Part III Conclusions and recommendations

Chapter 1: Conclusion

1-1 Dong Noi area

Taking into consideration the results of mineral occurrence surveys and drilling survey, we reached the following conclusion:

In the area with geochemical anomalies in zinc and lead values extending in the western half of Dong Noi area where limestone was distributed, hydrothermal ore solution in temperature of 140-250℃ and with high salinity rose up through joints in limestone and bedding place of fissures, formed silicificated zone on a certain horizon in relatively upper layers, caused occurrence of wide-ranged dolomitization and zinc/lead mineralization right above it, and at the same time formed quartz vein which changed joint systems and a specific horizon, precipitating galena and sphalerite.

The quartz vein in dolomitized zone was in width of 80 cm and its grade values were 7.86%Zn and 2.82%Pb. The sample extracted from 20 m section including this quartz vein also showed high values of 1.60%Zn and 1.43%Pb, and existence of zinc body was expected. However, since the structure to form quartz vein changes open joints and the part along bedding of a certain specific horizon, it is necessary to explain more in detail rock faces and the geological structure to estimate the position of its existence.

As a result of our investigation into MJTM-6 Hole excavated in a spare part of the district with IP anomalies, it was further clarified that the district with high IP anomalies might represent a mineralized zone of copper and lead overlapped with skarn. The depth of around 64 m in MJTM-6 Hole where occurrence of chalcopyrite was observed was almost in conformity with the depth of the upper limit to the anomaly zone (16 m V-sec/V or more) revealed through IP exploration. The depth of 140 m or lower where mineral showing including pyrite dissemination was intensified in general was in conformity with the district where IP anomalies (20 m V-sec/V or more) were observed. The district with IP anomalies (16 m V-sec/V or more) extended in a range of 100 m in diameter and 800 m in the total length. Based on the results of MJTM-5 Hole and MJTM-6 Hole, in view of the tendency of copper concentration to increase in a lower layer, i.e. the part where it was in contact with granite, ore shoots might possibly exist near the face which was in touch with granite. However, since copper showing in skarn zone is apt to be unevenly distributed, it is considered difficult to decide the exact position of such ore shoots.

1-2 Mae Kanai area

Resulting from our investigation on MJTM-7 Hole and past boring survey conducted by DMR, we found that the district with high IP anomalies corresponds to the mineralized zone including the silicificated zone along the fracture continuing in the NE-SW direction and accompanied predominant pyrite dissemination and chalcopyrite showing. The chalcopyrite was the most prevailing in the depth of around 129 m, but its grade was low. We may point out that this

mineralized zone might represent the passage of ore solution having formed the gossan zone where was distributed on the western side of the ridge.

Based on the result of our investigation conducted in the second year, the gossan zone with high zinc content in the Mae Kanai area had been considered to extend in a vertical direction. However, through our boring survey of this time, we confirmed that the gossan zone was distributed in thickness of a little more than 10 m and almost along the land surface and that remarkable mineral showing scarcely existed in its lower layers. This zone was distributed between argillized mudstone or sandstone. Although the gossan zone was originally a massive sulfide mineral abundant with pyrite and accompanying sphalerite, we presume that pyrite may have been oxidized and changed to limonite and sphalerite may have flown out through weathering.

The sedimentary rocks near the gossan zone were strongly influenced by argillization of talc-sericite-chlorite-smectite especially on the side of lower wall. Further, we observed that silicificated zone in the form of hydrothermal breccia accompanying white argillization and quartz vein had been developed on the upper wall of the gossan zone.

The present gossan zone is distributed only along the ridge and on a slow eastern slope of the land surface of the Mae Kanai area. Taking into consideration the fact that the bedding face was a slow slope inclined to east as well as our boring results, the gossan zone is considered to have been formed a few to fifteen meters away from the border between the limestone and general sedimentary rocks toward the side of sedimentary rocks or on the border in some part, and at present its upper face is almost in conformity with the land surface. In view of the fact that gossan zones occur almost on the same level, in the district surrounded by MJTM-8 Hole, MJTM-9 Hole and DMR's MK-3 Hole, it is quite possible that the horizon of the gossan may be beneath the land surface and that the gossan zone may have been hidden under it. Moreover, we presume that IP anomalies may be distributed at the east end of profile lines E and D for geophysical exploration on a slope inclined to east right under the land surface and that massive sulfide minerals may exist under the land surface.

Chapter 2: Recommendations for the Future

2-1 Dong Noi area

It is indeed possible that zinc bodies may exist in the limestone in the northwestern part of the Mae Kanai area. However, in estimating the position of such existence, careful attention should be paid to the result of detailed surveys on the geological structures and degrees of dolomitization concerned.

We note that the area with IP anomalies - especially the part with anomalies of 16 m V-sec/V or more – located in the central part of the Dong Noi area actually accompanies copper mineralization. Resulting from the boring surveys conducted three times by now, although no adequate grade or reserve of the deposit has been discovered to be considered as object of an operation, we think there still remains some room for further investigations.

2-2 Mae Kanai area

Further investigations should be made on the eastern part of the district where existence of subsurface gossan and massive sulfide ores is quite possible.

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Appendices

Appendix 1 Microscopic observation of polished thin section of rock and ore sample

No.	Sample No.	Locality	Rock type	Ore minerals											Gang minerals																Rock fragment
				Sulfide						Oxide		Hydroxide		Sulfate	Carbonate	Silica	Silicate											Oxide				
				Sphalerite	Galena	Chalcopyrite	Pyrite	Pyrrhotite	Arsenopyrite	Magnetite	Hematite	Cryptomelane	Goethite	Barite	Calcite	Quartz	K-feldspar	Plagioclase	Biotite	Muscovite	Chlorite	Clay Mineral	Amphibole	Clinopyroxene	Epidote	Garnet	Cordierite	Tourmaline	Sphene	Zircon	
1	MJTM-6(89.50m～89.70m)	MJTM-6(Dong Noi)	Green Skarnized rock	○	・	・	○								◎	○			◎	△	△	△									
2	MJTM-6(126.6m)	MJTM-6(Dong Noi)	Magnetite skarn			・	○			◎					・	○			◎	△	◎	△									
3	MJTM-6(129.65m)	MJTM-6(Dong Noi)	Magnetite skarn			・	○			◎					○	○			◎		○	△									
4	MJTM-6(154.03m)	MJTM-6(Dong Noi)	Green Skarnized rock	・	△		○	・		○				・	◎				◎				○								
5	MJTM-6(168.40m～168.45m)	MJTM-6(Dong Noi)	Aplite dike													◎	○	○	○	○	△										
6	MJTM-6(178.70m～178.80m)	MJTM-6(Dong Noi)	Green Skarn	△	△	○	○	△							○	○					○	△	◎	△	○						
7	MJTM-7(85.80m～85.95m)	MJTM-7(Mae Kanai)	Magnetite skarn			△	○			◎					○	○					◎	△									
8	MJTM-7(94.70m～94.95m)	MJTM-7(Mae Kanai)	Green Skarnized rock(quartz-calcite vein)	◎		・	・								○	◎						△									
9	MJTM-7(129.10m～129.20m)	MJTM-7(Mae Kanai)	Magnetite skarn			◎	・								◎	◎						△									
10	MJTM-8(21.60m～21.80m)	MJTM-8(Mae Kanai)	altared limestone			・	△								◎					・		・									
11	MJTM-8(139.45m)	MJTM-8(Mae Kanai)	Green Skarnized rock												○	◎			○	○		△									
12	MJTM-10(69.9m)	MJTM-10(Mae Kanai)	dolomitic limestone				○								○	△				○	○										
1	D20-26	Dong Noi	dolomitic limestone(calcite-quartz vein)	◎	◎	・	・	・					○		◎	○				・						○					

