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Kennecott Minerals

June 11, 1997

Mr. Larry Lynch
Wisconsin Department of Natural Resources
101 South Webster Street
P.O. Box 7921
Madison, WI 53707-7921

Dear Mr. Lynch:

Re: Flambeau Project - Type I Stockpile

Flambeau Mining Company (Flambeau) and their consultants have reviewed the available Type I stockpile data to develop an approach to identify the Type I waste rock in the vicinity of seep T1-1 that may require special handling during backfilling. Data suggests that it may be necessary to amend a portion of the Type I waste rock in the vicinity of seep T1-1 with limestone to achieve a cirumneutral pH. The proposed approach is outlined in this letter for your consideration. The data used in this assessment is included in Attachment 1 and consists of:

- Water quality data for seep T1-1 (Table 1), and field parameters for seeps T1-2, and T1-3 (Table 3);
- Copper, sulfur and oxide copper analyses for the seven drillholes completed in the Type I stockpile (Table 2 and Figure 1);
- Figures showing the Type I stockpile till blanket contours (Figure 3) and drillhole locations DH-1 through DH-7 (Figure 2 and 3);

Material Characteristics

As discussed in the report titled *1997 Backfilling Plan for Stockpiled Type II Material* submitted to the Wisconsin Department of Natural Resources in March 1997, sampling and testing of Type I material indicated that a general alkali amendment is not required as part of Type I backfilling. Given the quality of the water originating from seep T1-1 (Table 1), additional review of the drillhole data from DH-1 through DH-7 has been completed to identify potential source material that may be causing the reduced pH and elevated copper concentrations at that location as compared to other Type 1 seeps.

The copper, oxide copper and sulfur concentrations for DH-1 through DH-6 have been plotted as a function of elevation, as shown on Figure 1. Table 2 contains the supporting data for Figure 1. Each point on the plot represents the midpoint of the sample interval. Data for DH-7 were not considered for this evaluation as it was located in the sandstone as shown in Figure 2, and did not show significant concentrations of either copper or sulfur.

Parameters observed for seeps T1-2 and -3 (Table 3) suggest that the total area that may be contributing to the water quality at T1-1 is small. Seep T1-1 is located in close proximity to DH 1. However, the till blanket contours (Figure 3) suggest that DH-1, DH-2 and DH-6 could all fall within the catchment for seep T1-1. DH-3, DH-4, and DH-5 all clearly fall outside the catchment for seep T1-1. The plots in Figure 1 confirm the relative elevations for the till blanket, in that the till blanket at DH-1 was encountered at a lower elevation than DH-2 and DH-6. Thus, it is possible that the latter drillholes may fall within the catchment for seep T1-1.

Figure 1 further indicates that apparent zones of enriched copper are present immediately above the Type I waste rock/till blanket interface, and that the copper is predominantly in an oxidized form. However, to cause a decrease in pH), oxidation of sulfide sulfur is required. While sulfide sulfur analyses were not available, it is reasonable and conservative to use sulfur as an indicator of sulfide content. The drillhole data confirmed that the material stockpiled in the Type I stockpile met the Type I criteria, (i.e., sulfur content less than one percent). The plot for sulfur shows that drillholes DH-3 and DH-6 have zones of elevated sulfur immediately above the till blanket. The results for DH-2 show only marginally elevated sulfur contents above the till blanket. However, a zone of elevated oxide copper is present at DH-2 immediately above the till blanket. Any acidity that originates elsewhere (e.g., from DH-6) and passes through this area is likely to solubilize the oxide copper. The results therefore suggest that the materials immediately above the till blanket (below 1163 feet elevation) are the probable source for the acidity and elevated copper concentrations observed in Seep T1-1.

Drillhole 5 shows a band of elevated sulfur at an elevation of about 1175 to 1180. The corresponding copper and oxide copper for this interval however is low. Further, the results appear to be an isolated occurrence since this band is not observed in any adjacent drillholes. It is consequently not considered to represent a concern.

As shown in Figure 1, the characteristics of the near surface material in the Type I stockpile are similar to those at depth down to the 1163 foot elevation. Bearing in mind that the surface material has been exposed to oxygen more so than the material at depth, and that the test pit program discussed in the March 1997 report has shown that the material in the upper 10 foot

layer does not require alkali amendment, it is unlikely that the material at depth (i.e., above the 1163 foot elevation) would require alkali amendment.

