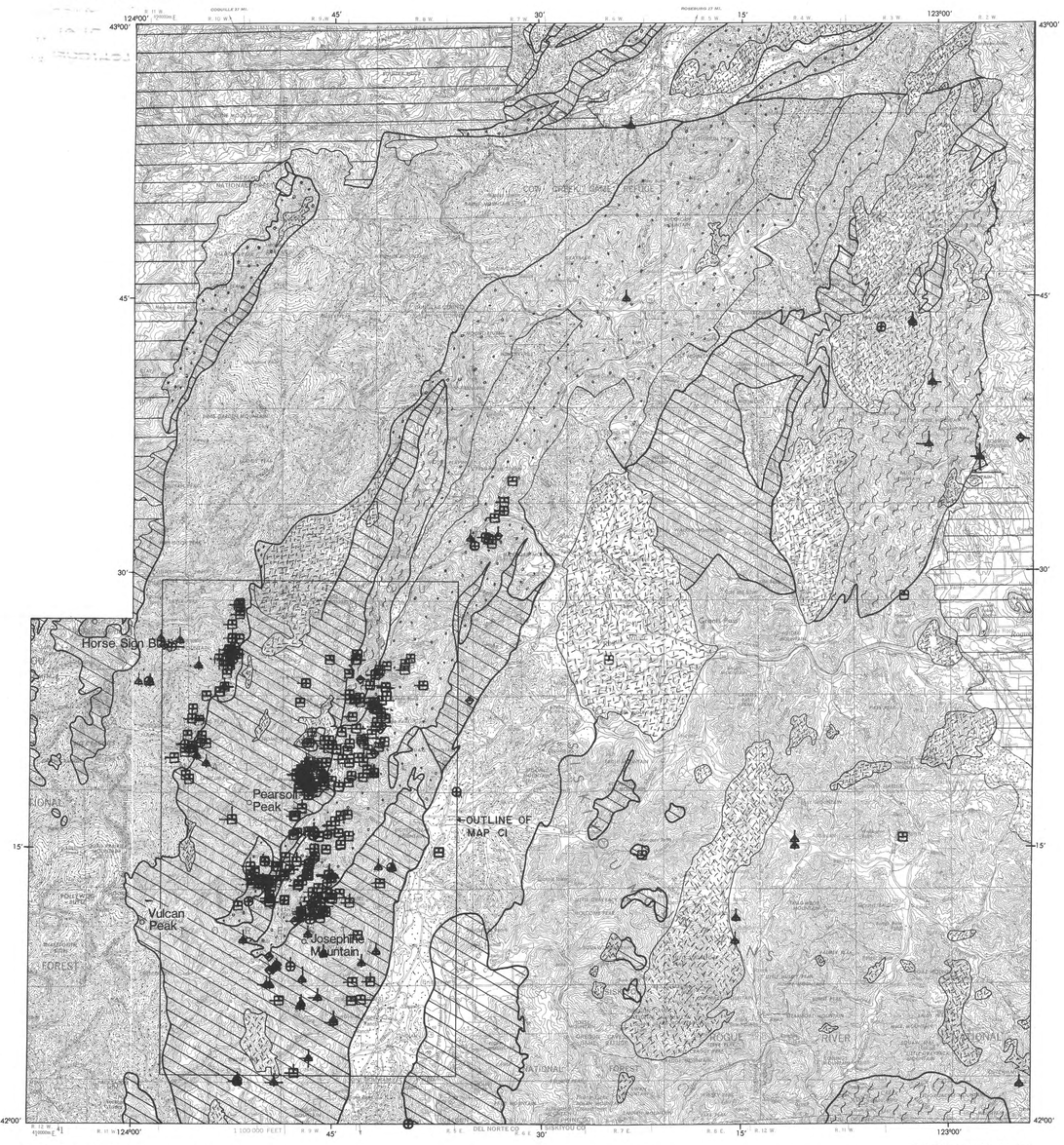
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-1832
SHEET 2 OF 2

