.54	47.	8.6L	.21	.00B	21.5	2200.L	.00
38 22.6	54.	60.10	6.00	64.	4.0L	.50L	.00B	22.0	2800.L	.01L
38 23C	99.	116.00	3.29	268.	2.0L	.16	.04	432.0	2000.L	.01L
38 25.1	96.	158.00	2.03	38.	5.2L	.20L	.00B	63.3	2400.L	.01L
38 26.8	127.	182.00	4.90	81.	14.0L	2.20	.00B	67.0L	10000.L	.02L
38 27.2	138.	223.00	3.90	3650.	35.0	6.24	.09	79.0	45000.L	.04L
38 32C	96.	105.00	2.80	420.	4.0L	.18	.07	45.0	2000.L	.01L
38 42C	56.	62.80	3.87	5.	4.0L	.36	.07	56.2	5000.L	.01L
38 49.6	139.	204.00	10.90	156.	5.0L	.70L	.00B	90.0	4000.L	.01L
38 51.5	108.	132.00	6.20	1213.	23.0	3.36	.00B	36.0	21000.L	.02L
38 54.2	187.	199.00	2.90	7.	10.0L	.20L	.00B	42.0	2000.L	.01L
38 62.2	85.	93.00	1.70	101.	5.0L	.80	.00B	37.0L	4400.L	.01L
38 66.6	12.	18.90	3.36	54.	3.1L	.10L	.00B	23.2	3700.L	.01L
38 73.6	35.	48.60	4.86	11.	4.0L	.35	.07	65.4	2500.L	.01L
38 79.0	1.	6.00	16.30	10.	1.4L	.05	.11	49.7	1.L	.01L
38 100.4	248.	.00B	.00B	168.	62.0	.00B	.10	.0B	40000.L	.00B
38 109.8	136.	166.00	.50	9.	2.8L	.22	.18	42.1	480.L	.00
38 118.2	68.	99.40	.83L	5.	1.0L	.08	.00B	36.8	560.L	.00
38 133C	4.	3.00	.49L	2.	6.0L	.30	.00B	2.7L	10000.L	.00
38 139.0	1.L	3.10	.54L	12.	3.2L	.24	.00B	1.3L	1500.L	.00
38 163C	11.	14.90	.75L	21.	16.0L	.58	.05	3.7L	8000.L	.00
38 187C	394.	421.00	16.40	7.	2.0L	.37	.11	29.0	2000.L	.01L
38 193.8	69.	90.40	1.0L	6.	1.0L	.08	.00B	41.9	1500.L	.01L
38 196C	24.	36.80	1.30	27.	4.0L	.63	.06	5.6L	8000.L	.00
38 216C	14.	18.60	.65L	53.	8.0L	.53	.00B	2.6L	8000.L	.00
38 234.2	119.	202.00	1.00	13.	2.4L	.14	.00B	37.0	2000.L	.01L
38 252.1	1.	1.80	9.80	117.	1.8L	.28	.00B	.0B	670.L	.00
Ranger 1 Drillhole 55										
55 7C	56.	80.30	4.20	986.	16.0L	.95	.00B	35.0	7000.L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 1 Drillhole 33-continued										
33 27.7	7.	17.60	82.	180.	210.0	3.0L	1800.00	9.	18.00L	54.
33 123.7	2.L	.96	30.	138.	137.0	4.0L	1300.00	4.L	.70L	2.L
Ranger 1 Drillhole 34-continued										
34 6C	2.	26.50	106.	73.	113.0	1.9	338.00	6.	810.00	79.
34 14C	8.	20.70	28.	39.	39.0	23.0	228.00	4.L	162.00	22.
34 25C	7.	9.76	20.	40.	54.4	42.0L	273.00	4.L	3.00	14.
34 53.3	2.L	28.90	119.	165.	207.0	4000.0L	171.00L	7.	340.00L	148.
34 64.0	2.L	.00B	77.	135.	.0B		.00B	4.L	.00B	56.
34 93C	3.	3.81	239.	73.	112.0	198.0L	549.00	11.	.76L	82.
Ranger 1 Drillhole 38-continued										
38 12C	40.	58.00	63.	249.	277.0	290.0L	326.00	6.	52.00L	17.
38 19C	18.	28.00	85.	71.	78.4	140.0L	297.00	7.	25.00L	47.
38 19.9	32.	44.00	49.	42.	51.7	9.0L	580.40	7.	42.00L	30.
38 22.6	2.	4.69	138.	99.	127.0	37.0L	121.50	5.	5.00L	35.
38 23C	2.L	5.08	110.	71.	85.0	230.0L	203.00	7.	180.00L	75.
38 25.1	2.L	2.12	155.	84.	97.6	82.4	162.00	4.L	100.00L	107.
38 26.8	2.L	76.70	181.	91.	129.0	5100.0L	275.00L	4.	2000.00L	169.
38 27.2	2.	106.00	229.	172.	207.0	30000.0L	180.00L	4.	7000.00L	178.
38 32C	2.L	6.28	130.	92.	103.0	270.0L	174.00	7.	330.00L	91.
38 42C	26.	35.30	103.	55.	65.0	61.0L	494.00	7.	87.00L	89.
38 49.6	2.L	8.26	165.	71.	97.6	980.0L	209.00	5.	67.00L	160.
38 51.5	2.L	36.60	115.	82.	96.0	9000.0L	380.00	4.L	800.00L	57.
38 54.2	2.L	1.23	193.	665.	782.0	98.0L	456.00L	4.L	10.00L	120.
38 62.2	2.L	11.20	102.	71.	92.3	1500.0L	246.00	5.	300.00L	77.
38 66.6	2.L	2.97	39.	56.	70.7	300.0L	268.80	4.L	56.00L	48.
38 73.6	2.L	1.86	112.	118.	146.0	10.0L	184.60	4.L	28.00L	111.
38 79.0	2.L	3.11	104.	154.	189.4	45.0	243.30	7.	5.40L	114.
38 100.4	3.	.00B	319.	195.	216.0	.0B	610.00L	4.L	.00B	194.
38 109.8	2.L	4.56	66.	71.	83.0	47.0L	88.70	4.L	18.00L	103.
38 118.2	2.L	1.06	49.	65.	78.5	1.7L	84.40	4.	14.00L	66.
38 133C	8.	11.60	14.	857.	1000.0	99.0L	310.00	4.L	42.00L	9.
38 139.0	13.	20.00	21.	450.	589.3	13.0L	281.40	4.L	15.00L	2.L
38 163C	17.	27.10	32.	766.	894.0	130.0L	341.00	4.L	39.00L	13.
38 187C	28.	34.80	166.	55.	62.6	180.0L	1200.00	9.	9.00	60.
38 193.8	2.L	.51	147.	120.	149.7	29.6	80.70	4.L	4.60L	341.
38 196C	13.	24.60	60.	1443.	1200.0	25.0L	778.00	4.L	68.00L	45.
38 216C	13.	25.40	20.	720.	900.0	20.0	465.00	4.L	5.00	13.
38 234.2	2.L	2.42	403.	382.	446.6	2.4L	156.20	4.L	20.00L	118.
38 252.1	3.	2.66	28.	63.	60.3	38.0L	1610.00	4.	4.00L	5.
Ranger 1 Drillhole 55-continued										
55 7C	2.L	26.60	64.	41.	50.0	5400.0	243.00	5.	1440.00	78.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
33 27.7	286.	10.L	14.L	86.	10.	13.80	1.66	9.	1.10	.40L
33 123.7	782.	10.L	7.L	166.	1.L	.57	.43	19.	.10L	.03L
Ranger 1 Drillhole 33-continued										
34 6C	611.	668.	18.L	63.	14.	20.20	4.70	6.	4.80	2.50
34 14C	2209.	157.	13.L	150.	9.	11.20	1.60	13.	.80	1.30
34 25C	16765.	34.	5.L	21.L	3.	3.70	1.90	17.	2.00L	.56
34 53.3	2992.	160.	15.L	72.L	21.	27.60	4.50L	4.	8.00L	1.90
34 64.0	1254.	1922.	0.B	0.B	29.	.00B	.00B	5.	.00B	.00B
34 93C	714.	15.	0.B	54.	1.	1.80	.67	3.	5.60	.43L
Ranger 1 Drillhole 34										
38 12C	233.	19.	10.	165.	9.	12.40	4.40	20.	1.10	.90
38 19C	355.	27.	6.	124.	6.	11.00	3.03	4.	4.10L	.71L
38 19.9	81.	20.	9.	88.	4.	6.17	.40	4.	1.24	.74
38 22.6	373.	10.L	4.L	52.	7.	11.40	.73	2.	.60	.50L
38 23C	156.	100.	6.L	108.	7.	12.90	.14L	4.	1.50	.68L
38 25.1	300.	57.	4.L	13.	8.	15.80	.50L	2.	1.40	.30L
38 26.8	510.	645.	44.L	220.	19.	37.50	.90L	8.	6.00L	1.00L
38 27.2	442.	2909.	0.B	92.	29.	38.10	3.00L	4.	10.00L	3.30
38 32C	229.	47.	0.B	74.	9.	12.80	.18L	5.	2.50	.69L
38 42C	358.	23.	10.	165.	9.	17.00	3.53	7.	1.50	.60
38 49.6	481.	54.	7.L	140.	7.	21.40	1.67	5.	1.70	.80L
38 51.5	225.	1951.	19.L	170.	16.	21.30	4.00L	10.	6.00L	2.50
38 54.2	298.	83.	4.L	100.	11.	17.00	.30L	8.	4.00L	.60L
38 62.2	369.	48.	14.L	109.	8.	12.60	.60L	10.	.57	.57
38 66.6	125.	10.	3.L	104.	5.	7.82	.40	6.	5.13	.50L
38 73.6	5.L	13.	3.L	246.	7.	14.60	.72	6.	.40	.60L
38 79.0	714.	10.L	4.L	185.	5.	8.99	.36L	5.	3.32	.52L
38 100.4	529.	11411.	0.B	0.B	48.	.00B	.00B	10.	.00B	.20
38 109.8	4296.	10.L	2.L	16.L	3.	4.39	1.25	7.	.60	.52L
38 118.2	1700.	10.L	2.L	25.L	5.	8.20	.44	5.	.90	.32L
38 133C	5.L	11.	8.L	18.L	1.L	.61	1.46	4.	2.00L	.80
38 139.0	38.	11.	5.	21.L	1.L	.14	1.51	3.	.50L	.35L
38 163C	132.	10.L	9.L	22.L	2.	3.38	3.69	5.	2.20L	.70
38 187C	137.	14.	6.	156.	10.	14.20	.08L	8.	2.10	.61L
38 193.8	226.	10.L	3.L	33.L	4.	9.02	1.15	17.	1.90	.50
38 196C	108.	10.L	1.L	29.	4.	6.78	3.28	19.	2.00L	.56
38 216C	42.	42.	0.B	17.L	3.	5.24	2.10	19.	2.30L	.56
38 234.2	204.	10.L	3.L	33.L	5.	13.00	.73	17.	.60	.72L
38 252.1	753.	25.	0.B	230.	1.	1.49	.60L	30.	.20L	.30L
Ranger 1 Drillhole 55										
55 7C	569.	565.	19.L	120.	13.	19.90	2.80	5.	5.20L	1.00

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 1 Drillhole 33-continued										
33 27.7	6.	15.60	.86	2447.	.80L	81.	94.0	6.00	5.	1.26
33 123.7	2.1	.58	.02L	36.	.30L	2.1	12.0L	.50L	3.	.20L
Ranger 1 Drillhole 34-continued										
34 6C	3.	10.20	.47	1498.	2.20L	175.	350.0	19.00	28.	3.50
34 14C	9.	11.40	.35	925.	2.00L	133.	192.0	8.20	19.	2.20
34 25C	3.	1.64	.09	228.	2.40L	31.	40.0	7.80	12.	.90
34 53.3	15.	15.30	.55	1481.	5.50L	189.	323.0	5.60L	20.	2.00
34 64.0	111.	.00B	.04	303.	.00B	92.	.0B	.00B	135.	.00B
34 93C	2.1	1.50	.02L	24.	3.30	22.	31.8	1.60	3.	.36L
Ranger 1 Drillhole 38-continued										
38 12C	10.	17.60	.48	2073.	1.80L	49.	62.0	7.10	9.	1.83
38 19C	13.	18.70	.57	1693.	1.40	65.	72.0	4.50	9.	2.49
38 19.9	15.	23.10	.17	694.	2.00L	22.	24.8	2.10	7.	2.17
38 22.6	11.	16.90	.57	2059.	.90L	51.	56.7	.70L	7.	1.20
38 23C	14.	12.70	.59	2101.	2.20L	143.	200.0	35.40	5.	.90
38 25.1	2.1	11.60	.54	632.	1.00L	231.	280.0	4.53	4.	.70
38 26.8	15.	23.40	.72	2621.	3.00L	354.	889.0	29.00	24.	3.90
38 27.2	41.	9.03	.61	3204.	12.00L	315.	872.0	42.00	89.	9.67
38 32C	15.	15.10	.44	1642.	1.30	136.	217.0	94.20	14.	1.79
38 42C	28.	35.80	.93	1245.	1.70	131.	171.0	3.20	11.	3.16
38 49.6	4.	19.40	.93	2348.	2.00L	298.	397.0	38.30	8.	1.00L
38 51.5	13.	8.58	.41	2117.	5.00L	173.	395.0	12.90	46.	5.29
38 54.2	4.	1.00	.52	1863.	1.00L	185.	200.0	3.30	1.	.30L
38 62.2	17.	15.20	.55	1286.	1.00L	143.	241.0	7.10	17.	1.70
38 66.6	5.	13.30	.19	614.	3.00L	82.	109.0	1.67	5.	.93
38 73.6	28.	64.70	.14	383.	2.00L	143.	166.0	5.00L	5.	.70
38 79.0	2.1	.70	.02L	34.	2.00L	88.	103.0	.72L	1.	.31L
38 100.4	55.	.00B	1.14	5422.	.00B	432.	868.0	.00B	125.	.00B
38 109.8	2.1	8.98	.36	760.	1.20L	50.	58.3	11.50	7.	.60
38 118.2	2.	7.46	.29	591.	1.10L	115.	134.0	2.82	2.	.31L
38 133C	2.1	.28	.02L	22.	1.00L	3.	34.0L	2.60	10.	.67
38 139.0	2.1	.19L	.02L	98.	.30L	2.	18.0L	.90	7.	.57
38 163C	2.	2.03	.03	88.	.30	6.	48.0L	21.10	11.	.93
38 187C	9.	14.20	.56	2504.	.55L	73.	74.2	49.30	5.	1.55
38 193.8	3.	2.68	.67	386.	1.80L	42.	49.4	19.70	2.	.34L
38 196C	3.	5.56	.14	335.	1.80L	20.	36.0L	1.30	12.	1.52
38 216C	4.	1.96	.133.	133.	1.20L	8.	26.0L	1.80	15.	.34L
38 234.2	4.	20.10	.65	452.	1.50L	63.	75.0	6.32	2.	.44L
38 252.1	7.	1.85	.05	296.	.20L	4.	7.4	.80L	4.	.78
Ranger 1 Drillhole 55-continued										
55 7C	18.	19.10	.49	2005.	3.20L	140.	283.0	9.00	32.	4.80

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHYPE	ALTYPE	ORETYPE	OXYTE
33 27.7	89.	115.	260.	9949.398	10351.700	1002.660	10.	2.	2.	3.
33 123.7	17.	16.	86.L	9949.801	10351.700	906.660	14.	1.	2.	3.
Ranger 1 Drillhole 33-continued										
Ranger 1 Drillhole 34										
34 6C	93.	72.	16000.L	9979.898	9899.898	1022.150	5.	1.	5.	1.
34 14C	32.	74.	8800.L	9979.898	9899.898	1014.150	5.	2.	4.	1.
34 25C	22.	20.	253.	9979.898	9899.898	1003.150	9.	4.	4.	1.
34 53.3	100.	74.	20000.L	9979.898	9899.801	974.850	12.	2.	2.	2.
34 64.0	51.	14.	0.B	9979.898	9899.898	964.150	9.	4.	6.	3.
34 93C	32.	28.	260.L	9979.898	9899.898	935.150	3.	2.	3.	3.
Ranger 1 Drillhole 38										
38 12C	29.	73.	340.L	10199.700	9949.898	1010.500	4.	2.	3.	1.
38 19C	15.	91.	409.	10199.700	9949.898	1003.500	5.	2.	3.	1.
38 19.9	17.	85.	263.	10199.700	9949.898	1002.600	4.	2.	3.	1.
38 22.6	19.	87.	200.L	10199.600	9949.898	999.900	5.	2.	3.	1.
38 23C	48.	116.	1100.L	10199.700	9949.898	1001.500	5.	2.	5.	1.
38 25.1	67.	57.	686.	10199.700	9949.898	997.400	5.	2.	4.	1.
38 26.8	72.	118.	26200.	10199.600	9949.898	995.700	5.	3.	4.	1.
38 27.2	194.	93.	1200.L	10199.700	9949.898	995.300	5.	3.	6.	3.
38 32C	46.	96.	1200.L	10199.700	9949.898	990.500	5.	2.	4.	1.
38 42C	46.	161.	280.L	10199.700	9949.898	980.500	5.	2.	4.	1.
38 49.6	43.	73.	470.L	10199.600	9949.898	972.900	5.	3.	4.	3.
38 51.5	49.	57.	42000.L	10199.700	9949.898	971.000	5.	3.	5.	1.
38 54.2	42.	17.	480.L	10199.600	9949.898	968.300	5.	2.	4.	1.
38 62.2	46.	49.	7200.L	10199.600	9949.898	960.300	5.	2.	4.	3.
38 66.6	74.	49.	1400.L	10199.700	9949.898	955.900	5.	4.	3.	3.
38 73.6	54.	150.	614.	10199.700	9949.898	948.900	5.	3.	3.	3.
38 79.0	65.	19.	239.	10199.100	9950.500	943.500	3.	2.	3.	3.
38 100.4	126.	124.	0.B	10197.700	9951.898	922.100	13.	3.	5.	3.
38 109.8	94.	61.	206.	10197.500	9952.102	912.700	9.	3.	3.	3.
38 118.2	70.	31.	320.L	10197.300	9952.301	904.300	9.	4.	3.	3.
38 133C	2.L	2.L	144.	10197.000	9952.602	889.500	7.	6.	2.	3.
38 139.0	24.	2.L	200.L	10196.900	9952.699	883.500	8.	3.	2.	3.
38 163C	7.	5.	94.	10194.800	9954.801	859.500	8.	3.	2.	2.
38 187C	34.	75.	42.L	10194.100	9955.500	835.500	6.	2.	2.	4.
38 193.8	89.	38.	61.	10193.900	9955.699	828.700	13.	3.	2.	3.
38 196C	12.	21.	219.	10193.800	9955.801	826.500	8.	3.	2.	3.
38 216C	9.	7.	140.L	10191.500	9958.000	806.500	7.	6.	2.	5.
38 234.2	40.	44.	440.L	10190.300	9959.301	788.300	8.	3.	2.	3.
38 252.1	14.	6.	10.L	10188.100	9960.898	770.400	14.	6.	2.	3.
Ranger 1 Drillhole 55										
55 7C	32.	67.	22000.L	10075.000	10000.000	1018.620	5.	1.	4.	1.

APPENDIX 1. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	SiO2%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U N	As N	Au N
Ranger 1 Drillhole 55-continued										
55 17C	81.10	10.10	1.16	.00B	1.01	.07	2.84	1300.00	6.30	.34
55 28C	61.70	14.40	5.18	2.97	10.70	.05	.86	889.00	1.90	.03
55 35.3	45.10	16.20	9.53	.00B	15.80	.08	.02L	4500.00	10.00L	.00
55 50.8	60.40	12.30	6.47	.00B	10.70	.06	.70	64.60	3.00L	.02L
55 60C	60.60	14.40	5.71	3.48	10.60	.08	1.34	2300.00	2.40	.32
55 80C	51.90	13.50	11.00	4.55	13.60	.15	.35	6500.00	5.30L	2.51
55 106C	46.80	18.80	6.64	.00B	13.40	.68	2.38	3300.00	3.80	.74
55 138.2	49.40	17.90	2.64	6.17	6.81	7.10	3.94	64.10	4.00L	.04L
55 146C	61.70	18.00	3.99	2.25	6.77	.06	3.39	2000.00	3.10	.35
55 178.2	46.40	16.20	8.87	.00B	18.30	.19	.02L	18.10	.90L	.00
55 194.9	51.80	19.70	3.22	.00B	14.90	.20	.02L	9.03	.30L	.00
55 230C	65.90	15.90	3.30	2.40	3.41	.18	7.24	24.50	1.90L	.04L
55 242.4	67.10	15.20	3.45	.00B	2.63	.14	7.35	27.00	.80L	.01L
Ranger 1 Drillhole 56										
56 13C	67.80	10.70	6.08	.00B	8.31	.02L	.42	291.00	1.90	.30
56 22C	58.10	13.30	9.73	3.14	10.60	.12	.69	1200.00	1.00	.60
56 26.4	70.00	10.00	7.77	.00B	7.01	.11	.65	85.50	1.46	.15
56 49.6	65.70	14.50	3.42	.00B	8.24	.17	1.74	197.00	.50L	.08
56 65.8	30.90	23.70	9.95	.00B	21.70	.17	.02L	528.00	6.00L	.10
56 83.1	78.40	7.36	2.46	.00B	6.16	.33	.56	818.00	1.00L	.04
56 86C	45.90	17.00	10.10	5.08	16.50	.33	.79	1600.00	3.00L	.54
56 136C	70.30	13.60	2.18	1.49	4.02	.36	4.77	15.00	2.10L	.03L
56 182C	73.20	14.60	.60	.00B	.60	.27	6.08	15.20	3.10L	.05L
Ranger 1 Drillhole 57										
57 13.1	65.10	17.10	2.12	.00B	3.92	.04	3.90	78.80	.00B	.00B
57 24C	66.60	16.30	2.40	1.42	5.35	.17	3.35	48.20	1.40L	.00
57 35.1	56.20	15.30	7.37	.00B	11.30	.13	.78	876.00	.30L	.09
57 41.8	73.90	11.90	3.66	.00B	3.52	.02L	2.31	23.00	.70L	.00
57 44.9	66.80	9.19	6.87	2.52	8.05	.08	.53	6130.00	7.00L	.06L
57 68C	65.40	13.60	6.30	4.43	7.53	.39	1.41	54.00	1.40L	.02L
57 77.2	75.90	11.80	2.80	.00B	3.67	.05	2.21	124.00	.40L	.01
57 99C	67.50	11.20	4.06	2.84	10.30	.09	.56	2.50	1.50L	.02
57 132.4	34.20	19.10	11.90	9.69	23.40	.49	.02L	22.20	.80L	.00
57 162.8	48.60	15.60	13.10	10.36	14.50	.43	.02L	5.77	.60L	.00
57 292.5	73.40	13.90	.98	.00B	.99	.09	7.62	27.10	.60L	.01L
Ranger 3 Drillhole 59										
59 30.6	81.30	5.46	2.93	2.15	6.13	.02L	.08	2.90	2.70L	.06
59 37.5	79.20	11.20	.53	.00B	1.06	.73	3.36	4.50	1.50L	.03L
59 46.5	81.00	9.51	1.13	.00B	2.92	.02L	2.38	1.50	.43L	.01L
59 49.7	55.60	18.90	3.10	.00B	12.20	.02L	3.20	1.60	1.70L	.03L
59 61.5	68.00	13.60	2.15	1.10	8.17	.02L	.51	2.80	2.50L	.05L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 1 Drillhole 55-continued										
55 17C	77.	176.	791.	3.	2.30L	10.L	370.00L	123.0	5.	5.65
55 28C	66.	45.	420.L	3.	1.95L	12.	250.00L	127.0	24.	27.80
55 35.3	53.	44.	14000.L	5.	14.00L	36.	594.00	880.0L	37.	41.30
55 50.8	419.	40.	149.L	4.	3.00L	128.	119.00	182.0	11.	11.70
55 60C	38.	209.	1300.	3.	1.80	11.	640.00L	430.0L	29.	39.80
55 80C	32.	44.	12000.	4.	6.90L	10.L	1800.00L	620.0L	35.	47.80
55 106C	188.	105.	4400.	5.	5.40L	76.	910.00L	300.0L	31.	41.20
55 138.2	411.	44.	140.L	4.	4.00L	140.	34.00L	181.0	13.	16.20
55 146C	26.	77.	1100.	5.	4.50L	10.L	90.00	178.0	32.	50.10
55 178.2	14.	10.	250.L	3.	1.63	13.	.66	150.0	42.	49.60
55 194.9	620.	14.	200.L	11.	3.78	10.	2.47	300.0	15.	19.50
55 230C	44.	491.	559.	2.	1.30	135.	220.00	116.0	5.	6.50
55 242.4	52.	525.	663.	2.	1.00L	163.	275.00	113.0	5.	5.70
Ranger 1 Drillhole 56-continued										
56 13C	16.	44.	217.	2.	1.10	10.	22.80	163.6	28.	40.30
56 22C	15.	84.	552.	3.	2.90L	10.L	31.20	116.0	27.	35.90
56 26.4	12.	177.	194.	1.	1.49	10.L	22.00L	140.0	28.	30.20
56 49.6	193.	52.	450.L	4.	.60L	10.L	50.00L	110.0	18.	17.90
56 65.8	25.	73.	690.L	7.	5.00L	469.	465.00	370.0L	43.	51.40
56 83.1	68.	101.	540.	4.	1.00L	10.L	220.00L	120.0	27.	29.60
56 86C	63.	234.	1600.	3.	4.00L	10.L	440.00L	78.5	18.	21.70
56 136C	48.	323.	393.	2.	2.40L	132.	183.00	83.6	6.	6.43
56 182C	109.	103.	420.L	4.	4.10L	10.L	2.10	300.0L	4.L	.56
Ranger 1 Drillhole 57-continued										
57 13.1	221.	32.	42.	3.	.00B	15.	22.00L	137.0	10.	12.60
57 24C	190.	29.	61.	3.	1.70L	12.	8.00	117.6	10.	120.00
57 35.1	71.	27.	10.L	4.	5.40	12.	200.00L	141.0	38.	43.00
57 41.8	31.	118.	127.	2.	1.37	10.L	7.90	137.0	8.	8.68
57 44.9	10.L	119.	21000.L	3.	8.00L	10.L	1600.00L	660.0L	38.	42.00
57 68C	395.	27.	160.L	3.	1.80	10.L	3.60	185.0	31.	33.90
57 77.2	73.	79.	125.	3.	1.61	24.	30.60	141.0	13.	14.40
57 99C	17.	42.	120.L	3.	1.80L	10.L	1.90	136.0	22.	28.30
57 132.4	10.L	6.	360.L	7.	.70L	10.L	1.00L	160.0	55.	52.00
57 162.8	10.L	6.	200.L	4.	.60L	10.L	2.00L	110.0	64.	76.80
57 292.5	32.	308.	297.	1.	.70	20.	13.40	208.0L	4.L	1.23
Ranger 3 Drillhole 59-continued										
59 30.6	10.L	29.	110.L	1.	3.10L	658.	82.50	55.8	14.	19.00
59 37.5	199.	69.	63.	1.	1.70L	276.	309.00	65.6	4.L	1.51
59 46.5	138.	39.	44.	1.	1.20	38.	54.20	86.8	6.	7.29
59 49.7	179.	34.	49.	2.	1.90L	200.	255.00	56.4	21.	28.80
59 61.5	524.	64.	65.	3.	2.90L	598.	638.00	85.8	11.	13.10

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	FZ	Ga N	Gd N	Ir N
Ranger 1 Drillhole 55-continued										
55 17C	38.	49.60	4.70	154.	20.0L	.49	.00B	19.0	2000.L	.01L
55 28C	94.	103.00	2.60	48.	2.0L	.37	.03	41.0	6000.L	.01L
55 35.3	83.	132.00	6.00L	12.	33.0	8.40	.00B	80.0L	19000.L	.01L
55 50.8	226.	320.00	2.00L	5.	2.7L	2.47	.00B	29.0	2600.L	.00
55 60C	79.	109.00	1.00	88.	6.0L	.79	.03	40.0	10000.L	.01L
55 80C	80.	134.00	1.30	123.	20.0L	1.67	.04	45.0	20000.L	.02L
55 106C	358.	480.00	6.00	67.	10.0L	1.24	.00B	50.0	20000.L	.02L
55 138.2	256.	321.00	3.00L	128.	2.6L	3.69	.00B	36.0	3300.	.00
55 146C	133.	205.00	1.50	26.	64.0L	1.26	.04	84.0	4000.L	.02L
55 178.2	81.	93.30	1.00L	3.	5.2L	.30L	.00B	44.0	1500.L	.01L
55 194.9	10.	16.00	.30L	3.	4.0L	.50L	.00B	3.0L	1400.L	.00
55 230C	11.	10.90	4.07	3.	4.0L	.39	.03	40.0	2000.L	.01L
55 242.4	6.	13.00	3.70	6.	4.8L	.80L	.00B	8.0L	6000.L	.01L
Ranger 1 Drillhole 56										
56 13C	23.	36.20	1.60	15.	4.0L	.31	.00B	23.0	2000.L	.01L
56 22C	60.	85.60	1.60	105.	11.0L	1.70L	.03	51.0	8000.L	.01L
56 26.4	46.	46.90	.60L	49.	3.1L	.55	.00B	25.0	1000.L	.00
56 49.6	55.	51.00	2.94	6.	3.1L	.35	.00B	28.0	1800.L	.00
56 65.8	246.	287.00	.70L	6.	13.0L	1.83	.00B	.0B	2100.L	.01L
56 83.1	44.	50.20	3.03	8.	3.4	.70	.00B	26.0	4000.L	.01L
56 86C	151.	179.00	3.80	5.	50.0L	.67	.10	35.0	14000.L	.01L
56 136C	10.	5.80	4.20	7.	3.0L	.34	.07	36.0	1000.L	.01L
56 182C	4.	2.20L	8.93	2.	3.0L	.03L	.00B	.0B	3000.L	.00
Ranger 1 Drillhole 57										
57 13.1	60.	70.00	6.70	4.	2.0L	.70L	.00B	.0B	2800.L	.01L
57 24C	60.	66.50	4.30	22.	2.0L	.05L	.06	64.0	6000.L	.01L
57 35.1	50.	60.00	1.30	289.	10.0L	1.60	.00B	49.0	10000.L	.01L
57 41.8	90.	87.20	4.34	4.	2.8L	.10L	.00B	21.0L	1300.L	.40L
57 44.9	58.	87.90	1.00L	1528.	20.0	2.20	.00B	.0B	16000.L	.02L
57 68C	10.	7.90	16.00	8.	1.6L	.11	.06	37.0	2000.L	.01L
57 77.2	14.	17.10	3.50	9.	2.8L	.03	.00B	20.4	2100.	.00
57 99C	202.	238.00	1.10L	5.	3.0L	.11	.07	44.0	2000.L	.01L
57 132.4	5.	9.85	.70L	77.	7.6L	.43	.13	67.0	1800.L	.00
57 162.8	1.1	3.00L	4.70	2.	4.3L	.20L	.07	23.0L	1000.L	.00
57 292.5	2.	2.10	2.39	79.	3.9L	.32	.00B	11.0L	880.L	.00
Ranger 3 Drillhole 59										
59 30.6	381.	480.00	.46L	2.	1.6L	1.59	.04	17.0L	440.L	.00
59 37.5	85.	97.80	.70	9.	7.7	1.22	.00B	38.4	8000.L	.00
59 46.5	27.	33.00	.12	6.	.2L	.12	.00B	31.9	620.L	.00
59 49.7	41.	59.00	1.17	8.	.5L	.48	.00B	68.0	1100.L	.00
59 61.5	37.	49.80	.40	4.	1.4L	1.27	.05	17.0L	1000.L	.00