Based on the above, Flambeau has concluded that the material that represents the source for acidity in seep T1-1 is delineated roughly by an area that extends from between DH-3 and DH-4, possibly up to the contact zone with the saprolite as approximately shown in Figure 2. Furthermore, the material is located below an elevation of about 1163 feet (approximately 15 feet above the till blanket).

Proposed Materials Handling Approach

Given the delineation of the source of acidity for seep T1-1, Flambeau proposes to relocate without limestone amendment the upper portion of the Type I waste rock, down to an elevation of about 1163 feet. Once this elevation is reached, test pits would be excavated ahead of relocation. The test pits would be excavated down to the till blanket, using the same methodology currently applied to the Type II stockpile. Test pit excavation would be initiated in the vicinity of seep T1-1, and would be performed on a 60 foot x 60 foot grid, radiating away from the starting point. Test pit excavation would not be continued beyond the point where no further limestone requirement is indicated, but would cover at minimum the triangular area delineated by DH-2, DH-3 and DH-6.

The sample collection, handling, and testing program to be applied to the Type I test pits will be the same as that used for the Type II materials with the exception that if paste pH values exceed 6.5 s.u. no alkali amendment would be required for the Type I material. For all other cases, Type I material would be classified as A, B, or C. The limestone application rate would be determined using the method developed for Type II material, with the exception of the excess for future oxidation which has been modified on the basis of the following discussion.

The maximum sulfur content of any of the samples collected from the Type I stockpile was less than 0.9 percent. This content does not take into consideration the fraction of the sulfur that has already been oxidized (i.e. the sulfide content is not known). Judging by the oxide copper present, it is likely that a significant proportion of the total sulfur has been oxidized to sulfate, and that the sulfide content is lower than the 0.9 percent. Further, not all of the sulfide will be available for oxidation. In addition, the Type II material placed in the pit below the Type I waste rock will have received sufficient alkali to neutralize all of the potential acidity that may be generated from future oxidation during the re-flooding period. Therefore, any oxidation that occurs in the Type I material originating from the seep T1-1 area will subtract from the oxidation that may occur in the Type II materials, and consequently an excess of

alkali will result in the Type II materials directly below. During the early stages of re-flooding, infiltration will transport acidity from these materials to the Type II zone, and will thus be neutralized. In the final stages of flooding, dissolved alkalinity will be transported from the zone with excess alkali to the Type I materials through upwelling groundwater, thus providing neutralization of acidity that may be generated in the Type I material originating from the seep T1-1 area prior to re-flooding. Thus Flambeau believes that it is not technically necessary to add additional alkalinity to the Type I material originating from the seep T1-1 area for oxidation that could occur prior to re-flooding.

Notwithstanding the above conclusion, to be conservative, Flambeau has decided to add additional alkalinity for future oxidation to Type I material found to have stored acidity as a result of the planned test pit program. The rate of application for the additional limestone will be 2.7 lb/ton. This rate is 50 percent of the application rate to be used for the Type II material above the 1065 foot elevation. Given the significant differences in the sulfur content between the Type I and Type II materials, the 2.7 lb/ton to be used for Type I material is very conservative.

Should you have any questions regarding this letter, please contact me at (715) 532-6690, extension 717.

Sincerely,

Jana E. Murphy
Environmental and Reclamation Manager

cc: Jeff Earnshaw, Flambeau Mining Company
Ken Markart, Wisconsin Department of Natural Resources
Thure Osuldsen, Rusk County
Melvin Spencer, Rusk County Zoning
Al Christianson, City of Ladysmith
Tom Riegel, Town of Grant
Jim Hutchison, Foth & Van Dyke
Daryl Hockley, Steffen, Robertson and Kirsten (Canada), Inc.