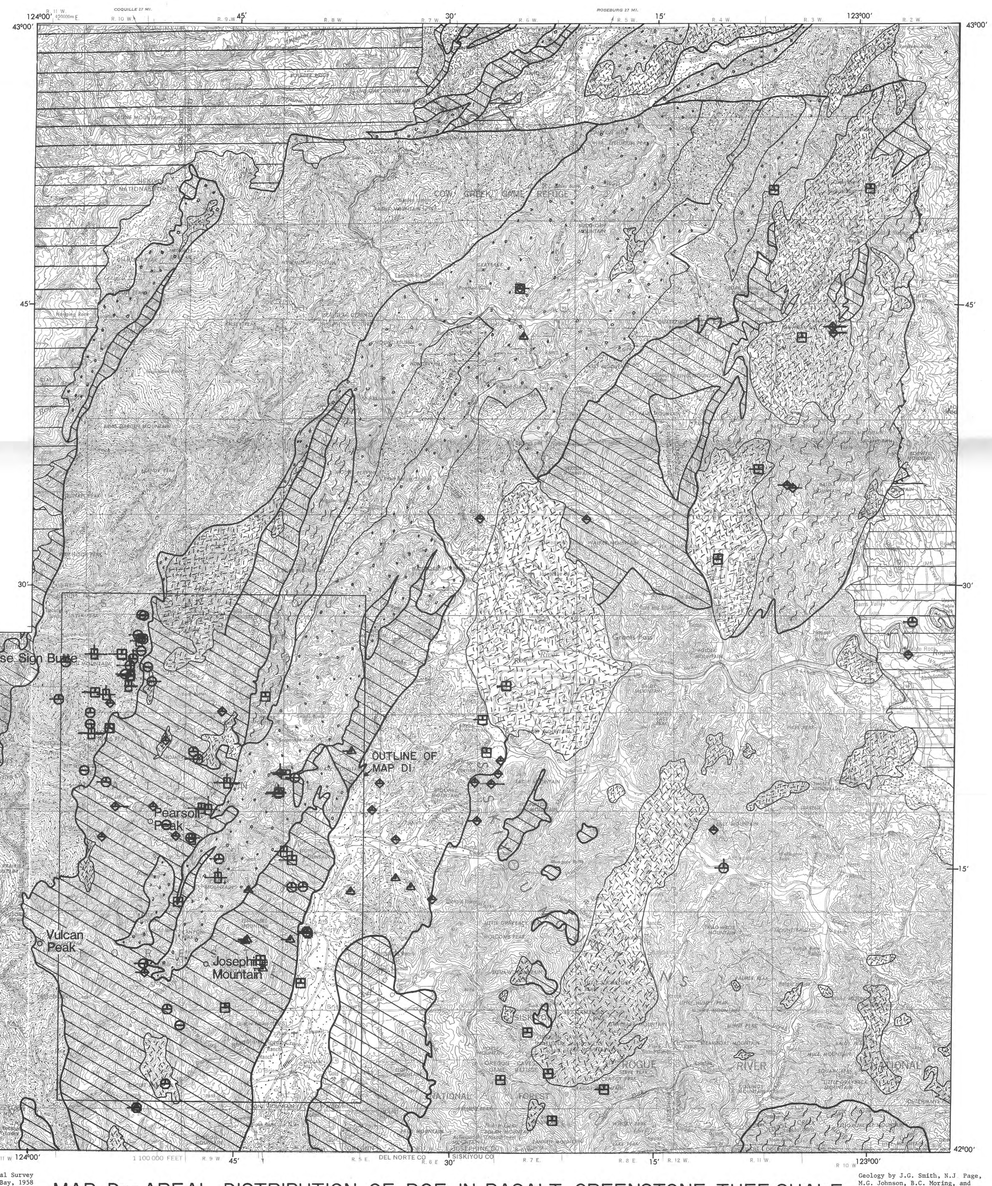
For explanation of geology and map-spars see sheet 1



