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GEOCHEMICAL DATA FOR JURASSIC DIABASE ASSOCIATED WITH EARLY MESOZOIC BASINS IN THE EASTERN UNITED STATES: SOUTH HARTFORD BASIN, CONNECTICUT

By

David Gottfried[1], Albert J. Froelich[1], and J. N. Grossman[1]

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[1]Reston, Va.

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SOUTH HARTFORD BASIN, CONNECTICUT

Twenty-three (23) whole rock samples of diabase from the West Rock and Barndoor sheets were collected by Froelich in 1988 and analyzed by the U.S. Geological Survey. Samples labeled WR-1-13 and BD-1-10 on the map are the same as those labeled FG-88-WR-1-13 and FG-88-BD-1-10 in the tables.

The palladium (Pd) and platinum (Pt) abundances and ratios in the chilled margins of the West Rock and Barndoor sheets, the two northernmost diabase sheets in the eastern North America (ENA) tholeiite province, are typical of those in high Ti, quartz normative (HTQ) magmas throughout the province. Platinum contents are greater than palladium in the orthopyroxene cumulate zones, and Pd is greater than Pt in the late-stage differentiates. In other HTQ sheets further south Pd is locally enriched in ferrogabbros. Unfortunately, the late-stage, iron-rich quartzose gabbros of the Barndoor sheet, mapped and studied by Kroll, 1976, were not sampled during this study; thus, it is uncertain if anomalous Pd enrichment is present in any part of the diabase sheets of the South Hartford basin.

References

Kroll, R.L., 1976, Barndoor diabase intrusions, north-central Connecticut: Geological Society of America Bulletin, v. 87, p. 1449-1454.

EXPLANATION FOR PLATE 1

Geochemical sample locality

● Froelich and Gottfried, USGS, 1988

SOUTH HARTFORD BASIN, CONNECTICUT

SAMPLE NO.	MAGMA TYPE	DESCRIPTION OF SAMPLES
		West Rock sheet - Table 1a, 1b
FG-88-WR-1	High Ti, quartz normative	Cumulate
FG-88-WR-2	"	Cumulate
FG-88-WR-3	"	Cumulate
FG-88-WR-4	"	Cumulate
FG-88-WR-5	"	Basal chill
FG-88-WR-6	"	Upper chill
FG-88-WR-7	"	Diabase
FG-88-WR-8	"	Upper chill
FG-88-WR-9	"	Diabase
FG-88-WR-10	"	Diabase
FG-88-WR-11	"	Diabase
FG-88-WR-12	"	Upper apophysis
FG-88-WR-13	"	Upper apophysis
		Barndoor Sheet - Table 2
FG-88-BD-1	"	Cumulate
FG-88-BD-2	"	Diabase
FG-88-BD-3	"	Lower chill
FG-88-BD-4	"	Diabase
FG-88-BD-5	"	Diabase
FG-88-BD-6	"	Diabase
FG-88-BD-7	"	Cumulate
FG-88-BD-8	"	Upper chill
FG-88-BD-9	"	Upper chill
FG-88-BD-10	"	Altered diabase

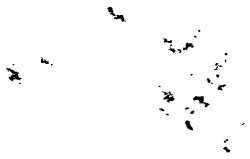

Table 1a. South Hartford basin, Connecticut. West Rock sheet.