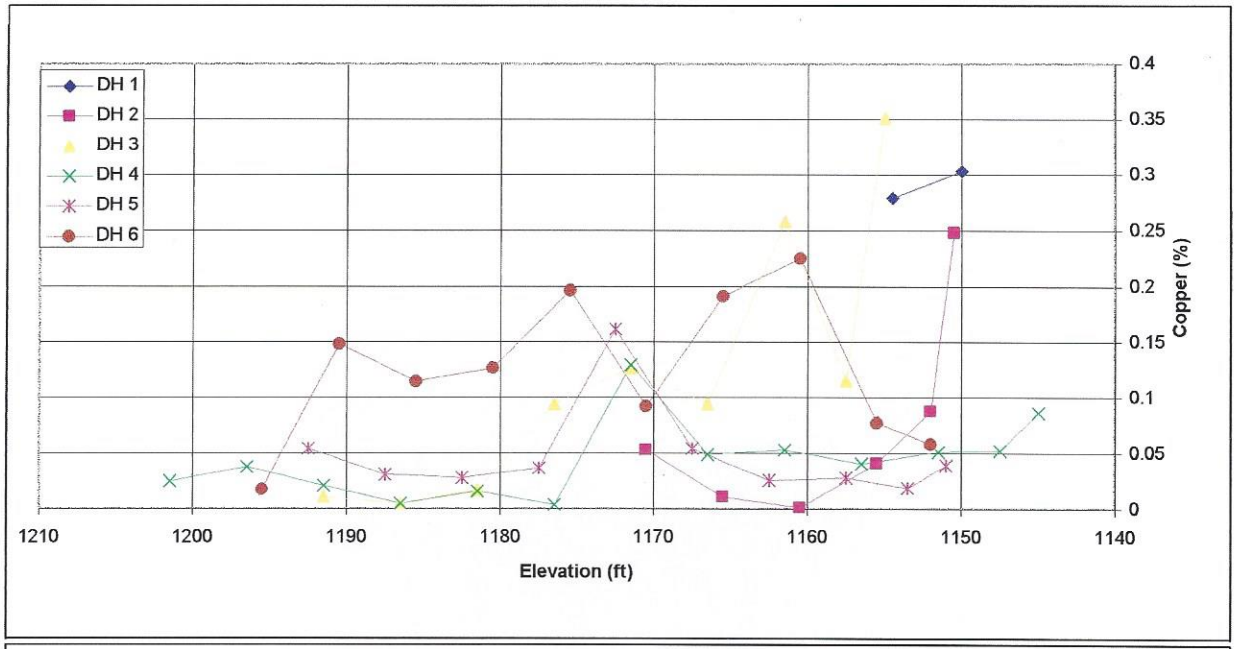
Attachment 1

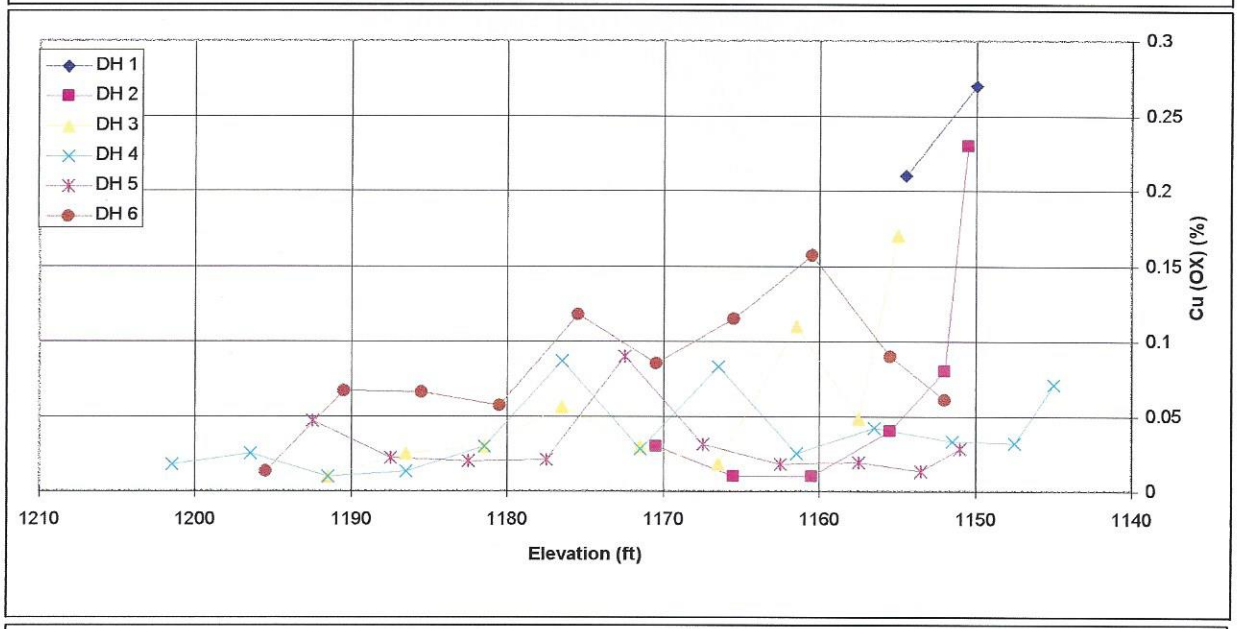
Table 1. Water quality data for seep T1-1.