Base from U.S. Geological Survey Medford, 1956 and Coos Bay, 1958

MAP C--AREAL DISTRIBUTION OF PGE IN SERPENTINITE, PYROXENITE, GABBRO, AND AMPHIBOLITE

Geology by J.C. Smith, N.J. Page, M.G. Johnson, B.C. Moring, and Floyd Gray, 1982



Base from U.S. Geological Survey Medford, 1956 and Coos Bay, 1958

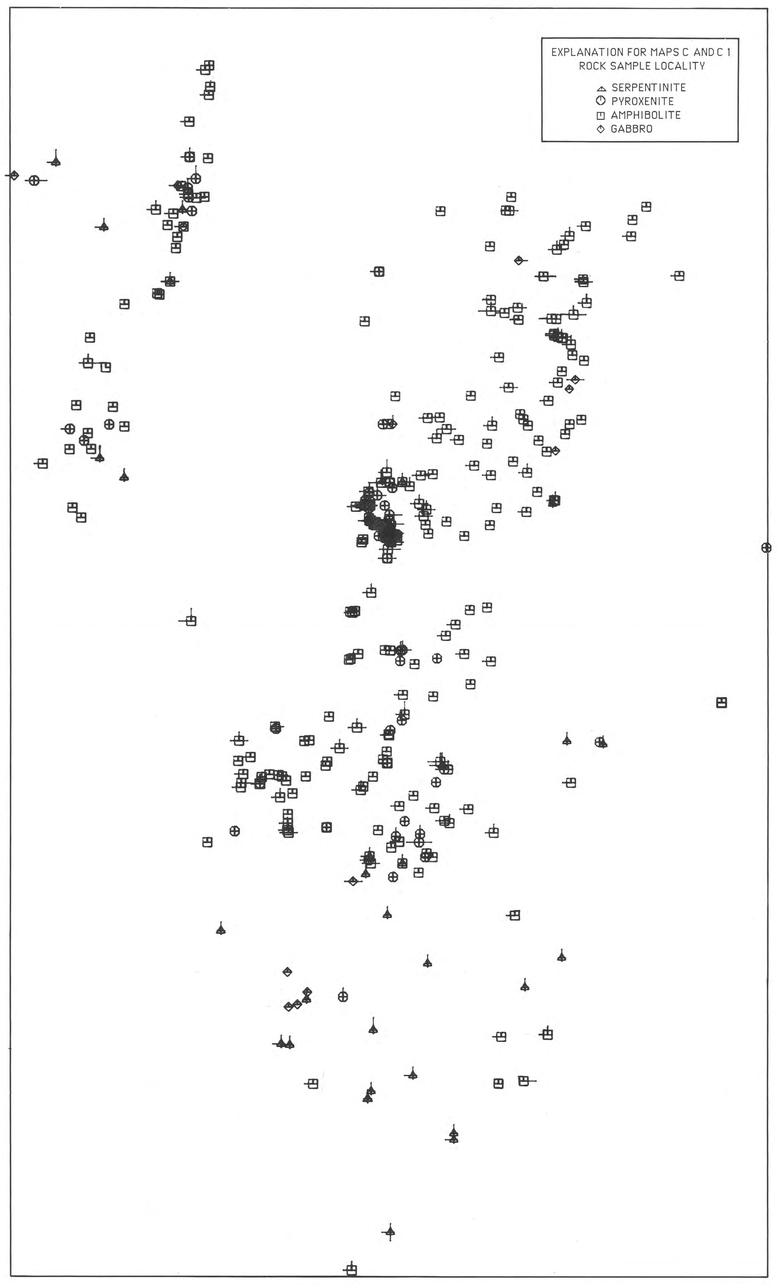
MAP D--AREAL DISTRIBUTION OF PGE IN BASALT, GREENSTONE, TUFF, SHALE, GRAYWACKE, AND GOSSAN