Legend : ◎:Abundant ○:Common △:Minor ・:Rare

Appendix 2 Result of X-ray diffraction analysis

No.	Sample No.	Locality	Rock type	Clay Mineral						Silica	Carbonate			Sulfate	Sulfide	Oxide	Hydroxide	Other silicate			etc.
				Saponite	Smectite	Chlorite/smectite	Chlorite	Sericite	Talc	Quartz	Calcite	Dolomite	Siderite	Barite	Pyrite	Hematite	Goethite	Plageoclase	K-Ferdspar	Albite	
1	MJTM-6(16.10m)	MJTM-6(Dong Noi)	green skarnized rock				・		・		◎	△									
2	MJTM-6(148.00-148.05m)	MJTM-6(Dong Noi)	green skarnized rock								△	・		○							
3	MJTM-6(176.90m)	MJTM-6(Dong Noi)	green argillic rock				・		△		◎										
4	MJTM-7(129.10m)	MJTM-7(Mae Ka Nai)	green argillic rock	・			・	・		○	・				・			・	・		
5	MJTM-7(163.00m)	MJTM-7(Mae Ka Nai)	green argillic rock	・			△	・		○	・							・	・		
6	MJTM-7(252.00m)	MJTM-7(Mae Ka Nai)	green argillic rock	△			・			・	・									○	
7	MJTM-8(8.20-8.30m)	MJTM-8(Mae Ka Nai)	hydrothermal altered clay				・		・	・			・				・				
8	MJTM-8(10.00-10.25m)	MJTM-8(Mae Ka Nai)	reddish brown limonite					・		・							・				
9	MJTM-8(13.50-13.60m)	MJTM-8(Mae Ka Nai)	hydrothermal altered clay				△			・			△								
10	MJTM-9(33.40m)	MJTM-9(Mae Ka Nai)	alteration clay		△		・	・	○												
11	MJTM-9(40.50m)	MJTM-9(Mae Ka Nai)	alteration clay		○		・	・	○	・									・		
12	MJTM-9(138.90m)	MJTM-9(Mae Ka Nai)	orange alteration zone		・		・		・		○	・									
13	MJTM-9(158.60m)	MJTM-9(Mae Ka Nai)	strong argillization zone		・		・	・	・		○	・									
14	MJTM-9(185.25m)	MJTM-9(Mae Ka Nai)	brown alteration zone		・		・				○	△									
15	MJTM-10(76.50-76.60m)	MJTM-10(Mae Ka Nai)	red brown alteration zone				・			・	◎	○									
16	MJTM-10(194.90m)	MJTM-10(Mae Ka Nai)	dolomitic limestone							・	△	◎									
1	D20-03	Dong Noi	brownish carbonate rock				・			・	・	◎									

Legend ; ◎:Abundant ○:Common △:Minor ・:Rare

Appendix 4 Ore assay data of core sample (1)

SAMPLE	Beginning (m)	END (m)	Au ppb	Ag ppm	Cu ppm	Fe %	Mn ppm	Pb ppm	Zn ppm
6-01	49.85	50.25	<5	14	750	5.36	3120	3440	2220
6-02	69.40	70.30	<5	<1	20	2.84	6210	15	85
6-03	84.70	84.80	<5	38	570	6.74	3850	39100	290
6-04	88.50	89.70	<5	6	625	7.36	5050	925	10830
6-05	106.80	109.60	<5	1	1835	>30.0	6160	25	35
6-06	144.40	144.90	<5	6	4240	5.17	4620	180	375
6-07	147.40	148.05	<5	47	5720	3.62	2610	1615	780
6-08	149.20	150.90	<5	4	735	5.39	3290	660	320
6-09	151.70	151.80	<5	7	145	3.81	4370	3710	125
6-10	152.05	152.35	<5	29	720	4.74	2540	5570	330
6-11	152.35	153.90	<5	3	365	5.18	2900	325	295
6-12	153.90	154.40	<5	21	270	5.93	3180	12210	240
6-13	154.40	155.25	<5	12	70	5.55	3120	6990	220
6-14	155.25	157.70	<5	9	255	5.54	3520	3770	255
6-15	164.00	164.45	<5	1	105	5.54	3850	350	145
6-16	177.10	177.60	<5	4	1715	5.4	4270	55	260
6-17	177.90	178.55	<5	3	1235	6.19	4380	290	360
6-18	178.55	178.85	<5	29	32900	15.25	3060	1680	3170
6-19	178.85	179.10	<5	3	2520	2.51	650	1265	515
6-20	179.10	180.30	<5	1	2080	9.88	5170	15	255
6-21	180.30	181.00	5	2	1975	7.83	1500	10	210
7-01	54.40	54.50	<5	0.4	883	3.7	1870	6	18
7-02	55.20	55.50	<5	1	1115	1.34	1365	68	10
7-03	70.75	70.85	<5	3.8	6100	7.2	4290	16	54
7-04	85.80	85.95	<5	0.6	528	36.5	3140	28	56
7-05	94.70	94.75	10	<.2	191	2.53	580	<2	1.16%
7-06	126.00	127.00	<5	0.2	41	1.61	1645	382	318
7-07	127.00	127.40	15	1.4	103	2.76	1515	1105	1815
7-08	127.40	127.70	<5	<.2	119	1.37	1740	8	60
7-09	127.70	129.10	<5	<.2	110	2.3	645	2	70
7-10	129.10	129.20	80	41.4	18.45%	16.3	585	164	238
7-11	129.20	129.40	20	5.8	1.35%	2.05	325	10	30
7-12	129.40	129.50	10	2.4	6980	1.01	730	<2	16
7-13	129.50	130.70	<5	<.2	186	1.24	1610	16	30
7-14	135.00	136.00	<5	1.4	2560	3.34	1515	<2	76
7-15	136.00	136.70	<5	2	2180	2.01	860	<2	48
7-16	136.70	138.60	<5	<.2	128	2.66	850	<2	56
7-17	138.60	139.70	<5	<.2	37	1.26	865	6	32
7-18	139.70	140.90	<5	<.2	16	1.69	365	<2	40
7-19	177.00	177.10	10	4	3970	6.91	930	80	225
7-20	245.50	248.50	<5	<1	35	3.95	220	5	20
8-01	1.60	3.00	<5	<1	60	>30.0	28000	145	14780
8-02	3.00	5.00	<5	1	140	>30.0	26300	395	13580
8-03	5.00	6.00	<5	3	305	>30.0	29700	255	12920
8-04	10.20	11.95	<5	3	525	>30.0	28700	335	5560
8-05	14.25	14.30	<5	6	350	>30.0	10120	4160	3270
8-06	25.85	25.95	<5	<1	45	5.87	3320	135	150
8-07	27.00	27.20	<5	2	45	5.73	3260	450	145
8-08	31.65	31.85	<5	<1	35	3.61	3270	50	30
8-09	32.80	33.40	<5	<1	95	6.24	3860	40	50
8-10			5	12	8110	5.71	2610	<5	120
9-01	139.75	140.00	<5	<1	10	1.17	450	10	10
9-02	185.30	185.40	<5	<1	5	1.31	1210	70	80
9-03	188.70	188.75	<5	<1	5	0.91	1060	80	25
9X-1	0.00	2.50	<5	1	210	>30.0	>50000	385	3250
9X-2	16.50	16.55	<5	<1	<5	17.95	1590	1635	90
9X-3	24.80	24.90	<5	10	625	22.5	29500	1410	2490
SAMPLE	Beginning	END	Au	Ag	Cu	Fe	Mn	Pb	Zn