DATE	Time	Cu (ug/l)	pH (su)	Conductivity (uS)	Temp (C)	Sulfate (mg/l)	Iron (mg/l)	Alkalinity (mg/l)	Flow (gpm)
1/25/96	1:25 PM	33900	6	1122	6.7				
1/25/96	2:13 PM	30400	5.7	1141	10.3				
1/26/96	11:14 AM		5.9	1131	5.0	390.0	0.020	54	
1/31/96	9:10 AM	17200	6	1060	8.6				
2/2/96	10:55 AM	16830	5.7	1115	5.7				
2/5/96	9:45 AM	16190	5.8	1077	4.5				
2/7/96	10:55 AM	17270	5.8	1059	4.6				
2/9/96	3:17 PM	22010	5.6	1154	10.3				
2/12/96	11:35 AM	13600	5.7	1081	5.8				
2/14/96	8:55 AM	16120	5.8	1173	6.7				
2/16/96	9:17 AM	13900	5.5	1068	4.6				
2/19/96	7:45 AM	12630	5.9	990	11.5				
2/19/96	11:35 AM	13550	6.1	1008	8.1	290	<0.0017	74	
2/20/96	11:23 AM	21270	5.9	1039	5.5				
2/21/96	3:17 PM	41230	5.2	892	4.4				
2/22/96	9:25 AM	28770	5.7	1012	4.6				
2/23/96	10:15 AM	20400	5.8	506	6.3				
2/26/96	3:40 PM	48390	5.5	964	6.1				
2/28/96	10:55 AM	20870	6	1038	6.0				
3/1/96	10:15 AM	14870	5.8	1063	4.5				
3/4/96	10:52 AM	16340	5.9	1028	5.3				
3/6/96	10:26 AM	15440	5.8	1047	4.1				
3/8/96	11:05 AM	10190	6	1038	5.6				
3/11/96	11:45 AM	13680	5.70	1074	5.9				
3/15/96	8:30 AM	6850	6.10	963	13.7				2.1
3/22/96	12:20 PM	3765	7.08						1.6
4/4/96	11:35 AM	5700	6.86	909	6.7				1.8
4/11/96	11:50 AM	8220	6.56	889	7.8				2.7
4/18/96	12:10 PM	7840	6.26	943	9.5				2.8
4/25/96	12:12 PM	5606	7	960	9.9				2.4
5/2/96	11:52 AM	1992	7.73	957	10.3				1.2
5/9/96	11:50 AM	6310	6.49	969	10.4				1.2
5/16/96	11:55 AM	5020	6.53	1005	9.6				1.1
5/23/96	2:47 PM	4198	7.23	1250	17.8				0.9
5/31/96	12:01 PM	3504	7.78	1066	17.2				1.0
6/5/96	11:23 AM	1293	7.48	1013	17.8				1.2
6/13/96	12:20 PM	4477	6.8	1089	22.1				0.9
6/20/96	11:50 AM	3200	7.71	1070	19.1				0.8
6/27/96	11:50 AM	5840	6.3	1160	20.6				1.1
7/3/96	12:12 PM	4105	7.1	1100	20.4				1.0
7/11/96	11:02 AM	1092	7.5	1053	17.4				0.9
7/18/96	11:10 AM	1300	8	916	18.6				1.0
7/25/96	11:51 AM	1910	7.9	1021	20.3				0.8
8/1/96	12:11 PM	3986	7	1037	21.2				0.8
8/8/96	1:38 PM	733	7.7	1334	20.4				0.7
8/15/96	11:55 AM	881	7.9	1045	20.1				0.6
8/22/96	12:45 PM	890	7.8	1145	21.6				0.8
8/29/96	1:32 PM	724	7.80	1402	26.2				0.6
9/5/96	11:12 AM	783	8.18	831	27.3				0.5
9/11/96	10:45 AM	532	7.78	997	18.2				0.5
9/19/96	11:01 AM	632	8.05	1046	19.3				0.4
9/26/96	10:43 AM	1039	7.75	1027	15.1				0.7
10/3/96	2:20 PM	946	8.10	1057	20.8				0.4
10/10/96	2:39 PM	657	7.66	945	NA				0.3

Table 1. Water quality data for seep T1-1.