	W-244939 FG-88 WR1	W-244940 FG-88 WR2	W-244941 FG-88 WR3	W-244942 FG-88 WR4	W-244943 FG-88 WR5	W-244944 FG-88 WR6	W-244945 FG-88 WR7
Lat.	41°25'N	41°25'N	41°25'N	41°25'N	41°25'N	41°28'N	41°28'N
Long.	72°57'W	72°57'W	72°57'W	72°57'W	72°57'W	72°56'W	72°56'W
SiO_2 (%)	52.00	51.60	51.90	52.00	52.10	51.90	52.20
TiO_2	1.25	1.20	1.25	1.11	1.14	1.15	1.17
Al_2O_3	15.60	16.00	14.80	13.90	13.80	14.10	14.50
Fe_2O_3	3.65	3.27	3.17	2.93	2.51	3.07	2.97
FeO	7.80	7.30	7.80	7.90	8.00	7.60	7.80
MnO	0.17	0.16	0.17	0.17	0.17	0.21	0.17
MgO	5.60	5.70	6.59	8.07	7.82	7.23	7.09
CaO	10.90	11.20	11.00	11.00	11.10	11.00	10.60
Na_2O	2.21	2.08	2.30	1.90	1.93	1.97	2.24
K_2O	0.56	0.51	0.66	0.60	0.51	0.56	0.64
P_2O_5	0.16	0.15	0.15	0.13	0.14	0.14	0.15
H_2O^+	0.93	0.92	0.98	0.65	0.65	0.98	0.65
H_2O^-	0.27	0.28	0.22	0.27	0.29	0.19	0.35
CO_2	<0.01	<0.01	<0.01	<0.01	<0.01	0.29	0.01
S	0.03	0.04	0.06	0.02	0.03	0.04	0.04
F	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cl	0.01	0.01	0.01	0.00	0.00	0.00	0.00
Σ	101.15	100.43	101.08	100.67	100.21	100.45	100.60
Sc (ppm)	35	33	36	37	36	36	36
Cr	137	155	250	430	320	270	270
Co	45	42	45	49	46	46	46
Ni	67	66	79	110	94	87	81
Zn	83	70	71	68	72	73	69
Ga	22.0	21.0	19.0	19.0	19.0	19.0	19.0
As	2.00	<0.70	<0.80	0.84	1.60	<1.30	<0.90
Rb	22.0	20.0	31	27.0	23.0	22.0	28.0
Sr	210	200	200	180	190	180	200
Sb	<0.130	0.150	<0.40	0.210	<0.130	0.260	<0.120
Cs	1.50	0.81	0.89	0.90	1.00	0.99	0.96
Ba	170	160	160	150	150	150	190
Y	22.0	21.0	21.0	19.0	20.0	20.0	20.0
La	12.0	11.3	11.9	10.1	10.5	10.7	11.1
Ce	24.6	23.0	25.0	21.0	22.0	23.0	23.0
Nd	15.0	12.0	14.0	12.0	10.0	<21.0	12.0
Sm	3.7	3.6	3.7	3.2	3.3	3.5	3.6
Eu	1.16	1.10	1.16	0.93	1.00	1.10	1.10
Tb	0.70	0.65	0.66	0.59	0.63	0.63	0.63
Yb	2.40	2.40	2.20	2.10	2.10	2.30	2.40
Lu	0.33	0.34	0.34	0.31	0.32	0.32	0.30
Hf	2.76	2.60	2.70	2.30	2.50	2.80	2.50
Nb	8.1	7.7	7.3	5.9	7.1	7.4	7.4
Ta	0.55	0.51	0.60	0.45	0.49	0.51	0.52
Th	2.31	2.10	2.30	1.90	1.80	2.20	2.20
U	0.55	0.42	<0.50	0.42	0.49	0.35	<0.40
Pd (ppb)	8.3	—	—	—	—	11.0	—
Pt	8.7	—	—	—	—	10.0	—
Rh	0.6	—	—	—	—	0.7	—
Ru	<0.5	—	—	—	—	<0.5	—
Ir	<0.5	—	—	—	—	<0.5	—
Au	<11.0	<5.0	<7.0	23.0	8.7	9.1	<11.0

Table 1b. South Hartford basin, Connecticut. West Rock sheet.