Appendix 3 Geochemical data of rock sample in the Northwestern of Dong Noi Area

SAMPLE	Au ppb	Ag ppm	Ca %	Cd ppm	Cu ppm	Fe %	Mg %	Mn ppm	Pb ppm	Zn ppm
D20-1	<5	<1	1.1	<5	<5	0.41	0.17	450	65	65
D20-2	<5	<1	29.4	<5	<5	1.52	1.81	15070	150	995
D20-3	<5	1	23.1	5	5	2.27	9.78	23400	11180	120
D20-4	<5	<1	12.8	<5	<5	0.68	3.37	6540	50	120
D20-5	<5	<1	>30.0	<5	<5	0.38	0.24	1430	100	125
D20-6	<5	<1	>30.0	<5	<5	0.31	0.26	1050	25	90
D20-7	<5	<1	27.9	<5	30	0.37	0.23	1090	35	75
D20-8	<5	<1	>30.0	<5	<5	0.57	0.18	1470	60	110
D20-9	<5	<1	>30.0	<5	5	0.54	0.35	1790	130	190
D20-10	<5	<1	>30.0	<5	<5	0.27	0.15	990	25	45
D20-11	<5	<1	>30.0	<5	<5	0.28	0.26	1160	25	60
D20-12	<5	<1	>30.0	<5	<5	0.42	0.36	1190	5	40
D20-13	<5	<1	0.7	<5	<5	0.42	0.30	190	20	70
D20-14	<5	<1	18.9	<5	<5	0.35	0.23	950	20	45
D20-15	<5	<1	>30.0	<5	<5	0.34	0.25	910	<5	30
D20-16	<5	<1	>30.0	<5	<5	0.34	0.26	750	35	65
D20-17	<5	<1	>30.0	<5	<5	0.46	0.30	1080	50	100
D20-18	<5	<1	>30.0	5	<5	1.67	1.81	8240	95	3180
D20-19	<5	<1	>30.0	<5	<5	0.40	0.37	920	15	150
D20-20	<5	<1	19.8	<5	<5	<.010	0.35	6080	40	765
D20-21	<5	<1	>30.0	<5	<5	0.42	0.82	2180	25	70
D20-22	<5	<1	23.9	<5	<5	0.28	0.17	700	95	25
D20-23	<5	<1	>30.0	<5	<5	0.24	0.21	860	<5	45
D20-24	<5	<1	11.5	<5	<5	0.31	0.19	550	<5	50
D20-25	<5	8	>30.0	75	15	0.62	1.66	4910	14270	16040
D20-26	<5	18	17.9	390	100	2.11	5.65	17180	28200	7.86%
D20-27	<5	<1	22.2	<5	<5	1.47	8.94	12400	180	330
D20-28	<5	<1	13.7	<5	<5	1.01	3.95	7410	215	615
D20-29	<5	<1	28.7	<5	45	0.89	4.14	6370	395	1840
D20-30	<5	<1	>30.0	<5	<5	0.28	0.22	1100	5	80
D20-31	<5	1	27.0	10	15	1.53	3.22	14310	970	2230
D20-32	<5	<1	27.9	<5	<5	0.76	4.96	6970	55	340
D20-33	<5	<1	27.5	5	5	0.96	3.18	6060	50	1860
D20-34	<5	<1	24.6	<5	<5	3.13	4.93	30700	50	820
D20-35	<5	<1	24.6	<5	5	1.42	6.05	10920	65	450
D20-36	<5	<1	0.3	<5	<5	0.36	0.06	1080	95	65
D20-37	<5	<1	10.7	<5	<5	0.31	0.11	960	45	35
D20-38	<5	<1	>30.0	<5	<5	0.26	0.20	1520	<5	80
D20-39	<5	<1	>30.0	<5	<5	0.27	0.26	1880	35	135
D20-40	<5	<1	>30.0	<5	75	1.64	0.27	13220	30	3020
D20-41	<5	1	>30.0	<5	5	0.48	0.31	1810	210	590
D20-42	<5	<1	19.5	<5	<5	0.53	0.80	3170	5	65
D20-43	50	<1	15.1	<5	15	1.04	2.22	3880	535	160
D20-44	<5	<1	27.9	<5	<5	0.33	0.21	1080	20	80
D20-45	<5	<1	13.9	<5	<5	0.51	1.63	2900	15	70
D20-46	<5	<1	>30.0	<5	<5	0.15	0.15	1020	15	75
D20-47	<5	1	28.3	<5	5	0.27	0.17	1650	65	130
D20-48	<5	<1	>30.0	20	5	0.29	0.16	1860	105	675
D20-49	<5	<1	25.8	<5	<5	0.31	0.13	1980	170	380
D20-50	<5	<1	23.7	5	<5	0.21	0.08	1460	125	355
D20-51	<5	<1	19.3	<5	<5	0.39	0.16	1040	85	210
D20-52	<5	<1	29.4	<5	<5	0.75	2.95	5870	15	80
D20-53	<5	<1	>30.0	5	20	0.22	0.15	1890	290	1385
D20-54	<5	<1	21.5	<5	<5	0.33	0.19	1530	25	90
D20-55	<5	<1	14.8	<5	5	0.41	0.10	1370	<5	40
D20-56	<5	1	19.7	<5	<5	0.23	0.12	1480	25	75
D20-57	<5	<1	11.6	<5	5	0.73	0.31	1670	30	115
D20-58	<5	<1	>30.0	<5	<5	0.98	0.54	7270	100	580
D20-59	<5	<1	22.9	5	<5	0.47	0.23	970	5	165
D20-60	<5	<1	29.7	5	<5	0.36	0.29	1350	60	185
D20-61	<5	4	27.3	5	60	4.16	0.20	18890	2680	2750

Appendix 4 Ore assay data of core sample

(2)

	(m)	(m)	ppb	ppm	ppm	%	ppm	ppm	ppm
10-01	25.00		<5	3.2	34	2.4	2170	274	296
10-02	56.25	56.30	<5	5	605	1.2	2170	9260	530
10-03	56.40	56.50	<5	57	100	1.41	680	7.29%	2990
10-04	59.25	59.28	<5	4	20	0.45	1370	13160	180
10-05	69.80	70.20	<5	<1	10	6.61	360	100	65
10-06	76.35	76.60	<5	<1	<5	1.04	2250	250	250
10-07	77.40	77.55	<5	<1	50	1.11	3120	225	190
10-08	79.75	81.00	<5	<1	10	1.08	2550	220	280
10-09	82.00	82.50	15	1	75	2.78	3270	25	45
10-10	55.00	55.10	<5	<1	5	2.17	2900	275	325

Appendix 5 Equipment of driiling survey

Item		Model/Spec.	Quantity	Remarks
Drilling Machine			3	
Rig No.1	Drill Rig	MPR-3(multi purpose)	1	made in Australia on Cat 320 Max HQ400m
	Engine	Detoroit 671	1	Detroit(USA) diesel 250HP
	Mud Pump	Bean Royal 435	1	Rexroth(Australia) 30gal/min
	Mud Mixer		1	hydraulic moter powered by MPR-3
Rig. No.2	Drill Rig	VK-600	1	Longyear Australia
	Engine	Detoroit 471	1	Detroit(USA) diesel 133HP
	Mud Pump	Bean Royal 435	1	Rexroth(Australia) 30gal/min
	Mud Mixer		1	hydraulic moter powered by VK-600
Rig. No.3	Drill Rig	Longyear 44	1	Longyear Australia
	Engine	F5L912	1	Klockner Humbordl Deutz AG, diesel 83HP
	Mud Pump	Bean Royal 435	1	Rexroth(Australia) 30gal/min
	Mud Mixer		1	hydraulic moter powered by LY-44
. . . . .		LC614	2	FMC corporation(USA)
Drilling Rod		PQ	40	3.05m/rod
		HQ	115	3.05m/rod
		NQ	210	3.05m/rod
Core Barrel Assembly		PQ	4	2.60m(core length 1.60m)
		HQ	4	3.80m(core length 2.80m)
		HQ	4	2.60m(core length 1.60m)
		NQ	4	2.60m(core length 1.60m)
		NQ	4	4.20m(core length 3.50m)