DATE	Time	Cu (ug/l)	pH (su)	Conductivity (uS)	Temp (C)	Sulfate (mg/l)	Iron (mg/l)	Alkalinity (mg/l)	Flow (gpm)
10/17/96	1:22 PM	53150	5.67	2420	18.2				1.2
10/18/96	9:01 AM	1140	7.46	1112	11.3				0.6
10/24/96	10:06 AM	21080	6.40	1383	10.5				0.9
10/31/96	10:47 AM	1944	7.83	1152	10.5				1.1
11/7/96	8:48 AM	2101	7.11	1109	11.9				1.6
11/14/96	2:45 PM	1484	8.30	1118	9.5				1.0
11/21/96	11:10 AM	3375	7.63	1120	6.8				1.5
12/5/96	1:30 PM	2109	7.55	1041	8.3				1.3
12/12/96	12:43 PM	2118	7.79	1073	6.7				1.2
12/19/96	11:20 AM	1588	8.87	1017	8.2				1.0
12/26/96	9:37 AM	2295	7.95	1024	6.2				0.9
1/2/97	11:49 AM	1701	8.67	1019	8.9				0.9
1/9/97	10:24 AM	2067	7.97	914	7.3				1.3
1/16/97	12:19 PM	2033	6.87	1015	5.9				0.9
1/23/97	2:01 PM	2233	7.34	857	8.6				2.0
1/30/97	11:44 AM	1260	8.15	1029	6.8				0.9
2/6/97	11:57 AM	1130	7.15	1026	7.4				0.7
2/13/97	11:58 AM	1279	8.03	1065	8.2				0.6
2/20/97	11:17 AM	9969	6.66	1045	7.5				3.6
2/27/97	11:50 AM	9550	6.28	726	11.4				5.8
3/6/97	12:04 PM	8620	6.49	948	9.2				2.3
3/13/97	11:16 AM	15350	6.05	850	5.5				4.9
3/20/97	12:06 PM	17620	6.22	808	9.9				5.1
3/27/97	8:20 AM	10200	5.75	893	10.5				5.4
4/3/97	11:26 AM	15850	6.33	927	8.7				4.5
4/10/97	12:01 PM	6960	6.75	1024	7.1				2.5
4/17/97	11:52 AM	3964	6.77	1070	9.2				1.8
5/2/97	11:58 AM	2608	7.13	1108	11.0				1.5
5/8/97	12:12 PM	2318	7.40	1130	13.8				1.4
5/22/97	12:22 PM	1413	7.47	1026	18.1				1.0
5/29/97	3:03 PM	5890	6.61	1168	13.0				1.2
6/5/97	2:23 PM	5870	6.76	1067	15.2				1.0





