

**INTER-OFFICE MEMORANDUM**

SUBJECT: Hydrogeochemistry - Deeth, Nevada

DATE: March 5, 1981

TO: J. E. Deymonaz, Wim Lodder, H. J. Olson

FROM: H. D. Pilkington

A total of twenty water samples have been collected in the Deeth area since 1977 (see enclosed map). The analyses are given in Table 1. The geothermometers are based upon Fournier (1981). The water samples have been plotted up on a Trilinear diagram (Figure 1) and give two distinct groups of water, one with thermal signatures and the second normal meteoric waters.

Examination of the thermal waters suggests they may be split into two groups as shown below:

<u>Waters/Minor Thermal Component</u>	<u>Waters/Major Thermal Characteristics</u>
W10576	W10574
11527	10575
11528	11524
11529	14975
11530	14976
11545	14977
	14978

The areal distribution of the different waters is quite striking. The meteoric waters sampled thus far are well away from the known thermal anomaly. The waters with the strongest thermal signatures are those from the Twin Buttes portion of the thermal anomaly. The only exception is the warm spring in the SW/4 Sec 26, T37N, R58E which lies at the south end of the southern thermal anomaly.

All of the waters which have chemistry indicative of only a minor thermal component are from the southern thermal anomaly. I would interpret this to mean some leakage of thermal waters, probably along faults and mixing with groundwaters within the Humboldt Formation. The silica contents and the

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difference between the silica and alkali geothermometers support such an interpretation. The warm springs in section 26 must have a better conduit to depth and are topping less diluted waters. That is to say that we are looking at groundwaters which have circulated to greater depths where they mixed with the thermal waters leaking along a fault or fracture.



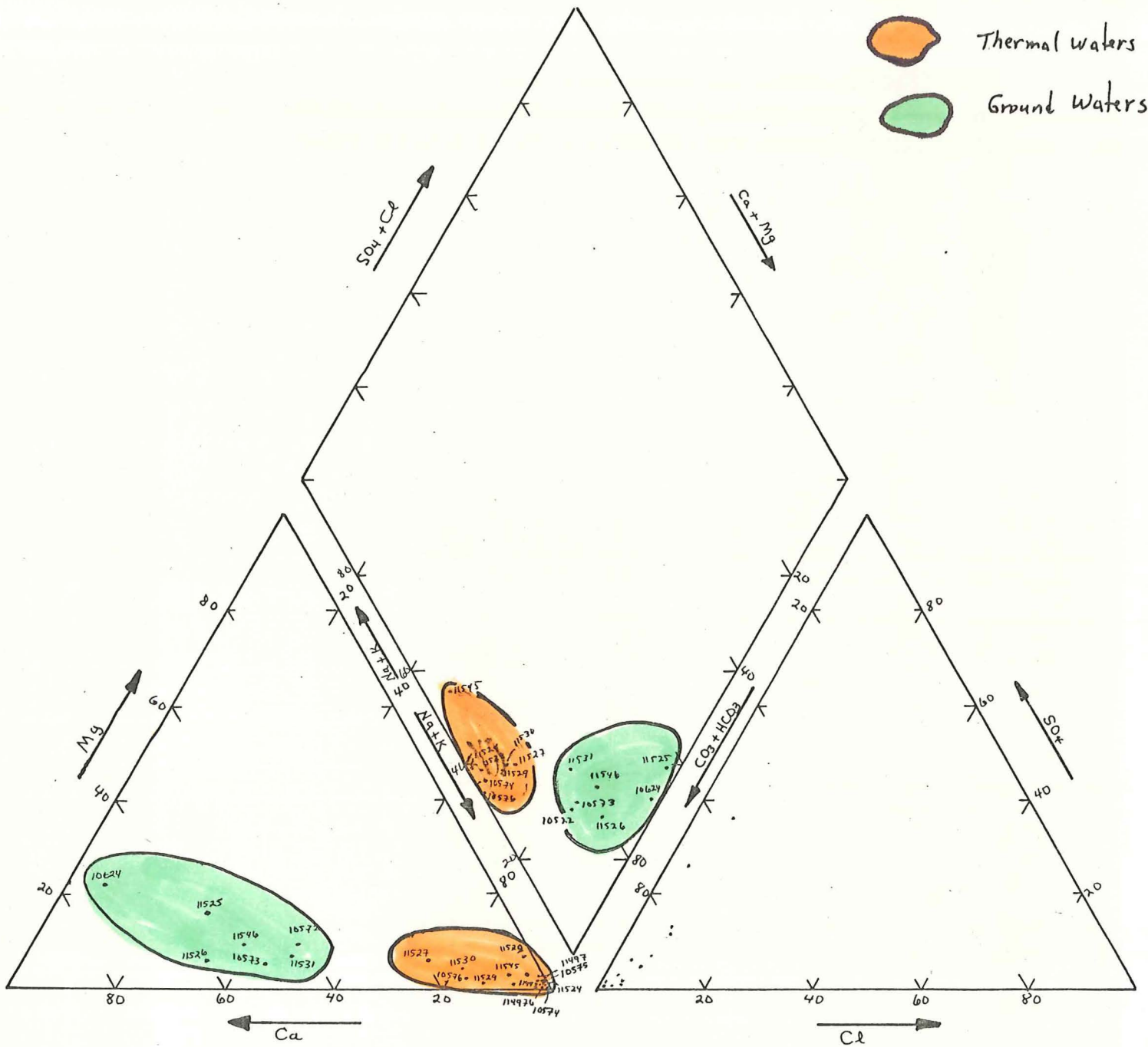
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HDP/c

attachments

Thermal waters  
Ground Waters







Sample No. T-H<sub>2</sub>O, T-SiO<sub>2</sub>, T-Na-K-Ca  
 B, NH<sub>3</sub> F, Cl