Appendix 6 Articles of consumption during drilling survey

Item	Spec.	Total	MJTM-6	MJTM-7	MJTM-8	MJTM-9	MJTM-10
Metal Crown	5"	0					
Diamond Bit	HQ	15	3	4	2	3	3
	NQ	12	1	2	4	1	4
Reamer	HQ	6	2	1	1	1	1
	NQ	7	1	3	1	1	1
Casing Shoe	HW	5	1	1	1	1	1
	NW	4		1	1	1	1
Aus-Gel(bentonite)	Kg	4,225.0	962.5	425	2,000	387.5	450
MI-Gel(bentonite)	Kg	0					
Quick Trol	Kg	613.5	56.5	187	296	29.5	44.5
Ploymer	Liter	408	107	16	149	62	74
Liqui-Pol	Kg	0					
Aqua-Pac	Liter	0					
Aus-Plug	Kg	0					
LCM	bag	40			40		
Cement	kg	125			125		
Diesel oil	Liter	9,909	1,348	1,991	2,844	1,840	1,886
Core box	Box	217	38	56	43	40	40

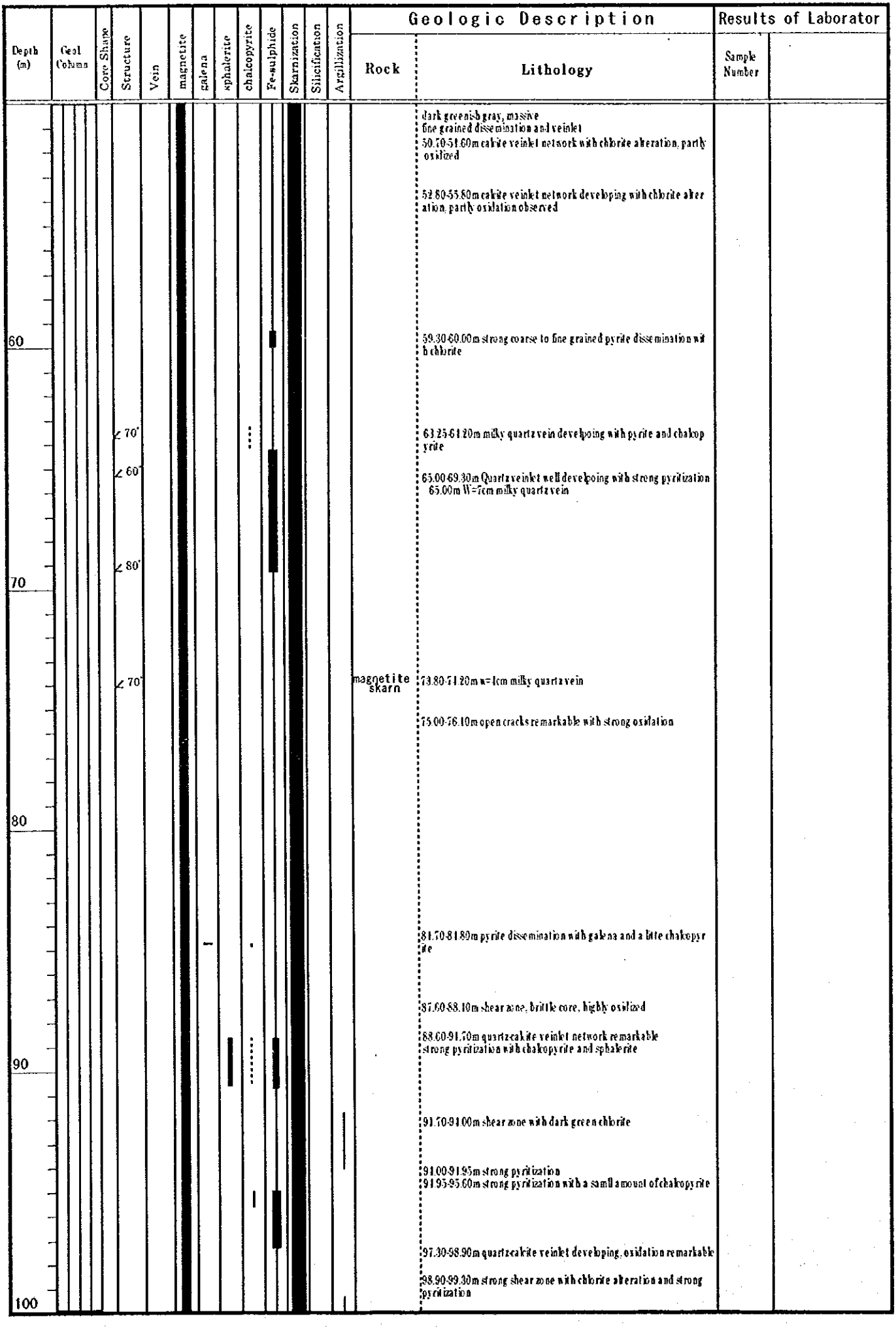
Appendix 7 Core logging sheet

MJTM-6
MJTM-7
MJTM-8
MJTM-9
MJTM-10

Mae Sariang, Thailand **MJTM-6** (Scale 1/200) (1/1) (Depth: 0 m - 50 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
1.80													Top Soil	reddish brown soil		
													altered weathered mudstone	1.80-2.70m chocolate color clayey mudstone, strong weathered 2.70-3.10m light brown altered tuff 3.10-4.10m white altered tuffceous mudstone 4.10-4.70m brown soil filled up open crack with organic material 4.90-5.70m light brown altered tuffceous mudstone 5.70-8.10m brown soil filled up open crack with organic material 8.10-8.70m light gray clay with white altered tuff gravel		
8.70																
10			∠ 10°										dolomitic limestone	8.70-11.60m light gray & yellowish gray fine banding, dolomitic lime stone and altered tuff alternation 11.60-11.60m light gray to white, massive 12.00-12.40m orange to brown hairline well developed 12.10-12.60m brecciated part, strongly argilized 13.50-14.10m yellowish gray, brecciation & argilization strong		
14.60																
20													green skarn	green to dark green, massive with calcite veinlet network partly orange to brown colored alteration 19.80-20.00m fine grained pyrite dissemination 20.20-21.00m quartz vein network with dark green chlorite alteration 20.20-20.35m pyritization strong 20.35-20.45m chloritization strong 21.00-22.10m weak silicified 22.10-22.90m shear strong with chlorite 22.90-25.00m partly weak silicified with very weak pyritization 24.70m calcite vein w=2cm 25.00-27.80m calcite veinlet network with pyrite some of veinlets oxidized		
				∠ 40°												
27.80																
30													magnetite skarn	gray to dark gray, massive 29.00-30.00m magnetite rare 27.80-30.00m fine grained pyrite dissemination and veinlet remarkable 30.00-30.10m strong sheared with abundant pyrite 30.10-32.00m strong pyrite dissemination and veinlet, partly oxidized 32.00-37.50m pyrite hairline to veinlet network 31.00m quartz-calcite vein(w=2cm) with pyrite 31.70m quartz-calcite vein(w=3cm) with pyrite 35.50-35.70m oxidation remarkable 37.60-37.90m oxidation remarkable 37.90-50.00m dark gray to dark greenish gray, massive fine grained pyrite dissemination and veinlet remarkable 41.20-41.50m banded quartz-calcite vein w=2cm 11.00-15.00m coarse grained idiomorphic pyrite dissemination 18.40-18.90m calcite vein with galena clot, partly orange colored oxidation		
				∠ 20°												
				∠ 70°												
40																
				∠ 65°												
50																