	W-244946 FG-88 WR8	W-244947 FG-88 WR9	W-244948 FG-88 WR10	W-244949 FG-88 WR11	W-244950 FG-88 WR12	W-244951 FG-88 WR13
Lat.	41°30'N	41°30'N	41°30'N	41°30'N	41°32'N	41°34'N
Long.	72°55'W	72°55'W	72°55'W	72°55'W	72°53'W	72°52'W
SiO_2 (%)	52.00	52.30	51.90	51.10	52.10	51.40
TiO_2	1.16	1.12	1.33	1.30	1.44	1.09
Al_2O_3	14.10	14.60	15.70	15.40	14.30	13.80
Fe_2O_3	3.13	2.57	3.11	2.95	3.77	3.10
FeO	7.50	7.80	7.70	8.10	7.70	7.70
MnO	0.27	0.18	0.18	0.17	0.18	0.18
MgO	7.50	7.14	5.38	5.33	5.55	7.82
CaO	10.60	11.10	10.80	9.86	8.95	8.22
Na_2O	1.93	2.09	2.43	2.97	2.75	2.01
K_2O	0.58	0.55	0.62	0.86	1.36	1.60
P_2O_5	0.15	0.15	0.16	0.15	0.18	0.13
H_2O^+	0.91	0.41	0.59	0.97	1.20	1.50
H_2O^-	0.29	0.40	0.33	0.33	0.36	0.23
CO_2	0.08	0.01	0.02	0.15	0.02	0.01
S	0.02	0.03	0.04	0.04	0.03	0.01
F	0.02	0.02	0.02	0.03	0.03	0.02
Cl	0.00	<0.00	<0.00	0.01	0.01	0.00
Σ	100.25	100.47	100.31	99.71	99.92	98.82
Sc (ppm)	36	36	33	35	35	36
Cr	260	240	113	62	70	266
Co	45	44	42	44	42	44
Ni	86	77	58	58	51	81
Zn	72	67	76	80	84	73
Ga	20.0	20.0	21.0	23.0	21.0	19.0
As	<0.90	<0.90	<0.90	0.96	1.50	1.10
Rb	21.0	25.0	26.0	30	46	25.0
Sr	180	210	230	320	290	190
Sb	<0.120	<0.120	0.30	0.210	0.180	0.160
Cs	0.66	0.48	0.50	1.70	0.52	0.75
Ba	160	160	170	230	270	170
Y	20.0	20.0	22.0	24.0	25.0	22.0
La	10.6	10.0	12.6	12.9	13.5	11.9
Ce	21.5	21.0	26.0	27.1	27.0	25.0
Nd	12.0	12.0	16.0	15.0	15.0	13.0
Sm	3.4	3.3	3.9	4.1	4.3	3.7
Eu	1.10	1.10	1.20	1.27	1.27	1.10
Tb	0.57	0.61	0.72	0.72	0.76	0.63
Yb	2.30	2.10	2.50	2.40	2.60	2.20
Lu	0.36	0.31	0.35	0.40	0.37	0.34
Hf	2.40	2.40	2.89	3.0	3.0	2.70
Nb	6.9	6.9	8.2	8.5	9.0	8.1
Ta	0.49	0.46	0.60	0.59	0.63	0.61
Th	2.20	2.00	2.40	2.70	2.50	2.40
U	0.51	0.47	0.53	0.45	0.69	<0.70
Pd (ppb)	—	—	—	—	13.0	—
Pt	—	—	—	—	8.8	—
Rh	—	—	—	—	0.5	—
Ru	—	—	—	—	<0.5	—
Ir	—	—	—	—	<0.5	—
Au	6.8	<5.0	<5.0	<3.0	13.0	<7.0

Table 2. South Hartford basin, Connecticut. Barndoor sheet.