**AMAX** EXPLORATION, INC.  
 GEOTHERMAL BRANCH  
**DEETH-NEVADA**  
**HYDROGEOCHEMISTRY**  
 Source: AMAX 1977, '78, '80 3/5/81



cal Analyses - De

	W10572 SEWS14T39NR58E Elko Co., NV	574 38NR59E Co., NV	24 SWNW40NR60E Co., NV
Te	9.0	3.0	1.5
F	3.0	3.0	1.0
ph	7.12	3.15	1.28
C	6.6	1.0	.5
F	0.2	2.0	1.1
SO	7.0		.0
HC	114.2	3.0	.6
CO	0.0	1.0	1.0
S	52.0	1.0	.0
Na	19.0	1.0	.5
K	7.0	1.0	1.5
Ca	20.0	3.0	1.0
Mg	5.7	1.4	1.0
Li	0.0	1.0	1.0
Cu	0.0	1.0	1.0
B	0.0	1.0	1.0
MO	0.0	1.0	1.0
NH	0.0	1.26	1.0
TE	231.7	3.7	1.2
Tc	104		
Tc	74		
TI	362		
TI	186		



	W11524 SENEWS10T38R60E Elko Co., NV	W11525 NESENE19T37NR57E Elko Co., NV	W11526 SWNWNES29T35NR57E Elko Co., NV	W11527 NWNENWS16T36NR58E Elko Co., NV	W11528 SWNWNES34T37NR58E Elko Co., NV	W11529 NWNWSWS25T37NR58E Elko Co., NV
Temp (°C)	15	17	16	15	14	14
Flow (gpm)	20	0	5	10	15	0
pH	9.48	7.52	7.02	8.19	8.54	7.90
Cl	5.0	24.0	11.0	16.0	17.0	NA
F	8.9	0.2	0.1	1.7	4.0	NA
SO <sub>4</sub>	0.0	150.0	0.0	100.0	18.0	NA
HCO <sub>3</sub>	220.0	223.0	425.0	254.0	178.0	275.0
CO <sub>3</sub>	173.0	0.0	0.0	0.0	20.0	0.0
SiO <sub>2</sub>	80.0	20.0	78.0	63.0	69.0	51.0
Na	230.0	38.0	33.0	120.0	110.0	120.0
K	27	2.8	26.0	12.0	11.0	24.0
Ca	1.0	80.0	110.0	34.0	5.0	20.0
Mg	0.0	25.0	13.0	10.0	2.0	2.0
Li	0.0	0.0	0.2	0.1	0.0	0.0
Cu	0.0	0.0	0.0	0.0	0.0	0.0
B	1.3	0.4	0.0	20.0	0.3	0.0
MO	40.0	0.0	0.0	500.0	20.0	0.0
NH <sub>3</sub>	0.3	0.0	0.6	0.0	0.0	0.3
TDS	720.2	563.4	696.9	610.8	434.3	492.3
T <sub>q</sub> SiO <sub>2</sub>	122	70	121	112	116	103
T <sub>c</sub> SiO <sub>2</sub>	97	31	96	84		
TNa-K	83	192	494.0	217	217	285
TNa-K-Ca	78	26	81	133	146	170



	W11530 NWSENWS24T37NR58E Elko Co., NV	W11531 NESWSWS25T38NR58E Elko Co., NV	W11545 SESWNWS23T36NR58E Elko Co., NV	W11546 NWNESES29T35NR59E Elko Co., NV	W14975 SW/4S30T38NR60E Elko Co., NV	W14976 SW/4S17T38NR60E Elko Co., NV
Temp (°C)	18	20	10	26	13	14
Flow (gpm)	15	0	0	1	2	5
pH	7.99	8.79	8.29	7.50	8.20	9.20
Cl	18.0	12.0	NA	NA	90.0	20.0
F	3.8	0.2	NA	NA	1.0	10.0
SO <sub>4</sub>	32.0	21.0	NA	NA	780.0	62.0
HCO <sub>3</sub>	202.0	98.0	778.0	319.0		
CO <sub>3</sub>	0.0	20.0	0.0	NA		
SiO <sub>2</sub>	54.0	20.0	44.0	43.0	47.0	62.0
Na	88.0	8.0	840.0	57.0	470.0	390.0
K	20.0	26.0	47.0	12.0	11.0	5.6
Ca	20.0	31.0	60.0	95.0	14.0	1.3
Mg	4.0	6.0	28.0	18.0	8.5	0.3
Li	0.1	0.0	0.2	0.0	1.0	1.0
Cu	0.1	0.0	0.2	0.0	6.0 (ppb)	3.0 (ppb)
B	0.0	0.3	NA	NA	5.4	3.3
MO	20.0	0.0	0.0	0.0	15.0 (ppb)	30.0 (ppb)
NH <sub>3</sub>	0.0	2.4	0.2	0.6		
Ec(K)					2364	1609
TDS	441.9	244.9	1797.4	544.6	1427.9	555.5
T <sub>q</sub> SiO <sub>2</sub>	106	60	97	97	100	111
T <sub>c</sub> SiO <sub>2</sub>		31	66	65	69	83
TNa-K	299	980	172	290	117	93
TNa-K-Ca	174	50	97	153	91	86