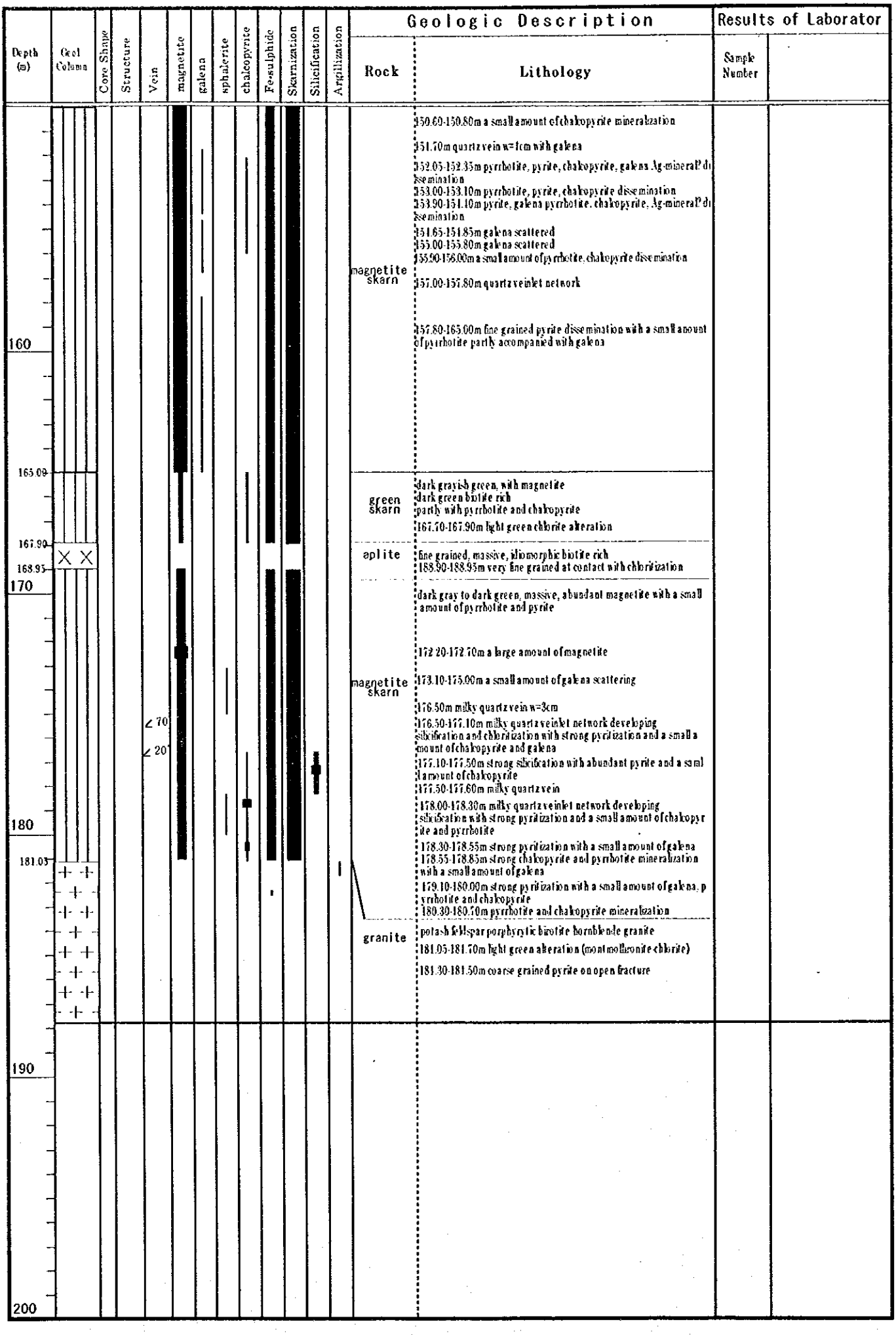
Mae Sariang, Thailand **MJTM-6** (Scale 1/200) (2/1) (Depth: 50 m - 100 m)



Mae Sariang, Thailand **MJTM-6** (Scale 1/200) (3/1) (Depth: 100 m - 150 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
100														100.10-100.70m calcite veinlet network oxidation remarkable		
														102.60-104.00m shear zone with phyllitic texture, dark green chlorite and pyrite abundant		
														104.00-105.00m pyrite dissemination strong		
														106.70-107.30m strong pyrite dissemination with a small amount of chalcopyrite		
110														109.00-109.60m strong pyrite dissemination with a small amount of chalcopyrite		
														dark green to dark gray, massive, pyritization strong		
			∠ 70°											111.80m milky quartz vein with pyrite, w=1cm		
120																
														121.70-122.70m chalcopyrite spotted 122.00-125.30m garnet abundant		
													magnetite skarn			
130														129.00-129.60m brecciated texture remarkable, quartz veinlet abundant		
														129.60-130.50m calcite-quartz veinlet developing with chalcopyrite and much pyrite		
			∠ 60°											131.60-131.80m milky quartz vein (w=20cm) with abundant pyrite		
														131.80-135.00m a small amount of chalcopyrite spotted		
														138.70-139.50m quartz veinlet network developing		
140			∠ 70° ∠ 60°											140.10-140.20m quartz-calcite vein w=3cm 140.60-140.80m milky quartz-calcite vein w=5cm 140.80-141.80m shear zone, strong argilic alteration 141.80-142.80m light gray to gray, silicified skarn with pyrite 142.80-143.10m dark green strong chloritization 143.10-144.10m light gray to gray, silicified skarn with pyrite 144.40-144.90m quartz veinlet network with chalcopyrite and pyrite		
														145.98-146.05m quartz vein w=5cm, strong chlorite alteration around vein		
														147.60-148.50m quartz veinlet well developing 147.30-148.05m a small amount of chalcopyrite dissemination		
														148.30m- pyrhotite dessemination remarkable		
150														149.30-150.00m a small amount of chalcopyrite scattered		