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 1 Drillhole 55-continued										
55 17C	2.	16.30	19.	45.	44.4	707.0L	257.00	4.L	68.00L	12.
55 28C	2.L	12.70	108.	79.	97.6	469.0L	140.00	4.	248.00	92.
55 35.3	2.L	122.00	160.	120.	150.0	80.0L	480.00L	4.L	100.00L	152.
55 50.8	83.	114.00	54.	31.	44.0	8.0L	170.00	4.	50.00L	34.
55 60C	2.L	26.30	94.	81.	102.0	1200.0L	611.00	4.	120.00L	85.
55 80C	2.L	113.00	122.	106.	121.0	3400.0L	540.00L	4.L	1640.00	95.
55 106C	53.	103.00	121.	89.	115.0	2400.0L	378.00	4.	1390.00	113.
55 138.2	93.	145.00	52.	34.	44.0	10.0L	167.00	6.	60.00L	36.
55 146C	2.L	28.80	121.	245.	304.0	1020.0	576.00	7.	544.00	109.
55 178.2	2.L	1.07	106.	139.	167.0	10.0L	79.70	4.	60.00L	109.
55 194.9	2.L	1.76	269.	62.	80.0	3.0L	1100.00	4.L	5.00L	79.
55 230C	63.	116.00	44.	116.	134.0	440.0L	1700.00	11.	162.00	9.
55 242.4	71.	132.00	41.	111.	126.0	61.0L	1500.00	8.	250.00	2.
Ranger 1 Drillhole 56-continued										
56 13C	2.L	7.19	79.	96.	116.5	210.0	187.00	5.	15.00L	54.
56 22C	2.L	18.30	76.	105.	124.0	460.0	234.00	5.	59.80L	63.
56 26.4	2.L	2.81	61.	74.	79.0	190.0L	414.00	5.	34.00L	51.
56 49.6	6.	49.6	117.	61.	67.6	430.0L	155.00	5.	60.00L	73.
56 65.8	548.	684.00	164.	420.	514.0	980.0L	430.00L	6.	250.00L	115.
56 83.1	2.	27.30	68.	83.	77.9	1700.0L	140.00	4.L	300.00L	60.
56 86C	2.L	26.20	96.	71.	87.3	830.0L	1300.00	7.	370.00	46.
56 136C	59.	97.10	45.	85.	100.0	370.0L	947.00	14.	130.00L	10.
56 182C	2.L	2.30	14.	164.	238.0	600.0L	19000.00	4.L	170.00L	2.L
Ranger 1 Drillhole 57-continued										
57 13.1	2.L	.00B	52.	25.	32.8	.0B	141.00	4.L	.00B	37.
57 24C	3.	5.61	62.	53.	64.6	250.0L	161.00	5.	5.00	47.
57 35.1	2.L	10.00	151.	108.	120.0	2000.0L	165.40	4.	200.00L	92.
57 41.8	2.L	2.47	114.	113.	125.0	50.0L	342.00	4.	4.00L	28.
57 44.9	2.L	155.00	76.	123.	150.0	700.0L	490.00L	4.L	2300.00L	98.
57 68C	2.L	3.96	62.	134.	164.8	230.0	833.00	18.	9.00	47.
57 77.2	12.	20.30	66.	59.	60.0	330.0L	290.30	5.	50.00L	35.
57 99C	2.L	1.50	89.	59.	65.5	270.0L	280.00	4.L	79.00L	101.
57 132.4	2.L	.84	138.	331.	405.0	3.0L	114.00	4.L	2.00L	148.
57 162.8	2.L	.56	212.	148.	186.0	.7L	142.00	14.	10.00L	54.
57 292.5	8.	8.92	47.	84.	82.4	50.0L	7870.00	4.L	21.80	2.
Ranger 3 Drillhole 59-continued										
59 30.6	467.	674.00	41.	123.	141.0	590.0L	58.60	4.L	430.00	24.
59 37.5	160.	188.00	7.	24.	22.6	320.0L	146.40	4.L	140.00	3.
59 46.5	32.	43.70	19.	19.	22.0	98.0L	124.70	4.L	40.00L	16.
59 49.7	143.	239.00	67.	32.	39.0	360.0L	100.80	4.L	86.00L	78.
59 61.5	469.	570.00	77.	44.	46.4	540.0L	622.30	4.	140.00L	91.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 1 Drillhole 55-continued										
55 17C	434.	792.	14.L	211.	10.	13.40	1.20	9.	1.30	.90
55 28C	129.	369.	0.B	66.	9.	12.10	1.20	4.	3.50L	.67L
55 35.3	236.	1144.	94.L	200.L	14.	27.20	264.00	3.	18.00L	4.00L
55 50.8	18168.	10.L	60.L	59.	14.	18.90	7.21	35.	8.00L	1.00L
55 60C	209.	425.	23.L	79.	12.	18.00	1.00	7.	1.10	2.30
55 80C	366.	1488.	53.L	45.	18.	25.30	6.00	3.	5.60L	2.30
55 106C	1914.	1376.	144.	120.	24.	37.90	1.40	20.	7.20L	1.30L
55 138.2	18994.	30.	64.L	77.	15.	25.80	8.94	38.	10.00L	2.00L
55 146C	812.	221.	0.B	68.	16.	29.10	2.30	7.	1.40	2.00
55 178.2	381.	13.	7.L	50.L	4.	7.76	1.07	4.	4.00L	.90L
55 194.9	444.	13.	6.L	26.L	3.	5.35	.02L	6.	3.10	.50L
55 230C	686.	32.	47.	221.	4.	4.84	13.40	61.	.90	.90
55 242.4	558.	33.	34.	230.	4.	6.34	15.30	41.	1.00	1.70
Ranger 1 Drillhole 56										
56 13C	142.	80.	13.L	47.L	8.	14.10	.90	2.	1.60	.60
56 22C	479.	236.	0.B	35.	12.	19.10	1.30	3.	1.20	.88L
56 26.4	417.	66.	7.L	20.L	9.	10.70	.20L	4.	.60L	.40L
56 49.6	547.	43.	0.B	40.	10.	11.10	.10L	3.	.80	.30L
56 65.8	1171.	70.	160.L	36.L	20.	33.40	3.57	86.	1.00L	.80L
56 83.1	1096.	201.	15.L	20.L	4.	5.54	1.40L	5.	.80	.50L
56 86C	344.	344.	39.L	100.	15.	21.40	1.00	8.	1.40	.60
56 136C	1020.	22.	5.	182.	3.	4.08	.70	32.	1.30	.90
56 182C	832.	19.	99.L	218.	1.	.96	.16L	10.	.50	.18
Ranger 1 Drillhole 57										
57 13.1	143.	18.	0.B	98.	12.	19.50	.00B	1.	1.00L	.70L
57 24C	472.	19.	13.L	93.	12.	16.30	.17	4.	.90	.65L
57 35.1	369.	115.	6.L	33.L	8.	14.10	1.21	2.	.70L	1.00
57 41.8	51.	10.L	0.B	115.	5.	7.37	.02L	4.	.60	.30L
57 44.9	206.	655.	100.L	40.L	11.	13.90	2.00L	6.	5.00L	1.00L
57 68C	933.	17.	10.L	230.	3.	4.06	.17L	8.	9.67	.60L
57 77.2	176.	45.	3.L	159.	5.	7.68	.30L	5.	1.43	.70
57 99C	201.	13.	14.L	29.	10.	15.00	.08L	6.	.70	.40
57 132.4	1565.	10.L	4.L	24.L	9.	14.40	.50L	8.	1.90	.50L
57 162.8	1379.	10.L	0.B	21.L	1.L	1.15	.02L	4.	19.70	.50L
57 292.5	541.	48.	23.L	149.	2.	1.92	.12	51.	.08L	.20L
Ranger 3 Drillhole 59										
59 30.6	698.	10.L	130.	16.L	2.	2.42	21.70	86.	.60	.29L
59 37.5	2206.	10.L	50.	63.	6.	7.45	13.70	82.	.50	1.39
59 46.5	36.	10.L	7.L	46.	4.	5.39	1.08	15.	.17L	.26L
59 49.7	208.	10.	54.	66.	6.	9.16	62.90	47.	2.30L	.43L
59 61.5	697.	10.L	63.	14.	6.	7.18	14.50	162.	.40	.33L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 1 Drillhole 55-continued										
55 17C	11.	11.60	.30	1056.	1.20	80.	136.0	4.00	19.	2.50
55 28C	10.	10.80	.53	1410.	1.90L	170.	261.0	15.00	9.	1.30
55 35.3	32.	11.40	.43	2244.	18.00L	282.	1200.0	8.70	39.	5.00L
55 50.8	11.	10.50	.37	1949.	5.00L	102.	145.0	19.90	23.	1.00L
55 60C	15.	14.70	.42	1505.	3.20L	134.	256.0	4.00	24.	3.70
55 80C	26.	16.00	.44	1745.	2.50	150.	349.0	9.00	42.	5.95
55 106C	14.	10.30	1.06	3043.	4.50L	356.	662.0	49.00	26.	4.50
55 138.2	8.	14.10	.91	1913.	6.00L	114.	138.0	23.90	26.	1.00L
55 146C	14.	20.30	.78	1877.	4.40L	159.	283.0	21.00	25.	3.80
55 178.2	13.	14.40	.49	520.	2.00L	123.	131.0	2.90	3.	.60L
55 194.9	7.	7.00	.02L	28.	2.00L	50.	62.8	.60L	1.	.30L
55 230C	47.	81.30	.47	1749.	2.40	16.	26.8	4.80L	10.	.42L
55 242.4	47.	108.00	.59	2099.	2.00L	18.	20.2	2.00L	13.	1.00
Ranger 1 Drillhole 56-continued										
56 13C	13.	23.20	.19	691.	1.80	93.	142.0	5.70	12.	1.60
56 22C	17.	16.50	.35	1134.	2.90L	128.	239.0	15.00	19.	3.10
56 26.4	2.	6.51	.30	913.	.80L	86.	98.0	2.00L	8.	1.02
56 49.6	21.	14.00	.54	1863.	1.00L	119.	160.0	7.40	6.	.60
56 65.8	15.	24.50	1.04	2490.	2.00L	210.	267.0	10.00L	4.	.60L
56 83.1	4.	3.67	.29	893.	1.00L	79.	130.0	12.40	10.	.70
56 86C	15.	14.00	.75	2433.	1.20	126.	316.0	11.00	19.	2.10
56 136C	46.	67.90	.61	2302.	1.60	16.	20.1	5.30L	10.	.49L
56 182C	2.L	.65	.02L	32.	.78L	2.L	20.0L	8.00L	2.	.62
Ranger 1 Drillhole 57-continued										
57 13.1	11.	19.80	.57	1225.	2.00L	149.	174.0	.00B	4.	1.00L
57 24C	14.	16.90	.58	1711.	1.70L	106.	134.0	4.20L	6.	1.20
57 35.1	15.	17.40	.51	1681.	2.00L	123.	256.0	7.00L	18.	1.90
57 41.8	2.L	9.50	.46	1472.	.90L	44.	54.4	3.00L	2.	.20L
57 44.9	25.	6.34	.29	1337.	4.00L	86.	224.0	15.00L	37.	5.00L
57 68C	6.	1.40	.02L	41.	2.20	40.	50.5	3.60L	2.	.90
57 77.2	20.	24.50	.26	805.	.60	46.	58.6	3.00L	10.	1.19
57 99C	2.L	3.27	.74	1704.	.90	121.	145.0	13.00	5.	1.10
57 132.4	2.	.96	.02L	16.	.90L	239.	260.0	2.00L	3.	.30L
57 162.8	2.L	.30L	.02L	10.L	5.00L	8.	28.0L	2.00L	1.	.30L
57 292.5	8.	6.46	.02L	123.	.60L	2.L	15.0L	1.40L	4.	.43
Ranger 3 Drillhole 59-continued										
59 30.6	2.L	15.20	.08	231.	1.20L	114.	125.0	6.00L	1.L	.40
59 37.5	23.	31.40	.25	843.	2.18	51.	54.4	7.00	9.	2.52
59 46.5	2.L	5.09	.05	203.	.69L	39.	46.5	1.10L	1.L	.17L
59 49.7	8.	14.40	.10	254.	1.10L	64.	273.4	3.80L	1.L	.27L
59 61.5	3.	16.10	.33	1083.	.99L	52.	57.4	5.50L	1.L	.30

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXYTE
Ranger 1 Drillhole 55--continued										
55 17C	32.	59.	16000.L	10073.500	10000.000	1008.620	5.	1.	4.	1.
55 28C	46.	86.	11000.L	10071.100	10000.000	997.620	5.	2.	5.	3.
55 35.3	42.	70.	0.B	10075.000	10000.000	990.320	5.	3.	6.	2.
55 50.8	15.	100.	0.B	10075.000	10000.000	974.820	5.	3.	6.	2.
55 60C	30.	72.	27000.L	10069.600	10000.000	965.620	5.	2.	5.	3.
55 80C	72.	83.	77000.L	10067.800	10000.000	945.620	5.	2.	5.	3.
55 106C	126.	109.	39000.L	10064.400	10000.000	919.620	5.	5.	6.	3.
55 138.2	17.	109.	0.B	10075.000	10000.000	887.420	13.	3.	3.	3.
55 146C	154.	98.	24000.L	10064.400	10000.000	879.620	10.	2.	5.	2.
55 178.2	96.	45.	0.B	10075.000	10000.000	847.420	13.	3.	3.	3.
55 194.9	33.	15.	0.L	10075.000	10000.000	830.720	3.	2.	2.	3.
55 230C	38.	291.	540.	10047.400	10000.000	795.620	14.	6.	2.	3.
55 242.4	36.	325.	630.	10075.000	10000.000	783.220	14.	6.	1.	3.
Ranger 1 Drillhole 56										
56 13C	72.	73.	970.	9975.000	10000.000	1015.600	5.	2.	4.	1.
56 22C	107.	86.	14000.L	9975.000	10000.000	1006.600	5.	2.	4.	1.
56 26.4	42.	80.	1000.L	9975.000	10000.000	1002.200	5.	2.	4.	1.
56 49.6	29.	86.	2000.L	9975.000	10000.000	979.000	5.	2.	4.	1.
56 65.8	291.	114.	6300.L	9975.000	10000.000	962.800	13.	3.	3.	2.
56 83.1	147.	44.	9700.L	9975.000	10000.000	945.500	9.	4.	3.	3.
56 86C	58.	100.	19000.L	9975.000	10000.000	942.600	10.	2.	4.	3.
56 136C	28.	252.	500.	9975.000	10000.000	892.600	14.	2.	3.	3.
56 182C	5.	19.	67.	9975.000	10000.000	846.600	3.	6.	2.	3.
Ranger 1 Drillhole 57										
57 13.1	99.	72.	430.	10175.200	10000.000	1010.450	5.	1.	3.	1.
57 24C	49.	77.	413.	10175.200	10000.000	999.550	5.	2.	3.	1.
57 35.1	86.	105.	9900.L	10175.200	10000.000	988.450	5.	3.	4.	3.
57 41.8	46.	86.	178.	10175.200	10000.000	981.750	5.	2.	4.	3.
57 44.9	71.	66.	70000.L	10175.200	10000.000	978.650	5.	3.	5.	3.
57 68C	31.	15.	155.	10175.200	10000.000	955.550	3.	2.	3.	3.
57 77.2	31.	100.	366.	10175.200	10000.000	946.350	5.	3.	4.	3.
57 99C	33.	90.	440.L	10175.200	10000.000	924.050	10.	2.	3.	3.
57 132.4	137.	9.	280.L	10175.200	10000.000	891.150	13.	3.	3.	3.
57 162.8	50.	4.	280.L	10175.200	10000.000	860.750	3.	2.	2.	3.
57 292.5	14.	57.	160.	10175.200	10000.000	731.050	14.	6.	1.	3.
Ranger 3 Drillhole 59										
59 30.6	22.	109.	60.L	9749.699	12050.000	988.900	2.	3.	1.	5.
59 37.5	5.	299.	104.	9749.301	12050.000	981.960	2.	3.	1.	5.
59 46.5	7.	37.	61.	9749.199	12050.000	973.010	2.	3.	1.	5.
59 49.7	18.	92.	176.	9749.102	12050.000	969.770	2.	3.	1.	5.
59 61.5	29.	146.	118.	9748.898	12050.000	957.650	2.	3.	1.	5.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	SiO2%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U N	As N	Au N
59 64.8	32.20	22.90	11.00	.00B	19.70	.02L	1.86	3.00	2.90L	.06L
Ranger 3 Drillhole 59-continued										
Ranger 1 Drillhole 161										
61 34C	66.10	14.70	3.22	2.03	7.24	.14	2.28	280.00	.64L	.03
61 36.0	60.30	15.70	6.64	5.00	8.65	.16	1.79	3.70	.26L	.00
61 39C	70.20	15.50	2.12	.98	3.11	.14	3.99	1300.00	1.10	.82L
61 65C	68.10	14.30	2.95	1.96	6.09	.13	2.44	94.50	.68L	110.00L
61 85.2	58.10	12.90	8.02	5.04	12.80	.13	.02L	458.40	.81L	.01L
61 96.5	84.40	4.49	2.57	.00B	5.01	.16	.02L	13.30	.01L	.01
61 105.6	62.10	10.70	6.96	.00B	11.80	.94	.02L	42.40	.40L	.02
61 126C	47.20	17.10	7.11	5.22	17.90	.37	.03	7.10	.54	.00
61 132C	19.00	3.42	2.56	.00B	28.40	9.40	.13	4.00	.46L	.01L
61 149.8	53.90	18.80	5.61	3.91	11.10	.04	2.85	2.70	.61L	.01L
61 161.3	1.70	.16	1.46	.00B	43.80	2.41	.02L	5.40	.15L	.00
61 164C	1.61	.38	2.11	.00B	32.40	15.40	.02L	8.30	.23L	.00
61 194.4	7.45	3.06	2.58	.00B	42.40	.60	.04	1.50	.56L	.01
61 234.8	7.36	3.19	1.46	.00B	23.60	22.80	.07	12.50	.35L	.20
61 258C	53.80	14.00	3.52	.00B	17.50	.99	.03	23.80	.28L	.01
61 275.1	65.80	14.00	4.70	.00B	6.81	.23	1.77	6.30	2.74	.01L
Ranger 1 Drillhole 64										
64 3.0	69.80	14.90	3.84	.00B	1.14	.02L	2.42	2400.00	9.00L	.09
64 4.0	72.10	12.80	5.18	.00B	1.19	.02L	1.01	2500.00	9.00L	.51
64 29.8	65.60	12.70	4.73	.00B	9.19	.02L	.48	1030.00	2.80	.04
64 38.7	67.30	13.40	3.82	.00B	7.86	.02L	2.31	88.00	1.65	.13
64 44.8	63.40	11.20	7.06	.00B	11.30	.02L	.13	1300.00	2.00L	.02L
64 48.0	65.30	10.70	6.54	.00B	10.50	.02	.02L	1450.00	.10L	.06
64 53.9	64.30	10.10	6.78	.00B	10.40	.02L	.02L	3600.00	.40L	.53
64 57.2	69.30	10.70	3.78	.00B	10.60	.03	.09	36.00	.10L	.24
64 65.5	69.40	11.80	3.84	2.33	8.11	.10	1.32	103.00	.03L	.05
64 74.0	62.20	13.40	4.87	.00B	11.20	.05	.90	2700.00	2.00L	.72
64 83.9	58.10	13.10	5.04	.00B	16.00	.18	.02L	188.00	.40L	.01L
64 84.0	49.60	15.80	5.46	.00B	18.70	.21	.02L	280.00	1.00L	.01
64 84.5	66.30	14.00	3.48	.00B	18.70	.13	2.06	1200.00	.80	.02
64 85.0	67.00	13.00	3.83	.00B	7.58	.12	1.62	1800.00	3.00L	.11
64 85.5	63.90	13.60	3.83	.00B	8.30	.15	1.77	3000.00	8.00L	.12
64 86.0	50.30	14.90	7.12	.00B	16.80	.24	.03	1800.00	5.00L	.04L
64 86.5	50.30	15.00	6.59	.00B	17.30	.19	.02L	1900.00	4.00L	.01L
64 87.0	58.90	12.90	5.28	.00B	14.10	.23	.02L	765.00	3.00L	.00
64 87.5	57.70	13.80	4.42	.00B	15.00	.15	.07	22.60	.80L	.01L
64 88.0	59.90	13.80	4.34	.00B	13.10	.15	.51	89.20	.80L	.01L
64 88.5	59.00	14.20	4.16	.00B	13.30	.14	.84	70.30	.90L	.00
64 103.0	89.80	3.22	1.81	.00B	3.53	.06	.02L	12.60	.20L	.09
64 111.0	28.00	18.30	14.20	.00B	22.60	3.09	.02L	2700.00	3.00L	.29
64 115.1	32.20	20.70	9.04	.00B	24.60	.06	.84	384.00	.60L	.07

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
59	64.8	178.	172.	3.	3.20L	508.	596.00	44.0L	54.	67.60
Ranger 3 Drillhole 59-continued										
61	34C	47.	311.	4.	2.70	10.	20.00	124.0	16.	23.10
61	36.0	18.	150.L	4.	1.20	10.L	5.56	106.3	31.	33.80
61	39C	121.	804.	5.	2.00L	10.L	73.00L	170.0L	25.	32.50
61	65C	98.	211.	4.	2.30	27.	34.30	162.0	17.	22.10
61	85.2	14.	380.L	3.	1.80	10.L	14.10	130.0	39.	54.60
61	96.5	18.	49.	1.	2.15	10.L	4.00L	185.0	14.	16.60
61	105.6	17.	150.L	3.	2.32	10.L	5.77	188.0	35.	59.10
61	126C	317.	220.L	5.	3.10	11.	6.40	271.0	40.	60.30
61	132C	36.	717.	1.	2.80	11.	14.50	309.0	9.	12.70
61	149.8	144.	172.	4.	.80	21.	26.50	115.3	24.	30.90
61	161.3	2.L	800.L	1.L	1.12	10.L	1.55	180.0L	6.	9.02
61	164C	2.	200.L	1.L	1.39	10.L	4.66	1000.0L	6.	9.46
61	194.4	2.L	880.L	4.	3.52	17.	19.90	220.0L	15.	27.60
61	234.8	24.	940.L	1.	12.60	10.L	16.50	787.7	10.	16.60
61	258C	14.	170.L	7.	3.73	10.L	11.00	287.7	19.	25.30
61	275.1	58.	270.L	4.	.50L	58.	61.00	123.0	21.	22.00
Ranger 1 Drillhole 161-continued										
Ranger 1 Drillhole 64-continued										
64	3.0	140.	9100.L	5.	9.00L	14.	400.00L	300.0L	6.	8.40
64	4.0	51.	7500.L	4.	9.00L	15.	600.00L	310.0L	12.	14.00
64	29.8	49.	1900.	3.	3.30	65.	300.00L	190.0	26.	30.70
64	38.7	260.	209.	2.	1.70	10.L	2.65	90.2	11.	15.00
64	44.8	38.	1200.L	3.	8.70	11.	300.00L	79.4	31.	37.80
64	48.0	27.	4600.	3.	.24	10.L	400.00L	210.0	29.	33.20
64	53.9	43.	5200.	3.	.70L	10.L	1000.00L	220.0	29.	34.30
64	57.2	29.	140.L	2.	1.44	10.L	1.00L	160.0	19.	24.70
64	65.5	101.	450.L	2.	2.00L	10.L	27.20	110.0	19.	21.00
64	74.0	93.	4200.L	3.	3.00L	15.	600.00L	420.0L	21.	26.00
64	83.9	20.	300.L	3.	3.00L	10.L	51.00L	146.0	19.	26.40
64	84.0	25.	350.L	4.	3.41	16.	16.00L	149.0	24.	26.50
64	84.5	89.	3100.L	4.	3.00L	10.L	67.00L	270.0L	20.	11.40
64	85.0	87.	3800.L	4.	5.00L	10.	100.00L	360.0L	12.	13.80
64	85.5	105.	10000.L	5.	13.00L	18.	633.00	330.0L	11.	14.70
64	86.0	36.	9700.L	5.	7.00L	22.	326.00	370.0L	27.	31.40
64	86.5	40.	1400.L	5.	7.00L	19.	50.00L	139.0	27.	30.70
64	87.0	21.	211.	3.	8.32	14.	25.00L	208.0	23.	31.90
64	87.5	18.	177.L	3.	1.84	10.L	1.46	173.0	22.	30.00
64	88.0	27.	140.L	3.	1.62	10.L	3.31	152.0	22.	28.70
64	88.5	31.	140.L	4.	1.39	10.L	.60	110.0	21.	24.00
64	103.0	30.	88.L	1.	4.68	10.L	1.34	276.0	8.	10.70
64	111.0	20.	7800.L	4.	4.00L	20.	600.00L	17.0L	51.	62.40
64	115.1	53.	430.L	5.	3.00L	10.L	95.00L	140.0	39.	46.10