Geology by J.G. Smith, N.J Page, M.G. Johnson, B.C. Moring, and Floyd Gray, 1982

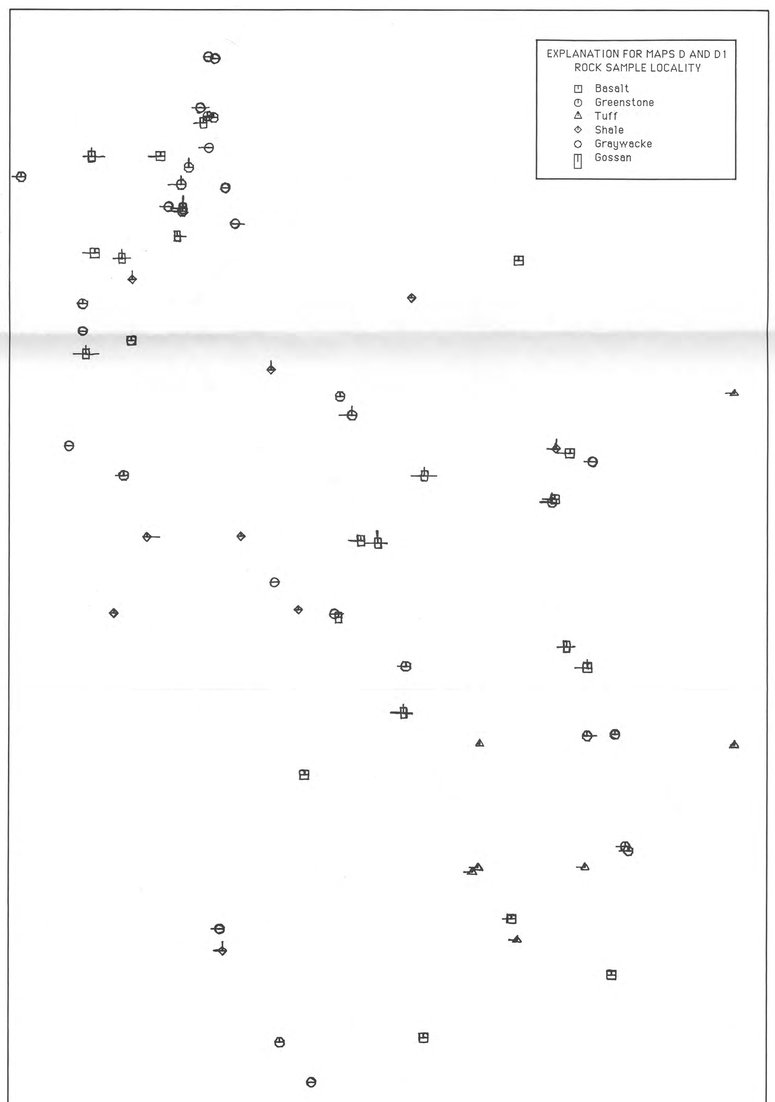
SCALE 1:250 000

5 0 5 10 15 20 25 MILES
5 0 5 10 15 20 25 KILOMETERS

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS
NATIONAL GEODETIC VERTICAL DATUM OF 1929



MAP C1--ENLARGEMENT OF DENSELY SAMPLED AREA IN MAP C



MAP D1--ENLARGEMENT OF DENSELY SAMPLED AREA IN MAP D

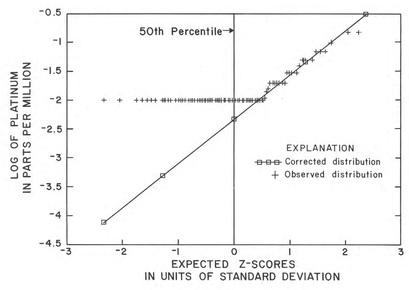


Figure 1.--Example of a log-probability plot of a censored data set.

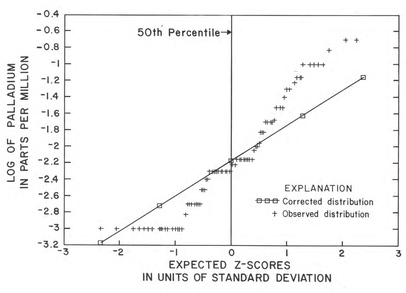


Figure 2.--Example of a log-probability plot of a censored data set containing samples from multiple populations.