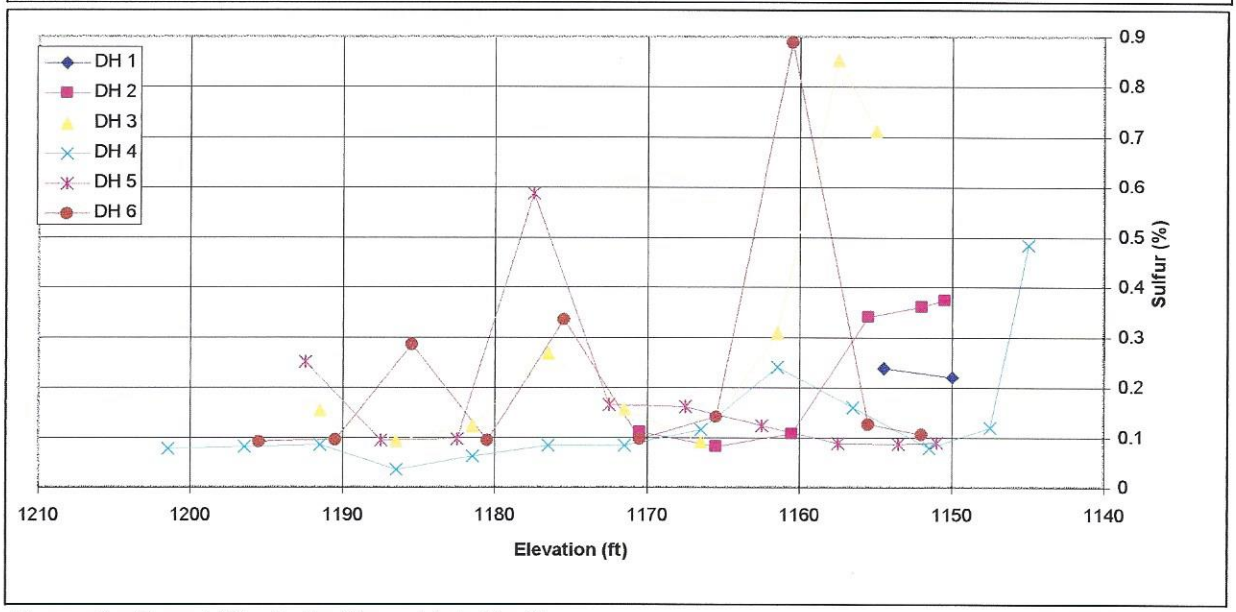


Figure 1. Type I Stockpile Down Hole Profiles

Table 2. Type I Stockpile - Drill Hole Analyses

Hole ID	Sample Elevation	Sulfur (%)	Moisture (%)	Soil pH
1-1	1157-1152	0.24	7.1	6.4
1-2	1152-1148	0.22	7.4	6.1
2-1	1173-1168	0.11	7.1	6.6
2-2	1168-1163	0.08	8.4	6.8
2-3	1163-1158	0.11	9.3	6.7
2-4	1158-1153	0.34	9.1	6.9
2-5	1153-1151	0.36	7.6	6.8
2-6	1151-1150	0.37	4.7	6.7
3-1	1194-1189	0.15	15.8	7.3
3-2	1189-1184	0.09	9.7	6.8
3-3	1184-1179	0.12	8.2	7.2
3-4	1179-1174	0.27	8.7	7.2
3-5	1174-1169	0.16	7.2	7.3
3-6	1169-1164	0.09	9.3	7.4
3-7	1164-1159	0.31	9.1	7.3
3-8	1159-1156	0.85	6.9	6.9
3-9	1156-1154	0.71	6.5	7.0
4-1	1204-1199	0.08	19.9	7.8
4-2	1199-1194	0.08	11.4	7.6
4-3	1194-1189	0.09	4.1	7.6
4-4	1189-1184	0.04	2.4	7.7
4-5	1184-1179	0.06	4.7	7.8
4-6	1179-1174	0.09	5.9	7.8
4-7	1174-1169	0.08	4.2	8.0
4-8	1169-1164	0.12	5.6	7.8
4-9	1164-1159	0.24	7.0	7.7
4-10	1159-1154	0.16	6.7	7.7
4-11	1154-1149	0.08	7.6	7.5
4-12	1149-1146	0.12	8.4	7.4
4-13	1146-1144	0.48	8.9	7.6

Table 2. Type I Stockpile - Drill Hole Analyses

Hole ID	Sample Elevation	Sulfur (%)	Moisture (%)	Soil pH
5-1	1195-1190	0.25	10.7	7.7
5-2	1190-1185	0.09	8.2	7.4
5-3	1185-1180	0.10	8.4	7.3
5-4	1180-1175	0.59	7.3	7.4
5-5	1175-1170	0.17	6.2	7.5
5-6	1170-1165	0.16	6.3	7.4
5-7	1165-1160	0.12	5.9	7.4
5-8	1160-1155	0.10	8.6	7.3
5-9	1155-1152	0.09	6.7	7.4
5-10	1152-1150	0.09	7.0	7.8
6-1	1198-1193	0.09	8.4	7.3
6-2	1193-1188	0.09	6.3	7.1
6-3	1188-1183	0.29	5.8	7.6
6-4	1183-1178	0.09	5.6	7.6
6-5	1178-1173	0.33	5.5	7.6
6-6	1173-1168	0.10	6.3	7.8
6-7	1168-1163	0.14	7.2	7.6
6-8	1163-1158	0.89	9.4	6.8
6-9	1158-1153	0.13	7.5	7.2
6-10	1153-1151	0.11	4.2	7.2
7-1	1195-1190	0.08	5.2	7.1
7-2	1190-1185	0.07	6.0	7.2
7-3	1185-1180	0.10	5.1	7.2
7-4	1180-1175	0.07	5.3	7.2
7-5	1175-1170	0.06	6.3	7.0
7-6	1170-1165	0.06	6.1	7.2
7-7	1165-1160	0.08	6.8	7.3
7-8	1160-1155	0.08	6.1	7.1
7-9	1155-1150	0.08	5.3	7.1
7-10	1150-1148	0.06	6.1	7.3