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Ca N	Cu	Dy N	Eu N	Fz	Ga N	Gd N	Ir N
59 64.8	109.	138.00	1.20	3.	1.8L	.94	.00B	20.0L	2800.L	.01L
Ranger 3 Drillhole 59-continued										
Ranger 1 Drillhole 161										
61 34C	54.	66.80	4.99	448.	4.0L	.32	.07	39.5	4000.L	.01L
61 36.0	49.	51.30	3.03	7.	5.4L	.12	.06	28.9	820.L	.01L
61 39C	59.	82.60	7.87	866.	8.4	.68	.05	32.0	6000.L	.01L
61 65C	31.	39.70	6.12	192.	3.0L	.21	.07	30.0	3000.L	.01L
61 85.2	39.	58.30	1.20L	2765.	6.0L	.55	.06	42.0	3000.L	.01L
61 96.5	33.	39.40	1.00	7.	.4L	.07	.00B	20.6	580.L	.00
61 105.6	162.	254.00	1.00	6.	2.0L	.29	.00B	53.0	1000.L	.01L
61 126C	17.	29.80	1.50	2.L	1.4L	.13	.11	60.5	2000.L	.01L
61 132C	23.	25.80	2.	59L	7.0L	.19	.00B	7.7	6000.L	.00
61 149.8	154.	181.00	2.60	13.	6.2L	.24	.08	30.1	1800.L	.01
61 161.3	1.L	2.20	.35L	9.	6.6L	.17	.00B	2.0	6000.L	.00
61 164C	6.	9.80	.56L	7.	2.2L	.41	.00B	2.8L	100.L	.00
61 194.4	20.	37.80	.40	7.	8.0L	.92	.00B	10.0	5200.L	.00
61 234.8	7.	11.50	1.02	14.	6.4L	.50	.00B	4.6L	1300.L	.00
61 258C	44.	57.00	1.50	424.	2.0L	.57L	.00B	22.0	1000.L	.00
61 275.1	89.	91.00	3.24	3849.	4.8L	.86	.00B	17.0	2000.L	.00
Ranger 1 Drillhole 64										
64 3.0	51.	50.70	3.40	1769.	24.0L	3.00	.00B	.0B	20000.L	.03L
64 4.0	40.	89.00	2.00L	1886.	28.0L	3.50	.00B	.0B	20000.L	.03L
64 29.8	72.	81.50	1.60	6.	11.0L	.90	.00B	24.0	3100.L	.01L
64 38.7	100.	112.00	1.40	8.	8.0L	.70	.00B	29.0	1800.L	.01L
64 44.8	58.	68.90	1.00L	9.	9.0L	3.90	.00B	100.0L	8000.L	.01L
64 48.0	74.	88.20	.30L	7.	7.4	1.00L	.00B	8.0	4200.L	.01L
64 53.9	63.	92.80	2.00L	7.	19.0	8.42	.00B	13.0L	7400.L	.02L
64 57.2	56.	66.80	.50L	29.	2.8L	.10L	.00B	38.0	880.L	.01L
64 65.5	42.	45.40	.99	11.	2.9L	.10L	.06	28.0	850.L	.00
64 74.0	38.	24.00L	2.00L	3.	20.0L	3.50	.00B	45.0	16000.L	.01L
64 83.9	42.	53.90	.80L	29.	5.5L	.79	.00B	38.0	1400.L	.01L
64 84.0	52.	59.80	2.00L	2.L	10.0L	1.30	.00B	41.0	2300.L	.01L
64 84.5	45.	54.30	4.80	3.	11.0L	.70L	.00B	31.0	5800.L	.01L
64 85.0	39.	51.70	3.70	6.	12.0L	1.00	.00B	33.0	14000.L	.02L
64 85.5	64.	108.00	5.00L	3.	68.0L	4.30	.00B	49.0	1300.L	.06L
64 86.0	60.	81.00	3.00L	5.	33.0L	4.20	.00B	57.0	1100.L	.03L
64 86.5	73.	80.00	4.00L	12.	21.0L	3.40	.00B	55.0	12000.L	.04L
64 87.0	51.	72.00	3.00L	14.	7.5L	2.30	.00B	40.0	7900.L	.02L
64 87.5	44.	59.00	2.00L	4.	3.5L	.20L	.00B	50.0	1200.L	.00
64 88.0	41.	53.50	1.80	5.	2.8L	.30L	.00B	42.0	1200.L	.00
64 88.5	48.	58.80	2.20	3.	3.5L	.30L	.00B	28.0	1200.L	.00
64 103.0	29.	34.00	.40L	5.	2.4L	.14	.00B	17.0	440.L	.00
64 111.0	164.	201.00	3.00L	3.	18.0L	7.20	.00B	62.0L	1000.L	.03L
64 115.1	297.	331.00	1.30	15.	7.9L	.81	.00B	44.0	2100.L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
59 64.8	423.	545.00	101.	107.	125.1	600.0L	428.40	7.	120.00L	84.
Ranger 3 Drillhole 59-continued										
61 34C	2.	9.26	98.	70.	90.0	1300.0	336.00	6.	14.00L	50.
61 36.0	2.L	3.76	133.	110.	135.0	3.2L	121.90	5.	6.50L	38.
61 39C	2.L	17.80	54.	48.	61.0	690.0L	249.00	7.	690.00	22.
61 65C	11.	20.00	132.	83.	97.0	66.0	500.00	9.	60.00	32.
61 85.2	3.	6.87	90.	171.	199.5	1200.0L	130.00L	7.	440.00L	93.
61 96.5	2.L	.44	42.	75.	89.1	25.0	81.40	4.L	5.50L	49.
61 105.6	2.	5.13	63.	104.	125.0	110.0L	89.20	4.L	6.80L	121.
61 126C	2.	5.01	122.	98.	126.0	110.0L	509.00	19.	200.00	144.
61 132C	4.	7.56	30.	676.	839.0	120.0L	1100.00	4.L	36.00	14.
61 149.8	12.	18.20	139.	56.	63.9	8.9L	978.20	9.	56.00L	102.
61 161.3	2.	1.57	1.	1014.	1300.0	14.0L	400.00L	4.L	3.10L	6.
61 164C	3.	7.14	3.	2003.	2300.0	22.0L	740.00L	4.L	1.90L	7.
61 194.4	25.	48.60	31.	805.	1400.0	5.9L	120.00L	4.L	27.00L	56.
61 234.8	11.	24.20	37.	1278.	1500.0	33.0L	306.80	7.	10.00L	25.
61 258C	2.L	2.86	346.	148.	183.3	63.0L	337.00	4.	16.00L	83.
61 275.1	27.	37.00	120.	184.	192.0	7.0L	260.00	5.	42.00L	40.
Ranger 1 Drillhole 64-continued										
64 3.0	3.	145.00	47.	21.	50.0L	3000.0L	251.00	6.	1000.00L	28.
64 4.0	2.L	161.00	52.	115.	124.0	4600.0	380.00L	4.	1000.00L	44.
64 29.8	42.	70.20	129.	70.	75.0	2500.0L	380.00L	5.	600.00L	60.
64 38.7	2.L	2.57	107.	353.	449.0	200.0L	522.00	7.	15.00L	50.
64 44.8	2.L	60.60	108.	70.	77.8	200.0L	140.00L	5.	4.00L	87.
64 48.0	2.L	14.90	114.	82.	99.0	200.0L	173.00L	4.	500.00L	83.
64 53.9	2.L	38.30	89.	104.	118.0	600.0L	230.00	4.L	400.00L	91.
64 57.2	2.L	.86	116.	59.	74.8	88.0L	68.00	4.L	10.00L	98.
64 65.5	2.L	2.75	74.	48.	52.0	250.0L	369.00	4.	57.00L	57.
64 74.0	2.L	36.10	129.	73.	94.4	6000.0L	237.00	5.	400.00L	93.
64 83.9	2.L	3.91	124.	64.	97.3	400.0L	90.00	4.L	52.00L	118.
64 84.0	2.L	4.49	170.	84.	114.0	4.0L	76.00	4.	18.00L	159.
64 84.5	2.L	18.10	119.	50.	66.0	16.0L	186.00	4.L	40.00L	69.
64 85.0	2.L	25.70	112.	52.	66.0	18.0L	420.00L	4.	50.00L	62.
64 85.5	2.L	93.70	128.	70.	93.0	70.0L	700.00L	4.L	80.00L	65.
64 86.0	2.L	52.90	175.	136.	170.0	21.0L	340.00L	8.	70.00L	155.
64 86.5	2.L	26.80	180.	112.	142.0	30.0L	310.00L	8.	37.00L	161.
64 87.0	2.L	12.90	145.	84.	107.0	16.0L	190.00L	4.L	50.00L	137.
64 87.5	2.L	.89	159.	54.	67.3	2.0L	53.00	4.L	12.00L	135.
64 88.0	2.L	2.10	132.	41.	51.3	1.0L	91.00	4.L	14.00L	100.
64 88.5	2.L	1.78	119.	38.	48.1	3.0L	87.00	4.L	14.00L	88.
64 103.0	2.L	1.77	33.	38.	41.9	20.0L	126.00	4.L	4.00L	28.
64 111.0	2.L	35.60	111.	183.	238.0	5000.0L	33.00L	5.	300.00L	156.
64 115.1	2.L	6.26	132.	74.	91.0	850.0L	480.00	4.L	190.00L	145.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
59 64.8	576.	10.L	64.	96.	10.	15.40	10.40	142.	1.10	1.00L
Ranger 3 Drillhole 59-continued										
61 34C	311.	28.	8.L	147.	8.	14.30	.13L	4.	1.80	.73L
61 36.0	347.	12.	1.L	87.	9.	11.30	1.07	2.	.70	2.28
61 39C	370.	111.	0.B	387.	11.	17.50	.47L	5.	4.70	1.60
61 65C	214.	15.	2.L	181.	7.	10.80	3.46	5.	1.80	.67L
61 85.2	281.	66.	6.L	38.L	10.	15.50	1.16	2.	.60	.78L
61 96.5	416.	10.	2.L	12.L	2.	3.19	.35	3.	1.20L	.24L
61 105.6	2217.	10.L	4.L	32.L	8.	15.10	.21	6.	1.10	.69L
61 126C	875.	10.L	6.L	43.L	6.	13.30	.45	8.	14.00	.89L
61 132C	140.	10.L	0.B	11.	2.	3.57	1.02	43.	2.60L	.37L
61 149.8	114.	10.L	0.B	97.	11.	16.70	.35	5.	1.20	.56L
61 161.3	32.	10.L	1.L	11.L	1.	2.64	.67	4.	1.10L	.23L
61 164C	13.	10.L	0.B	16.L	3.	4.91	1.57	27.	1.90L	.55
61 194.4	476.	10.L	11.L	19.L	1.	4.64	4.74	4.	1.80L	1.10
61 234.8	135.	10.L	6.	15.L	1.	2.33	.11L	14.	.36L	.63
61 258C	1210.	10.	5.L	20.	2.	3.46	1.34	9.	3.76	.39L
61 275.1	918.	10.L	7.L	69.	9.	10.60	3.92	12.	2.00L	.40L
Ranger 1 Drillhole 161										
64 3.0	817.	732.	0.B	180.	13.	15.90	.70L	7.	8.00L	2.00L
64 4.0	972.	1265.	0.B	98.L	14.	18.80	15.00L	4.	8.00L	2.80
64 29.8	143.	140.	0.B	15.L	6.	7.99	2.00L	27.	1.10	.50L
64 38.7	174.	245.	6.L	84.	7.	10.90	.70L	2.	.80	.53
64 44.8	209.	329.	35.L	43.L	8.	11.70	12.00	2.	2.50	1.60
64 48.0	103.	287.	9.L	30.L	8.	10.40	.30L	2.	3.00L	.50L
64 53.9	128.	1623.	22.L	54.L	10.	13.00L	.70L	2.	4.00L	.80L
64 57.2	67.	20.	3.L	16.L	7.	10.90	.50L	1.	.70L	.50L
64 65.5	204.	21.	4.L	49.	8.	9.60	3.00L	3.	.60L	.30L
64 74.0	206.	455.	24.L	78.L	11.	16.70	2.00L	3.	2.00L	1.00L
64 83.9	425.	24.	0.B	22.L	4.	9.23	.49	1.	.50L	.50L
64 84.0	624.	31.	8.L	47.L	5.	11.00	7.92	1.	5.00L	1.00L
64 84.5	350.	153.	21.L	160.	9.	13.00	27.00	4.	1.00L	.80
64 85.0	382.	219.	26.L	120.	8.	11.90	2.77	3.	8.00L	1.00L
64 85.5	455.	554.	80.L	158.	11.	18.70	150.00	5.	14.00L	2.00L
64 86.0	737.	238.	47.L	100.L	13.	22.60	89.70	3.	11.00L	2.00L
64 86.5	542.	150.	40.L	100.L	14.	26.90	48.00	2.	16.00L	3.00L
64 87.0	615.	50.	24.L	81.L	8.	15.90	23.30	2.	.80L	2.00L
64 87.5	397.	10.	6.L	44.L	5.	11.90	.89	1.	5.00L	.90L
64 88.0	420.	25.	8.L	21.	6.	12.40	2.91	2.	6.00L	1.00L
64 88.5	393.	22.	7.L	31.	8.	12.80	2.17	2.	6.00L	1.00L
64 103.0	168.	10.L	2.L	9.L	2.	2.23	.27	2.	.10L	.20L
64 111.0	8035.	164.	24.L	73.L	4.	24.90	5.00L	7.	8.00L	3.00
64 115.1	175.	65.	7.L	26.L	13.	23.70	.10L	4.	.90L	.60L
Ranger 1 Drillhole 64										

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO ₂ %	Ti	Tm N	V	V N	W N	Y	Yb N
59 64.8	25.	45.60	1.21	2809.	3.80L	139.	168.0	26.70	1.1L	.80
Ranger 3 Drillhole 59-continued										
Ranger 1 Drillhole 161-continued										
61 34C	12.	22.10	.50	1779.	2.10L	80.	123.0	55.80	12.	1.84
61 36.0	12.	15.80	.52	1664.	1.60	48.	51.8	1.63	8.	1.25
61 39C	17.	21.30	.54	1454.	1.30	66.	162.0	203.00	25.	4.02
61 65C	17.	26.00	.33	1327.	2.40	56.	83.0	35.20	8.	2.14
61 85.2	21.	22.90	.34	1226.	2.10L	149.	190.0	10.90	14.	1.69
61 96.5	2.	3.36	.15	235.	.51L	47.	54.4	2.97	1.	.15L
61 105.6	6.	7.38	.49	716.	1.50L	156.	178.0	10.70	5.	.60
61 126C	2.L	1.70	.02L	40.	3.92	133.	170.0	1.20L	1.	.62L
61 132C	6.	3.70	.12	402.	1.10L	16.	28.0L	1.10	4.	.39
61 149.8	10.	18.70	.86	2881.	1.40	82.	85.0	8.59	6.	2.05
61 161.3	2.L	.10	.02L	10.L	.33L	3.	38.2	.60	5.	.28
61 164C	4.	.49	.02L	22.	.73L	5.	12.2L	.50	13.	1.03
61 194.4	4.	4.00	.09	259.	1.70	9.	80.0L	2.50	9.	1.55
61 234.8	5.	5.58	.06	239.	.90	6.	14.0L	.72L	17.	1.10
61 258C	4.	5.82	.31	670.	1.20L	36.	48.6	8.00	4.	.48
61 275.1	7.	10.60	.47	2248.	.90L	76.	78.0	.80L	9.	1.00
Ranger 1 Drillhole 64-continued										
64 3.0	24.	13.30	.46	1928.	10.00L	114.	428.0	49.00	30.	4.00L
64 4.0	24.	16.00	.45	1824.	10.00L	153.	467.0	19.00L	50.	6.00L
64 29.8	12.	11.50	.45	1431.	2.00L	108.	145.0	4.80	4.	.80L
64 38.7	11.	14.00	.48	1796.	.60L	83.	99.6	6.50	5.	.30L
64 44.8	11.	13.40	.39	1147.	4.00L	102.	208.0	12.00L	18.	1.00L
64 48.0	13.	8.97	.42	1056.	2.00L	137.	193.0	7.13	11.	.80L
64 53.9	19.	13.70	.46	1278.	.50L	182.	271.0	5.10	32.	2.30
64 57.2	4.	9.33	.34	656.	1.00L	122.	146.0	5.80	2.	.30L
64 65.5	13.	13.90	.30	783.	.80L	89.	110.0	4.50	6.	1.00L
64 74.0	21.	18.40	.32	1134.	6.00L	163.	443.0	14.80	19.	4.00L
64 83.9	5.	12.90	.46	700.	1.00L	110.	170.0	6.30	5.	.40L
64 84.0	8.	10.60	.48	1192.	3.00L	188.	240.0	9.52	8.	1.40
64 84.5	12.	10.60	.40	798.	3.00L	111.	205.0	3.90	28.	3.30
64 85.0	14.	11.60	.39	1311.	6.00L	103.	294.0	7.00	23.	2.60
64 85.5	29.	15.00	.47	1258.	15.00L	125.	571.0	16.00	49.	4.00L
64 86.0	23.	21.30	.49	2308.	9.00L	183.	470.0	12.00	36.	2.00L
64 86.5	34.	38.90	.62	2487.	11.00L	184.	346.0	6.00	20.	3.00L
64 87.0	17.	22.00	.40	981.	6.00L	124.	211.0	4.70	10.	2.00L
64 87.5	5.	14.00	.46	901.	2.00L	112.	128.0	2.00L	2.	.60L
64 88.0	8.	16.00	.43	853.	2.00L	99.	122.0	2.00L	3.	.70L
64 88.5	14.	14.70	.52	1095.	2.00L	96.	121.0	4.50	3.	.70L
64 103.0	2.L	1.07	.02	72.	.40L	28.	34.6	.90	1.	.10L
64 111.0	20.	22.70	.43	1566.	9.00L	217.	359.0	14.00	30.	3.80
64 115.1	3.	6.58	.91	1797.	1.00L	208.	260.0	8.00	6.	.40L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXTYPE
59 64.8	47.	298.	0.B	9748.898	12050.000	954.650	2.	2.	1.	3.
Ranger 3 Drillhole 59-continued										
Ranger 1 Drillhole 161										
61 34C	24.	83.	670.L	10251.100	9948.199	987.540	5.	2.	4.	1.
61 36.0	28.	73.	219.	10251.100	9948.801	985.540	13.	3.	3.	1.
61 39C	33.	91.	3100.L	10251.000	9948.000	982.540	5.	1.	4.	1.
61 65C	16.	87.	220.L	10250.600	9947.500	956.540	5.	2.	3.	3.
61 85.2	111.	69.	1000.L	10249.900	9947.102	936.340	5.	3.	3.	3.
61 96.5	40.	18.	160.L	10250.100	9946.898	925.041	9.	4.	3.	3.
61 105.6	99.	74.	680.	10249.200	9946.602	915.940	9.	4.	3.	3.
61 126C	85.	2.	550.L	10248.600	9945.102	895.540	12.	3.	2.	3.
61 132C	14.	18.	230.L	10248.400	9944.898	889.540	8.	2.	2.	3.
61 149.8	64.	109.	180.L	10247.200	9944.801	871.740	10.	2.	2.	3.
61 161.3	2.L	2.L	34.	10245.900	9944.398	860.240	7.	6.	1.	3.
61 164C	3.	2.	126.	10245.500	9944.398	857.540	7.	6.	1.	3.
61 194.4	21.	14.	240.L	10242.000	9947.898	827.140	7.	5.	1.	2.
61 234.8	6.	26.	170.	10236.310	9951.102	786.740	8.	2.	1.	3.
61 258C	37.	57.	380.L	10231.900	9951.398	764.940	12.	2.	1.	3.
61 275.1	40.	98.	300.L	10228.400	9951.801	748.300	14.	2.	1.	3.
Ranger 1 Drillhole 64										
64 3.0	21.	63.	20000.L	10099.500	9950.000	1021.800	5.	7.	5.	1.
64 4.0	21.	78.	27000.L	10099.500	9950.000	1020.800	5.	7.	5.	1.
64 29.8	91.	100.	10000.L	10099.300	9949.000	995.000	5.	2.	5.	5.
64 38.7	25.	114.	300.L	10099.200	9950.000	986.100	5.	2.	3.	3.
64 44.8	35.	78.	20000.L	10099.100	9950.000	980.000	5.	2.	3.	2.
64 48.0	28.	114.	17000.L	10099.000	9949.000	976.800	5.	2.	5.	3.
64 53.9	80.	127.	40000.L	10098.800	9949.000	970.900	5.	2.	6.	3.
64 57.2	55.	101.	100.L	10098.700	9950.000	967.600	5.	2.	4.	3.
64 65.5	21.	55.	1200.L	10098.500	9950.000	959.300	5.	2.	4.	3.
64 74.0	67.	91.	30000.L	10097.500	9950.000	950.900	5.	2.	4.	3.
64 83.9	51.	51.	100.L	10096.600	9950.000	941.000	5.	2.	3.	3.
64 84.0	75.	77.	700.L	10096.600	9949.199	940.900	5.	2.	4.	3.
64 84.5	49.	54.	3000.L	10096.600	9949.199	940.400	5.	2.	4.	3.
64 85.0	48.	64.	4000.L	10096.600	9949.199	939.900	5.	2.	5.	3.
64 85.5	118.	73.	0.B	10096.500	9949.199	939.400	5.	2.	5.	3.
64 86.0	72.	83.	0.B	10096.500	9949.199	938.900	5.	2.	5.	3.
64 86.5	40.	86.	800.L	10096.400	9949.199	938.400	5.	2.	5.	3.
64 87.0	42.	57.	0.B	10096.400	9949.199	937.900	5.	2.	4.	3.
64 87.5	27.	61.	0.B	10096.300	9949.199	937.400	5.	2.	4.	3.
64 88.0	25.	52.	0.B	10096.300	9949.199	936.900	5.	2.	3.	3.
64 88.5	16.	68.	0.B	10096.300	9949.199	936.400	5.	2.	3.	3.
64 103.0	27.	7.	13.L	10095.200	9950.000	921.800	9.	4.	3.	3.
64 111.0	136.	48.	30000.L	10094.600	9950.000	913.900	13.	2.	3.	2.
64 115.1	94.	94.	500.L	10094.300	9949.000	909.800	11.	2.	4.	3.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	SiO2%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U	N	As	N	Au	N
Ranger 1 Drillhole 64-continued													
64 116.4	20.76	10.16	14.21	.00B	14.03	3.57	.11	58100.00		.00B		.00B	
64 138.0	3.56	1.85	2.90	.00B	26.30	21.20	.02L	10.10		.09L		.00	
64 144.9	27.70	17.40	18.90	6.71	23.60	.93	.02L	425.00		.80L		.01L	
64 151.4	59.40	19.90	3.19	2.98	7.37	.05	3.92	6.01		.50L		.00	
64 162.0	29.60	20.20	15.50	.00B	22.30	1.18	.02L	90.80		.60L		.10	
64 175.0	58.60	17.60	5.89	.00B	8.65	.26	3.11	336.00		1.00L		.01L	
64 182.5	65.60	8.56	7.01	.00B	7.70	1.43	.02L	5510.00		5.00L		1.03	
64 183.4	40.40	21.20	6.96	.00B	11.30	5.45	.02	743.00		1.00L		.03	
64 194.0	54.10	13.00	7.53	.00B	17.20	.43	.02L	1900.00		2.00L		.27	
64 199c	39.70	18.80	4.81	2.49	24.60	.22	.08	121.00		.20L		.04	
64 202.8	46.40	16.90	5.33	.00B	20.70	.18	.10	20.80		.20L		.02	
64 212.8	37.60	17.50	4.41	6.67	27.90	.16	.02L	127.00		.20L		.03	
64 219.1	66.90	17.00	1.85	.70	4.61	.23	4.30	2.35		.20L		.00	
64 231.5	70.40	15.50	1.82	.00B	4.45	.08	3.44	5.83		.30L		.01	
Ranger 1 Drillhole 165													
65 2.0	81.60	8.64	4.64	.00B	1.12	.02L	.99	88.60		1.33		.25	
65 3.0	61.00	14.30	6.78	.00B	8.58	.02L	.52	59.70		.50L		1.21	
65 20.8	97.50	1.06	.99	.00B	.27	.11	.07	171.00		.38		.64	
65 48.3	27.20	20.60	21.30	.00B	17.90	.37	.02L	26.50		.50L		.01L	
65 66.7	27.90	17.50	18.10	.00B	22.50	.38	.02L	13.00		.70L		.01L	
65 73.8	49.60	17.30	5.06	3.48	18.60	.07	.20	1.95		.72		.00	
65 82.4	64.60	12.80	4.34	.00B	11.50	.35	.56	16.60		.30L		.02	
65 92.8	52.64	12.55	6.24	.00B	12.18	.35	.07	36100.00		.00B		.00B	
65 97.6	63.80	18.40	1.84	1.06	5.47	.30	4.41	2.25		.17		.00	
65 102.4	72.60	14.30	1.08	.65	2.48	.17	6.51	18.70		.20L		.00	
Ranger 1 Drillhole 70													
70 3.0	61.50	17.00	2.96	.00B	7.70	.06	3.02	20.00		.60L		.04	
70 4.0	62.20	15.70	2.77	.00B	5.61	.08	3.48	28.30		1.00L		.08	
70 15.3	66.10	10.50	4.62	.00B	9.09	1.00	.06	2200.00		1.00L		.46	
70 26.4	62.30	12.70	5.20	.00B	9.52	.23	.31	5400.00		6.30		.11	
70 28.5	60.70	15.90	3.99	.00B	9.73	.13	.29	2000.00		2.00L		.10	
70 29.0	68.60	11.60	4.31	.00B	9.40	.02L	.12	442.00		.47		.01	
70 35.0	50.80	27.60	1.92	.00B	4.24	.14	7.22	76.20		.50L		.01L	
70 56.5	43.20	18.50	6.93	.00B	15.30	.21	.05	15300.00		.00B		.00B	
70 63.6	89.20	3.44	1.03	.00B	4.35	.26	.02L	6.56		.08L		.00	
70 70.7	73.70	9.05	4.75	.00B	6.55	.07	.78	19.00		.20L		.01	
70 96.5	87.30	3.14	2.97	1.15	3.43	.45	.40L	212.00		.40L		.16	
70 112.0	59.60	14.50	8.26	.00B	10.20	.32	.45	333.00		.60L		.01L	
70 113.0	62.40	11.70	7.49	4.65	9.69	.40	.07	6100.00		7.00L		2.81	
70 138.0	66.30	14.70	3.60	.00B	8.89	.19	.07	12.90		.10L		.00	
70 143.0	30.40	23.80	12.50	.00B	21.30	.49	.04	3.23		.40L		.00	
70 160C	54.80	15.30	6.65	.00B	13.30	.40	.69	3150.00		.89		.13	
70 164.5	64.60	13.80	3.98	2.12	8.69	.17	1.43	3700.00		3.00L		.17	

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 1 Drillhole 64-continued										
64 116.4	236.	241.	180000.	9.	.00B	50.	.00B	19000.0L	16.	.00B
64 138.0	10.L	2.L	1200.L	1.	.80L	10.L	1.00L	330.0L	7.	8.69
64 144.9	10.L	9.	510.L	5.	1.00L	10.L	120.00L	190.0	53.	61.00
64 151.4	73.	232.	317.	3.	.60L	10.L	14.00	62.0L	16.	19.30
64 162.0	10.L	8.	570.L	3.	.80L	14.	24.00L	170.0L	41.	56.60
64 175.0	26.	177.	490.L	4.	1.00L	10.L	2.55	68.0L	23.	30.00
64 182.5	28.	76.	110000.	4.	7.00L	10.L	1500.00L	660.0L	24.	28.00
64 183.4	3148.	73.	800.L	7.	2.00L	38.	15.70	240.0L	25.	27.10
64 194.0	32.	33.	1800.L	5.	4.00L	12.	500.00L	169.0	32.	39.90
64 199c	74.	23.	220.L	7.	2.69	10.L	22.00L	260.0	26.	21.50
64 202.8	39.	44.	200.L	5.	3.91	10.L	1.00L	320.0	27.	32.00
64 212.8	33.	16.	380.L	6.	3.91	10.L	32.00L	270.0	24.	26.80
64 219.1	88.	187.	249.	6.	.52	10.L	6.36	50.0	5.	5.70
64 231.5	73.	173.	420.L	3.	.43	23.	28.00	81.0	6.	7.94
Ranger 1 Drillhole 165-continued										
65 2.0	60.	39.	140.L	3.	4.40	20.	18.80	148.0	22.	25.60
65 3.0	66.	54.	220.L	3.	2.52	11.	4.80	111.0	33.	41.80
65 20.8	11.	52.	74.	1.	4.00L	10.	25.00L	264.0	4.L	.83
65 48.3	10.L	7.	470.L	3.	.70L	10.L	8.00L	130.0L	79.	92.20
65 66.7	10.L	23.	984.L	4.	.80L	32.	15.00L	300.0L	56.	75.80
65 73.8	49.	7.	220.L	7.	4.40	10.L	1.00L	406.0	24.	28.10
65 82.4	51.	178.	179.	3.	4.54	10.L	3.50	262.0	21.	29.70
65 92.8	40.	336.	45000.	11.	.00B	45.	.00B	1800.0L	26.	.00B
65 97.6	140.	81.	340.L	3.	1.56	10.L	12.00	127.0	5.	6.83
65 102.4	47.	185.	220.	1.	1.03	10.L	17.00	106.0	4.L	3.00
Ranger 1 Drillhole 70-continued										
70 3.0	155.	41.	130.L	3.	.60L	41.	36.30	68.0	23.	24.90
70 4.0	203.	52.	110.L	2.	1.00L	68.	87.00	64.7	15.	21.80
70 15.3	15.	72.	3200.L	3.	3.00L	21.	13.00L	230.0L	28.	33.40
70 26.4	84.	70.	8300.	4.	5.00L	10.L	2000.00L	370.0L	26.	30.70
70 28.5	784.	77.	3070.	8.	24.00L	24.	500.00L	680.0L	18.	20.20
70 29.0	64.	36.	350.L	3.	2.00L	10.L	100.00L	325.3	20.	23.00
70 35.0	345.	884.	1300.	6.	.80L	14.	20.00L	103.0	5.	6.00
70 56.5	88.	92.	20000.	9.	.00B	11.	.00B	880.0L	46.	.00B
70 63.6	10.L	46.	64.L	3.	2.35	10.L	2.00L	251.0	4.	3.96
70 70.7	12.	73.	130.L	3.	1.32	10.L	2.28	150.0	19.	19.80
70 96.5	10.	44.	250.L	2.	.40L	10.L	10.30	96.0	9.	11.10
70 112.0	208.	33.	1400.L	4.	1.60	10.L	7.09	130.0	35.	40.70
70 113.0	144.	45.	18000.L	4.	10.00L	10.L	460.00L	440.0L	37.	12.40
70 138.0	207.	14.	137.L	5.	2.61	10.L	2.00	217.0	16.	20.90
70 143.0	12.	9.	256.L	5.	.50L	10.L	72.0	27.0	46.	65.30
70 160C	77.	88.	6600.	5.	3.60	10.L	16.00L	600.0L	29.	38.80
70 164.5	126.	150.	6100.	4.	5.00L	10.L	.00B	490.0L	19.	23.60