	W-244952 FG-88 BD1	W-244953 FG-88 BD2	W-244954 FG-88 BD3	W-244955 FG-88 BD4	W-244956 FG-88 BD5	W-244957 FG-88 BD6	W-244958 FG-88 BD7	W-244959 FG-88 BD8	W-244960 FG-88 BD9	W-244961 FG-88 BD10
Lat.	41°48'N	41°48'N	41°48'N	41°49'N	41°49'N	41°49'N	41°50'N	41°55'N	41°58'N	41°58'N
Long.	72° 0'W	72° 0'W	72° 0'W	72°52'W	72°52'W	72°52'W	72°52'W	72°49'W	72°47'W	72°47'W
SiO_2 (%)	52.00	52.00	51.90	51.60	50.90	52.20	52.00	52.00	51.80	51.20
TiO_2	1.10	1.37	1.13	1.38	1.72	1.20	1.12	1.20	1.17	1.05
Al_2O_3	14.00	13.80	14.00	14.90	15.30	14.30	14.30	14.20	14.10	13.50
Fe_2O_3	2.64	3.21	2.82	2.93	3.77	1.84	2.19	3.02	2.94	2.67
FeO	8.00	8.40	8.00	8.20	9.00	8.70	8.40	7.60	7.80	7.40
MnO	0.17	0.18	0.17	0.17	0.18	0.17	0.17	0.18	0.19	0.17
MgO	7.84	6.30	7.66	5.28	5.12	7.25	7.61	7.14	7.20	8.36
CaO	11.10	10.20	11.10	8.29	10.40	11.00	11.00	10.70	11.00	11.10
Na_2O	1.98	2.28	2.05	4.23	2.61	2.17	2.08	2.13	1.95	2.35
K_2O	0.54	0.77	0.49	1.10	0.59	0.59	0.59	0.72	0.52	0.40
P_2O_5	0.14	0.17	0.14	0.18	0.13	0.15	0.14	0.15	0.15	0.13
H_2O^+	0.71	1.00	0.78	1.20	0.66	0.54	0.67	0.49	1.20	1.10
H_2O^-	0.18	0.19	0.20	0.31	0.22	0.21	0.19	0.43	0.59	0.30
CO_2	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	0.01	<0.01
S	0.03	0.06	0.04	0.03	0.03	0.05	0.03	0.03	0.05	0.03
F	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cl	<0.00	0.01	0.05	0.01	0.01	<0.00	0.01	0.00	<0.00	0.01
Σ	100.44	99.96	100.55	99.84	100.66	100.40	100.51	100.04	100.70	99.78
Sc (ppm)	36	37	37	33	38	36	36	35	37	35
Cr	310	171	310	50	25.0	240	340	260	300	400
Co	47	46	47	41	51	45	47	45	47	48
Ni	90	68	92	47	53	80	96	83	89	110
Zn	67	79	69	81	86	71	67	73	71	67
Ga	19.0	20.0	19.0	22.0	22.0	20.0	20.0	20.0	20.0	18.0
As	1.50	<1.00	2.00	<1.10	<1.10	<1.10	<1.20	<1.20	<1.20	<1.20
Rb	21.0	31	22.0	49	23.0	23.0	22.0	28.0	18.0	18.0
Sr	180	190	190	320	230	200	190	210	190	230
Sb	<0.140	0.160	0.250	0.140	<0.150	0.230	0.180	0.210	<0.150	<0.150
Cs	0.53	0.64	1.30	0.42	0.39	0.49	0.80	0.50	0.31	<0.220
Ba	150	180	170	240	180	160	140	180	150	140
Y	20.0	24.0	20.0	25.0	19.0	21.0	20.0	21.0	20.0	18.0
La	11.0	13.4	11.0	13.9	11.0	11.0	11.0	11.0	11.0	9.6
Ce	22.4	28.4	22.0	27.0	22.0	23.3	22.0	24.0	24.0	20.0
Nd	12.0	15.0	11.0	17.0	11.0	14.0	9.6	11.0	14.0	12.0
Sm	3.4	4.1	3.5	4.2	3.4	3.6	3.4	3.6	3.6	3.1
Eu	0.99	1.30	1.04	1.26	1.15	1.10	0.99	1.10	1.10	0.93
Tb	0.65	0.75	0.64	0.77	0.65	0.68	0.62	0.63	0.63	0.54
Yb	2.10	2.70	2.20	2.60	2.30	2.30	2.10	2.30	2.30	1.90
Lu	0.32	0.39	0.34	0.37	0.32	0.38	0.31	0.32	0.37	0.290
Hf	2.60	3.1	2.60	3.3	2.40	2.70	2.40	2.60	2.40	2.20
Nb	7.0	8.5	7.1	10.0	7.6	7.0	7.2	7.0	7.5	6.9
Ta	0.53	0.60	0.53	0.65	0.50	0.59	0.49	0.55	0.53	0.43
Th	2.10	2.60	2.20	2.80	2.20	2.20	2.10	2.20	2.20	1.90
U	0.43	0.53	0.59	0.60	0.52	0.76	<0.50	<1.00	0.44	<0.60
Pd (ppb)	—	—	—	15.0	—	—	—	—	10.0	—
Pt	—	—	—	7.3	—	—	—	—	10.0	—
Rh	—	—	—	0.8	—	—	—	—	0.6	—
Ru	—	—	—	<0.05	—	—	—	—	<0.05	—
Ir	—	—	—	<0.05	—	—	—	—	<0.05	—
Au	<5.0	<4.0	<7.0	<8.0	<5.0	<5.0	<15.0	<11.0	<5.0	<5.0