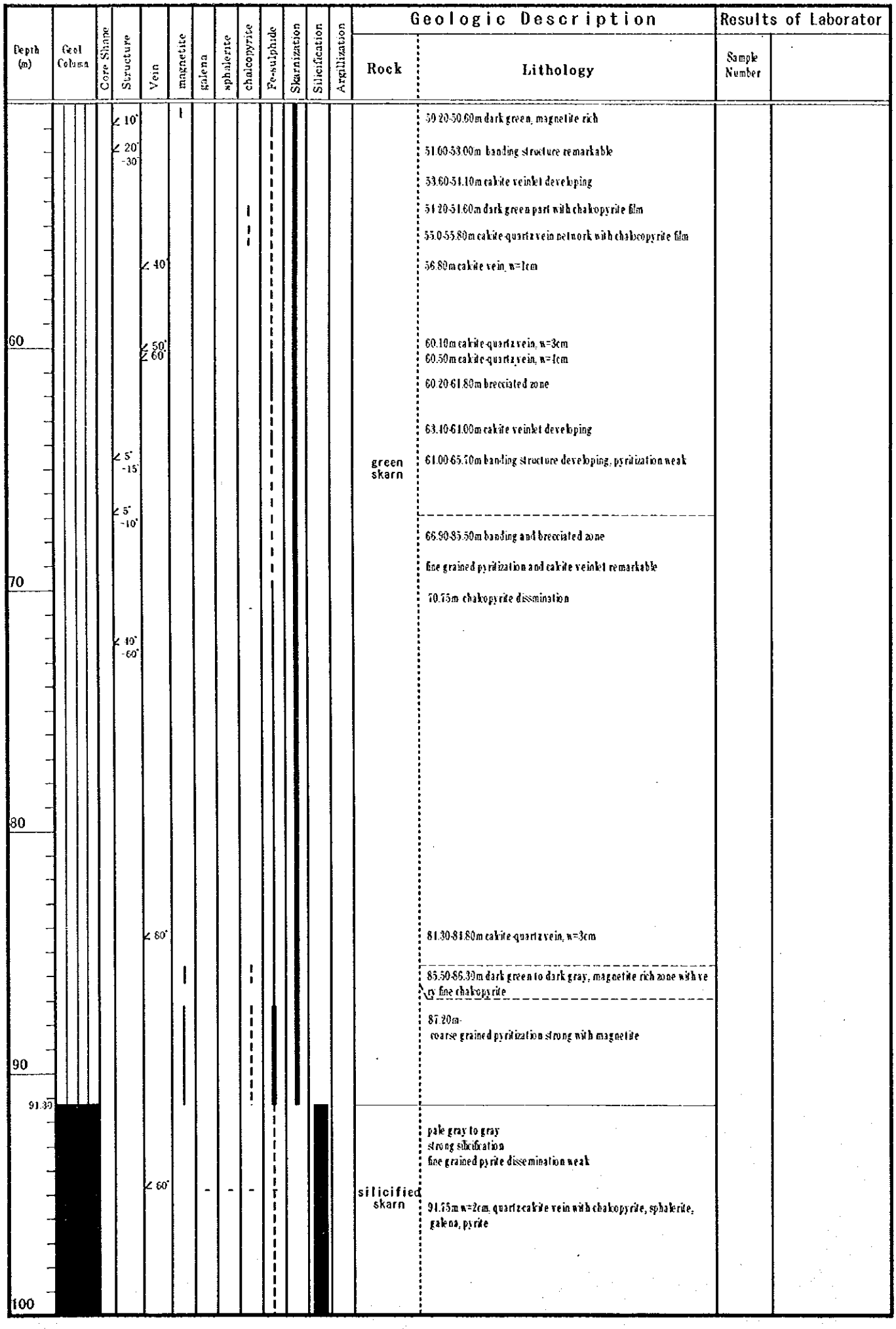
Mae Sariang, Thailand **MJTM-6** (Scale 1/200) (1/1) (Depth: 150 m - 200 m)



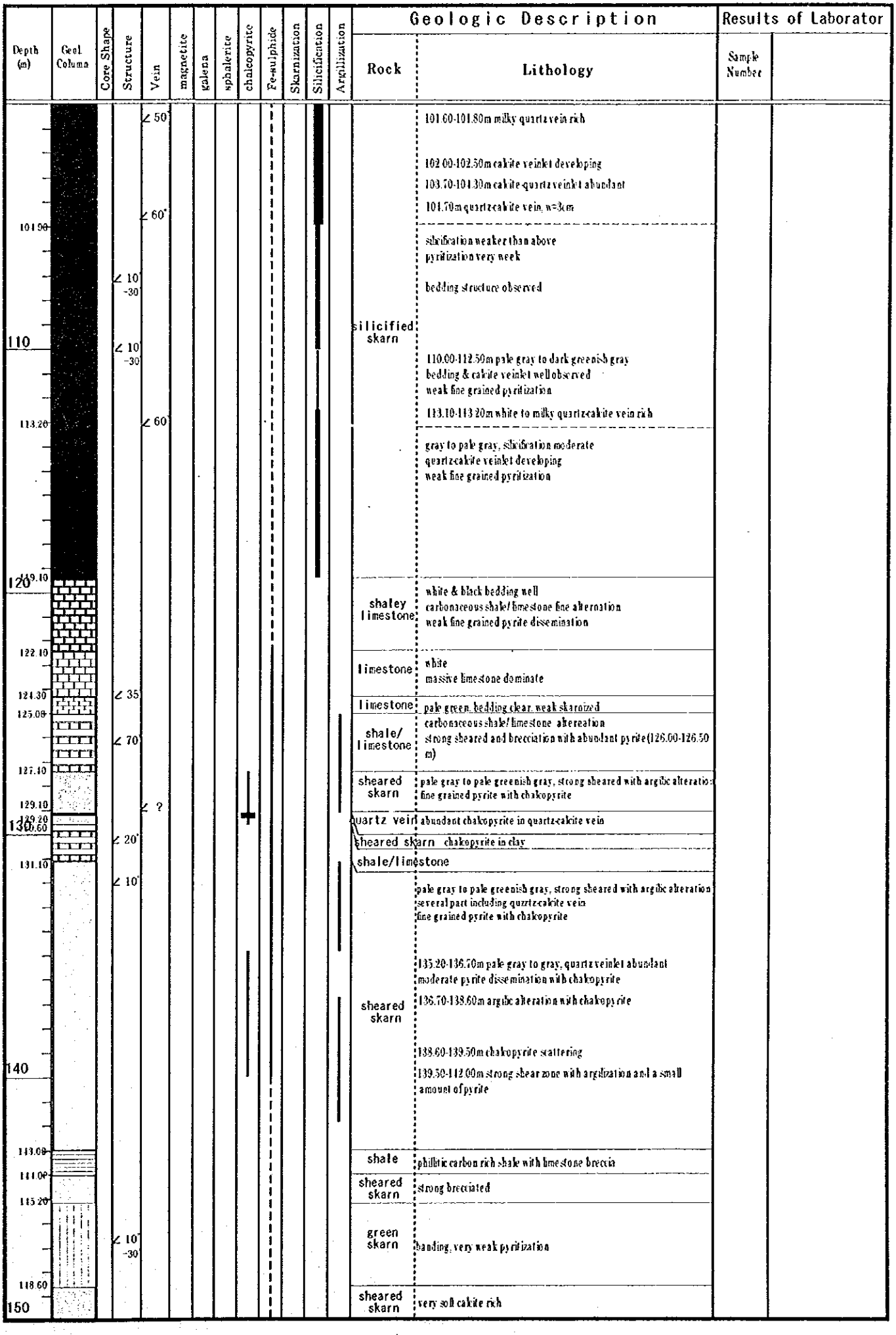
Mae Sariang, Thailand **MJTM-7** (Scale 1/200) (1/6) (Depth: 0 m - 50 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
													Top Soil	brown to reddish brown		
3.70													granule congl.	pale gray rework sediment along stream		
4.20													fine sandstone	yellowish gray to phe brown strong weathered, with Fe-oxide mineral		
8.60													weathered skarn	pale yellow to pale orange strong weathered		
9.90													green skarn	dark green massive to banding structure to 18.00m fine to coarse grained pyrite disseminated with a small amount of magnetite		
				∠ 40°										at 16.20m chalcopyrite film		
														18.00-18.20m epidote vein, w=5mm		
20														19.70-25.00m pyrite dissemination very weak		
				∠ 60°										21.20m calcite(quartz) vein, w=1cm		
				∠ 20°										22.75m calcite(quartz) vein, w=1cm		
			∠ 30°											25.00-25.50m fine grained pyrite dissemination		
			∠ 10° -30°											25.50-26.70m pyrite dissemination weak		
														26.70-28.20m coarse to fine grained pyrite dissemination		
				∠ 40°										28.20m calcite(quartz) vein, w=1cm		
														28.20-28.70m pyrite dissemination weak		
30			∠ 10° -30°											28.70-30.00m coarse to fine grained pyrite dissemination		
				∠ 60°										30.10m calcite(quartz) vein, w=1cm		
			∠ 30° -40°											31.00-33.00m fine to coarse grained pyrite disseminated with a small amount of magnetite		
33.00													silicified skarn	pale greenish gray to white, massive		
34.40			∠ 60°											banding structue remarkable fine to coarse pyrite dissemination with magnetite		
														38.30-38.40m magnetite rich		
40														40.50-41.00m calcite-quartz vein network		
													green skarn	41.90-42.40m argilic alteration		
				∠ 40° -50°										42.30-42.50m calcite veilet abundant		
														43.70-44.00m calcite veilet abundant		
			∠ 20° -30°											45.00-50.00m banding structue remarkable		
50														45.00-50.00m banding structue remarkable 46.40-47.80m coarse grained pyrite disseminated with a small amount of magnetite		