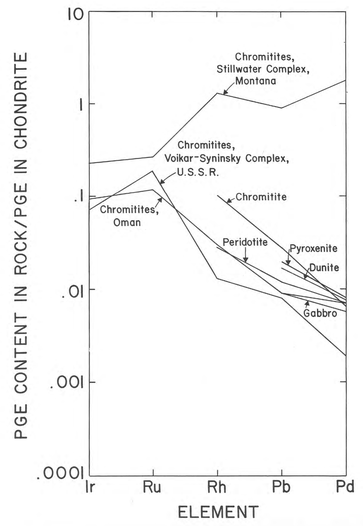


Figure 3.--Chondrite normalized PGE diagram using geometric means. Data for chromitites from other regions (Page and others, 1983) shown for comparison.

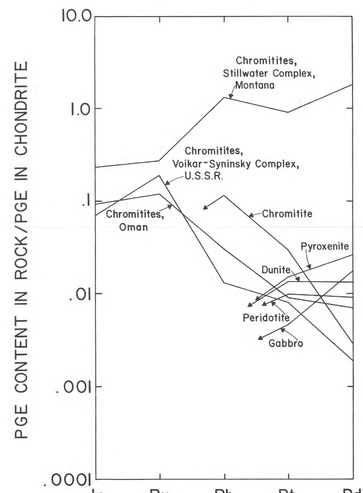


Figure 4.--Chondrite normalized PGE diagram using geometric means corrected for censored data. Data for chromitites from other regions (Page and others, 1983) shown for comparison.

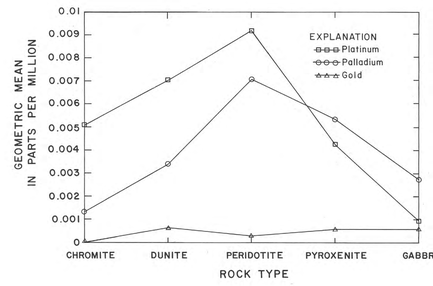


Figure 5.--PGE and gold variation diagram for plutonic ophiolite rocks.

Table 1.--Platinum, palladium, rhodium, and gold: geometric mean, abundance, and associated statistics by rock type

[Geometric statistics are corrected for censored data (Cohen, 1961; Miesch, 1967). Abundances are calculated from geometric statistics (Sichel, 1966; Miesch, 1967). All values are presented to four decimal places regardless of statistical precision. A value is called reported if the chemist reports a value above the lower limit of determination. Where less-than (<) values are indicated, actual values are several orders of ten less than the indicated value. By peridotite, we mean I.U.G.S. peridotite exclusive of dunite (Streckeisen, 1976). By serpentinite, we mean throughly sheared and altered rocks consisting of serpentine minerals with the original petrologic texture completely obliterated. In comparison, some dunite or peridotite rocks may be highly altered to serpentinite minerals but retain their original petrologic texture]