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	Fz	Ga N	Gd N	Ir N
Ranger 1 Drillhole 64-continued										
64 116.4	109.	.00B	.00B	14.	.0B	.00B	.27	.0B	64000.L	.00B
64 138.0	12.	13.60	.30L	10.	28.0L	.16	.00B	.0B	4400.L	.00
64 144.9	111.	135.00	1.00L	48.	9.2L	2.79	.17	81.0	2900.L	.01L
64 151.4	154.	174.00	3.10	20.	2.8L	.81	.07	43.0	1600.L	.01L
64 162.0	74.	98.00	.80L	150.	10.0L	.88	.00B	66.0L	1400.L	.01L
64 175.0	145.	170.00	5.40	31.	4.0L	1.34	.00B	.0B	5000.L	.01L
64 182.5	44.	78.30	2.00L	9519.	51.0L	4.66	.00B	37.0	7200.L	.02L
64 183.4	79.	78.00	1.00L	877.	14.0L	1.31	.00B	.0B	7200.L	.01L
64 194.0	43.	59.00	2.00L	2.L	22.0L	3.80	.00B	.0B	10000.L	.02L
64 199c	92.	78.00	.96	16.	4.4L	.45	.22	21.7	2300.L	.00
64 202.8	120.	146.00	.60L	7.	4.1L	.57	.00B	24.7	1200.L	.00
64 212.8	79.	89.70	.68	6.	7.1L	.92	.27	24.0	1800.L	.00
64 219.1	1.L	1.00L	5.32	13.	3.1L	.29	.08	17.5	670.L	.00
64 231.5	4.	6.60	4.68	34.	3.6L	.47	.00B	21.9	680.L	.00
Ranger 1 Drillhole 165										
65 2.0	97.	111.00	2.70	36.	4.0L	.57	.00B	24.0	550.L	.00
65 3.0	44.	50.70	1.20	4.	4.0L	.42	.00B	41.0	1000.L	.01L
65 20.8	4.	2.70	.70L	4.	1.7L	.42	.00B	.0B	848.L	.00
65 48.3	155.	176.00	1.00L	45.	9.1L	.35	.00B	37.0	1300.L	.01L
65 66.7	176.	210.00	1.00L	35.	22.0L	1.62	.00B	35.0	2000.L	.01L
65 73.8	83.	88.00	.50L	16.	4.5L	.21	.08	26.0	800.L	.00
65 82.4	80.	102.00	1.54	13.	5.2L	.67	.00B	24.0	1100.L	.00
65 92.8	42.	.00B	.00B	13.	190.0	.00B	.00B	.0B	48000.L	.00B
65 97.6	8.	11.30	10.70	9.	3.1L	.48	.11	24.0	950.L	.00
65 102.4	1.L	.80L	2.66	7.	2.6L	.51	.04	13.0	1700.L	.00
Ranger 1 Drillhole 70										
70 3.0	58.	60.40	2.30	39.	2.6L	.46	.00B	.0B	930.L	.01L
70 4.0	86.	103.00	3.20	31.	2.0L	.70	.00B	.0B	1400.L	.01L
70 15.3	55.	65.00	1.00L	22.	9.6	3.00	.00B	.0B	4000.L	.02L
70 26.4	134.	183.00	2.00L	130.	29.0	2.30	.00B	12.0L	7400.L	.02L
70 28.5	66.	46.50	.90L	1058.	24.0L	1.60	.00B	.0B	16000.L	.01L
70 29.0	64.	66.90	.77	281.	6.0L	.28	.00B	34.0	3600.L	.00
70 35.0	126.	132.00	10.40	4.	4.0L	.66	.00B	.0B	1800.L	.01L
70 56.5	149.	.00B	.00B	17.	70.0	.00B	.00B	.0B	5600.L	.00B
70 63.6	5.	3.50	1.08	3.	1.4L	.15	.00B	.0B	356.L	.00
70 70.7	142.	137.00	1.30	3.	2.6L	.61	.00B	19.9	940.L	.00
70 96.5	93.	107.00	1.37	14.	2.6L	.60L	.04	16.0	790.L	.00
70 112.0	1.L	2.30	10.20	5.	7.5L	.34	.00B	35.0	9100.L	.01L
70 113.0	1.L	5.00L	.40L	10.	71.0L	1.01	.06	27.0	9400.L	.01L
70 138.0	10.	14.20	1.90	2.L	7.4L	.10L	.00B	66.0	712.L	.00
70 143.0	3.	8.60	1.40	29.	5.3L	.30L	.00B	66.0	1500.L	.00B
70 160C	91.	129.00	2.80	23.	26.0L	4.90	.00B	43.9	6500.L	.03L
70 164.5	94.	140.00	2.30	14.	27.0L	1.90	.09	60.0	1000.	.02L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 1 Drillhole 64-continued										
64 116.4	18.	.00B	71.	487.	2000.0L	.0B	15000.00	4.L	.00B	78.
64 138.0	2.L	.87	1706.	1706.	2400.0	18.0L	510.00L	7.	.80L	9.
64 144.9	2.L	8.92	130.	140.0	1000.0L	1000.0L	190.00L	11.	230.00L	178.
64 151.4	4.	8.92	103.	43.	53.0	16.0L	1400.00	10.	17.00L	54.
64 162.0	2.L	2.62	106.	185.	288.0	200.0L	200.00L	5.	37.00L	110.
64 175.0	2.L	8.10	142.	79.	90.5	800.0L	1000.00	7.	48.00L	61.
64 182.5	2.L	82.70	143.	109.	9.8	13000.0L	1100.00L	4.L	100.00L	61.
64 183.4	7.	20.50	125.	727.	755.0	2000.0L	2800.00	10.	200.00L	94.
64 194.0	2.L	27.60	119.	114.	145.0	4000.0L	270.00L	4.L	400.00L	99.
64 199C	2.L	2.35	322.	82.	103.0	250.0L	144.00	4.L	36.00L	104.
64 202.8	2.L	2.14	294.	93.	114.0	45.0L	134.00	4.L	10.00L	92.
64 212.8	2.L	2.13	237.	78.	91.0	290.0L	194.00	4.L	51.00L	83.
64 219.1	2.L	2.84	45.	60.	71.0	1.0L	107.00	4.L	8.00L	13.
64 231.5	10.	16.70	68.	108.	110.0	2.0L	530.00	6.	24.00	16.
Ranger 1 Drillhole 165-continued										
65 2.0	6.	14.50	38.	73.	83.7	200.0L	212.30	6.	41.00L	35.
65 3.0	2.	6.03	97.	119.	148.0	100.0L	210.00	5.	14.00L	60.
65 20.8	4.	4.16	13.	20.	33.5	360.0L	565.00	4.L	19.00L	2.L
65 48.3	2.L	2.42	147.	242.	286.0	5.0L	100.00	10.	8.00L	92.
65 66.7	2.L	7.56	125.	685.	871.0	3.0L	164.00L	10.	8.00L	116.
65 73.8	2.L	.11	589.	88.	93.4	1.0L	88.00	5.	10.00L	128.
65 82.4	5.	9.10	143.	72.	87.7	1.0L	208.00	4.L	9.00L	65.
65 92.8	4.	.00B	221.	581.	650.0	.0B	1200.00L	4.L	.00B	74.
65 97.6	2.	5.86	62.	81.	96.4	1.6	728.00	9.	3.00L	18.
65 102.4	3.	9.24	34.	64.	61.3	36.0L	1100.00	4.L	17.00L	3.
Ranger 1 Drillhole 70-continued										
70 3.0	24.	33.60	70.	44.	53.8	6.0L	124.00	4.	19.30	56.
70 4.0	52.	77.70	51.	22.	27.7	71.0L	355.00	5.	27.00L	32.
70 15.3	7.	38.10	108.	60.	75.3	5000.0L	210.00L	4.	91.00L	88.
70 26.4	2.L	60.60	159.	102.	130.0	10000.0L	242.00L	4.L	1100.00L	103.
70 28.5	2.L	58.70	158.	62.	72.3	2800.0L	631.00	4.L	1100.00L	93.
70 29.0	2.L	7.95	148.	76.	91.4	960.0L	108.00	4.L	45.00L	93.
70 35.0	2.L	1.98	98.	57.	71.6	20.0L	2700.00	10.	9.00L	36.
70 56.5	2.L	.00B	359.	221.	280.0	.0B	300.00	8.	.00B	222.
70 63.6	2.L	1.53	57.	40.	46.2	11.0L	153.00	4.L	1.00L	19.
70 70.7	2.L	1.44	63.	50.	54.0	50.0L	367.00	4.L	8.00L	71.
70 96.5	3.	7.21	29.	62.	72.0	560.0L	89.00	4.L	94.00L	31.
70 112.0	2.	11.70	109.	104.	139.0	880.0L	482.00	10.	80.00L	53.
70 113.0	2.L	162.00	102.	138.	170.0	16000.0L	790.00L	11.	2000.00L	62.
70 138.0	2.L	2.73	76.	57.	79.3	34.0L	805.00	4.	3.00L	30.
70 143.0	2.L	.46	124.	122.	174.0	2.0L	86.20	14.	18.00L	83.
70 160C	2.L	35.30	184.	129.	150.0	8000.0L	410.00	9.	80.00L	87.
70 164.5	2.L	42.40	165.	77.	88.0	9000.0L	490.00	8.	.00B	50.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 1 Drillhole 64-continued										
64 116.4	13200.	10078.	0.B	0.B	123.	.00B	.00B	38.	.00B	.00B
64 138.0	208.	10.L	1.L	9.L	1.	2.52	.58	27.	.90L	.20L
64 144.9	2546.	42.	6.L	35.L	9.	21.30	3.00L	5.	1.50	1.27
64 151.4	151.	17.	9.L	115.	12.	20.00	1.10	21.	1.00L	.20L
64 162.0	2582.	11.	0.B	34.L	1.	13.60	.79	4.	1.80	.70L
64 175.0	580.	51.	15.L	95.	13.	21.50	.80L	5.	1.60	.30L
64 182.5	4668.	630.	42.L	27.L	12.	15.50	8.00L	13.	3.10	5.20
64 183.4	14740.	123.	32.L	36.L	14.	18.40	.70L	22.	7.20	2.40
64 194.0	873.	514.	0.B	50.L	4.	8.55	1.00L	7.	4.00L	1.00L
64 199c	608.	10.L	2.L	13.L	4.	4.69	.70L	5.	.65	.40L
64 202.8	517.	10.L	2.L	21.L	4.	7.77	.02L	7.	2.00L	.40L
64 212.8	402.	18.	2.L	20.L	2.	3.30	.10L	4.	.50L	.77
64 219.1	690.	10.L	3.L	208.	1.	1.94	.79	10.	.10L	.20L
64 231.5	291.	10.L	4.L	135.	3.	3.92	2.00L	11.	1.23	.30L
Ranger 1 Drillhole 165										
65 2.0	242.	28.	7.L	38.	3.	5.03	7.00L	3.	7.80	.30L
65 3.0	230.	29.	5.L	21.L	7.	10.70	1.55	3.	3.30	.50L
65 20.8	136.	14.	4.L	4.L	1.	.62	.54	9.	.50L	.20L
65 48.3	905.	10.	4.L	36.L	25.	34.70	.03L	2.	4.00L	.80L
65 66.7	994.	18.	7.L	49.L	8.	37.90	2.51	4.	.60L	.90L
65 73.8	202.	10.L	2.L	15.L	4.	6.31	.50L	2.	.90	.30L
65 82.4	904.	10.L	5.L	32.	3.	4.64	1.08	7.	.72	.61
65 92.8	720.	7392.	0.B	0.B	62.	.00B	.00B	8.	.00B	.00B
65 97.6	988.	10.L	4.L	137.	2.	4.62	1.20	4.	.20L	.10L
65 102.4	721.	17.	5.L	172.	1.	1.52	1.41	48.	.80L	.40L
Ranger 1 Drillhole 70										
70 3.0	227.	23.	0.B	62.	7.	11.00	2.97	10.	.90	.50L
70 4.0	297.	13.	23.L	75.	8.	12.50	4.94	19.	1.00	.50L
70 15.3	3134.	768.	26.L	43.L	7.	9.89	2.00L	4.	4.00L	.80L
70 26.4	840.	676.	20.L	56.L	12.	14.90	4.30	4.	1.80	1.80
70 28.5	413.	801.	32.L	14.L	12.	14.80	2.00L	8.	3.00L	.92
70 29.0	66.	157.	5.L	7.L	5.	6.79	.60L	2.	1.00L	.40L
70 35.0	320.	86.	13.L	210.	16.	22.80	.05L	13.	.40L	.70L
70 56.5	610.	2787.	0.B	0.B	37.	.00B	.00B	4.	.00B	.00B
70 63.6	562.	10.L	2.L	3.L	1.	.92	.23	6.	.40L	.10L
70 70.7	286.	10.L	0.B	16.L	10.	11.50	1.59	3.	2.00L	.30L
70 96.5	1401.	45.	6.L	14.L	2.	3.35	.53	3.	1.00L	.30L
70 112.0	1043.	48.	9.L	107.	3.	4.78	.08L	5.	3.00	.40L
70 113.0	1277.	1105.	0.B	23.L	18.	6.23	6.00L	4.	.80L	.90
70 138.0	475.	10.L	6.L	29.L	2.	3.92	.14	4.	2.40	.40L
70 143.0	1210.	13.	4.L	46.L	2.	12.20	.02L	2.	7.60	.70L
70 160C	1156.	1127.	18.L	1.	16.	22.00	3.20	6.	2.90	2.10
70 164.5	472.	550.	10.L	140.	18.	23.10	3.00	7.	2.80	3.10

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 1 Drillhole 64-continued										
64 116.4	371.	.00B	.32	2168.	.00B	233.	750.0	.00B	484.	.00B
64 138.0	2.L	1.47	.06	203.	.50L	7.	47.0L	.20L	4.	.10L
64 144.9	13.	19.30	.72	1640.	2.00L	335.	370.0	7.60	14.	1.00L
64 151.4	11.	19.00	.91	3066.	2.00L	118.	110.0	5.40	3.	1.00L
64 162.0	2.L	9.70	.40	752.	2.00L	174.	236.0	2.70	4.	.30L
64 175.0	14.	18.70	.59	1980.	2.00L	126.	185.0	13.60	8.	.60L
64 182.5	26.	10.50	.02L	68.	6.00L	84.	130.0	5.00L	59.	9.80
64 183.4	6.	.90L	.02L	42.	2.00L	185.	223.0	4.00L	33.	.90L
64 194.0	19.	21.70	.11	407.	5.00L	151.	295.0	4.00L	19.	1.00L
64 199c	6.	7.64	.57	1261.	.80L	78.	95.0	9.60	5.	.30L
64 202.8	10.	14.10	.65	467.	.90	65.	130.0	3.80	8.	.63
64 212.8	14.	11.80	.62	738.	.30L	118.	130.0	24.00	8.	.60L
64 219.1	2.L	3.81	.02L	111.	.70L	5.	18.0L	.40L	3.	.50L
64 231.5	5.	14.90	.05	356.	.60L	10.	21.0L	1.64	3.	.20L
Ranger 1 Drillhole 165-continued										
65 2.0	2.	2.60	.09	236.	6.00L	45.	61.0	73.30	3.	.20L
65 3.0	2.L	3.67	.02L	126.	3.00L	88.	101.0	2.50	4.	.40L
65 20.8	6.	.58	.02L	83.	.50L	9.	19.4	1.62	3.	.10L
65 48.3	2.L	2.25	2.89	8944.	2.00L	201.	223.0	34.00	19.	2.00L
65 66.7	2.L	1.40	2.90	13968.	2.00L	296.	331.0	5.70	15.	2.00
65 73.8	6.	10.40	.55	1628.	.70L	49.	51.0	5.10	2.	.20L
65 82.4	11.	13.10	.34	409.	1.00L	47.	54.7	6.10	5.	.70L
65 92.8	127.	.00B	.23	1320.	.00B	120.	1380.0	.00B	229.	.00B
65 97.6	2.L	3.60	.12	601.	.70L	25.	28.0	2.45	5.	.50L
65 102.4	2.L	6.08	.02L	137.	.62	2.L	10.0L	.40L	4.	.70L
Ranger 1 Drillhole 70-continued										
70 3.0	10.	15.90	.56	1731.	1.00L	52.	53.8	41.80	3.	.30L
70 4.0	8.	16.80	.53	2243.	1.00L	46.	57.0	74.40	4.	.60L
70 15.3	13.	6.50	.28	929.	5.00L	128.	340.0	11.20	21.	1.00L
70 26.4	30.	12.90	.28	1273.	6.00L	393.	699.0	7.00L	29.	5.80
70 28.5	22.	5.47	.47	1596.	2.00L	231.	475.0	22.00	15.	1.00L
70 29.0	8.	7.03	.36	867.	.90L	133.	189.0	21.20	3.	.40L
70 35.0	12.	18.30	.98	3118.	1.00L	168.	208.0	9.50	3.	.50L
70 56.5	89.	.00B	.74	3726.	.00B	245.	688.0	.00B	82.	.00B
70 63.6	2.L	.20	.02L	30.	.40L	23.	35.3	.79	1.	.06L
70 70.7	5.	4.21	.55	1606.	.40L	129.	140.0	5.48	9.	1.56
70 96.5	8.	1.69	.07	247.	.80L	24.	37.0	4.30	3.	.40L
70 112.0	8.	.67	.02L	17.	1.00L	41.	64.0	1.00L	3.	.30L
70 113.0	18.	.50L	.02L	31.	2.00L	123.	450.0	16.00	46.	1.30
70 138.0	2.L	4.47	.02L	16.	1.00L	25.	29.3	.60L	1.L	.20L
70 143.0	2.L	2.00L	.02L	34.	3.00L	77.	103.0	1.00L	1.	.50L
70 160C	18.	18.90	.43	1368.	9.00	151.	237.0	6.00	33.	6.10
70 164.5	22.	3.60	.42	1911.	6.00L	139.	214.0	7.00	42.	5.60

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXYTE
Ranger 1 Drillhole 64--continued										
64 116.4	80.	84.	0.B	10094.200	9949.000	908.500	13.	2.	6.	5.
64 138.0	2.	8.	120.L	10091.900	9947.000	886.900	8.	2.	3.	3.
64 144.9	112.	107.	5000.L	10091.000	9947.000	880.100	13.	2.	3.	3.
64 151.4	26.	134.	320.L	10090.200	9946.500	873.600	10.	6.	3.	3.
64 162.0	139.	44.	1000.L	10088.700	9950.000	862.800	13.	2.	3.	2.
64 175.0	58.	89.	400.L	10086.600	9950.000	849.800	11.	2.	3.	2.
64 182.5	102.	5.	65000.L	10085.700	9949.000	842.400	9.	4.	4.	3.
64 183.4	63.	121.	500.L	10085.500	9950.000	841.500	3.	2.	4.	2.
64 194.0	100.	22.	20000.L	10084.200	9950.000	830.900	11.	2.	3.	2.
64 199c	70.	63.	1000.L	10083.400	9945.000	825.900	12.	2.	3.	3.
64 202.8	52.	54.	273.	10082.700	9944.801	822.200	12.	2.	3.	3.
64 212.8	51.	50.	1500.L	10081.000	9944.102	812.300	12.	2.	3.	3.
64 219.1	21.	45.	150.L	10079.800	9943.898	805.800	13.	1.	2.	2.
64 231.5	35.	29.	215.	10077.100	9943.199	793.700	14.	1.	2.	3.
Ranger 1 Drillhole 165										
65 2.0	46.	22.	100.L	9902.398	9951.000	1030.500	11.	7.	2.	1.
65 3.0	55.	10.	14.L	9902.398	9951.000	1029.500	11.	7.	2.	1.
65 20.8	7.	3.	1500.L	9903.000	9951.000	1011.650	9.	4.	2.	5.
65 48.3	135.	115.	370.L	9902.398	9951.500	984.160	13.	2.	3.	3.
65 66.7	285.	116.	360.L	9903.602	9951.602	965.800	13.	2.	3.	3.
65 73.8	34.	30.	170.L	9903.199	9952.000	958.720	11.	2.	2.	5.
65 82.4	32.	35.	320.L	9904.000	9954.102	950.110	13.	2.	2.	3.
65 92.8	58.	48.	0.B	9900.000	9950.000	940.200	13.	2.	7.	3.
65 97.6	12.	48.	160.L	9903.602	9952.199	934.940	11.	1.	2.	3.
65 102.4	11.	24.	280.L	9903.602	9952.199	930.150	14.	1.	2.	3.
Ranger 1 Drillhole 70										
70 3.0	60.	68.	400.L	10049.000	9950.000	1023.600	5.	7.	3.	1.
70 4.0	28.	76.	300.L	10049.000	9950.000	1022.600	5.	7.	3.	1.
70 15.3	70.	58.	30000.L	10049.000	9950.000	1011.300	5.	7.	5.	1.
70 26.4	197.	87.	65000.L	10049.000	9950.000	1002.200	5.	2.	6.	3.
70 28.5	48.	83.	6800.	10049.000	9950.000	998.100	5.	2.	5.	1.
70 29.0	77.	99.	4800.L	10049.000	9950.000	997.600	5.	2.	6.	1.
70 35.0	12.	104.	1000.L	10049.000	9950.000	991.600	5.	2.	6.	1.
70 56.5	83.	99.	0.B	10048.300	9950.000	970.200	5.	2.	6.	2.
70 63.6	22.	2.	74.L	10048.000	9950.000	963.000	13.	2.	4.	3.
70 70.7	48.	71.	150.L	10047.500	9950.000	955.900	11.	2.	3.	4.
70 96.5	39.	12.	2500.L	10045.300	9950.000	930.100	9.	4.	2.	2.
70 112.0	77.	16.	4000.L	10044.700	9950.000	914.600	3.	2.	3.	2.
70 113.0	82.	24.	20000.L	10044.700	9950.000	913.600	3.	2.	7.	2.
70 138.0	39.	2.	150.L	10045.300	9950.000	888.600	3.	2.	2.	3.
70 143.0	106.	33.	440.L	10045.000	9950.000	883.600	3.	2.	2.	2.
70 160C	102.	64.	3600.L	10044.100	9950.000	867.600	11.	2.	5.	3.
70 164.5	70.	67.	0.B	10043.400	9950.000	862.200	11.	2.	5.	2.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	S102%	Al203%	T-Fe203%	FeO%	MgO%	CsO%	K2O%	U N	As N	Au N
Ranger 1 Drillhole 70-continued										
70 166.1	29.00	20.40	10.60	5.84	22.50	.57	.02	12200.00	.00B	.00B
70 169.0	70.50	8.57	5.15	.00B	9.48	.36	.02L	1600.00	2.00L	.26
70 175.5	43.10	17.00	7.42	.00B	21.80	.12	.02L	12.50	.40L	.00
70 180.4	30.20	20.20	12.90	.00B	24.40	.25	.02L	601.00	1.10	.00
70 184.8	36.90	17.30	8.84	5.74	25.00	.14	.02L	35.80	.40L	.00
70 189.8	69.00	16.80	1.99	.00B	3.87	.18	3.70	18.10	.30L	.00
70 191.7	64.90	14.20	5.31	.00B	7.59	.32	1.97	7.68	.40L	.01L
70 196.0	72.50	13.80	2.06	.00B	5.07	.15	2.43	10.60	.20L	.01
Ranger 1 Drillhole 73										
73 26.1	90.10	2.51	1.28	.54	2.16	1.28	.02L	150.40	.30L	.05
73 28C	34.10	18.70	11.10	4.84	16.00	.48	.28	19100.00	9.00	2.42
73 28.6	32.88	17.96	11.09	.00B	12.84	.43	.07	46200.00	.00B	.00B
73 37.9	65.80	16.50	2.73	.00B	4.63	.69	3.85	43.90	.20L	.06
73 44.1	12.03	7.91	34.83	3.54	9.45	17.53	.02L	146.00	6.65	.26
73 47.6	63.50	15.50	4.03	.00B	7.40	.27	3.01	26.80	2.38	.04
73 49.9	76.60	6.70	2.45	.00B	5.87	.83	.04	5.23	.57	.01
73 50C	77.20	6.81	3.31	.00B	7.39	.53	.02L	14.40	1.40L	.03
73 51.3	89.10	3.31	1.83	.00B	3.50	.24	.02L	3.60	.10L	.70
73 58.3	45.30	25.60	5.24	.00B	9.13	.50	6.11	8.72	.58	.01L
73 64.4	77.80	7.84	2.78	.00B	6.27	.27	.02L	6.80	.09	.00
73 70C	68.80	14.20	3.89	1.97	5.28	.49	2.39	181.00	1.90	.06
73 71.3	65.00	15.40	4.50	2.13	5.05	.61	2.64	4360.00	6.00L	.64
73 83.7	32.60	24.60	9.27	5.81	21.70	.33	.02L	6.12	.60L	.01
73 103C	37.30	23.20	9.29	4.08	15.80	.24	3.05	1700.00	3.20L	.19
73 114C	35.30	18.70	12.20	5.45	20.30	1.31	.03	1100.00	2.40L	.15
73 150.3	44.20	16.00	4.21	.00B	24.50	.12	.08	10.00	.36L	.00
73 167.3	64.90	13.50	4.90	3.49	7.70	.13	2.88	70.50	.59L	.01L
73 178.3	68.40	14.60	3.22	.00B	3.75	.38	4.85	7.24	.90L	.01L
Ranger 1 Drillhole 78										
78 20C	56.80	18.10	3.75	2.01	8.57	.63	2.89	367.00	.95L	.03
78 20.8	61.50	15.80	3.92	.00B	9.17	.16	1.85	53.70	.40L	.00
78 35.2	76.90	12.40	1.09	.00B	1.62	.14	3.44	1800.00	.90L	.35
78 37C	64.80	15.00	3.59	2.17	7.39	.11	2.41	824.00	.90L	.07
78 46.7	67.20	15.60	2.47	.00B	2.96	.10	3.85	3620.00	2.10	.07
78 61.9	54.70	19.00	5.49	2.88	10.20	.14	2.57	1710.00	.80	.02
78 82.9	55.70	16.60	5.68	3.14	11.10	.12	1.97	6350.00	1.90	.88
78 130.7	60.50	11.30	5.70	.00B	13.30	1.45	.02L	5.10	.40L	.02
78 145C	58.60	18.30	4.80	2.61	7.38	.06	3.39	4650.00	.91L	.12
78 184.3	79.20	3.62	7.98	.00B	4.81	.88	.02L	1070.00	1.00L	.01L
78 205C	7.64	1.90	3.14	.00B	39.00	3.38	.02L	3.40	.26L	.07
78 251.5	74.00	13.60	1.48	.00B	2.71	.15	4.68	6.70	.20L	.00
Ranger 1 Drillhole 79										
79 13C	60.90	17.20	3.27	1.15	7.77	.15	2.83	156.00	.71L	.10

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 1 Drillhole 70-continued										
70 166.1	111.	126.	20000.	11.	.00B	10.L	.00B	940.0L	49.	.00B
70 169.0	63.	49.	6800.L	4.	2.00L	10.L	410.00L	274.0	21.	21.70
70 175.5	14.	10.	260.L	4.	1.56	10.L	5.56	220.0	36.	40.30
70 180.4	15.	17.	3000.L	4.	1.00L	15.	160.00L	140.0L	52.	72.70
70 184.8	17.	18.	430.L	4.	1.32	10.L	9.00L	187.0	40.	42.20
70 189.8	66.	106.	300.L	3.	.33	13.	20.00	73.0	6.	6.28
70 191.7	40.	74.	260.L	5.	.50L	46.	57.60	79.1	14.	20.70
70 196.0	53.	93.	120.	4.	.40L	18.	19.50	115.0	8.	11.90
Ranger 1 Drillhole 73-continued										
73 26.1	10.L	77.	129.	3.	1.80	10.L	42.00L	91.3	7.	9.02
73 28C	68.	99.	20000.	6.	13.00L	20.	1100.00L	900.0L	54.	71.90
73 28.6	85.	72.	1300.L	8.	.00B	10.L	.00B	2500.0L	51.	.00B
73 37.9	333.	107.	167.	3.	.60L	62.	57.70	138.0	11.	12.50
73 44.1	10.L	9.	1000.L	1.	2.00L	25.	80.30	99.2	30.	65.50
73 47.6	49.	159.	155.	2.	.60L	44.	38.70	40.0	21.	21.10
73 49.9	38.	36.	124.L	3.	2.78	10.L	2.80	273.6	11.	16.10
73 50C	10.L	15.	140.L	2.	2.00	10.L	3.60	132.7	14.	19.40
73 51.3	10.L	23.	74.L	1.	2.55	10.L	2.00	236.4	8.	11.70
73 58.3	496.	53.	162.L	5.	.40L	15.	23.30	92.0	19.	26.70
73 64.4	10.L	37.	90.L	3.	.99	10.L	1.80L	90.2	14.	18.80
73 70C	325.	57.	310.	4.	2.20L	15.	10.40	118.9	17.	17.90
73 71.3	306.	227.	6900.	5.	7.00L	10.L	1000.00L	360.0L	16.	15.80
73 83.7	29.	27.	556.L	7.	1.67	10.L	5.59	230.0	50.	173.00
73 103C	54.	227.	1300.	4.	4.20L	10.L	9.30	180.0L	31.	38.80
73 114C	41.	25.	297.	4.	3.50L	10.L	2.70	160.0	38.	50.20
73 150.3	20.	18.	160.L	6.	5.23	10.L	1.44	317.0	24.	42.40
73 167.3	33.	265.	352.	3.	.58L	43.	88.80	46.0	15.	20.60
73 178.3	39.	456.	850.L	4.	.80L	172.	18.10	71.0L	6.	6.22
Ranger 1 Drillhole 78-continued										
78 20C	108.	58.	243.	4.	2.90	10.	20.00L	228.0	17.	20.10
78 20.8	156.	24.	144.L	5.	1.17	10.L	2.92	150.0	23.	29.10
78 35.2	105.	157.	5200.L	5.	2.30L	11.	440.00L	322.0L	4.L	2.43
78 37C	75.	69.	600.	3.	3.90	10.L	46.00L	168.0	18.	23.40
78 46.7	131.	367.	7100.	6.	1.30L	11.	10000.00L	280.0L	8.	8.40
78 61.9	140.	147.	5100.L	4.	10.00L	19.	400.00L	144.0	21.	25.30
78 82.9	54.	280.	15000.L	3.	4.60L	30.	1200.00L	366.0L	27.	30.20
78 130.7	10.L	20.	156.L	6.	1.27	10.L	4.37	216.0	32.	31.50
78 145C	42.	209.	5000.	4.	4.00	10.	260.00L	300.0L	29.	39.80
78 184.3	20.	35.	2600.L	2.	1.70	10.L	270.00L	165.0	12.	11.60
78 205C	10.L	3.	900.L	1.	1.34	10.	12.00	220.0L	10.	11.70
78 251.5	60.	305.	340.	5.	.61	10.L	12.80	52.0	4.L	2.84
Ranger 1 Drillhole 79-continued										
79 13C	71.	42.	117.	4.	.80	13.	8.70L	102.0	13.	16.00