Mae Sariang, Thailand **MJTM-7** (Scale 1/200) (2/6) (Depth: 50 m - 100 m)



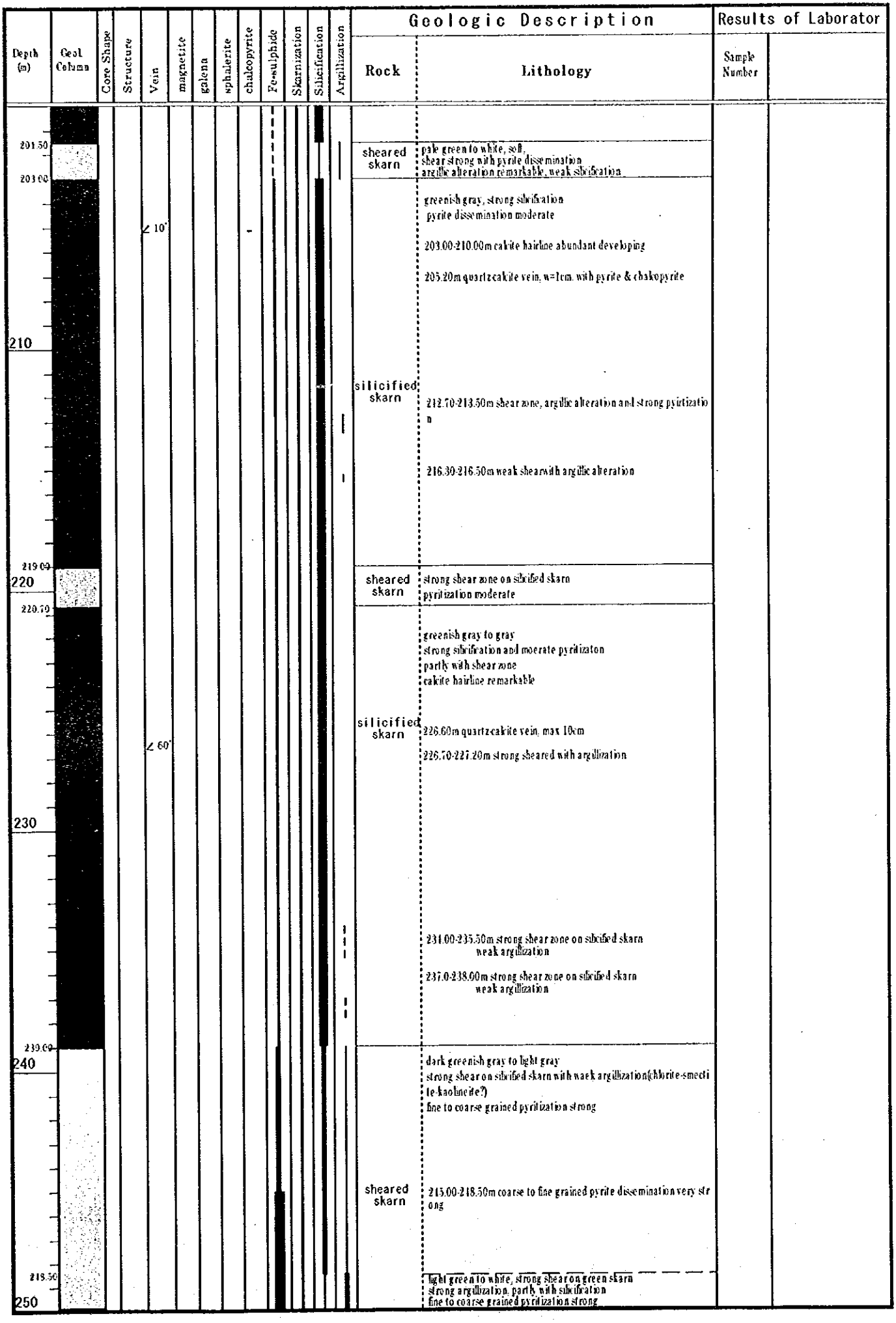
Mae Sariang, Thailand **MJTM-7** (Scale 1/200) (3/6) (Depth: 100 m - 150 m)



Mae Sariang, Thailand **MJTM-7** (Scale 1/200) (4/6) (Depth: 150 m - 200 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
160													sheared skarn	pale green to white, soft. shear strong with pyrite dissemination argillic alteration remarkable		
161.10													silicified skarn	161.10-162.20m moderate pyritization 162.20-162.70m waek pyritization		
162.70														pyritization weak		
163.70													silicified skarn	pale greenish gray, strong silicification fine grained pyrite dissemination weak		
165.10													sheared skarn	strong sheared fine grained pyrite abundant		
167.60													green skarn	weak silicification and sheared fine grained pyrite dissemination strong		
170																
171.70													silicified skarn	strong silicification fine grained pyrite dissemination moderate		
173.30													sheared skarn	strong sheared and argillization moderate pyritization		
174.40													silicified skarn	strong silicification and strong to moerate pyritizaton 176.90-177.20m Calcite and quartz vein with pyrite & chalcopyrite w=2cm 178.10-178.90m milky quartz veinlet network with pyrite & chalcopyrite 179.90m quartz-calcite vein w=2cm. with pyrite & fine grained chalcopyrite		
180				∠ 70												
				∠ 10												
181.30													black shale	weak silicification and pyritizaton		
181.90													silicified skarn	light green to yellowish gray strong silicification, very waek pyrite dissemination calcite hairline network remarkable		
186.90														moderate pyritizaton		
188.30													green skarn	light greenish gray to gray weak silicification, very waek pyrite dissemination calcite hairline network developing		
190.00													silicified skarn	light green to yellowish gray strong silicification, very waek pyrite dissemination 195.10-195.60m fine grained pyritization strong with a small amount ofchalcopyrite 195.60-201.50m gray to greenish gray strong silicification, waek pyrite dissemination calcite hairline network remarkable		
200																