Element	Chromite	Dunite	Peridotite	Serpentinite	Pyroxenite	Gabbro	Amphibolite	Basalt	Greenstone	Tuff	Shale	Graywacke	Gossan
Geometric mean in parts per million													
Platinum --	0.0051	0.0070	0.0092	0.0111	0.0043	0.0009	0.0020	<0.0.0100	0.0014	<0.0.0100	0.0013	<0.0.0050	0.0095
Palladium -	0.0013	0.0034	0.0071	0.0069	0.0033	0.0027	0.0026	0.0013	0.0034	0.0021	0.0028	0.0008	0.0177
Rhodium ---	0.0077	<0.0.0100	0.0004	<0.0.0050	<0.0.0050	<0.0.0050	<0.0.0020	<0.0.0040	<0.0.0040	<0.0.0050	<0.0.0050	<0.0.0040	<0.0.0040
Gold ------	<0.0.0030	0.0006	0.0003	--	0.0006	0.0006	0.0005	0.0005	0.0007	<0.0.0020	0.0036	0.0004	0.0074
Abundance in parts per million													
Platinum --	0.0310	0.0197	0.0166	0.0144	0.0204	0.0068	0.0033	--	0.0085	--	0.0041	--	0.0667
Palladium -	0.0068	0.0273	0.0149	0.0104	0.0320	0.0189	0.0042	0.0026	0.0194	0.0038	0.0036	0.0017	0.1396
Rhodium ---	0.0177	--	0.0010	--	--	--	--	--	--	--	--	--	--
Gold ------	--	0.0016	0.0041	--	0.0067	0.0061	0.0016	0.0015	0.0035	--	0.0068	0.0030	0.0744
Geometric deviation													
Platinum --	6.7900	4.2800	3.0100	2.2600	6.0000	7.5400	2.8000	--	7.7800	--	4.8000	--	7.3300
Palladium -	6.1900	7.7800	3.2900	2.7200	6.8300	7.3100	2.7 500	3.4400	7.2600	3.0600	2.1400	3.4 500 .	10.2800
Rhodium ---	3.6300	--	3.3600	--	--	--	--	--	--	--	--	--	--
Gold ------	--	3.9400	11.2700	--	10.0700	9. 5000	5.0700	4.7 500	6.7200	--	3.2400	8.5900	13.4300
Number of samples (no. of reported values/no. of analyzed samples)													
Platinum --	39/95	45/95	181/327	36/56	35/100	57/240	5/19	1/25	7/23	2/11	7/29	3/14	9/14
Palladium -	31/98	50/97	273/313	50/55	76/92	177/245	11/19	17/24	17/23	6/11	28/29	7/14	12/13
Rhodium ---	60/98	2/99	13/325	3/56	2/95	0/232	0/19	1/25	0/23	0/11	0/30	0/14	2/14
Gold ------	0/29	17/71	63/272	7/49	25/82	103/232	7/19	8/22	11/23	2/11	20/29	5/13	10/13

Table 2.--Comparison of platinum (Pt), palladium (Pd), and gold (Au) abundance in rocks of the Medford region with those from other ophiolites

[Modified from Oshin and Crocket (1982) with additional data. All abundances in parts per million]

Locality	Rock type	Number of samples	Pt	Pd	Au	References*
Medford region ---------	Chromitite	98	0.0310	0.0068	--	10
	Dunite	99	0.0197	0.0273	0.0016	
	Peridotite	327	0.0166	0.0149	0.0041	
	Serpentinite	56	0.0144	0.0104	--	
	Pyroxenite	100	0.0204	0.0320	0.0067	
	Gabbro	252	0.0068	0.0189	0.0061	
	Basalt	25	--	0.0026	0.0015	
	Greenstone	23	0.0085	0.0194	0.0035	
	Tuff	11	--	0.0038	--	
	Shale	30	0.0041	0.0036	0.0068	
	Graywacke	14	--	0.0017	0.0030	
	Gossan	14	0.0667	0.1396	0.0744	
Thetford Mines ---------	Harzburgite	7	0.0100	0.0038	0.0015	8
	Cumulate dunite	13	0.0280	0.0205	0.0018	
	Cumulate pyroxenite	12	0.0170	0.0290	0.0014	
	Cumulate gabbro	4	0.0065	0.0029	0.0017	
	Hornblende-rich late-phase gabbro	3	0.0072	0.0180	0.0120	
	Hypabyssal metagabbro	5	0.0057	0.0011	0.0010	
Troodos ----------	Harzburgite dunite	3	--	0.0081	0.0014	1
	Cumulate dunite	5	--	0.0009	0.0005	2
	Cumulate pyroxenite	4	--	0.0130	0.0022	
	Cumulate gabbro	6	--	0.0031	0.0011	
Mt. Albert pluton, ----- Quebec	Harzburgite dunite	13	0.0097	0.0095	0.0018	3 6
Burro Mtn., ---------- California	Dunite	18	<0.0100	<0.0040	--	5
Red Mtn., ---------- Cypress Island, Twin Sisters U.S.A.	Dunite and peridotite	4	<0.0100	<0.0040	--	7
Ray-Iz massif. --------- Polar Urals, U.S.S.R.	Dunite	4	0.1120	0.0150	--	4
	Harzburgite	4	0.0260	0.0040	--	4
Volkar-Syninsky Complex- Polar Urals, U.S.S.R.	Tectonite	23	0.0075	0.0039	--	9
	Cumulate ultramafic and mafic rocks	23	0.0133	0.0103	--	
	Gabbro	19	0.0095	0.0118	--	
	Dike rocks	6	0.0030	0.0190	--	