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	FZ	Ga N	Gd N	Ir N
Ranger 1 Drillhole 70-continued										
70 166.1	145.	.00B	.00B	35.	47.0	.00B	.14	.0B	3000.	.00B
70 169.0	31.	23.00	.80L	11.	50.0L	5.20	.00B	.0B	18000.L	.01L
70 175.5	110.	115.00	.60L	7.	5.2L	.53	.00B	31.5	0.L	.00
70 180.4	130.	181.00	1.20L	7.	12.0L	1.61	.00B	47.0	4000.L	.01L
70 184.8	70.	69.70	.90L	6.	8.4L	.20L	.19	26.0	1000.L	.00
70 189.8	6.	6.51	6.62	7.	3.5L	.45	.00B	15.0	630.L	.00
70 191.7	85.	110.00	3.70	5.	5.2L	1.06	.00B	.0B	920.L	.01L
70 196.0	8.	12.30	3.73	10.	3.0L	.41	.00B	4.8	900.L	.00
Ranger 1 Drillhole 73										
73 26.1	39.	51.00	1.88	5.	2.6L	.31	.09	29.8	450.L	.00
73 28C	249.	379.00	6.20L	122.	28.0L	4.40	.12	83.0	6000.L	.08L
73 28.6	279.	.00B	.00B	47.	190.0L	.00B	.08	.0B	27000.L	.00B
73 37.9	163.	169.00	2.90	4.	2.0L	.98	.00B	31.0	2600.L	.01L
73 44.1	72.	179.00	3.60L	37.	4.2L	9.86	.00B	31.0	1700.L	.02L
73 47.6	497.	427.00	2.80	7.	2.6L	.58	.00B	27.0	2200.L	.01L
73 49.9	55.	73.20	1.20	4.	2.6L	.75	.00B	25.0	720.L	.00
73 50C	54.	65.70	1.60	14.	1.0L	.13	.00B	16.0	4000.L	.00
73 51.3	31.	42.90	.50L	6.	1.0L	.04	.00B	10.7	400.L	.00
73 58.3	28.	38.00	8.30	2.	4.0L	.31	.00B	53.0	1600.L	.01L
73 64.4	32.	41.80	2.94	68.	.8L	.03L	.00B	27.4	370.L	.00
73 70C	11.	10.00	7.73	3.	6.0L	.13	.07	34.0	5000.L	.01L
73 71.3	8.	29.70	9.42	5.	23.0	2.70	.07	164.0	2900.L	.01L
73 83.7	7.	25.90	2.80	47.	12.0L	.37	.00B	5200.L	5200.L	.01L
73 103C	186.	240.00	1.70L	7.	14.0L	2.10	.12	67.0	6000.L	.01L
73 114C	47.	62.30	1.40L	37.	12.0L	1.04	.18	59.0	4000.L	110.00L
73 150.3	57.	101.00	2.45	4.	1.8L	.13	.00B	35.7	1000.L	.01L
73 167.3	69.	90.80	4.82	99.	8.1L	.40	.00B	20.7	1300.L	.01L
73 178.3	7.	9.33	4.66	10.	3.9L	.94	.00B	.0B	4500.	.00
Ranger 1 Drillhole 78										
78 20C	54.	63.00	5.51	111.	4.0L	.27	.08	40.0L	3000.L	.01L
78 20.8	54.	62.30	4.33	7.	3.0L	.32	.00B	44.0	990.L	.01L
78 35.2	42.	53.00	5.97	5.	6.3	1.61	.00B	4.1L	12900.	.01L
78 37C	70.	80.50	4.20	13.	6.0L	.47	.07	38.0L	3000.L	100.00L
78 46.7	120.	14.80	7.10	2682.	20.0L	3.13	.00B	24.0	13000.L	.02L
78 61.9	84.	113.00	5.33	22.	8.5	1.30	.07	55.0	11300.	.01L
78 82.9	92.	99.50	2.30L	5.	19.4	6.18	.00B	39.0L	19900.	.02L
78 130.7	222.	202.00	.70	17.	3.3L	.64	.00B	35.0	1000.L	.00
78 145C	145.	185.00	17.20	213.	18.0L	2.29	.11	38.0L	18000.L	340.00L
78 184.3	22.	27.70	.60L	11.	4.9	2.45	.00B	2800.L	2800.L	.01L
78 205C	13.	14.00	.54L	27.	6.0L	.38	.00B	3.4	10000.L	.00
78 251.5	1.L	1.00L	5.48	10.	2.8L	.26	.00B	.0B	1200.L	.00
Ranger 1 Drillhole 79										
79 13C	58.	63.90	3.90	8.	4.0L	940.00L	.08	54.5	2000.L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 1 Drillhole 70-continued										
70 166.1	2.L	.00B	307.	241.	260.0	.0B	380.00	14.	.00B	169.
70 169.0	2.L	46.00	92.	112.	138.0	1900.0L	180.00L	4.L	1100.00L	61.
70 175.5	9.	9.81	236.	93.	111.0	20.0L	64.00	4.L	8.00L	132.
70 180.4	2.L	10.80	161.	117.	162.0	1500.0L	120.00L	4.L	150.00L	120.
70 184.8	2.L	1.16	192.	115.	142.0	80.0L	137.00	4.	13.00L	80.
70 189.8	8.	11.80	65.	61.	71.0	37.0L	758.00	4.L	8.00L	11.
70 191.7	18.	32.00	87.	216.	268.0	3.0L	182.00	4.	23.00L	39.
70 196.0	7.	3.76	90.	53.	65.0	393.0	479.00	4.	100.00L	16.
Ranger 1 Drillhole 73-continued										
73 26.1	3.	6.65	23.	39.	35.3	200.0L	105.70	4.L	35.00L	28.
73 28C	2.L	240.00	172.	144.	168.4	10000.0L	610.00L	4.L	770.00	182.
73 28.6	3.	.00B	158.	240.	240.0	.0B	1800.00	4.L	.00B	162.
73 37.9	43.	56.60	56.	32.	38.2	88.0L	202.40	4.	35.00L	26.
73 44.1	6.	33.20	51.	66.	85.7	167.0	120.00L	7.	73.00L	50.
73 47.6	31.	43.40	66.	50.	55.8	5.0L	1100.00	4.	17.00L	51.
73 49.9	2.L	2.04	51.	98.	119.0	13.0L	122.10	4.L	3.00L	41.
73 50C	2.L	2.73	80.	144.	150.5	180.0L	95.00	4.L	55.00L	38.
73 51.3	2.L	.49	57.	85.	93.2	1.2L	108.00	4.L	4.00	26.
73 58.3	9.	24.30	90.	68.	86.5	21.0L	138.30	5.	6.00L	60.
73 64.4	2.L	1.03	64.	95.	113.5	41.0L	116.10	4.	37.00L	46.
73 70C	11.	24.80	55.	88.	125.0	290.0L	505.00	16.	55.00	27.
73 71.3	7.	107.00	91.	125.	140.0	9000.0L	310.00	10.	1600.00L	24.
73 83.7	2.L	3.25	164.	159.	372.0	18.9	275.40	4.L	53.00L	145.
73 103C	2.L	31.10	164.	131.	150.5	350.0	1200.00	9.	88.00L	76.
73 114C	2.L	21.20	120.	182.	212.8	320.0	263.00	21.	54.00L	111.
73 150.3	2.	.63	247.	78.	93.6	34.0L	93.00	4.L	6.20L	85.
73 167.3	24.	40.10	66.	282.	321.0	180.0L	242.60	6.	110.00L	43.
73 178.3	74.	95.40	41.	262.	257.0	6.0L	702.00	17.	28.00L	8.
Ranger 1 Drillhole 78-continued										
78 20C	2.	7.63	81.	137.	163.0	160.0L	804.00	4.	260.00L	62.
78 20.8	2.L	2.53	116.	88.	99.1	100.0L	155.00	5.	20.00L	89.
78 35.2	5.	29.50	35.	106.	111.0	4000.0L	268.50	5.	300.00L	9.
78 37C	2.L	6.36	71.	102.	122.0	440.0L	277.00	6.	460.00L	57.
78 46.7	2.	36.20	44.	121.	150.0	8500.0L	490.00L	7.	650.00L	23.
78 61.9	2.L	23.60	93.	79.	116.0	3700.0L	739.40	7.	340.00L	92.
78 82.9	5.	61.80	93.	118.	138.0	11000.0L	520.20	10.	2300.00	77.
78 130.7	7.	10.60	104.	95.	97.1	8.0L	91.00	4.L	5.00L	136.
78 145C	2.L	28.40	96.	66.	93.0	2500.0L	7000.00	15.	820.00L	50.
78 184.3	2.	29.60	37.	55.	48.0	2000.0L	122.00	6.	400.00L	41.
78 205C	20.	30.10	18.	1225.	1500.0	60.0L	160.00L	4.L	20.00	13.
78 251.5	5.	7.51	43.	102.	99.1	14.0L	620.00	4.L	4.00L	3.
Ranger 1 Drillhole 79-continued										
79 13C	3.	2.73	66.	47.	62.0	270.0L	246.00	5.	120.00L	73.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 1 Drillhole 70-continued										
70 166.1	1681.	4707.	0.B	0.B	31.	.00B	.00B	9.	.00B	.00B
70 169.0	625.	882.	22.L	13.L	7.	7.03	4.00L	4.	2.00L	1.90
70 175.5	320.	10.L	6.L	20.L	6.	8.24	.80L	3.	1.40	.59
70 180.4	135.	54.	10.L	51.L	2.	14.10	1.30	2.	1.30	.80L
70 184.8	372.	10.	4.L	24.L	4.	6.13	.60L	3.	.90L	.40L
70 189.8	613.	10.L	6.L	113.	2.	2.64	1.64	6.	.67	.10L
70 191.7	855.	10.	8.L	93.	7.	12.00	3.14	4.	.70L	.40L
70 196.0	417.	13.	0.B	100.	2.	3.38	.33	5.	.79	.36
Ranger 1 Drillhole 73										
73 26.1	3161.	25.	4.L	10.L	2.	3.04	.95	7.	1.10L	.33
73 28C	1573.	6444.	111.L	240.L	46.	66.30	9.00	4.	20.00L	7.00
73 28.6	2011.	11426.	0.B	0.B	94.	.00B	.00B	5.	.00B	.00B
73 37.9	1951.	16.	9.L	84.	10.	15.40	4.63	16.	.70L	.40L
73 44.1	40358.	36.	10.L	100.L	7.	22.30	12.40	25.	7.50L	1.60
73 47.6	808.	12.	10.L	90.	12.	16.20	1.94	12.	.30L	.60L
73 49.9	7896.	10.L	1.L	21.L	4.	6.87	1.14	7.	1.10	.55
73 50C	1467.	10.L	10.L	27.L	3.	4.78	.72	3.	1.70	.48L
73 51.3	579.	10.L	1.L	14.L	1.	2.04	.29	4.	.50	.28L
73 58.3	1446.	10.L	5.L	180.	3.	7.90	.90L	5.	4.50	.70L
73 64.4	668.	10.L	2.L	41.	4.	5.86	.48	5.	1.90	.31L
73 70C	1530.	27.	0.B	120.	3.	4.51	.27L	10.	13.00	.52L
73 71.3	2074.	372.	80.L	117.	9.	10.70	1.00L	7.	7.03	2.40
73 83.7	673.	24.	6.L	39.	6.	31.20	1.30L	1.	1.50	1.30L
73 103C	101.	145.	40.L	110.	19.	28.80	2.20	9.	2.20	.80
73 114C	3130.	126.	0.B	53.L	10.	15.20	2.80	5.	4.10L	1.90
73 150.3	180.	11.	2.L	30.L	5.	11.70	.64	3.	1.40	.65L
73 167.3	347.	16.	7.L	122.	8.	12.10	.42	12.	.50	1.22
73 178.3	1450.	12.	18.L	201.	4.	4.43	11.40	37.	1.20	1.38
Ranger 1 Drillhole 78										
78 20C	355.	36.	13.L	74.	8.	14.50	.30L	9.	1.00	.69L
78 20.8	581.	36.	6.L	59.	6.	11.10	.50L	2.	1.40	.40L
78 35.2	391.	97.	17.L	229.	8.	9.81	2.30L	7.	3.00L	.40L
78 37C	237.	159.	9.L	139.	9.	14.40	2.30	5.	2.30	.72L
78 46.7	244.	1973.	19.L	343.	16.	19.80	1.70L	33.	4.80	1.00L
78 61.9	244.	116.	17.L	100.	10.	23.60	1.20L	12.	.60L	1.40
78 82.9	328.	512.	30.L	99.	18.	23.70	3.30L	8.	7.00L	4.00
78 130.7	4762.	10.L	6.L	17.L	6.	6.25	1.62	5.	2.00L	.30L
78 145C	150.	1019.	27.L	240.	15.	23.70	.88L	15.	6.00	1.60
78 184.3	2889.	111.	20.L	21.L	4.	4.61	2.26	8.	1.00L	1.43
78 205C	120.	10.L	6.	16.L	2.	2.86	2.54	6.	1.50L	.34L
78 251.5	541.	12.	7.L	162.	1.	.84	1.20	19.	.04L	.20
Ranger 1 Drillhole 79										
79 13C	376.	83.	0.B	94.	12.	17.20	.70	3.	1.30	.30

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO ₂ Z	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 1 Drillhole 70-continued										
70 166.1	78.	.00B	.53	2227.	.00B	294.	501.0	.00B	47.	.00B
70 169.0	14.	3.73	.05	282.	2.00L	103.	360.0	12.00L	16.	.90L
70 175.5	8.	13.50	.64	654.	.60L	67.	70.0	1.00L	6.	.50L
70 180.4	8.	13.70	.59	717.	1.80L	102.	191.0	10.70	6.	.50L
70 184.8	7.	8.30	.86	1037.	.90L	92.	8.10	.90L	2.	.20L
70 189.8	8.	7.41	.05	300.	.60L	13.	14.0	.70L	5.	.48
70 191.7	2.L	11.10	.46	1893.	1.00L	78.	94.0	2.00L	6.	1.10
70 196.0	6.	7.75	.09	456.	.80L	14.	18.2	1.60	4.	.80
Ranger 1 Drillhole 73-continued										
73 26.1	6.	1.30	.09	271.	.84L	44.	58.8	4.11	8.	.39
73 28C	60.	19.00	1.08	3545.	9.00	375.	1900.0	30.00	82.	6.20L
73 28.6	250.	.00B	.66	3479.	.00B	338.	1180.0	.00B	260.	.00B
73 37.9	7.	8.60	.64	1292.	.90L	94.	112.0	39.30	9.	.60L
73 44.1	7.	10.60	.21	553.	11.00L	78.	103.0	61.00	32.	1.90
73 47.6	2.L	6.50	.99	2114.	1.00L	117.	130.0	15.40	4.	.40L
73 49.9	2.L	4.24	.02L	44.	1.00L	56.	62.1	1.26	4.	.30L
73 50C	2.L	3.19	.07	207.	1.20L	44.	8.00	8.00	2.	.40
73 51.3	6.	1.60	.05	120.	.68L	27.	32.5	1.98	1.	.17L
73 58.3	2.L	2.20	.02L	44.	3.00L	57.	55.5	1.80	2.	.40L
73 64.4	2.L	6.09	.05	224.	.90	45.	48.5	4.32	1.	.20L
73 70C	2.L	1.60L	.02L	24.	1.70	28.	51.4	3.95L	3.	.48L
73 71.3	15.	2.06	.02L	13.	2.00L	39.	170.0	9.00L	22.	2.00L
73 83.7	3.	10.00	.02L	29.	.30L	125.	271.0	1.30L	1.	.70L
73 103C	14.	20.60	1.12	3021.	3.20L	184.	335.0	23.00	21.	3.20
73 114C	9.	7.65	.10	387.	1.20	156.	241.0	9.00	22.	3.40
73 150.3	17.	15.80	.41	633.	1.30L	92.	111.0	6.66	2.	.39L
73 167.3	4.	13.80	.45	2060.	1.70	69.	90.4	1.20L	11.	1.75
73 178.3	56.	77.00	.57	2366.	2.00L	16.	46.0L	2.00L	22.	1.30
Ranger 1 Drillhole 78-continued										
78 20C	10.	17.00	.67	1455.	2.30L	106.	159.0	3.20	7.	1.06
78 20.8	10.	18.60	.54	1518.	.90L	69.	72.3	1.00L	5.	.60L
78 35.2	13.	10.60	.38	1079.	3.00L	80.	177.0	7.10	20.	.90
78 37C	11.	16.30	.51	1681.	2.40L	108.	212.0	4.22	11.	2.01
78 46.7	29.	12.00	.55	1870.	5.00L	98.	232.0	9.00	28.	5.44
78 61.9	5.	14.10	.66	2185.	3.50L	241.	345.0	22.10	26.	4.53
78 82.9	31.	13.80	.58	2335.	7.20L	178.	354.0	7.00	38.	6.64
78 130.7	2.L	3.33	.40	1067.	.80L	85.	93.6	8.24	7.	.20L
78 145C	19.	21.60	.80	3035.	10.00L	131.	455.0	145.00	27.	7.02
78 184.3	6.	5.71	.12	754.	.40L	80.	139.0	2.50L	23.	1.33
78 205C	2.L	2.15	.06	91.	.60	8.	48.0L	1.20	13.	.25L
78 251.5	7.	6.79	.02L	114.	.50L	2.L	16.0L	.60L	5.	.37
Ranger 1 Drillhole 79-continued										
79 13C	15.	16.10	.60	1418.	1.90L	136.	179.0	3.90	9.	1.26

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYE	ORETYPE	OXTYPE
Ranger I Drillhole 70-continued										
70 166.1	169.	83.	0.B	10043.100	9950.000	860.600	11.	2.	5.	3.
70 169.0	60.	10.	5200.L	10042.500	9950.000	857.800	13.	2.	5.	2.
70 175.5	61.	73.	218.	10041.300	9950.000	851.400	13.	2.	3.	3.
70 180.4	57.	39.	410.L	10041.100	9950.000	846.200	13.	2.	3.	3.
70 184.8	62.	42.	420.L	10039.700	9950.000	842.000	12.	3.	3.	3.
70 189.8	15.	33.	200.L	10038.100	9950.000	837.200	14.	1.	3.	3.
70 191.7	59.	72.	180.L	10037.500	9950.000	835.400	14.	2.	2.	3.
70 196.0	24.	35.	65.L	10036.100	9950.000	831.400	14.	2.	2.	3.
Ranger I Drillhole 73										
73 26.1	23.	17.	299.	9999.898	9949.102	1002.000	5.	2.	4.	1.
73 28C	143.	108.	45000.L	9999.102	9949.000	1000.100	13.	3.	6.	2.
73 28.6	135.	90.	0.B	9999.102	9949.000	999.500	13.	3.	6.	2.
73 37.9	21.	46.	200.L	9999.898	9949.102	990.200	13.	3.	4.	1.
73 44.1	93.	14.	1870.	9999.102	9948.801	984.000	13.	3.	3.	2.
73 47.6	39.	101.	550.	9999.898	9949.102	980.500	10.	3.	3.	3.
73 49.9	64.	2.L	300.L	9999.898	9949.012	978.820	9.	3.	3.	3.
73 50C	51.	9.	310.L	9998.898	9949.000	978.100	9.	3.	3.	3.
73 51.3	27.	9.	160.L	9999.898	9949.102	976.800	9.	4.	3.	2.
73 58.3	33.	27.	200.L	9999.898	9949.102	969.800	13.	3.	2.	3.
73 64.4	81.	8.	190.L	9998.602	9949.102	963.700	9.	4.	2.	3.
73 70C	47.	15.	430.L	9997.102	9947.699	958.100	3.	2.	4.	2.
73 71.3	66.	10.	48000.L	9997.801	9947.699	956.800	3.	2.	7.	2.
73 83.7	114.	2.L	790.L	9996.500	9947.398	944.400	13.	3.	2.	3.
73 103C	79.	111.	4100.L	9992.699	9946.801	925.100	10.	2.	4.	3.
73 114C	245.	35.	14000.L	9991.898	9946.801	914.100	13.	3.	4.	3.
73 150.3	58.	49.	410.L	9988.398	9945.801	877.800	12.	2.	2.	3.
73 167.3	58.	116.	562.	9987.000	9945.301	860.800	14.	2.	2.	2.
73 178.3	67.	278.	526.	9986.398	9945.102	849.800	14.	2.	2.	3.
Ranger I Drillhole 78										
78 20C	22.	75.	8800.L	10149.900	10049.900	1003.760	5.	1.	4.	1.
78 20.8	16.	98.	240.L	10149.900	10049.900	1002.960	5.	1.	4.	1.
78 35.2	57.	78.	21000.L	10149.200	10049.900	988.560	5.	1.	5.	5.
78 37C	51.	94.	2000.L	10149.300	10049.900	986.760	5.	2.	4.	1.
78 46.7	44.	69.	49000.L	10149.100	10049.900	977.060	5.	3.	5.	3.
78 61.9	43.	100.	20000.L	10148.800	10049.900	961.860	5.	2.	5.	3.
78 82.9	157.	91.	6.L	10148.500	10049.900	940.860	5.	3.	3.	3.
78 130.7	102.	50.	64.	10147.600	10049.900	893.060	12.	3.	3.	3.
78 145C	36.	108.	11000.L	10147.400	10049.900	878.760	10.	2.	5.	3.
78 184.3	37.	23.	10000.L	10146.700	10049.900	839.460	9.	3.	3.	3.
78 205C	2.L	8.	200.L	10146.400	10049.900	818.760	7.	6.	2.	3.
78 251.5	26.	40.	52.L	10145.500	10049.900	772.260	14.	2.	2.	3.
Ranger I Drillhole 79										
79 13C	36.	89.	370.L	10129.900	10000.100	1011.700	5.	1.	4.	1.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	S102%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U N	As N	Au N
Ranger 1 Drillhole 79-continued										
79 18.3	62.20	15.90	3.36	.00B	8.85	.14	2.17	121.00	.32L	.00
79 31C	59.70	16.80	4.25	2.79	8.61	.16	2.61	723.00	.94L	.09
79 34.4	58.90	18.50	3.62	.00B	8.41	.16	3.08	999.00	.70L	.01L
79 39.8	75.30	13.60	1.33	.00B	2.24	.02L	3.67	1080.00	.40L	.01
79 40.5	78.20	11.20	1.17	.00B	1.72	.03	3.03	7290.00	1.30L	.04L
79 51C	65.60	14.90	3.08	.00B	6.60	.10	2.79	1750.00	1.20L	.18
79 67.7	70.10	14.70	1.65	.00B	4.42	.14	3.41	390.00	.40L	.01
79 73.4	68.40	9.70	3.21	1.32	10.60	.11	1.04	390.00	2.10	.07
79 77C	65.90	12.40	4.72	2.88	10.00	.08	.86	1070.00	1.60L	.05
79 91.6	53.50	14.40	8.33	5.13	14.20	.21	.02	4790.00	1.80	.04
79 106.0	44.90	18.10	8.88	5.01	14.80	.18	.41	16100.00	8.00L	.15
79 139C	52.90	19.50	5.32	2.99	10.30	.08	3.21	696.00	1.20L	.20
79 174.3	2.80	.80	82.80	.01	2.90	3.20	.02L	18.40	.58L	.01L
79 180.7	70.10	7.61	6.48	.00B	8.60	.48	.02L	1460.00	.60L	.01
79 193.6	17.10	3.62	5.83	.00B	34.40	1.44	.02L	5.30	.47L	.00
79 209.0	27.10	7.28	6.18	.00B	30.30	.58	.02L	5.30	.32L	.01L
79 220C	4.50	.71	2.51	.00B	37.60	6.59	.02L	9.70	.15L	.00
79 234.9	33.50	18.90	5.27	2.60	26.40	1.41	.86	17.60	.30L	.00
79 241.3	61.70	14.50	6.17	.00B	8.26	.18	3.52	6.30	.80L	.01L
Ranger 1 Drillhole 80										
80 8C	69.40	16.80	1.62	.00B	1.97	.06	4.35	560.00	4.50	.03
80 10.0	73.40	15.80	1.00	.00B	1.33	.04	4.25	621.00	1.00	.01L
80 19C	63.30	16.20	2.78	1.11	6.98	.09	2.50	2600.00	2.90L	.04
80 24C	65.90	15.40	1.95	1.15	7.42	.12	2.49	136.00	1.50L	.27
80 33.3	73.50	12.30	2.94	.00B	5.43	.03	1.99	346.00	1.05	.02
80 36C	62.20	12.40	4.53	2.47	11.10	.07	.52	4200.00	6.00	1.64
80 38.1	85.60	4.05	2.17	.00B	4.16	.02	.02L	2800.00	2.10L	.37
80 40C	66.70	10.80	3.84	2.24	10.90	.13	.58	2100.00	3.00	.46
80 46.5	77.80	6.63	2.14	.00B	5.17	.04	.73	12300.00	6.50L	3.24
80 47.6	70.10	8.21	2.97	.00B	7.62	.09	.86	24300.00	16.00L	1.80
80 48C	66.90	12.80	3.49	2.34	9.63	.32	1.14	28.00	1.30L	.01
80 54C	68.50	12.70	3.72	2.18	7.51	.13	1.76	900.00	.90L	.08
80 68.2	73.00	10.60	3.56	.00B	6.72	.07	.93	1700.00	2.00L	.16
80 75C	59.10	15.90	4.37	2.60	11.00	.15	1.56	329.00	.80L	.07
80 82.0	66.70	11.40	4.95	.00B	9.74	.05	.22	893.00	.70	.10
80 122C	61.00	16.20	3.82	2.36	8.96	.10	2.83	16.50	.83L	.02
80 127C	25.10	.26	1.90	.00B	35.40	3.15	.02L	6.50	.43L	.08
80 146.1	23.40	2.00	3.56	.00B	35.80	.71	.02L	6.40	.42L	.01
80 178C	12.60	3.72	3.45	.00B	38.20	1.72	.03	47.00	.72L	.05
80 205.8	37.10	12.30	3.92	2.16	24.50	2.49	.02L	307.10	.71L	.01
80 210.5	5.26	1.60	2.43	.00B	41.80	2.31	.02L	6.50	.30L	.00
80 219.8	37.50	19.90	5.91	3.67	21.00	1.51	1.97	13.40	.47L	.01
Ranger 3 Drillhole 81										
81 72.4	60.40	15.40	7.67	.00B	7.12	.14	2.72	40.60	.80L	.30

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 1 Drillhole 79-continued										
79 18.3	115.	25.	65.	3.	1.27	10.L	5.24	125.0	16.	20.50
79 31C	62.	71.	512.	3.	2.00L	10.L	40.00L	165.0	24.	32.60
79 34.4	149.	51.	651.	4.	1.50	19.	18.30	136.0	19.	24.00
79 39.8	50.	184.	771.	2.	1.20L	10.L	240.00	121.0L	5.	5.63
79 40.5	69.	161.	1400.0L	3.	5.12	11.	1400.00L	344.0L	4.L	2.80
79 51C	53.	214.	1300.	3.	2.00L	12.	.98L	160.0L	13.	20.00
79 67.7	63.	223.	399.	3.	.70	10.L	28.20	78.0	8.	14.00
79 73.4	58.	70.	2900.	3.	1.70L	10.L	280.00L	130.0	13.	13.40
79 77C	65.	110.	1500.	3.	2.70	10.L	60.00L	158.0	14.	19.30
79 91.6	31.	27.	7500.	4.	1.00L	10.L	1300.00L	290.0L	41.	49.70
79 106.0	41.	57.	32000.L	6.	13.00L	63.	4200.00L	662.0L	49.	79.10
79 139C	62.	290.	487.	3.	2.30L	17.	39.00L	114.0L	38.	37.80
79 174.3	10.L	23.	240.L	1.L	1.00L	10.L	9.00	64.0L	6.	4.70
79 180.7	10.	26.	2700.	1.	4.30	10.L	420.00L	217.0	25.	34.70
79 193.6	10.L	7.	1300.L	1.	.73L	14.	141.00	310.0L	19.	32.40
79 209.0	10.L	6.	920.L	1.	1.78	12.	9.83	98.0	26.	40.40
79 220C	10.L	22.	1200.L	1.L	.44	10.L	3.91	340.0L	7.	11.40
79 234.9	46.	47.	390.L	22.	2.25	10.L	4.22	220.0	26.	36.90
79 241.3	19.	181.	390.	3.	.70L	23.	58.30	89.0	17.	16.70
Ranger 1 Drillhole 80-continued										
80 8C	146.	215.	803.	5.	2.20L	10.L	2.80	95.2	5.	6.70
80 10.0	96.	248.	16000.L	4.	.40L	10.L	24.70	75.1	4.L	3.12
80 19C	274.	68.	1300.	6.	4.20L	10.	383.00	122.0	19.	35.00
80 24C	200.	46.	131.	4.	1.90	11.	.90	149.4	9.	10.90
80 33.3	32.	135.	53.	2.	2.75	12.	96.00L	83.0	14.	16.60
80 36C	72.	74.	4300.	4.	6.10L	12.	80.00	280.0L	24.	37.40
80 38.1	10.L	30.	3700.	1.	3.30L	10.L	277.00	253.0	11.	19.80
80 40C	38.	53.	2800.	3.	7.00	10.L	110.00	122.0	20.	31.10
80 46.5	63.	155.	24000.L	3.	8.60L	16.	570.00L	486.0L	7.	18.10
80 47.6	64.	146.	47000.L	3.	21.00L	22.	1400.00L	1100.0L	7.	17.10
80 48C	31.	17.	210.L	3.	2.10	10.L	.90	202.3	17.	21.00
80 54C	64.	123.	582.	3.	3.50	10.L	250.00L	152.0	19.	23.20
80 68.2	92.	96.	808.L	3.	11.60	24.	400.00L	296.0	18.	21.50
80 75C	138.	-33.	255.	4.	.90	10.L	92.00L	161.0	18.	24.90
80 82.0	41.	29.	276.	3.	2.00	22.	200.00L	230.8	26.	31.40
80 122C	75.	180.	226.	3.	1.40L	15.	9.00	73.0	23.	28.10
80 127C	10.L	3.	1000.L	1.L	.77L	10.L	2.05	236.0L	8.	10.70
80 146.1	10.L	4.	840.L	1.	1.52	26.	34.80	180.0L	11.	15.50
80 178C	10.L	18.	922.L	2.	1.10	10.L	17.60	214.0L	12.	22.20
80 205.8	692.	38.	500.L	9.	1.10	12.	6.11	117.0	21.	26.50
80 210.5	10.L	8.	1200.L	1.	2.30	11.	16.50	280.0L	7.	12.80
80 219.8	167.	56.	170.L	33.	2.83	10.L	3.23	286.9	27.	43.10
Ranger 3 Drillhole 81-continued										
81 72.4	12.	67.	450.L	2.	.60	10.L	12.00L	290.0L	14.	15.30