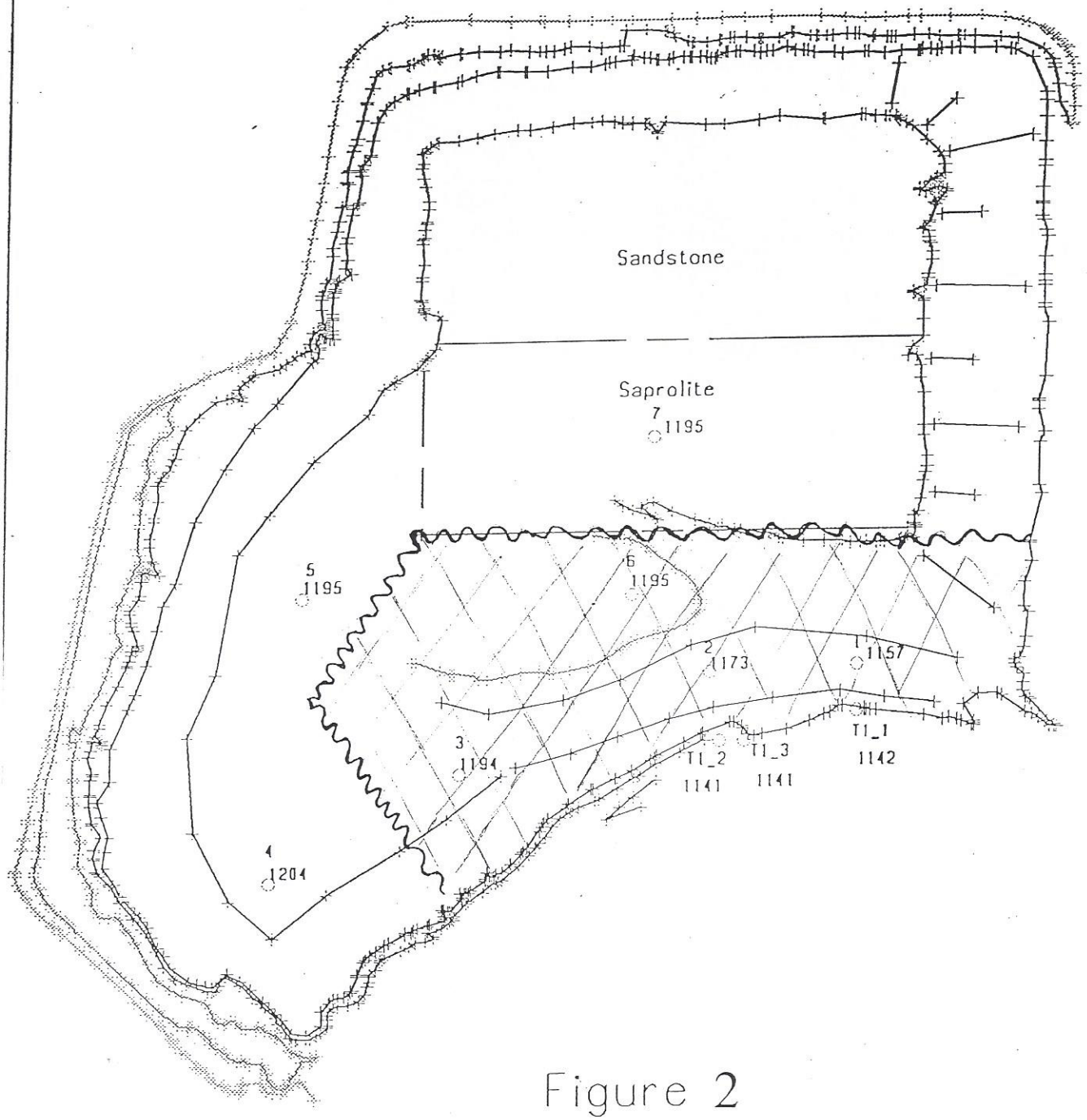


Figure 2

Approximate source area for T1-1 seep.

Type I drillhole locations.

NOT TO SCALE

Table 3. Water quality data for seep T1-2 and T1-3.