*References: 1, Agiorgitis and Becker (1979); 2, Becker and Agiorgitis (1978); 3, Crocket and Chyi (1971); 4, Khvostova and others (1971); 5, Loney and others (1971); 6, Oshin (1981); 7, Page (1969); 8, Oshin and Crocke (1982); 9, Page and others (1983); 10, this study.

Table 3.--Upper limits for map-spar groups

[Individual samples are assigned to a group based on the amount of metal in the sample. All values are in parts per million]

Groups	Plate I		Plate II	Plate III				Plate IV					
	Chromite	Dunite	Peridotite	Serpentinite	Pyroxenite	Gabbro	Amphibolite	Basalt	Greenstone	Tuff	Shale	Graywacke	Gossan
Gold													
Lowest group-	--	0.0025	0.0070	0.0020	0.0030	0.0095	0.0015	0.0010	0.0150	--	0.0060	0.0010	0.0120
Middle group-	--	0.0500	0.0400	0.0200	0.0100	0.0400	0.0070	0.0100	0.0500	--	0.0125	0.0200	0.0900
Upper group--	--	--	0.7000	--	0.0700	0.5000	--	--	--	--	0.0300	--	0.1000
Multiple----- Populations	--	--	--	--	Yes	Yes	--	--	--	--	--	--	Yes
Platinum													
Lowest group-	0.0100	0.0100	0.0100	0.0020	0.0100	0.0050	0.0060	0.0150	0.0070	--	0.0060	--	0.0050
Middle group-	0.2000	0.0400	0.8000	0.0250	0.0700	0.0400	0.0150	0.0200	0.0500	--	0.0200	--	0.1000
Upper group--	1.1800	1.0000	2.0000	0.1000	0.3000	0.2000	--	--	--	--	--	--	0.5000
Multiple----- Populations	--	--	Yes	--	--	--	--	--	--	--	--	--	Yes
Palladium													
Lowest group-	0.0040	0.0080	0.0350	0.0080	0.0180	0.0020	0.0020	0.0010	0.0020	0.0025	0.0040	0.0010	0.0020
Middle group-	0.0180	0.0400	0.1500	0.0400	0.0900	0.1000	0.0500	0.0030	0.0150	0.0150	0.0200	0.0070	0.0200
Upper group--	0.2000	0.5000	1.0000	0.0700	0.3000	0.2000	--	0.0200	0.1500	--	--	--	2.0000
Multiple----- Populations	--	Yes	Yes	--	Yes	--	--	Yes	Yes	--	Yes	--	Yes
Rhodium													
Lowest group-	0.0190	0.0150	0.0050	0.0050	0.0100	--	--	--	--	--	--	--	--
Middle group-	0.0400	0.0350	0.0140	0.0070	0.0170	--	--	--	--	--	--	--	--
Upper group--	0.2000	--	--	--	--	--	--	--	--	--	--	--	--
Multiple----- Populations	Yes	--	--	--	--	--	--	--	--	--	--	--	--

MAPS SHOWING THE DISTRIBUTION OF THE PLATINUM-GROUP ELEMENTS AND GOLD IN ROCKS FROM THE WESTERN HALF OF THE MEDFORD AND PART OF THE ADJACENT COOS BAY 1° BY 2° QUADRANGLES, SOUTHWESTERN OREGON

By
C.A. Carlson, N.J Page, and R.R. Carlson

1986

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