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	FZ	Ga N	Gd N	Ir N
Ranger 1 Drillhole 79-continued										
79 18.3	52.	63.80	3.41	6.	3.1L	.81	.00B	59.5	2300.	.01L
79 31C	87.	106.00	3.18	14.	4.0L	.41	.09	35.0L	2000.L	9400.00L
79 34.4	58.	81.80	4.70	8.	3.7	1.63	.00B	54.9	14700.	.01L
79 39.8	88.	88.50	4.12	36.	5.3	.92	.00B	18.0L	16800.	.01L
79 40.5	80.	22.00	6.45	23.	47.8	3.11	.00B	19.0L	44900.	.03L
79 51C	59.	89.60	4.45	6.	12.0L	.93	.07	37.0L	5000.L	150.00L
79 67.7	48.	68.40	5.04	12.	4.0L	.80	.00B	33.1	24000.L	.01L
79 73.4	36.	39.10	2.37	2.L	12.0L	1.81	.10	20.1	4100.L	.01L
79 77C	27.	38.60	3.33	9.	10.0L	.49	.08	28.7	4000.L	.01L
79 91.6	57.	97.00L	2.00L	3.	19.0	4.54	.08	40.0	4400.	.02L
79 106.0	164.	360.00	6.40L	9.	51.4	9.11	.09	5.3L	83400.	.08L
79 139C	217.	195.00	2.80	165.	6.0L	.69	.10	38.8	6000.L	130.00L
79 174.3	1.L	16.00L	4.20L	16.	1.6L	.13L	.00B	5.5L	610.L	.02L
79 180.7	57.	81.20	1.10L	9046.	10.1	2.40L	.00B	34.0	8700.	.01L
79 193.6	20.	37.10	1.00L	1600.	8.8L	1.40	.00B	10.0	2200.L	.01L
79 209.0	51.	82.80	1.10L	7.	6.6L	.43	.00B	19.1	1100.L	.01L
79 220C	4.	5.26	.48L	5.	8.0L	.12	.00B	1.0L	15000.L	.00
79 234.9	1.	3.01	14.80	1585.	7.8L	2.90	.00B	20.9	3600.L	.00
79 241.3	82.	92.10	4.34	17.	9.6L	1.09	.00B	24.0L	1200.L	.00
Ranger 1 Drillhole 80										
80 8C	57.	67.20	5.80	317.	2.8	.40	.00B	36.0	2000.L	.01L
80 10.0	50.	61.10	6.18	124.	3.8	.66	.00B	29.0	35000.L	.01L
80 19C	57.	118.00	4.90	754.	8.0L	1.10	.08	52.0	4000.L	.02L
80 24C	48.	52.60	4.50	5.	3.0L	.13	.08	38.0	6000.L	.01L
80 33.3	9.	16.00	1.40	5.	4.0L	.61	.00B	50.0L	3400.L	.01L
80 36C	83.	147.00	1.90	132.	24.0L	1.90	.08	45.0	15000.L	.02L
80 38.1	18.	64.70	1.90L	36.	16.0L	2.04	.00B	8.7L	5600.L	.03L
80 40C	77.	130.00	1.20	37.	6.0L	1.50	.09	62.0	8000.L	.01L
80 46.5	41.	213.00	6.00	34.	37.5	16.00	.00B	7.0	57100.	.08L
80 47.6	57.	224.00	2.10L	34.	67.8	21.50	.00B	.0B	104000.	.10L
80 48C	11.	11.00	23.70	14.	4.0L	.10	.11	67.0	2000.L	.01L
80 54C	36.	46.80	3.26	14.	6.0L	.44	.06	2.8	6000.L	.01L
80 68.2	39.	51.00	1.40	243.	12.0L	1.30	.00B	51.0	10000.L	.01L
80 75C	77.	93.10	3.20	6.	4.2L	.11L	.08	54.0L	4000.L	.01L
80 82.0	14.	26.00	.90L	7.	8.0L	1.70	.00B	27.0L	10000.L	.01L
80 122C	151.	159.00	3.15	102.	4.0L	.21	.11	33.0	2000.L	.01L
80 127C	4.	3.97	.51L	16.	6.0L	.29	.00B	2.2L	10000.L	.00
80 146.1	11.	16.90	.52L	5.	5.6L	.92	.00B	2.9L	1600.L	.00
80 178C	27.	38.00	.97L	4.	4.0L	.65	.00B	9.2	10000.L	.01L
80 205.8	25.	34.70	.90	30.	5.6L	.49	.19	23.0	3400.L	.01L
80 210.5	10.	16.70	.53L	9.	14.8L	.47	.00B	3.6L	3200.L	.00
80 219.8	64.	92.40	2.72	44.	1.0L	.14	.41	4204.0	1100.L	.01
Ranger 3 Drillhole 81										
81 72.4	174.	178.00	12.60	8.	12.0L	.41	.00B	22.0	950.L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 1 Drillhole 79-continued										
79 18.3	2.L	3.69	90.	38.	44.3	320.0L	164.10	4.	97.00L	73.
79 31C	2.L	5.84	70.	105.	130.0	380.0L	299.00	6.	640.00L	59.
79 34.4	2.L	12.60	100.	57.	64.2	2600.0L	278.70	9.	200.00L	85.
79 39.8	2.L	14.90	41.	42.	45.2	3000.0L	286.50	6.	307.00L	18.
79 40.5	2.	69.10	36.	94.	112.0	12000.0L	540.00L	4.L	1800.00L	12.
79 51C	3.	17.20	63.	62.	81.0	930.0L	567.00	6.	980.00L	44.
79 67.7	4.	20.00	42.	47.	49.3	1000.0L	246.70	4.	320.00L	19.
79 73.4	2.L	12.40	70.	84.	97.0	2700.0L	160.00	4.L	800.00L	26.
79 77C	2.L	10.60	70.	67.	82.4	570.0L	374.00	5.	290.00L	49.
79 91.6	2.L	47.00	159.	120.	134.0	10000.0L	105.00L	5.	1000.00L	120.
79 106.0	33.	268.00	207.	154.	184.0	35000.0L	418.00L	5.	2400.00L	115.
79 139C	5.	12.10	97.	93.	86.0	370.0L	1500.00	14.	110.00L	85.
79 174.3	2.L	7.73	3.	347.	413.0	9.9L	110.00L	7.	60.00L	8.
79 180.7	2.L	25.60	57.	116.	126.0	4000.0L	167.00L	4.L	340.00L	56.
79 193.6	5.	10.10	22.	2305.	2800.0	9.3L	300.00L	4.L	12.00L	14.
79 209.0	9.	12.30	53.	1007.	1400.0	4.8L	200.00L	4.L	15.00L	37.
79 220C	2.L	2.01	6.	2003.	3000.0	34.0L	210.00L	4.L	4.60L	4.
79 234.9	2.L	2.24	333.	176.	224.0	33.0L	224.20	4.L	5.00L	39.
79 241.3	11.	34.00	50.	404.	507.0	3.0L	705.00	6.	30.10	45.
Ranger 1 Drillhole 80-continued										
80 8C	2.L	12.60	42.	28.	28.6	40.0	387.00	4.	140.00	16.
80 10.0	2.L	14.80	35.	23.	27.1	1600.0L	373.40	6.	180.00L	8.
80 19C	2.L	37.10	131.	50.	56.4	1400.0L	368.00	4.	650.00L	66.
80 24C	3.	6.79	75.	84.	94.2	6.0	230.00	6.	27.00	43.
80 33.3	3.	11.90	72.	57.	71.1	800.0L	506.40	6.	68.00L	40.
80 36C	2.L	77.20	114.	102.	130.4	900.0	380.00L	4.L	210.00L	92.
80 38.1	2.L	36.60	38.	59.	83.9	7300.0L	140.00L	4.L	2300.00L	32.
80 40C	2.L	44.70	91.	104.	130.7	1170.0	152.00L	4.L	800.00	64.
80 46.5	2.L	121.00	62.	225.	233.0	20000.0L	330.00L	4.L	3000.00L	27.
80 47.6	4.	194.00	74.	283.	317.0	550.0L	776.00L	4.L	1700.00L	27.
80 48C	2.L	2.64	95.	120.	149.1	220.0L	392.00	19.	69.00L	68.
80 54C	2.L	7.91	74.	74.	84.0	400.0L	417.00	6.	730.00L	52.
80 68.2	11.	32.80	93.	61.	73.3	3000.0L	112.00	4.L	200.00L	56.
80 75C	2.L	3.61	90.	67.	79.0	204.0	188.00	5.	66.00	89.
80 82.0	3.	11.30	117.	85.	102.0	2000.0L	123.80	6.	300.00L	60.
80 122C	4.	5.45	70.	53.	61.3	11.0L	1370.00	9.	140.00L	44.
80 127C	2.L	2.75	45.	1326.	1600.0	170.0L	400.00	4.L	71.00L	9.
80 146.1	47.	63.20	37.	960.	1100.0	6.4L	281.00	4.L	81.00	10.
80 178C	14.	28.70	59.	1303.	1600.0	250.0L	184.00	4.L	130.00L	36.
80 205.8	7.	13.50	102.	513.	534.9	160.0L	565.10	4.	86.00L	51.
80 210.5	20.	31.20	28.	1973.	2500.0	3.4L	180.00L	4.L	21.00L	13.
80 219.8	2.L	3.53	254.	94.	116.3	7.0L	96.90	20.	26.00L	62.
Ranger 3 Drillhole 81-continued										
81 72.4	2.L	2.15	90.	353.	399.0	75.0L	205.00	8.	20.00	57.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 1 Drillhole 79-continued										
79 18.3	373.	47.	4.1	67.	11.	16.70	.60L	2.	.90	.50L
79 31C	196.	97.	8.1	126.	9.	14.50	.66L	4.	3.40	.71L
79 34.4	414.	186.	7.1	175.	11.	21.00	.60L	3.	1.20	.80L
79 39.8	47.	123.	9.1	188.	7.	8.21	.20L	6.	1.10	.40L
79 40.5	69.	473.	33.1	233.	12.	14.40	6.50L	9.	2.30	1.90
79 51C	248.	217.	13.1	170.	8.	16.50	1.30	6.	.90	.90L
79 67.7	329.	44.	9.1	267.	6.	11.60	.10L	10.	.80	.50
79 73.4	385.	157.	0.B	87.	7.	8.28	1.80	5.	2.00L	.70
79 77C	200.	118.	0.B	117.	8.	12.00	1.20	4.	1.50	.64L
79 91.6	703.	387.	17.1	64.1	16.	20.60	19.00L	4.	6.00L	3.10
79 106.0	463.	873.	99.1	200.1	25.	46.00	5.40L	13.	17.00L	3.60L
79 139C	143.	372.	17.1	95.	16.	21.50	4.90	19.	2.60	1.10
79 174.3	64.	30.	3.1	150.1	1.1	2.66	4.66	11.	3.70L	2.60L
79 180.7	1024.	165.	14.1	33.1	6.	8.23	1.20L	7.	.00B	1.80
79 193.6	256.	10.1	5.1	29.1	7.	12.90	5.00	7.	3.40L	1.40
79 209.0	100.	18.	0.B	33.1	4.	8.52	2.30L	4.	1.20	.40
79 220C	5.1	10.1	1.1	16.1	1.	1.24	.78	11.	.52L	.29L
79 234.9	3222.	85.	15.1	112.	1.	2.49	1.28	16.	1.12	.25L
79 241.3	635.	10.1	0.B	124.	5.	10.30	3.57	10.	.60	.64
Ranger 1 Drillhole 80										
80 8C	279.	219.	20.1	270.	9.	12.50	.80	6.	.90	.90
80 10.0	216.	49.	10.1	280.	6.	9.99	.20L	5.	.90	.60
80 19C	331.	163.	0.B	140.	15.	34.30	2.90	6.	4.70	2.30
80 24C	328.	51.	15.1	110.	8.	12.00	.70	3.	1.10	.59L
80 33.3	102.	103.	8.1	67.	5.	7.88	.16	4.	.80	.48
80 36C	148.	1021.	51.1	80.	14.	24.50	3.70	6.	7.10L	2.80
80 38.1	87.	413.	15.1	67.1	5.	9.04	2.94	2.	5.00L	3.30
80 40C	318.	522.	0.B	57.	8.	13.80	2.90	4.	.90	2.20
80 46.5	107.	1265.	63.1	150.	21.	45.50	6.90L	6.	16.00L	9.00
80 47.6	207.	3043.	0.B	210.1	26.	31.70	11.00L	5.	17.00L	16.00
80 48C	890.	15.	16.1	248.	4.	5.92	.52	5.	10.30	.54L
80 54C	223.	103.	10.1	150.	9.	11.90	4.25	4.	2.80	.82L
80 68.2	191.	556.	18.1	36.1	8.	10.70	2.50	6.	1.00L	1.40
80 75C	527.	56.	7.1	115.	10.	17.10	.70	2.	1.09	.60
80 82.0	147.	58.	6.1	32.1	8.	11.40	1.00L	2.	2.00L	.60L
80 122C	147.	16.	0.B	82.	11.	14.70	1.55	12.	2.17	.63L
80 127C	23.	10.1	8.1	14.1	2.	2.77	.91	7.	1.50L	.37
80 146.1	305.	11.	13.	18.1	1.	1.84	5.10	4.	1.20L	1.10
80 178C	74.	10.1	3.1	26.1	4.	6.27	3.59	7.	2.90L	.50
80 205.8	1034.	61.	0.B	25.1	6.	9.13	1.23	23.	2.27	.70
80 210.5	123.	16.	6.	17.1	1.	2.85	3.01	7.	1.50L	.29L
80 219.8	3485.	10.1	0.B	57.	7.	12.20	.04L	24.	7.93	.67L
Ranger 3 Drillhole 81										
81 72.4	469.	10.1	0.B	221.	10.	14.60	.58	5.	1.00	.50L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 1 Drillhole 79-continued										
79 18.3	11.	15.00	.50	1556.	1.30L	134.	157.0	1.00L	5.	.67
79 31C	10.	13.80	.61	1714.	.96L	106.	202.0	175.00	9.	2.12
79 34.4	16.	22.10	.62	2798.	3.00L	202.	312.0	5.20	11.	1.71
79 39.8	14.	10.50	.46	2032.	2.00L	71.	149.0	3.80	13.	.91
79 40.5	29.	5.79	.39	1384.	9.00L	54.	336.0	6.00	30.	6.38
79 51C	12.	19.30	.42	1562.	2.00	106.	210.0	9.62	15.	.50
79 67.7	9.	18.00	.47	2201.	.70	64.	105.0	6.30	7.	1.34
79 73.4	12.	9.53	.32	1278.	1.00L	43.	76.8	5.52	12.	1.11
79 77C	14.	17.90	.34	1410.	2.70L	88.	169.0	6.40	16.	2.31
79 91.6	26.	15.00	.50	2234.	5.00L	187.	474.0	10.00L	44.	7.31
79 106.0	67.	56.40	.62	2877.	27.00L	323.	973.0	30.00L	55.	6.00L
79 139C	15.	19.00	.91	3816.	3.10L	202.	245.0	55.80	15.	2.37
79 174.3	2.L	1.50L	.02L	41.	5.50L	115.	202.0	92.60	1.	1.50L
79 180.7	4.	11.50	.03	210.	3.30L	93.	162.0	2.50	21.	1.26
79 193.6	3.	4.46	.10	98.	.60	11.	13.9	1.10L	7.	1.66
79 209.0	9.	8.37	.26	235.	1.90L	31.	39.7	5.56	5.	1.14
79 220C	2.L	1.22	.02L	78.	.84L	4.	76.0L	6.38	2.	.24
79 234.9	2.L	1.10	.02L	93.	.70L	12.	13.3	.70L	6.	.42
79 241.3	8.	10.30	.50	2726.	.90L	90.	94.0	2.00L	5.	.80
Ranger 1 Drillhole 80-continued										
80 8C	8.	16.30	.57	1536.	2.20L	77.	139.0	4.80L	32.	2.60
80 10.0	9.	16.40	.50	1787.	1.50L	54.	113.0	4.60	17.	1.59
80 19C	18.	25.70	.52	1632.	4.70L	182.	345.0	15.00	25.	3.80
80 24C	12.	16.80	.47	1440.	1.10	76.	110.0	4.40L	7.	1.10
80 33.3	19.	23.50	.19	726.	1.00L	62.	108.0	1.00L	14.	1.70
80 36C	21.	14.20	.33	1101.	2.90	174.	503.0	10.00	29.	4.30
80 38.1	2.L	4.07	.07	242.	7.20L	40.	231.0	12.00	18.	3.70
80 40C	15.	13.70	.38	1146.	3.40L	119.	240.0	56.00	21.	3.50
80 46.5	34.	13.90	.18	905.	24.00L	125.	482.0	14.00L	63.	14.60
80 47.6	66.	11.70	.21	720.	28.00L	76.	681.0	36.00L	145.	18.00
80 48C	2.L	2.00	.02L	24.	2.80	65.	77.4	3.60L	3.	.48L
80 54C	11.	17.20	.39	1637.	3.30L	98.	155.0	95.90	14.	.82L
80 68.2	18.	14.60	.20	757.	2.00L	94.	267.0	9.00	21.	1.60
80 75C	12.	20.10	.53	1211.	2.40L	152.	198.0	27.40	7.	1.63
80 82.0	22.	21.70	.20	841.	2.00L	87.	217.0	6.40	23.	2.10
80 122C	11.	15.60	.73	2031.	1.82	100.	118.0	19.00	3.	1.51
80 127C	2.L	.16	.02L	24.	.79L	5.	72.0L	1.21	4.	.58
80 146.1	2.L	2.18	.06	152.	.30	11.	14.0	.80L	12.	.64
80 178C	2.L	5.07	.12	122.	1.50L	17.	42.0L	2.80	10.	1.10
80 205.8	13.	8.29	.09	318.	1.60L	45.	64.0	10.50	10.	1.45
80 210.5	2.L	2.69	.05	55.	.50	6.	44.0L	1.92	8.	.64
80 219.8	7.	11.40	.64	2715.	2.10L	62.	71.2	35.90	3.	.46L
Ranger 3 Drillhole 81-continued										
81 72.4	9.	13.50	.59	2532.	.90L	145.	155.0	.20L	8.	.80

APPENDIX I. Chemical Analyses of Samples from the Renger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHYPE	ALTYPE	ORETYPE	OXYTE
Renger 1 Drillhole 79-continued										
79 18.3	81.	76.	661.	10129.900	10000.000	1006.400	5.	1.	4.	1.
79 31C	44.	75.	1700.L	10129.900	10000.100	993.700	5.	2.	4.	1.
79 34.4	23.	121.	1920.	10129.900	10000.100	990.300	5.	1.	5.	1.
79 39.8	38.	142.	13000.L	10129.900	10000.100	984.900	5.	1.	6.	1.
79 40.5	23.	118.	65000.L	10129.900	10000.100	984.200	5.	1.	5.	2.
79 51C	53.	79.	4200.L	10129.900	10000.100	973.700	5.	2.	5.	3.
79 67.7	49.	89.	1570.	10129.900	10000.100	957.000	5.	2.	4.	3.
79 73.4	71.	68.	13000.L	10129.900	10000.100	951.300	5.	3.	6.	3.
79 77C	40.	70.	2500.L	10129.900	10000.100	947.700	5.	2.	4.	3.
79 91.6	69.	107.	60000.L	10129.900	10000.100	933.100	5.	3.	5.	3.
79 106.0	149.	104.	19000.L	10129.900	10000.100	918.700	5.	3.	6.	2.
79 139C	112.	153.	1700.L	10129.900	10000.100	885.700	10.	2.	4.	3.
79 174.3	24.	2.L	1500.L	10129.900	10000.100	850.400	8.	5.	3.	2.
79 180.7	80.	8.	1660.	10129.900	10000.100	844.000	9.	4.	6.	2.
79 193.6	19.	14.	400.L	10129.900	10000.100	831.100	8.	5.	3.	2.
79 209.0	41.	19.	430.L	10129.900	10000.100	815.700	8.	2.	3.	3.
79 220C	2.L	2.	180.L	10129.900	10000.100	804.700	7.	6.	2.	3.
79 234.9	24.	19.	32.	10129.900	10000.100	789.800	13.	3.	4.	3.
79 241.3	47.	114.	170.L	10129.900	10000.100	783.400	14.	6.	2.	3.
Renger 1 Drillhole 80										
80 8C	65.	68.	800.	10149.900	9949.898	1014.840	5.	1.	4.	1.
80 10.0	54.	79.	1920.	10149.900	9949.898	1012.840	5.	1.	4.	1.
80 19C	97.	79.	20200.	10149.900	9949.898	1003.840	5.	1.	4.	1.
80 24C	63.	79.	74.	10149.900	9949.898	998.840	5.	2.	3.	1.
80 33.3	50.	82.	4000.L	10149.900	9949.898	989.540	5.	2.	5.	1.
80 36C	134.	48.	8200.	10149.900	9949.898	986.840	5.	3.	5.	4.
80 38.1	72.	20.	32000.L	10149.900	9949.898	984.740	5.	5.	5.	1.
80 40C	82.	73.	7600.	10149.900	9949.898	982.840	5.	2.	5.	1.
80 46.5	122.	65.	1500.L	10149.900	9949.898	976.340	5.	4.	6.	3.
80 47.6	63.	63.	2500.L	10149.900	9949.898	975.240	5.	4.	6.	3.
80 48C	54.	37.	370.	10149.900	9949.898	974.840	3.	2.	3.	3.
80 54C	39.	79.	2100.L	10149.900	9949.898	968.840	5.	2.	4.	3.
80 68.2	43.	50.	20000.L	10149.900	9949.898	954.640	9.	4.	4.	3.
80 75C	65.	88.	780.L	10149.900	9949.898	947.840	5.	2.	4.	3.
80 82.0	69.	89.	10000.L	10149.900	9949.898	940.840	5.	3.	4.	3.
80 122C	44.	92.	130.L	10149.900	9949.898	900.840	10.	2.	3.	3.
80 127C	15.	2.L	77.L	10149.900	9949.898	895.840	7.	6.	3.	3.
80 146.1	18.	10.	290.L	10149.900	9949.898	876.740	8.	2.	2.	3.
80 178C	15.	14.	560.L	10149.900	9949.898	844.840	8.	3.	3.	3.
80 205.8	44.	21.	803.	10149.900	9949.898	817.040	13.	3.	2.	3.
80 210.5	2.	8.	79.	10149.900	9949.898	812.340	7.	2.	2.	3.
80 219.8	43.	14.	167.	10149.900	9949.898	803.040	8.	3.	2.	3.
Renger 3 Drillhole 81										
81 72.4	108.	78.	80.L	10150.000	9900.000	950.700	5.	3.	2.	3.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	SiO2%	Al2O3%	T-Fe2O3%	FeO%	MgO%	CaO%	K2O%	U	N	As	N	Au	N
Ranger 3 Drillhole 81-continued													
81 121C	60.10	17.60	3.89	2.41	8.47	.03	3.04	62.00		.93L		.03L	
81 133.0	61.20	17.00	4.36	2.86	8.43	.05	2.67	21.80		.70L		.02	
81 183C	13.00	4.82	2.49	.00B	36.50	3.40	.02	173.00		.74L		.03	
Ranger 3 Drillhole 82													
82 407.2	4.50	.27	.56	.00B	21.60	29.10	.02L	8.30		.12L		.00	
82 414.2	.64	.21	3.28	.66	20.40	30.00	.02L	243.70		.37L		.67	
82 419.6	17.50	11.10	10.10	.00B	21.50	12.30	.02L	9000.00		.00B		.00B	
82 425.6	44.70	15.10	9.86	.00B	19.90	.74	.02L	1670.00		1.00		.16	
82 429.5	49.10	14.10	8.07	.00B	18.70	.71	.02L	51.70		.30L		.00	
82 430.1	8.36	2.38	1.77	.00B	20.40	26.10	.03	1.40		.20L		.00	
82 440.3	7.02	1.85	1.23	.00B	20.50	27.00	.02L	2.70		.44L		.01	
82 443.4	4.230	7.43	4.84	3.52	15.90	9.82	.02L	4060.00		2.00L		.49	
82 443.7	7.55	2.26	1.94	.00B	20.40	25.80	.02L	9.50		.33L		.01	
82 452.0	29.40	18.70	11.60	.00B	25.30	1.10	.02L	3990.00		2.00L		.04L	
82 459.6	31.30	21.90	11.10	.00B	22.50	.12	.20	1.40		1.57		.00	
Ranger 3 Drillhole 83													
83 18.0	65.20	17.60	4.63	.00B	2.67	.07	4.11	6.29		.60L		.00	
83 34.0	65.40	18.60	2.85	1.25	3.34	.06	4.23	6.20		1.30L		.03L	
83 61.9	57.20	22.60	3.02	1.17	4.45	.18	5.18	4.40		1.30L		.02L	
83 74.4	76.00	11.30	1.46	.00B	11.30	.12	1.45	2.60		.54L		.01L	
83 99.6	52.30	20.20	3.74	.00B	11.70	.05	2.74	2.50		.77L		.06	
83 122.3	76.40	12.80	1.12	.53	2.53	.08	3.17	111.80		.55L		.01L	
83 127.0	67.60	17.10	.77	.36	2.27	.64	4.68	11.50		3.59		.01	
83 128.3	83.30	8.20	1.19	.15	.79	.25	2.32	4.70		2.07		.46	
83 136.3	61.10	20.90	.99	.00B	2.42	.52	6.61	196.00		.90		2.06	
83 141.9	58.00	22.80	1.05	.30	2.80	.57	6.81	9.70		.60L		.01L	
83 158.6	58.40	15.50	6.67	.00B	11.80	.33	.72	9.80		.49L		.08	
83 170.4	55.50	17.00	6.57	.00B	11.80	.20	1.52	8.00		.20L		.00	
83 204.3	50.80	16.90	7.15	.00B	9.81	.22	2.16	5.17		.30L		.00	
83 223.7	52.00	16.00	6.79	.00B	16.20	.21	.08	54.00		.30L		.00	
83 268.1	53.20	16.10	5.31	3.16	15.50	.44	.17	19.20		.35L		.02	
83 284.8	71.70	12.10	2.87	1.44	5.54	.08	1.93	3900.00		29.00		.29	
83 293.0	76.40	7.08	4.00	2.64	7.01	.05	.30	7010.00		5.00		.07	
83 294.9	59.00	11.00	4.15	2.51	12.70	.62	.08	15700.00		.00B		.00B	
83 295.9	75.70	7.19	2.59	1.55	8.28	.27	.04	3010.00		6.00L		.14	
83 298.0	40.40	17.30	6.39	4.09	19.10	1.39	.04	6670.00		8.00L		.10L	
83 325.2	48.10	16.80	6.11	.00B	18.20	.16	.02L	2130.00		3.00L		.20L	
83 355.7	52.10	15.20	8.02	.00B	15.10	.15	.14	141.00		2.00L		.01L	
83 371.3	63.30	10.70	5.27	.00B	11.60	.18	.03	8500.00		.00B		.75	
83 372.5	44.30	16.00	10.30	.00B	12.50	1.67	1.67	11900.00		21.00L		.70	
83 373.3	36.30	14.90	13.20	6.34	17.60	.13	.06	19700.00		.00B		.00B	
83 373.8	54.20	13.50	6.82	4.61	14.60	.10	.26	4670.00		6.00L		.07L	
83 379.3	76.60	7.32	2.56	.00B	6.72	.94	.08	1800.00		4.00L		.03L	

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br	N	Ce	Ce N	Cl	N	Co	Co N
Ranger 3 Drillhole 81-continued												
81 121C	168.	223.	350.	3.	1.60L	12.	7.37	71.0	22.	29.60		
81 133.0	43.	199.	580.L	4.	.70L	10.L	9.72	85.0	23.	26.40		
81 183C	10.	6.	1000.L	2.	6.30	10.	29.60	337.0	13.	24.30		
Ranger 3 Drillhole 82-continued												
82 407.2	10.L	2.L	451.	1.L	4.38	10.L	2.18	212.0	4.L	2.37		
82 414.2	10.L	2.L	120.	1.L	6.26	10.L	14.00L	456.4	4.L	6.53		
82 419.6	38.	2.	13000.	3.	.00B	10.L	.00B	990.0L	48.	.00B		
82 425.6	16.	5.	6400.L	3.	3.00L	10.	480.00L	236.0L	44.	57.40		
82 429.5	10.	3.	270.L	3.	1.04	10.L	14.00L	140.0	36.	44.40		
82 430.1	10.L	4.	700.L	1.	16.40	10.	6.43	1400.0	6.	8.16		
82 440.3	10.L	3.	600.L	1.L	12.40	15.	23.20	1200.0	4.	4.60		
82 443.4	17.	12.	6600.	2.	4.00	10.L	1000.00L	650.0L	23.	27.30		
82 443.7	10.L	3.	440.L	1.L	12.80	10.L	13.20	1200.0	7.	9.33		
82 452.0	10.	4.	11000.L	5.	3.00L	14.	800.00L	326.0L	52.	71.00		
82 459.6	10.L	6.	1100.L	6.	.50L	10.L	2.00L	280.0L	26.	29.50		
Ranger 3 Drillhole 83-continued												
83 18.0	28.	466.	870.L	2.	.70L	40.	72.50	180.0L	11.	12.10		
83 34.0	98.	495.	529.	2.	1.90L	54.	4.18	70.0L	6.	6.94		
83 61.9	51.	801.	921.	3.	1.60L	74.	96.40	77.8	6.	8.72		
83 74.4	94.	238.	241.	4.	1.70	40.	44.00	149.7	6.	6.13		
83 99.6	78.	208.	224.	4.	1.10L	39.	56.10	114.0	16.	19.90		
83 122.3	76.	371.	481.	3.	.75L	63.	67.70	60.4	4.L	3.51		
83 127.0	310.	24.	54.L	4.	1.70	10.L	9.16	174.0	5.	6.02		
83 128.3	138.	31.	71.L	6.	3.12	11.	3.87	232.0	10.	9.30		
83 136.3	360.	34.	172.	6.	1.30	14.	50.00L	180.0	4.L	2.14		
83 141.9	354.	31.	91.L	5.	1.20	11.	7.45	152.0	4.	5.14		
83 158.6	184.	8.	160.L	4.	1.50	10.L	10.40	123.1	29.	30.20		
83 170.4	725.	12.	120.L	3.	.64	10.L	4.15	97.1	29.	30.00		
83 204.3	110.	24.	270.L	5.	.91	10.L	6.27	140.0	30.	32.40		
83 223.7	117.	6.	260.L	4.	.50	10.L	15.00L	110.0	33.	38.30		
83 268.1	90.	5.	180.L	4.	1.40	12.	1.50	158.3	26.	30.30		
83 284.8	57.	106.	6900.	3.	4.00L	12.	1000.00L	540.0L	19.	19.30		
83 293.0	15.	34.	14000.L	1.	6.40L	10.	2000.00L	332.0L	22.	37.00		
83 294.9	95.	13.	27000.	5.	.00B	10.L	.00B	1500.0L	37.	.00B		
83 295.9	21.	29.	9400.	3.	8.00L	10.L	1600.00L	870.0L	21.	39.50		
83 298.0	156.	26.	12000.	7.	11.00L	60.	2000.00L	780.0L	37.	46.50		
83 325.2	101.	7.	4300.	5.	3.00L	10.L	600.00L	320.0L	30.	38.50		
83 355.7	20.	6.	350.L	3.	2.00L	10.L	39.00L	96.4	38.	44.80		
83 371.3	14.	16.	18000.L	5.	6.00L	13.	1300.00L	518.0L	27.	24.50		
83 372.5	10.L	74.	30000.L	4.	28.00L	10.L	1000.00L	770.0L	49.	27.10		
83 373.3	10.L	8.	45000.L	4.	.00B	10.L	1100.00L	1100.0L	61.	.00B		
83 373.8	26.	31.	7700.	3.	8.00L	10.L	13000.00L	460.0L	40.	50.60		
83 379.3	26.	21.	3700.L	2.	2.00L	21.	420.00L	309.0	11.	10.40		