Sample Location
T1-2

DATE	Time	Cu (ug/l)	pH	Conductivity	Temp (C)
2/16/96	**3:05 PM**	**664**	**7.28**	**972**	**6.5**
2/19/96	8:00 AM	858	7.22	1004	9.7
2/19/96	11:35 AM	960	7.04	944	5.4

Sample Location
T1-3

DATE	Time	Cu (ug/l)	pH	Conductivity	Temp (C)
2/20/96	11:31 AM	234	6.96	669	5.4

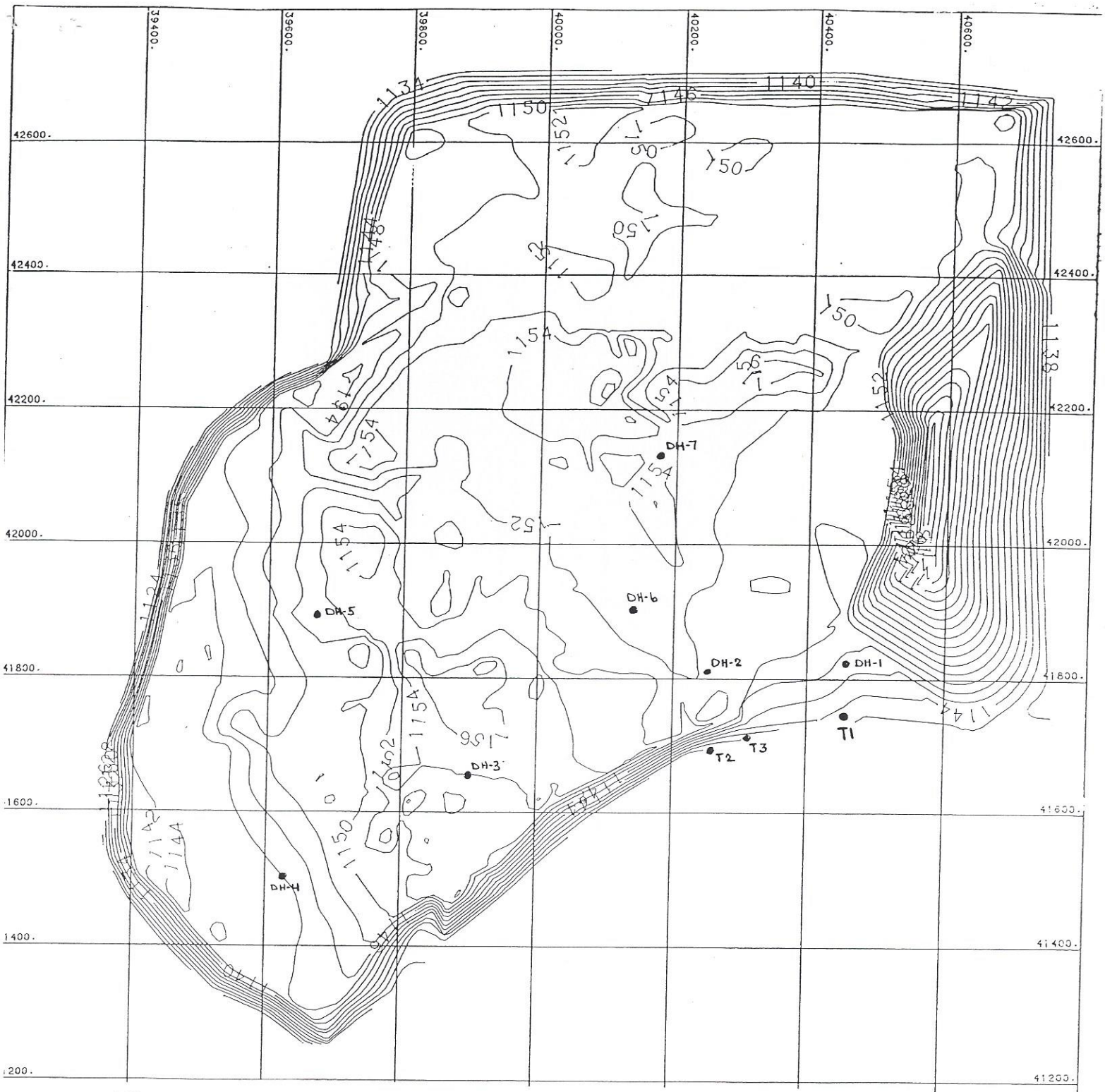


Figure 3. Till Blanket Contours/Drillhole & Seep Locations