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	FZ	Ga N	Gd N	Ir N
Ranger 3 Drillhole 81-continued										
81 121C	147.	172.00	3.15	4.	3.0L	.22	.09	44.0	1000.L	7600.00L
81 133.0	148.	150.00	1.85	4.	2.8L	.31	.07	56.0	930.L	.01L
81 183C	30.	49.90	1.10L	34.	10.0L	.90	.00B	12.0	12000.L	.01L
Ranger 3 Drillhole 82										
82 407.2	1.L	1.40	.18L	6.	3.0L	.16	.00B	1.0L	4000.L	.00
82 414.2	1.L	22.60	.36L	2.	2.0L	.10	.01L	13.8	1700.L	.00
82 419.6	67.	.00B	.00B	119.	76.0L	.00B	.00B	.0B	2500.	.00B
82 425.6	84.	114.00	2.50	320.	7.6	1.60	.00B	57.5	8300.	.01L
82 429.5	85.	95.30	1.55	67.	5.6L	.04L	.00B	50.0	830.L	.00
82 430.1	11.	14.60	.50	3.	4.6L	.09	.00B	.0B	1300.L	.00
82 440.3	9.	12.00	.09	7.	6.0L	.53	.00B	.0B	800.L	.00
82 443.4	46.	73.30	2.00L	19.	45.0L	2.10	.07	23.0	5300.L	.02L
82 443.7	10.	15.80	.30	39.	5.4L	.43	.00B	5.9	1800.L	.00
82 452.0	86.	117.00	2.30L	55.	23.0L	3.51	.00B	61.8	42000.L	.02L
82 459.6	159.	175.00	2.48	5.	34.0L	.70L	.00B	22.4	2300.L	.01L
Ranger 3 Drillhole 83										
83 18.0	140.	135.00	4.65	5.	4.2L	1.73	.00B	22.0	750.L	.01L
83 34.0	115.	123.00	6.84	3.	6.0L	.48	.05	37.0	1800.L	2.40L
83 61.9	165.	199.00	3.88	12.	12.0L	.93	.06	38.0	2800.L	.01L
83 74.4	40.	45.00	2.10	5.	5.2L	.31	.00B	29.0	1000.L	.00
83 99.6	88.	108.00	5.34	5.	6.0L	.52	.00B	63.0	2400.L	.00
83 122.3	46.	53.50	4.61	59.	9.0L	.53	.05	32.0	2600.L	.00
83 127.0	497.	499.00	3.13	13.	1.0L	.94	.06	78.3	820.	.01L
83 128.3	230.	226.00	2.61	13.	.9L	.20	.04	33.3	500.L	.00
83 136.3	305.	265.00	5.78	97.	3.3L	.57	.00B	75.0	1200.L	.01L
83 141.9	391.	3.62	6.44	16.	1.9L	.27	.03	63.3	1200.L	.01L
83 158.6	15.	18.60	1.17	2.	1.0L	.05	.00B	42.4	1600.L	.00
83 170.4	51.	52.60	1.71	6.	2.6L	.20L	.00B	45.7	1600.L	.00
83 204.3	57.	59.20	4.74	5.	5.6L	.39	.00B	24.3	730.L	.01L
83 223.7	52.	61.20	1.40	5.	5.1L	.30L	.00B	37.0	870.L	.01L
83 268.1	1.L	2.00	13.20	17.	1.6L	.04	.12	35.7	900.L	.00
83 284.8	24.	44.20	1.50	33.	59.0L	2.00	.06	78.0L	6000.L	.01L
83 293.0	9.	42.00	2.00	63.	18.6	3.20	.03	.0B	21700.	.03L
83 294.9	45.	.00B	.00B	2170.	.0B	.00B	.07	.0B	17000.L	.00B
83 295.9	27.	871.00	3.00L	698.	65.0L	4.25	.05	55.0L	10000.L	.03L
83 298.0	925.	1010.00	3.00L	66.	42.0	5.61	.08	.0B	14000.L	.03L
83 325.2	46.	70.30	1.00L	23.	46.0L	2.20	.00B	90.0L	4900.L	.01L
83 335.7	50.	55.70	1.50	8.	6.6L	.10L	.00B	120.0L	1000.L	.01L
83 371.3	128.	76.40	.70L	93.	39.9	2.00	.00B	33.0	23200.	.02L
83 372.5	111.	100.00	2.40	14.	42.5	.90L	.00B	93.0L	35100.	.02L
83 373.3	72.	.00B	.00B	25.	73.2	.00B	.09	.0B	42400.	.00B
83 373.8	72.	110.00	2.00L	76.	37.0L	.90L	.07	.0B	12000.L	.20L
83 379.3	63.	68.00	1.00L	7.	10.0L	1.00L	.00B	.0B	7400.	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 3 Drillhole 81-continued										
81 121C	4.	4.80	64.	34.	47.5	340.0L	1400.00	10.	150.00L	56.
81 133-0	2.1L	2.30L	76.	48.	59.0	50.0L	1100.00	9.	9.00L	92.
81 183C	16.	35.30	102.	1460.	2000.0	620.0L	92.00	4.	220.00L	53.
Ranger 3 Drillhole 82-continued										
82 407.2	2.1L	2.80	15.	754.	883.0	22.0L	191.00	6.	5.00L	7.
82 414.2	2.1L	2.90	3.	3349.	58.5	130.0L	192.40	6.	150.00L	2.
82 419.6	2.1L	.00B	80.	2153.	2490.0	.0B	940.00L	14.	.00B	92.
82 425.6	2.1L	18.20	100.	192.	218.0	4500.0L	379.10	4.	290.00L	136.
82 429.5	2.1L	1.30	91.	168.	192.0	100.0L	390.00	4.1L	4.00L	131.
82 430.1	2.	3.73	22.	944.	1100.0	3.3L	246.00	6.	9.23L	19.
82 440.3	27.	50.60	22.	583.	711.3	.7L	170.00	6.	50.00	6.
82 443.4	3.	48.40	68.	420.	459.0	9000.0L	1300.00L	4.	2000.00L	58.
82 443.7	18.	30.50	16.	606.	705.2	73.0L	158.70	7.	22.00L	13.
82 452.0	3.	30.80	145.	234.	284.0	10000.0L	658.00	6.	1600.00L	176.
82 459.6	2.1L	.24	135.	891.	1060.0	3.0L	688.00	4.1L	24.00L	47.
Ranger 3 Drillhole 83-continued										
83 18.0	20.	44.00	37.	159.	180.0	18.0L	3200.00	10.	31.00L	39.
83 34.0	31.	39.70	50.	55.	61.2	320.0L	3000.00	9.	120.00L	33.
83 61.9	40.	56.80	65.	66.	81.3	15.0L	3300.00	12.	82.00L	46.
83 74.4	21.	27.70	97.	60.	65.0	92.0L	348.40	4.1L	44.00	45.
83 99.6	18.	32.30	181.	109.	130.0	190.0L	930.30	10.	45.00	132.
83 122.3	34.	42.30	37.	65.	73.8	59.0L	972.30	6.	88.00L	21.
83 127.0	4.	4.33	46.	27.	27.0	16.4	251.00	6.	8.00L	32.
83 128.3	4.	1.35	19.	23.	21.3	3.4	182.00	8.	15.00L	47.
83 136.3	4.	4.86	40.	31.	33.5	370.0L	425.00	6.	37.00L	26.
83 141.9	3.	3.26	38.	36.	37.5	20.0L	359.00	7.	30.00L	34.
83 158.6	7.	15.00	128.	145.	221.2	120.0L	688.10	6.	42.00L	73.
83 170.4	2.1L	.90	112.	117.	122.0	20.0L	373.00	4.	5.00L	73.
83 204.3	2.1L	3.32	172.	200.	220.0	10.0L	433.00	7.	15.00L	46.
83 223.7	2.1L	2.07	161.	94.	114.0	120.0L	368.00	4.	20.00L	125.
83 268.1	4.	1.10	140.	150.	228.3	56.0L	769.20	12.	4.20L	117.
83 284.8	5.	219.00	88.	87.	110.0	3000.0L	864.00	8.	6000.00L	58.
83 293.0	2.1L	100.00L	51.	64.	72.9	20000.0L	342.00	4.1L	1700.00L	42.
83 294.9	2.	.00B	140.	142.	183.0	.0B	1600.00	4.1L	.00B	123.
83 295.9	2.	116.00	71.	82.	190.0	8000.0L	580.00	4.1L	1000.00L	84.
83 298.0	24.	145.00	223.	191.	210.0	18000.0L	970.00	9.	1000.00L	194.
83 325.2	2.1L	51.00	150.	155.	170.0	5500.0L	620.00L	4.1L	900.00L	207.
83 355.7	2.1L	5.94	142.	125.	146.0	330.0L	229.00	4.1L	22.00L	104.
83 371.3	2.	62.30	112.	133.	174.0	12000.0L	325.00	4.1L	2200.00L	76.
83 372.5	2.1L	253.00	100.	84.	105.0	30000.0L	628.00L	4.1L	6000.00L	129.
83 373.3	2.1L	.00B	115.	103.	102.0	.0B	1800.00L	4.1L	.00B	143.
83 373.8	2.1L	105.00	116.	91.	105.0	12000.0L	280.00	5.	2000.00L	128.
83 379.3	8.	85.70	81.	78.	81.4	3600.0L	302.00	4.1L	200.00L	69.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 3 Drillhole 81-continued										
81 121C	77.	16.	15.L	72.	11.	16.70	5.65	14.	2.50	.67L
81 133.0	139.	10.L	0.B	86.	9.	13.80	.30L	10.	1.08	.40L
81 183C	67.	92.	7.L	31.L	2.	6.46	4.42	7.	3.30L	1.10
Ranger 3 Drillhole 82										
82 407.2	186.	10.L	2.L	6.L	1.	.70	.55	37.	.49L	.29
82 414.2	5.L	11.	4.L	9.L	21.	5.22	.24	29.	.80	.22
82 419.6	2274.	2062.	0.B	0.B	18.	.00B	.00B	14.	.00B	.00B
82 425.6	187.	372.	15.L	37.L	5.	11.00	3.30L	9.	.90	.90L
82 429.5	218.	36.	4.L	22.L	6.	9.19	.08L	7.	.91	.50L
82 430.1	5.L	10.L	3.L	9.L	1.	2.28	.03	16.	.81L	.17L
82 440.3	93.	10.L	15.	6.L	1.	1.20	3.37	13.	.5L	.48
82 443.4	675.	1140.	0.B	54.L	13.	16.10	.90L	12.	5.00L	2.10
82 443.7	83.	10.L	8.	9.L	1.	2.21	2.46	12.	.83L	.53
82 452.0	1810.	787.	20.L	73.L	7.	12.70	2.10	9.	6.00L	.35L
82 459.6	207.	10.L	6.L	26.L	11.	19.00	2.16	9.	1.20	.60L
Ranger 3 Drillhole 83										
83 18.0	334.	10.L	12.L	193.	10.	12.90	3.67	21.	.60L	.30L
83 34.0	180.	16.	28.L	160.	12.	14.50	3.97	35.	.80	.70
83 61.9	501.	34.	0.B	209.	15.	21.20	.49	46.	1.00	1.10
83 74.4	354.	10.L	10.L	57.	6.	7.96	3.08	4.	.50	.45
83 99.6	64.	10.L	14.L	121.	10.	15.40	4.04	7.	1.90	.70
83 122.3	218.	14.	22.	94.	7.	9.65	.27	12.	1.00	.90
83 127.0	2108.	11.	6.L	102.	30.	35.50	.80L	9.	1.10	.60L
83 128.3	842.	27.	3.L	79.	11.	12.70	.53	7.	4.19	.40L
83 136.3	1579.	33.	6.L	140.	34.	33.80	2.00L	9.	.30L	.70L
83 141.9	1766.	20.	6.L	164.	32.	35.70	1.06	10.	.90L	.80L
83 158.6	779.	10.L	9.L	27.	5.	6.25	.39	5.	4.86	.18L
83 170.4	535.	10.L	3.L	57.	9.	11.90	.07	5.	.70	.40L
83 204.3	543.	15.	5.L	88.	10.	12.90	.58	7.	.40L	.50L
83 223.7	582.	10.L	4.L	23.L	6.	9.62	.44	4.	.50L	.50L
83 268.1	1024.	13.	7.L	34.	2.	2.99	.03L	7.	5.35	.11L
83 284.8	175.	1211.	130.L	103.	13.	15.20	1.00L	9.	1.00L	1.70
83 293.0	65.	1135.	41.L	37.L	9.	18.10	200.00L	6.	.00B	1.50
83 294.9	401.	3683.	0.B	0.B	26.	.00B	.00B	12.	.00B	.00B
83 295.9	257.	1100.	62.L	78.L	8.	35.70	13.00L	12.	8.00L	3.80
83 298.0	4591.	878.	83.L	88.L	32.	41.80	11.00L	43.	1.00L	3.00L
83 325.2	422.	144.	36.L	44.L	12.	17.00	4.00L	5.	4.00L	1.90
83 355.7	400.	31.	0.B	22.L	5.	11.40	.10L	3.	2.00L	.50L
83 371.3	286.	1370.	36.L	25.L	16.	16.50	1.00L	8.	5.00L	.40L
83 372.5	226.	1768.	300.L	51.L	19.	12.30	4.00L	12.	4.00L	.90L
83 373.3	235.	3326.	0.B	0.B	24.	.00B	.00B	6.	.00B	.00B
83 373.8	270.	1222.	84.	67.L	14.	19.00	1.00L	5.	2.00L	1.00L
83 379.3	2671.	341.	0.B	32.L	9.	10.70	3.00L	11.	4.00L	.70L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 3 Drillhole 81-continued										
81 121C	12.	15.20	.80	2558.	2.00	109.	145.0	84.10	4.	1.36
81 133.0	4.	15.50	.79	2546.	1.00L	93.	104.0	2.00L	4.	.90
81 183C	2.L	5.04	.16	236.	2.10L	25.	140.0L	4.70	14.	1.83
Ranger 3 Drillhole 82-continued										
82 407.2	5.	.18	.02L	10.L	.35L	2.L	46.0L	.22	6.	.33
82 414.2	5.	1.89	.02L	10.L	.66L	8.	65.3	1.20	10.	.30
82 419.6	51.	.00B	.19	1085.	.00B	83.	243.0	.00B	94.	.00B
82 425.6	9.	11.80	.34	948.	3.00L	160.	268.0	4.90L	13.	1.40
82 429.5	6.	4.65	.39	705.	.80L	137.	153.0	.70L	3.	.30L
82 430.1	8.	3.07	.05	100.	.36L	9.	11.1	.60	3.	.27
82 440.3	6.	1.93	.04	146.	.57	6.	14.0L	1.00L	19.	.53
82 443.4	23.	5.22	.21	1091.	5.00L	83.	134.0	7.00L	36.	3.20
82 443.7	2.L	2.07	.05	112.	.47L	10.	24.0L	1.20	13.	.48
82 452.0	39.	35.80	.51	1260.	6.50L	154.	299.0	9.00	26.	4.53
82 459.6	9.	18.60	.86	934.	1.00L	87.	90.1	44.00	2.	.30L
Ranger 3 Drillhole 83-continued										
83 18.0	13.	21.00	.74	2909.	2.00L	80.	86.0	1.00L	5.	1.40
83 34.0	17.	15.40	.68	2239.	.97L	75.	80.0	3.50L	6.	1.36
83 61.9	12.	21.50	.78	2777.	1.60L	104.	116.0	6.00	9.	2.40
83 74.4	8.	9.34	.36	1065.	.65L	53.	58.4	1.50L	5.	.93
83 99.6	6.	11.00	1.29	2756.	1.60L	131.	142.0	13.80	4.	1.60
83 122.3	12.	16.50	.48	1469.	1.71	55.	78.0	1.40L	13.	.72L
83 127.0	10.	8.59	2.58	10199.	1.00L	279.	290.0	6.80	10.	1.27
83 128.3	10.	2.61	.90	3300.	6.00L	107.	113.0	2.71	3.	.20L
83 136.3	14.	5.37	2.18	8678.	1.00L	370.	453.0	1.90	11.	1.16
83 141.9	8.	7.05	2.51	10676.	2.00L	294.	314.0	4.78	10.	1.00L
83 158.6	2.L	.86	.02L	15.	2.00	82.	86.1	1.30L	1.	.31L
83 170.4	17.	15.70	.55	1289.	.80L	100.	106.0	.60L	3.	.20L
83 204.3	13.	17.70	.57	2445.	1.00L	53.	53.0	.80L	6.	.90
83 223.7	8.	15.40	.58	1256.	.60L	126.	150.0	.70L	6.	.50L
83 268.1	6.	.73	.02L	16.	2.60	18.	15.6	.19L	2.	.19L
83 284.8	36.	20.40	.30	1614.	4.00L	106.	151.0	5.00L	48.	3.00L
83 293.0	28.	18.00L	.11	404.	11.00L	41.	166.0	11.00	27.	8.60
83 294.9	67.	.00B	.33	1628.	.00B	138.	270.0	.00B	92.	.00B
83 295.9	20.	19.30	.19	815.	7.00L	74.	426.0	14.00L	18.	13.00
83 298.0	40.	22.60	1.30	4723.	9.00L	302.	426.0	14.00L	111.	11.00
83 325.2	16.	13.60	.38	1428.	3.00L	206.	267.0	8.00L	35.	2.10
83 355.7	10.	16.50	.51	1199.	1.00L	81.	103.0	3.00L	4.	.60L
83 371.3	30.	7.36	.32	1385.	6.00L	147.	292.0	8.00	35.	5.90
83 372.5	39.	6.51	.58	2257.	6.00L	141.	350.0	40.00L	35.	3.04
83 373.3	57.	.00B	.52	1824.	.00B	148.	437.0	.00B	59.	.00B
83 373.8	27.	12.80	.44	1889.	5.00L	148.	269.0	12.00L	24.	2.80
83 379.3	9.	5.30	.41	1231.	4.00L	137.	267.0	18.00L	13.	1.00L

APPENDIX I. Chemical Analyses of Samples from the Rsngr Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXYTPE
Ranger 3 Drillhole 81-continued										
81 121C	30.	96.	150.L	10150.000	9900.000	902.100	10.	2.	2.	3.
81 133.0	22.	98.	119.	10150.000	9900.000	890.100	10.	2.	2.	3.
81 183C	48.	15.	410.L	10150.000	9900.000	840.100	8.	2.	2.	3.
Ranger 3 Drillhole 82										
82 407.2	6.	2.L	0.B	10550.000	11850.000	604.250	8.	3.	3.	3.
82 414.2	2.L	2.L	580.L	10550.000	11850.000	597.250	7.	5.	3.	2.
82 419.6	138.	37.	0.B	10550.000	11850.000	592.040	8.	3.	6.	3.
82 425.6	123.	31.	20000.L	10550.000	11850.000	585.900	13.	2.	3.	3.
82 429.5	131.	22.	271.	10550.000	11850.000	581.950	13.	2.	3.	3.
82 430.1	16.	3.	100.L	10550.000	11850.000	581.350	7.	3.	3.	3.
82 440.3	5.	10.	35.L	10550.000	11850.000	571.190	7.	6.	3.	3.
82 443.4	72.	33.	50000.L	10550.000	11850.000	568.130	11.	2.	5.	3.
82 443.7	9.	5.	130.L	10550.000	11850.000	567.830	7.	6.	3.	3.
82 452.0	383.	75.	40000.L	10550.000	11850.000	559.500	13.	2.	4.	3.
82 459.6	715.	36.	400.L	10550.000	11850.000	559.870	13.	2.	4.	3.
Ranger 3 Drillhole 83										
83 18.0	26.	196.	480.L	10650.000	11850.000	995.000	4.	6.	1.	3.
83 34.0	16.	122.	200.L	10649.500	11850.000	979.030	4.	2.	2.	3.
83 61.9	25.	133.	205.	10646.100	11850.000	951.250	4.	2.	1.	2.
83 74.4	12.	79.	85.	10644.600	11850.000	938.880	4.	2.	1.	2.
83 99.6	41.	70.	203.	10640.800	11850.000	913.990	4.	1.	2.	3.
83 122.3	11.	230.	526.	10636.500	11850.000	891.770	4.	2.	2.	3.
83 127.0	9.	154.	121.	10635.600	11850.000	887.140	4.	1.	2.	3.
83 128.3	7.	41.	220.L	10635.300	11850.000	885.840	4.	1.	2.	3.
83 136.3	6.	85.	2000.L	10633.800	11850.000	877.950	4.	1.	2.	3.
83 141.9	9.	112.	300.L	10632.700	11850.000	872.500	4.	1.	2.	3.
83 158.6	51.	12.	180.L	10628.300	11850.000	856.470	3.	2.	2.	3.
83 170.4	32.	68.	230.L	10625.000	11850.000	845.020	5.	2.	3.	3.
83 204.3	31.	82.	300.L	10615.200	11850.000	812.600	5.	2.	4.	3.
83 223.7	26.	91.	329.	10609.200	11850.000	794.230	5.	2.	3.	3.
83 268.1	43.	42.	50.L	10594.100	11850.000	752.400	3.	2.	2.	5.
83 284.8	19.	140.	46000.L	10588.200	11850.000	736.830	5.	2.	4.	3.
83 293.0	11.	37.	80000.L	10585.200	11850.000	729.180	9.	4.	6.	3.
83 294.9	25.	40.	0.B	10584.600	11850.000	727.420	9.	4.	6.	3.
83 295.9	16.	40.	70000.L	10584.200	11850.000	726.510	9.	4.	6.	3.
83 298.0	42.	492.	80000.L	10583.400	11850.000	724.460	9.	4.	6.	3.
83 325.2	88.	72.	25000.L	10573.200	11850.000	699.300	5.	2.	4.	5.
83 355.7	56.	75.	200.L	10561.600	11850.000	671.100	5.	2.	4.	3.
83 371.3	73.	61.	60000.L	10555.500	11850.000	656.750	6.	3.	5.	4.
83 372.5	28.	60.	50000.L	10555.100	11850.000	655.640	6.	3.	6.	4.
83 373.3	39.	87.	0.B	10554.800	11850.000	654.900	6.	2.	6.	4.
83 373.8	42.	97.	55000.L	10554.600	11850.000	654.450	5.	2.	6.	3.
83 379.3	32.	61.	18000.L	10554.600	11850.000	654.450	5.	2.	4.	3.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	SiO2Z	Al2O3Z	T-Fe2O3Z	FeOZ	MgOZ	CaOZ	K2OZ	U N	As N	Au N
Ranger 3 Drillhole 83-continued										
83 382.6	58.50	12.00	4.36	.00B	15.30	.90	.02L	671.00	3.00L	.01L
83 385.9	7.34	2.14	.99	.00B	21.30	27.00	.07	19.90	.17L	.00
83 407.3	40.10	17.80	6.42	4.56	23.60	.27	.02L	19.50	.74	.01
83 407.8	1.27	.50	1.16	.00B	21.10	29.80	.02L	.70	.23L	.01
83 421.3	55.20	18.70	4.03	2.18	11.10	.06	2.80	63.50	.63L	.01L
83 423.4	21.10	8.07	3.92	.00B	21.80	16.10	.02L	.80	.32L	.01L
83 445.6	11.30	4.83	6.71	5.09	18.60	21.50	.02L	6300.00	7.00L	.07L
83 451.8	30.00	19.40	12.30	8.41	25.80	.24	.02L	1180.00	2.00L	.02
83 456.0	30.80	11.50	7.25	.00B	20.10	9.16	.02L	.70	.38L	.00
83 458.4	12.50	3.76	3.34	.00B	26.80	15.90	.02L	2.10	.16L	.00
83 499.4	49.10	18.80	5.15	4.08	3.89	9.83	7.91	2.30	1.10L	.01L
83 516.8	34.90	13.50	2.42	.00B	24.50	6.89	1.60	4.40	.44L	.01L
83 533.0	23.80	7.88	2.34	.00B	23.00	17.30	1.78	2.90	.31L	.00
83 537.4	24.50	.93	2.22	.00B	23.40	19.70	.11	1.80	.39L	.01
83 539.5	60.00	16.60	8.38	6.45	4.14	.13	6.50	6.50	1.20L	.02L
83 544.6	66.30	15.50	6.35	4.49	2.07	.70	5.16	13.00	2.40L	.04L
83 549.3	73.40	14.00	1.01	.83	.33	.69	5.56	21.00	2.10L	.01L
Ranger 1 Drillhole 96										
96 282C	3.68	1.00	.56	.00B	21.40	29.00	.03	1.70	.18L	.01
96 297.5	46.40	14.10	5.65	.00B	22.10	.06	1.16	3.87	2.00L	.02L
96 309.7	68.10	13.60	5.90	.00B	3.15	1.11	3.87	5.60	.20L	.01L
96 310.1	65.10	13.70	7.19	.00B	4.79	.64	3.76	4.01	5.00L	.10L
96 317.2	76.40	14.00	.50	.00B	.57	.41	1.72	5.80	1.00L	.01L
Ranger 3 Drillhole 97										
97 64.4	81.80	5.51	1.76	.00B	7.88	.02L	.02L	2.30	.20L	.01
97 67.1	55.30	5.05	2.10	.00B	6.98	15.40	.02L	35.20	6.00	.03
97 70.1	89.70	3.14	.96	.00B	3.46	.17	.02L	4.44	.55	.00
97 76.3	71.10	8.32	3.04	2.00	11.20	.26	.02L	9.00	.40L	.01
97 79.8	83.10	5.28	2.75	2.06	5.34	.02L	.27	3.57	.30L	.01
97 85.0	77.90	6.27	4.75	3.61	7.27	.02L	.02L	5.58	.30L	.01
97 86.6	65.20	14.30	2.89	1.70	8.27	.02L	2.52	13.20	4.80	.02L
97 88.8	48.70	20.00	4.39	.00B	7.66	.58	3.80	17700.00	.00B	.00B
97 89.1	57.20	20.40	3.99	.99	4.91	.02	4.98	971.00	12.00	.55
97 90.2	36.70	18.00	7.26	.00B	15.10	6.15	1.33	2380.00	3.00L	1.84
97 90.9	65.70	8.50	5.89	.00B	10.20	2.63	.02L	216.00	.30	.06
97 91.4	87.90	3.23	2.37	.00B	3.91	.07	.02L	194.00	.42	.01
97 93.3	80.10	5.78	3.56	.00B	6.79	.02L	.02L	315.00	.60L	.02
97 96.2	85.90	4.01	2.25	1.52	4.86	.04	.02L	10.30	.20L	.16
97 97.4	58.80	12.50	8.86	6.80	12.60	.02L	.28	4.78	2.00L	.01
Ranger NMF Drillhole										
NM 57.6	47.40	14.90	14.90	.00B	6.42	8.89	1.43	.40	2.60L	.04L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger 3 Drillhole 83-continued										
83 382.6	28.	5.	1500.L	3.	9.30	10.	180.00L	261.0	20.	25.60
83 385.9	10.L	3.	320.L	1.	2.92	10.L	6.64	276.7	4.	5.71
83 407.3	10.L	2.	270.L	6.	1.52	10.L	6.43	110.0	32.	33.00
83 407.8	10.L	3.	1000.L	1.	9.29	10.L	2.05	837.3	39.	53.20
83 421.3	426.	209.	273.	4.	2.00L	10.L	4.48	70.2	17.	20.00
83 423.4	27.	2.	800.L	3.	4.13	10.L	2.57	482.0	24.	25.20
83 445.6	36.	2.	12000.L	2.	8.00L	10.L	1800.00L	1100.0L	20.	24.40
83 451.8	21.	3.	1000.L	5.	2.00L	10.L	300.00L	420.0L	57.	61.90
83 456.0	10.L	2.	360.L	2.	6.45	31.	29.10	521.0	26.	34.20
83 458.4	10.L	2.	800.L	2.	2.04	10.L	3.14	250.0L	10.	12.30
83 499.4	120.	522.	619.	3.	1.50L	56.	57.50	173.0	8.	9.74
83 516.8	63.	73.	280.L	2.	.64L	20.	15.60	98.0	5.	5.35
83 533.0	10.L	112.	440.L	4.	.50	17.	18.60	160.0L	7.	9.52
83 537.4	10.L	6.	660.L	1.	11.70	22.	22.80	738.2	6.	7.54
83 539.5	13.	255.	296.L	4.	1.50L	51.	57.70	260.0L	14.	15.00
83 544.6	10.L	228.	460.L	4.	3.10L	37.	48.00	280.0L	10.	10.60
83 549.3	10.L	245.	550.L	2.	2.00L	24.	26.90	290.0L	4.L	1.06
Ranger 1 Drillhole 96-continued										
96 282C	10.L	3.	400.L	1.L	2.38	10.L	7.31	172.0	4.L	2.92
96 297.5	42.	16.	486.L	14.	1.00L	53.	56.20	108.0	9.	10.50
96 309.7	10.L	628.	450.	2.	1.00L	52.	58.80	290.0L	15.	16.70
96 310.1	14.	386.	367.	3.	7.00L	53.	56.10	322.0L	15.	15.70
96 317.2	10.	76.	470.L	3.	1.00L	10.L	10.10	400.0L	4.L	.87
Ranger 3 Drillhole 97-continued										
97 64.4	10.L	11.	168.L	1.	.78	15.	5.60	143.6L	10.	12.10
97 67.1	10.L	31.	88.	2.	.70L	49.	65.50	696.0	12.	14.40
97 70.1	10.L	61.	69.	3.	.35	10.	12.10	57.5	6.	6.59
97 76.3	10.L	80.	150.L	3.	.44	10.L	6.37	85.0	15.	17.20
97 79.8	18.	58.	93.L	2.	.40L	38.	34.80	44.0	15.	15.60
97 85.0	10.L	17.	120.L	1.	.55	35.	29.70	84.0	26.	28.10
97 86.6	199.	128.	140.L	4.	3.00L	272.	262.00	64.3	16.	16.90
97 88.8	529.	1131.	26000.	13.	.00B	73.	.00B	1100.0L	28.	.00B
97 89.1	714.	564.	1500.	8.	2.50L	51.	270.00L	260.0L	12.	12.80
97 90.2	252.	210.	4800.	8.	5.00L	48.	600.00L	230.0	72.	73.90
97 90.9	10.L	39.	346.L	1.	.90L	25.	185.00	105.0	29.	13.90
97 91.4	10.L	32.	220.L	1.	.38	10.L	50.00L	87.0	13.	13.50
97 93.3	10.L	38.	320.L	1.	.80	10.	11.50	110.0	19.	21.10
97 96.2	10.L	17.	90.L	2.	1.67	10.L	5.82	124.0	13.	15.00
97 97.4	23.	42.	220.L	3.	1.00L	257.	244.00	63.0	45.	50.30
Ranger NMF Drillhole-continued										
NM 57.6	10.L	280.	940.L	1.L	3.40L	35.	31.20	950.6	43.	56.00

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Cr	Cr N	Cs N	Cu	Dy N	Eu N	Fz	Ga N	Gd N	Ir N
Ranger 3 Drillhole 83-continued										
83 382.6	78.	96.00	1.00L	6.	8.0L	.60L	.00B	.0B	2800.L	.01L
83 385.9	15.	19.70	.20	2.L	2.0L	.06	.00B	.0B	1000.L	.00
83 407.3	153.	154.00	.90	9.	7.1L	1.30	.12	70.6	5800.	.01L
83 407.8	1.	3.72	.33L	17.4	6.6L	.12	.00B	1.9L	4000.L	.00
83 421.3	143.	156.00	2.56	10.	2.6L	.10	.08	44.0	820.L	.01L
83 423.4	54.	55.10	.48L	2.	6.8L	.90	.00B	33.5	2000.L	.00
83 445.6	30.	80.00	2.00L	293.	89.0L	6.21	.10	.0B	6500.L	.02L
83 451.8	116.	127.00	2.21	13.	19.0L	1.50	.14	52.0	3800.L	.01L
83 456.0	56.	69.90	.80	3.	3.2L	.21	.00B	17.0	1600.L	.00
83 458.4	22.	31.00	.43L	3.	5.2L	.20	.00B	9.2	1400.L	.00
83 499.4	136.	142.00	15.70	11.	5.6L	.44	.09	10.0L	1000.L	.01L
83 516.8	57.	64.10	4.90	4.	2.3L	.16	.00B	16.0	880.L	.00
83 533.0	31.	44.10	34.60	11.	2.8L	.21	.00B	11.0	1100.L	.00
83 537.4	1.	3.25	5.05	16.	6.0L	.22	.00B	.0B	1500.L	.00
83 539.5	84.	92.20	8.01	28.	7.4L	.27	.28	.0B	1200.L	.01L
83 544.6	68.	75.10	10.30	11.	9.0L	.24	.17	.0B	1300.L	.01L
83 549.3	1.	3.89	1.55	2.	3.0L	.16	.05	.0B	1000.L	.00
Ranger 1 Drillhole 96										
96 282C	8.	9.82	.35L	10.	2.0L	.09	.00B	1.4L	4000.L	2400.00L
96 297.5	70.	85.40	12.80	23.	10.0L	.30L	.00B	19.0	1200.L	.00
96 309.7	104.	106.00	8.27	54.	12.0L	1.61	.00B	.0B	1300.L	.00
96 310.1	106.	113.00	6.63	132.	16.0L	1.41	.00B	50.0L	1600.L	.00
96 317.2	1.	1.90	1.18	10.	8.2L	.39	.00B	.0B	2000.L	.00
Ranger 3 Drillhole 97										
97 64.4	33.	35.60	.40L	4.	3.2L	.10L	.00B	24.0	664.L	.00
97 67.1	110.	113.00	1.25	9.	4.9L	3.36	.00B	20.0	1200.	.00
97 70.1	125.	121.00	2.00	8.	1.5L	2.07	.00B	13.3	260.L	.00
97 76.3	152.	152.00	1.20	6.	5.5L	.48	.08	27.0	590.L	.30L
97 79.8	71.	68.80	1.09	4.	2.0L	.24	.03	15.0	290.L	.00
97 85.0	28.	27.30	.40L	7.	2.5L	.26	.05	14.0	410.L	.00
97 86.6	138.	139.00	1.90	14.	2.8L	1.57	.06	.0B	1000.L	.01L
97 88.8	406.	.00B	.00B	15.	106.0	.00B	.00B	.0B	64000.L	.00B
97 89.1	784.	739.00	5.40	164.	7.4	1.22	.08	46.0L	3300.	.01L
97 90.2	325.	316.00	1.90	214.	19.0L	3.28	.00B	63.0L	9500.L	.01L
97 90.9	103.	37.20	.30L	560.	6.5L	1.01	.00B	35.4	1900.L	.00
97 91.4	73.	66.40	.40L	312.	1.7L	.10L	.00B	9.0	470.L	.00
97 93.3	42.	48.70	.40L	107.	4.6L	1.01	.00B	24.0	960.L	.00
97 96.2	159.	168.00	.30L	621.	1.9L	.20L	.04	15.0	280.L	.00
97 97.4	231.	239.00	1.10	8.	4.4L	.60L	.05	.0B	600.L	.00
Ranger NMF Drillhole										
NM 57.6	107.	129.00	2.20L	68.	12.2L	1.03	.00B	.0B	3000.L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger 3 Drillhole 83-continued										
83 382.6	2.L	24.00	108.	78.	94.0	1600.0L	294.00	4.L	180.00L	110.
83 385.9	2.L	4.61	26.	264.	313.6	.3L	132.80	7.	6.10L	11.
83 407.3	2.L	.77	140.	96.	104.0	40.0L	467.00	4.	18.00L	218.
83 407.8	2.L	.85	6.	1683.	2000.0	49.0L	670.00L	5.	19.00L	35.
83 421.3	4.	4.68	118.	45.	50.9	120.0L	907.80	11.	27.00L	112.
83 423.4	2.L	1.44	55.	938.	1100.0	73.0L	265.20	9.	26.00L	114.
83 445.6	2.L	139.00	45.	4235.	4850.0	14000.0L	1000.00L	9.	2600.00L	49.
83 451.8	2.L	31.20	116.	158.	185.0	2800.0L	590.00	5.	500.00L	202.
83 456.0	11.	15.10	187.	339.	396.1	65.0L	223.40	5.	14.00	39.
83 458.4	2.L	1.99	33.	916.	1100.0	38.0L	360.00L	6.	6.00L	56.
83 499.4	30.	35.20	50.	236.	266.4	250.0L	1800.00	15.	21.00L	28.
83 516.8	7.	8.34	137.	126.	161.0	110.0L	1100.00	7.	5.60L	12.
83 533.0	6.	9.40	97.	367.	467.1	.6L	706.00	8.	17.00L	17.
83 537.4	9.	12.90	22.	904.	1100.0	51.0L	568.70	6.	16.00L	3.
83 539.5	29.	32.50	41.	298.	340.8	230.0L	4300.00L	13.	32.00L	51.
83 544.6	20.	25.10	49.	404.	426.0	460.0L	17000.00	12.	140.00L	31.
83 549.3	12.	16.60	14.	164.	191.1	190.0L	23000.00	6.	37.00L	2.L
Ranger 1 Drillhole 96-continued										
96 282C	2.L	3.58	11.	328.	392.0	47.0L	205.00	9.	3.70L	3.
96 297.5	22.	30.00	263.	263.	329.0	15.0L	603.00	5.	200.00L	31.
96 309.7	27.	34.50	80.	644.	680.0	7.0L	16600.00	7.	34.30	40.
96 310.1	23.	34.70	82.	598.	679.0	75.0L	10000.00	8.	400.00L	45.
96 317.2	3.	5.53	16.	40.	46.0	5.0L	38400.00	4.L	8.00L	2.L
Ranger 3 Drillhole 97-continued										
97 64.4	4.	3.76	59.	40.	48.0	1.0L	69.30	4.L	3.00L	68.
97 67.1	40.	62.90	57.	69.	63.7	70.0L	91.00	4.	40.00L	60.
97 70.1	11.	14.00	49.	57.	57.0	1.0L	142.00	4.L	3.00L	35.
97 76.3	2.	7.14	85.	103.	111.0	20.0L	101.00	4.L	9.00L	102.
97 79.8	33.	33.00	44.	87.	95.0	7.0L	140.00	4.L	10.00	29.
97 85.0	29.	29.70	52.	52.	58.0	12.0L	60.00	4.L	9.26	35.
97 86.6	217.	267.00	84.	71.	75.8	30.0L	245.00	6.	64.50	83.
97 88.8	58.	.00B	175.	183.	230.0	.0B	630.00	5.	.00B	45.
97 89.1	53.	88.30	101.	84.	90.9	2200.0L	514.00	7.	360.00L	32.
97 90.2	29.	86.30	157.	144.	164.0	5000.0L	390.00	11.	900.00L	184.
97 90.9	14.	22.00	48.	132.	155.0	600.0L	85.00L	4.	200.00L	78.
97 91.4	4.	7.87	18.	73.	75.0	400.0L	70.30	4.L	70.00L	28.
97 93.3	5.	14.60	46.	132.	149.0	760.0L	76.00	4.L	160.00L	52.
97 96.2	4.	4.06	44.	93.	79.9	20.0L	84.00	4.L	7.00L	43.
97 97.4	200.	238.00	93.	97.	110.0	12.0L	106.00	5.	95.30	53.
Ranger NMF Drillhole-continued										
NM 57.6	11.	14.00	27.	1255.	1500.0	490.0L	16600.00	12.	140.00L	66.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	P	Pb	Pr N	Rb N	Sc	Sc N	Sm N	Sr	Ta N	Tb N
Ranger 3 Drillhole 83-continued										
83 382.6	2481.	115.	0.B	32.L	6.	13.20	3.00L	6.	1.00L	.70L
83 385.9	86.	10.L	2.L	7.L	1.	1.75	.52	33.	.71L	.14L
83 407.3	687.	10.L	4.L	21.L	10.	14.40	.10L	4.	1.30	2.70
83 407.8	215.	10.L	3.L	12.L	1.	2.86	.37	17.	.91L	.20L
83 421.3	125.	17.	10.L	77.	11.	14.60	.77	6.	1.10	.61L
83 423.4	158.	10.L	4.L	14.L	8.	8.44	.71	9.	.60	.29L
83 445.6	4269.	1962.	89.L	67.L	11.	13.40	8.00L	19.	5.00L	3.50
83 451.8	632.	316.	22.L	44.L	6.	10.30	2.00L	6.	.80L	.70L
83 456.0	97.	13.	6.L	21.L	7.	9.88	1.46	7.	.42L	.42L
83 458.4	122.	10.	2.L	13.L	4.	5.25	.67	26.	.18L	.04L
83 499.4	110.	16.	20.L	260.	12.	14.70	2.79	171.	.43L	.18L
83 516.8	5.L	19.	9.L	51.	5.	6.12	1.35	25.	.23L	.28L
83 533.0	62.	10.L	5.	104.	3.	6.41	1.38	25.	.40	.30L
83 537.4	5.L	10.	13.	12.	1.L	.31	10.00L	19.	.40L	.17
83 539.5	369.	29.	230.L	225.	10.	11.70	3.76	15.	.50	.70
83 544.6	307.	30.	7.L	251.	7.	8.55	2.61	67.	2.70L	.33L
83 549.3	401.	55.	0.B	152.	2.	2.46	1.90	74.	.40	.33
Ranger 1 Drillhole 96										
96 282C	5.L	10.L	3.L	12.L	1.	1.07	.44	23.	1.00L	.22L
96 297.5	54.	10.L	10.L	55.	5.	13.80	2.14	6.	6.00L	1.00L
96 309.7	775.	14.	0.B	181.	9.	10.60	.30L	94.	.80	.20L
96 310.1	503.	16.	100.L	172.	8.	10.90	3.90	62.	5.00L	1.00L
96 317.2	666.	12.	0.B	44.	1.	1.20	.70L	39.	.10L	.22
Ranger 3 Drillhole 97										
97 64.4	5.L	17.	2.L	15.L	1.	2.05	.22	1.	1.00L	.20L
97 67.1	52930.	10.L	5.L	14.L	7.	8.40	5.01	40.	2.00L	1.71
97 70.1	470.	10.L	3.L	9.L	2.	2.02	.43	5.	.10L	.20L
97 76.3	875.	10.L	5.L	14.L	4.	4.64	.75	6.	.90	.30L
97 79.8	43.	10.L	6.L	13.	2.	2.62	.77	9.	.62	.20L
97 85.0	73.	10.L	6.L	15.L	2.	2.61	.65	5.	1.00L	.30L
97 86.6	334.	20.	0.B	54.	10.	12.80	3.90	70.	.90L	.60L
97 88.8	1791.	2387.	0.B	0.B	24.	.00B	.00B	40.	.00B	.00B
97 89.1	99.	730.	42.L	137.	11.	12.50	1.10L	33.	1.00L	.50L
97 90.2	19744.	476.	56.L	74.L	15.	16.60	4.00L	21.	1.00L	1.00
97 90.9	6312.	38.	5.L	8.L	6.	3.39	4.10	7.	.10L	.04L
97 91.4	5.L	15.	0.B	11.L	1.	1.31	.30L	4.	.20L	.20L
97 93.3	5.L	39.	10.L	15.L	3.	3.93	.92	3.	.40L	.20L
97 96.2	190.	10.L	4.L	12.L	1.	1.53	.41	2.	.40L	.20L
97 97.4	286.	10.L	24.L	12.L	6.	6.99	6.01	57.	.50L	.40L
Ranger NMF Drillhole										
NM 57.6	690.	15.	70.L	115.	27.	36.40	2.86	217.	.51L	1.30

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Th	Th N	TiO2%	Ti	Tm N	V	V N	W N	Y	Yb N
Ranger 3 Drillhole 83-continued										
83 382.6	2.L	13.10	.55	855.	3.00L	180.	249.0	12.00L	7.	.70L
83 385.9	2.L	1.45	.06	301.	.30L	7.	8.8L	.80	2.	.20
83 407.3	10.	14.40	.77	1208.	5.40	133.	148.0	12.30	14.	7.43
83 407.8	2.L	.22	.02L	59.	.49L	4.	56.0L	2.26	4.	.43
83 421.3	8.	13.90	.82	3073.	1.60L	109.	126.0	10.30	5.	.37L
83 423.4	3.	5.55	.33	1088.	.61L	49.	58.0	7.76	5.	.42
83 445.6	31.	12.90	.14	834.	27.00L	52.	120.0	12.00L	77.	6.00L
83 451.8	11.	9.84	.56	798.	2.00L	185.	250.0	8.00L	13.	.40L
83 456.0	13.	11.40	.41	710.	.50L	43.	47.6	1.10L	5.	.72
83 458.4	3.	3.71	.12	220.	.56L	21.	31.5	.80	7.	.42
83 499.4	10.	13.70	.55	2982.	1.80L	71.	73.4	2.70L	12.	1.44
83 516.8	15.	9.87	.49	1854.	.68L	45.	57.9	2.90	4.	.40
83 533.0	3.	5.96	.26	1318.	.68L	35.	37.2	1.70	4.	.30
83 537.4	2.	.26	.02L	43.	.39L	11.	17.6L	263.00	4.	.30
83 539.5	19.	13.50	.58	2246.	1.50L	84.	92.5	3.30L	7.	1.05
83 544.6	7.	13.10	.35	1944.	.90	57.	62.8	6.30L	6.	.50
83 549.3	5.	11.00	.05	335.	.51L	3.	18.0L	5.40L	6.	.41
Ranger 1 Drillhole 96-continued										
96 282C	3.	.92	.02L	113.	.73L	6.	16.0L	.40	2.	.17L
96 297.5	2.L	13.10	.44	1083.	2.00L	80.	78.0	19.10	2.	.70L
96 309.7	5.	10.50	.46	2520.	.90L	77.	87.3	4.00L	8.	1.26
96 310.1	5.	10.10	.55	2754.	2.00L	89.	94.3	10.00L	6.	.70L
96 317.2	3.	4.66	.02L	71.	.40L	2.	24.0L	3.50L	2.	.34
Ranger 3 Drillhole 97-continued										
97 64.4	10.	2.94	.06	168.	.50L	40.	46.8	1.00L	1.	.10L
97 67.1	2.L	4.03	.26	884.	2.00L	28.	33.3	5.26	80.	2.33
97 70.1	2.	3.58	.13	549.	.50L	24.	25.3	4.33	3.	.10L
97 76.3	4.	7.68	.35	1475.	.50L	70.	78.5	3.82	7.	.44
97 79.8	5.	6.07	.27	1248.	.50L	31.	30.0	.70L	2.	.10L
97 85.0	8.	6.83	.16	603.	.50L	15.	14.0	.80L	2.	.20L
97 86.6	13.	13.20	.52	1912.	2.00L	79.	85.5	12.00L	3.	1.20
97 88.8	77.	.00B	.90	4316.	.00B	121.	709.0	.00B	142.	.00B
97 89.1	13.	12.40	.76	2191.	.80L	88.	166.0	12.00	8.	.80L
97 90.2	28.	13.80	.86	3388.	3.00L	186.	323.0	34.50	53.	2.20
97 90.9	16.	3.74	.31	743.	.50L	65.	78.7	8.11	25.	.55
97 91.4	2.L	2.07	.08	328.	.60L	28.	46.0	2.00L	2.	.10L
97 93.3	2.	5.98	.18	698.	1.00L	45.	68.0	5.00	11.	1.22
97 96.2	5.	1.26	.11	510.	.50L	28.	28.4	4.12	2.	.10L
97 97.4	2.	10.00	.44	1747.	2.00L	67.	76.0	4.00L	4.	.80
Ranger NMF Drillhole-continued										
NM 57.6	3.	1.10	2.28	11238.	4.20L	302.	361.0	7.20L	17.	1.70

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXYTYPE
Ranger 3 Drillhole 83-continued										
83 382.6	48.	79.	360.L	10551.150	11850.000	646.360	5.	2.	4.	3.
83 385.9	2.L	10.	84.L	10549.800	11850.000	643.250	7.	6.	3.	3.
83 407.3	90.	79.	230.L	10541.600	11850.000	623.640	11.	2.	2.	3.
83 407.8	2.L	2.L	120.L	10541.400	11850.000	623.220	8.	2.	3.	2.
83 421.3	19.	83.	189.	10536.200	11850.000	610.690	10.	2.	3.	3.
83 423.4	59.	39.	180.L	10535.400	11850.000	608.720	8.	2.	3.	2.
83 445.6	620.	30.	75000.L	10527.000	11850.000	588.280	8.	3.	5.	3.
83 451.8	174.	48.	14000.L	10524.600	11850.000	582.510	1.	2.	5.	3.
83 456.0	55.	21.	260.L	10523.000	11850.000	578.620	8.	2.	2.	3.
83 458.4	35.	16.	170.L	10522.100	11850.000	576.430	8.	2.	3.	3.
83 499.4	54.	42.	93.	10505.600	11850.000	538.880	8.	6.	2.	2.
83 516.8	52.	116.	47.	10498.600	11850.000	522.940	8.	3.	2.	3.
83 533.0	25.	22.	190.L	10492.100	11850.000	508.190	8.	6.	2.	2.
83 537.4	2.L	2.L	100.L	10490.300	11850.000	504.210	8.	3.	2.	3.
83 539.5	77.	79.	370.L	10489.400	11850.000	502.230	14.	6.	2.	3.
83 544.6	97.	71.	320.L	10487.400	11850.000	497.570	14.	6.	2.	3.
83 549.3	19.	61.	106.	10485.500	11850.000	493.340	14.	6.	2.	3.
Ranger 1 Drillhole 96										
96 282C	2.L	7.	140.L	10300.000	10900.000	736.720	7.	6.	1.	3.
96 297.5	70.	60.	700.L	10300.000	10900.000	721.220	8.	2.	1.	3.
96 309.7	75.	88.	200.L	10300.000	10900.000	709.020	14.	6.	1.	3.
96 310.1	45.	78.	0.B	10300.000	10900.000	708.620	14.	6.	1.	3.
96 317.2	4.	29.	100.L	10300.000	10900.000	701.520	14.	6.	1.	3.
Ranger 3 Drillhole 97										
97 64.4	75.	38.	80.L	9777.898	11750.000	963.440	2.	2.	2.	3.
97 67.1	36.	27.	370.L	9777.000	11750.000	960.900	12.	5.	3.	2.
97 70.1	20.	26.	160.L	9776.000	11750.000	958.150	9.	4.	3.	3.
97 76.3	61.	67.	134.	9773.898	11750.000	952.300	12.	4.	3.	3.
97 79.8	41.	76.	204.	9772.801	11750.000	949.050	2.	2.	3.	3.
97 85.0	20.	82.	160.	9770.898	11750.000	944.130	2.	2.	3.	3.
97 86.6	48.	110.	280.L	9770.398	11850.000	942.620	2.	2.	3.	3.
97 88.8	53.	125.	0.B	9769.699	11750.000	940.600	2.	2.	6.	5.
97 89.1	62.	117.	10000.L	9769.500	11750.000	940.270	2.	2.	6.	2.
97 90.2	132.	125.	26000.L	9769.199	11750.000	939.290	2.	2.	5.	2.
97 90.9	70.	96.	1000.L	9768.898	11750.000	938.580	2.	2.	4.	3.
97 91.4	25.	15.	2000.L	9768.699	11750.000	938.070	2.	2.	4.	3.
97 93.3	55.	76.	4000.L	9768.102	11750.000	936.330	2.	2.	4.	3.
97 96.2	34.	22.	120.L	9767.102	11750.000	933.600	2.	2.	3.	3.
97 97.4	45.	63.	200.L	9766.699	11750.000	932.500	2.	2.	3.	3.
Ranger NMF Drillhole										
NM 57.6	113.	89.	840.L	10778.000	10110.400	972.810	1.	2.	1.	3.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	S102Z	Al2O3Z	T-Fe2O3Z	FeOZ	MgOZ	CaOZ	K2OZ	U N	As N	Au N
NM 60.0	47.80	14.40	14.50	.00B	7.26	8.91	1.12	.60	2.20L	.03L
NM 67.6	71.80	14.90	.23	.00B	.37	.17	8.07	4.60	1.90L	.01L
				Ranger NMF Drillhole-continued						
				Ranger PMF Drillhole						
PM 124C	59.30	14.20	6.66	5.16	6.70	2.32	2.53	3.80	2.10L	.05L
PM 163.0	75.10	13.80	.78	.00B	.44	.25	3.29	7.20	2.00L	.03L
PM 164.8	74.80	14.20	.94	.25	.38	.26	4.02	7.50	2.10L	.01L
PM 167C	65.20	15.80	4.26	3.20	2.29	1.82	4.47	6.30	2.30L	.02L
PM 172.2	72.60	13.60	2.32	1.85	.72	.70	6.24	6.20	2.50L	.04L
PM 183.6	71.50	14.00	4.30	3.29	1.88	.79	2.79	2.90	2.50L	.01L
PM 185C	63.50	13.80	3.21	2.43	2.68	4.70	3.58	5.80	2.20L	.02L
PM 186.4	65.40	15.10	8.06	6.31	3.39	.26	3.10	2.50	.86L	.01L
PM 186.5	58.80	17.80	9.61	.00B	4.72	.30	3.50	3.20	1.10L	.01L
PM 188.5	70.20	14.60	3.09	.00B	1.08	1.18	3.70	6.71	2.00L	.03L
PM 195.9	78.90	10.80	1.39	.00B	.43	.41	5.58	5.20	1.60L	.02L
PM 205C	65.50	15.10	4.58	3.66	2.63	2.54	4.24	5.40	2.40L	.02L
PM 208.0	63.30	16.50	4.66	.00B	2.58	2.62	4.37	4.10	2.00L	.03L
PM 211.1	64.20	16.00	4.37	.00B	2.38	3.50	3.73	4.50	3.40L	.05L
PM 221.9	59.40	18.80	4.09	2.83	5.35	.83	4.49	12.20	.71L	.01L

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	B	Ba	Ba N	Be	Br N	Ce	Ce N	Cl N	Co	Co N
Ranger NMF Drillhole-continued										
NM 60.0	10.L	194.	920.L	1.L	2.80L	34.	28.00	566.0	38.	48.60
NM 67.6	10.L	107.	320.L	1.	4.10	10.L	1.55	540.8	4.L	.54
Ranger PMF Drillhole-continued										
PM 124C	19.	360.	277.	5.	3.20L	54.	61.80	260.0L	20.	23.40
PM 163.0	199.	37.	460.L	9.	3.00L	10.L	2.00L	340.0L	4.L	.63
PM 164.8	151.	56.	440.L	10.	2.60	10.L	3.00L	400.0L	4.L	.46
PM 167C	18.	775.	655.	3.	2.50L	94.	100.00	700.0L	12.	15.80
PM 172.2	10.L	1115.	1000.L	2.	3.20L	92.	101.00	280.0L	4.L	3.92
PM 183.6	10.L	537.	670.	2.	2.30L	53.	60.90	260.0L	8.	10.30
PM 185C	18.	614.	578.	2.	2.40L	75.	89.90	660.0L	7.	8.54
PM 186.4	10.L	406.	880.L	2.	.99L	40.	58.20	210.0L	27.	31.90
PM 186.5	10.L	460.	1700.L	3.	1.20L	53.	70.20	300.0L	25.	29.20
PM 188.5	14.	910.	1800.L	2.	3.00L	94.	107.00	340.0L	5.	6.25
PM 193.9	10.L	725.	710.	1.	2.10L	76.	89.50	280.0L	4.L	2.65
PM 205C	18.	781.	780.	3.	2.50L	84.	93.90	380.0L	10.	12.60
PM 208.0	26.	766.	829.	2.	3.00L	84.	83.60	380.0L	10.	11.80
PM 211.1	10.L	795.	771.	2.	4.30L	81.	96.50	600.0L	10.	12.80
PM 221.9	43.	300.	246.	4.	.92L	107.	135.00	120.0L	6.	6.69

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	La	La N	Li	Mn	Mn N	Mo N	Na N	Nb	Nd N	Ni
Ranger NMF Drillhole-continued										
NM 60.0	11.	14.50	28.	1101.	1400.0	410.0L	16700.00	13.	120.00L	62.
NM 67.6	2.L	1.40	5.	26.	31.7	180.0L	20000.00	4.L	33.00L	2.L
Ranger PMF Drillhole-continued										
PM 124C	25.	34.40	87.	672.	750.0	580.0L	9200.00	11.	200.00L	36.
PM 163.0	2.L	.60L	30.	119.	215.0	24.0L	27100.00	5.	120.00L	2.L
PM 164.8	3.	.70	11.	245.	380.0	190.0L	25000.00	6.	36.00L	4.
PM 167C	49.	59.00	101.	463.	563.0	290.0L	18200.00	10.	75.00L	12.
PM 172.2	49.	56.50	48.	235.	255.0	32.0L	15000.00	8.	150.00L	5.
PM 183.6	28.	35.80	53.	402.	436.5	220.0L	15500.00	8.	35.00	22.
PM 185C	38.	50.40	57.	373.	432.0	290.0L	15600.00	10.	73.00L	13.
PM 186.4	19.	32.70	118.	1386.	1600.0	8.9L	1200.00L	5.	48.00L	41.
PM 186.5	25.	38.10	128.	2043.	2400.0	10.0L	1300.00	7.	39.00	45.
PM 188.5	48.	60.70	46.	284.	308.0	22.0L	24800.00	10.	120.00L	7.
PM 195.9	43.	52.40	17.	174.	194.0	18.0L	10500.00	4.L	59.00	5.
PM 205C	43.	55.90	58.	423.	511.0	310.0L	15000.00	7.	66.00	11.
PM 208.0	43.	49.10	63.	450.	505.0	20.0L	20400.00	11.	42.00L	9.
PM 211.1	43.	55.80	38.	334.	391.3	38.0L	20900.00	9.	28.00L	11.
PM 221.9	56.	80.50	119.	573.	658.5	11.0L	637.20	13.	21.00L	20.

APPENDIX I. Chemical Analyses of Samples from the Ranger Orebodies-continued

SAMPLE	Zn	Zr	Zr N	EAST (M)	NORTH(M)	ELEV.(M)	LITHTYPE	ALTYPE	ORETYPE	OXTYPE
NM 60.0	84.	79.	850.L	10777.400	10111.100	970.620	1.	2.	1.	3.
NM 67.6	7.	11.	55.L	10775.000	10113.400	963.780	3.	2.	1.	3.
Ranger PMF Drillhole										
PM 124C	104.	79.	540.L	8731.000	9080.602	938.940	5.	6.	1.	3.
PM 163.0	18.	8.	26.L	8742.000	9108.000	861.940	5.	6.	1.	3.
PM 164.8	14.	12.	89.L	8741.199	9108.801	910.660	3.	6.	1.	3.
PM 167C	80.	80.	74.	8741.801	9110.199	909.100	5.	6.	1.	3.
PM 172.2	22.	112.	300.L	8743.000	9113.000	905.500	4.	6.	1.	3.
PM 183.6	59.	95.	198.	8745.699	9121.699	897.580	4.	6.	1.	3.
PM 185C	422.	98.	100.L	8746.199	9122.602	896.610	5.	6.	1.	3.
PM 186.4	58.	77.	310.L	8746.500	9123.000	895.630	4.	6.	1.	3.
PM 186.5	52.	97.	480.L	8746.602	9123.102	895.560	4.	6.	1.	3.
PM 188.5	31.	166.	300.L	8748.801	9126.000	836.410	5.	6.	1.	3.
PM 195.9	32.	90.	250.	8749.000	9130.199	889.030	4.	6.	1.	3.
PM 205C	49.	96.	250.	8751.301	9136.500	882.730	5.	6.	1.	3.
PM 208.0	54.	80.	340.L	8753.801	9139.000	816.980	5.	6.	1.	3.
PM 211.1	40.	84.	400.L	8752.102	9140.602	878.520	4.	6.	1.	3.
PM 221.9	41.	121.	360.L	8755.500	9148.102	871.000	4.	6.	1.	3.

X-ray fluorescence analyses by J. S. Wahlberg, J. E. Taggart, and J. W. Baker, U. S. Geological Survey.
 Fluorine and ferrous iron analyses by J. Graves, M. Manser, G. R. Mason, H. G. Neiman, F. Newman, and E. E. Engleman,
 U. S. Geological Survey.

Appendix II.--Precision and Accuracy of Analyses

As mentioned previously, precision and accuracy of the analyses are not completely evaluated at this time. However, some indication of the accuracy is provided by analyses for USGS standards G-2 and BCR-1. Splits of these standards were analyzed by INAA and ICP along with the unknowns and the results are presented below. Accepted values for these standards from Flanagan (1973) are also reported.

Appendix II

Values for geochemical reference standards (ppm)

	G-2 ¹	G-2 ²	BCR-1 ¹	BCR-1 ²
U N	2.2	2.0	1.7	1.74
As N	6.7	0.25	6.5	0.70
Au N	0.07L	1.0 (ppb)	0.06L	0.95 (ppb)
B	10L	2.0	10L	5
Ba	1638	1870	582	675
Ba N	2400	do.	654	do.
Be	2	2.6	1	1.7
Br	7.0L	0.3	6.9L	0.15
Ce	141	150	58	53.9
Ce N	173	do.	54.7	do.
Cl N	550L	50	600L	50
Co	4	5.5	30	38
Co N	5.01	do.	43.10	do.
Cr	9	7	6	17.6
Cr N	13.2	do.	11.4	do.
Cs N	1.5	1.4	2.0L	0.95
Cu	10	11.7	14	18.4
Dy N	16L	2.6	32L	6.3
Eu N	0.88	1.5	1.15	1.94
Ga N	0.00B	22.9	0.00B	20
Gd N	9000L	5	16000L	6.6
Ir N	0.01L	0.002 (ppb)	0.01L	0.004 (ppb)
La	81	96	20	26
La N	112.0	do.	31.4	do.
Li	25	34.8	10	12.8
Mn	225	260	1198	1406
Mn N	300	do.	1500	do.
Mo N	820L	0.36	810L	1.1
Na N	35000	30200	26400	24200
Nb	9	13.5	11	13.5
Nd N	210L	60	200L	29
Ni	4	5.1	9	15.8
P	492	600	1308	1600
Pb	35	31.2	13	17.6
Pr N	240L	19	190L	7
Rb	226	168	150	46.6
Sc	3	3.7	26	33
Sc N	3.85	do.	36.30	do.
Sm N	6.9	7.3	5.2	6.6
Sr	427	479	299	330
Ta N	0.9	0.91	0.8	0.91
Tb N	0.62L	0.54	0.60	1.0
Th	20	24.2	2	6.0
Th N	27.00	do.	7.07	do.
Ti	2397	2780	11809	12750

Appendix II--continued

Values for geochemical reference standards (ppm)				
	G-2 ¹	G-2 ²	BCR-1 ¹	BCR-1 ²
Tm N	1.2	0.3	2.2	0.6
V	33	35.4	379	399
V N	52	do.	464	do.
W N	196	0.1	19L	0.4
Y	6	12	28	37.1
Yb N	0.57L	0.88	3.26	3.36
Zn	148	85	114	120
Zr	32	145	152	190
Zr N	720L	do.	0.03L	do.

1-Values reported by Oak Ridge National Laboratory

2-Values from Flanagan (1973)

L=less than value shown

B=not determined