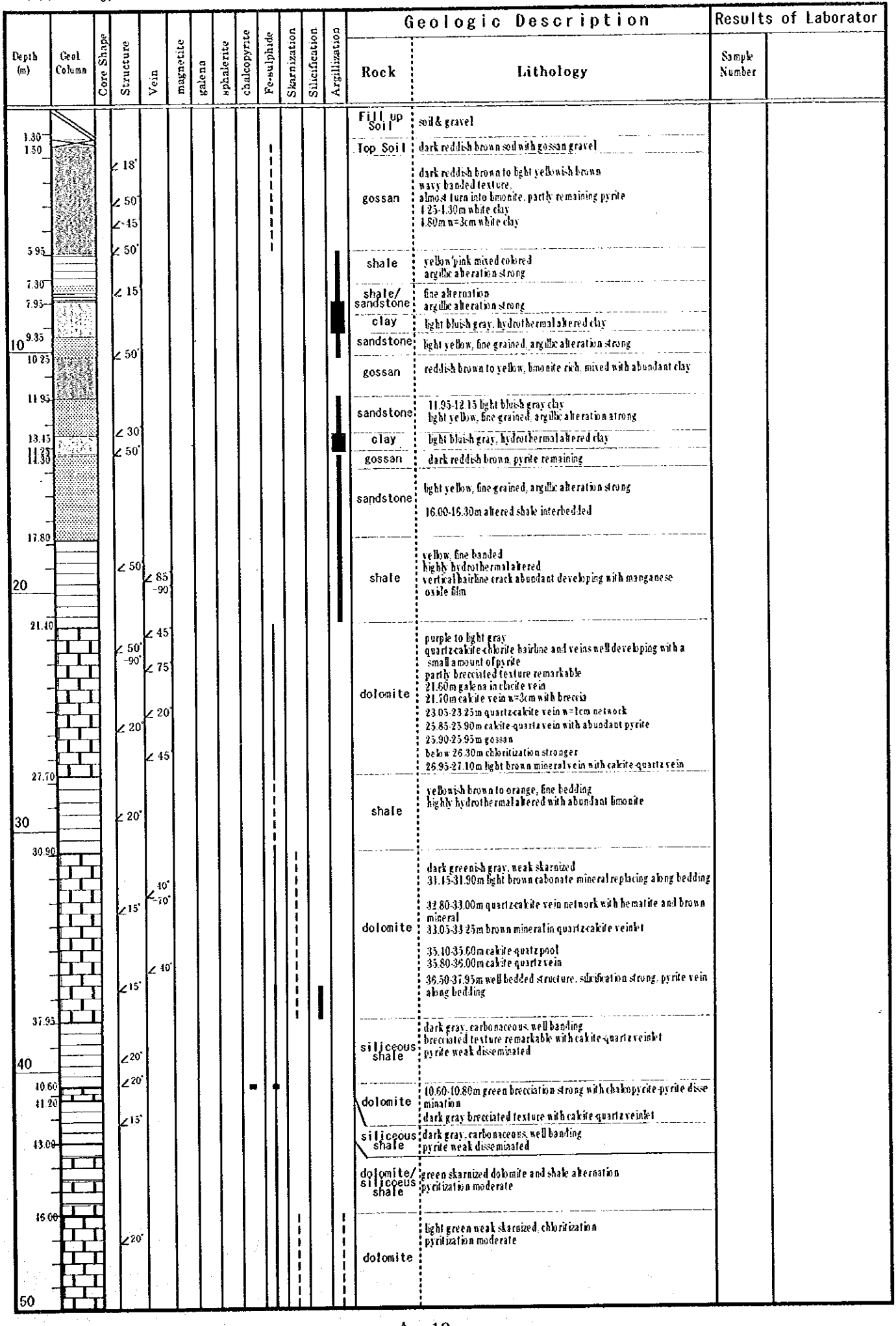
Mae Sariang, Thailand **MJTM-7** (Scale 1/200) (5/6) (Depth: 200 m - 250 m)



Mae Sariang, Thailand **MJTM-7** (Scale 1/200) (6/6) (Depth: 250 m - 270 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
251.20													sheared skarn	light green to white strong shear, strong argilization(chloride-smectite-kaolinite?) with silicification fine to coarse grained pyritization very strong		
260														green to light green strong shear, strong argilization(chloride-smectite-kaolinite?) with weak silicification fine to coarse grained pyritization very strong		
														green to light green strong shear, with silicification fine to coarse grained pyritization very strong		
261.00														strong silicification fine to coarse grained pyritization very strong		
261.60													green skarn	dark green to green massive, weak pyritization		
267.80														white to light green brreciation remakable, moderate pyritization		
269.20														dark green, massive, idiomorphic pyrite dissemination moderate		
270																

Mae Sariang, Thailand **MJTM-8** (Scale 1/200) (1/3) (Depth: 0 m - 50 m)



Mae Sariang, Thailand **MJTM-8** (Scale 1/200) (2/5) (Depth: 50 m - 100 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Rock	Lithology	Sample Number
			∠60°	∠15°									dolomite	50.50 calcite-quartz vein w=1cm 51.10-51.20m pyrite abundant 51.65m calcite vein with pyrite 52.50m pyrite abundant along crack 2.80-57.10m pyrite dissemination weak 53.90m calcite-quartz vein w=5cm 51.10-51.70m shear strong 56.00m calcite-quartz vein w=1cm 56.80-57.10m shear zone, brittle core	
57.10			∠65°	∠80°											
			∠80°	∠60°											
60			∠45°										muddy dolomite	light gray to gray, well banded pyrite dissemination weak 61.10-61.30m calcite-quartz vein w=1cm 61.30m-vertical calcite vein, w=5mm 61.60m open crack with idiomorphic calcite	
				∠75°											
				∠90°											
67.30															
68.50													dolomite	dark green, skarnized, fine-grained pyrite dissemmination	
70													siliceous shale	gray, fine bedded abundant shear cracks with calcite hairline pyrite dissemination weak	
76.30													chert	light brown, weak pyritization crashed brittle core	
80 79.70													sheared limestone/ shale	black to gray shale and limestone alternation w=10-100cm each strong sheared, almost turn into clayey limestone clastic pebble in carbon rich clay partly remaining limestone core with pyrite	
90															
			∠50°											98.60m slickensile in clayey shale	
100			∠50°											99.30m slickenside in clayey shale	

Mae Sariang, Thailand **MJTM-8** (Scale 1/200) (3/5) (Depth: 100 m - 150 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
100			∠60°											100.30m slickensile in clayey shale 100.60m slickensile in clayey shale		
102.20			∠60°										siliceous shale	light gray, fine banding brittle core of pebble sized a small amount of pyritization		
104.20													sheared limestone/ shale	black to gray shale and limestone alternation w=10-100cm each strong sheared, almost turn into clayey limestone clastic pebble in carbon rich clay partly remaining limestone core with pyrite		
110													skarnized dolomite	green, dolomitic part remaining in lenticular shear strong, brittle to pulverizing 110.80-111.30m light bown cherty shale seam interbedding		
115.30			∠35°													
			∠50°										sheared limestone/ shale/ green skarn	black, green, white alternative 20-50cm width strong sheared, almost turn into clayey and breccia 117.10m slickenside 117.90-120.30m pyrite dissemination remarkable		
120																
125.60			∠50°													
			∠75°										sheared green skarn	dark green to green storng sheared, core brittle to pulverized 128.60m slickenside 130.30-132.00m core shape remained 131.40-132.00m silicfied skarn, very fine pyrite disminated		
130																
133.90													green skarn	dark green, banded structure remarkable light gray chert seam interbedding 131.20m pyrite disminated along crack 131.70-135.90m hardly crash and pulverized bby shear zone 136.00-138.20m idiomorphic pyrite dissemination along bedding		
			∠35°													
138.20													silicified skarn	light green to green, banded structure remarkable quartz-calcite veinlet network developing, fine pyrite dissemination		
139.40			∠45°													
140													sandostone	dark gray, massive, calcareous bonded with lintite large porphyroblast pyrite dissemination moderate		
140.10			∠50°													
			∠40°													
				∠50°										green, banded structure remarkable fine grained pyrite dissemonation weak to moderate 112.10-113.30m quartz segrigation seam along beding with chlorite 113.60m calcite-quartz vein w=5cm		
				∠15°									silicified skarn	115.15-115.20m brecciated quartz vein		
				∠10°										117.10m quartz vein w=6mm 118.00-118.80m quartz-calcite vein w=1-5cm network with chlorite 119.00-159.90m remarkably platy bedded		
150			∠50°													

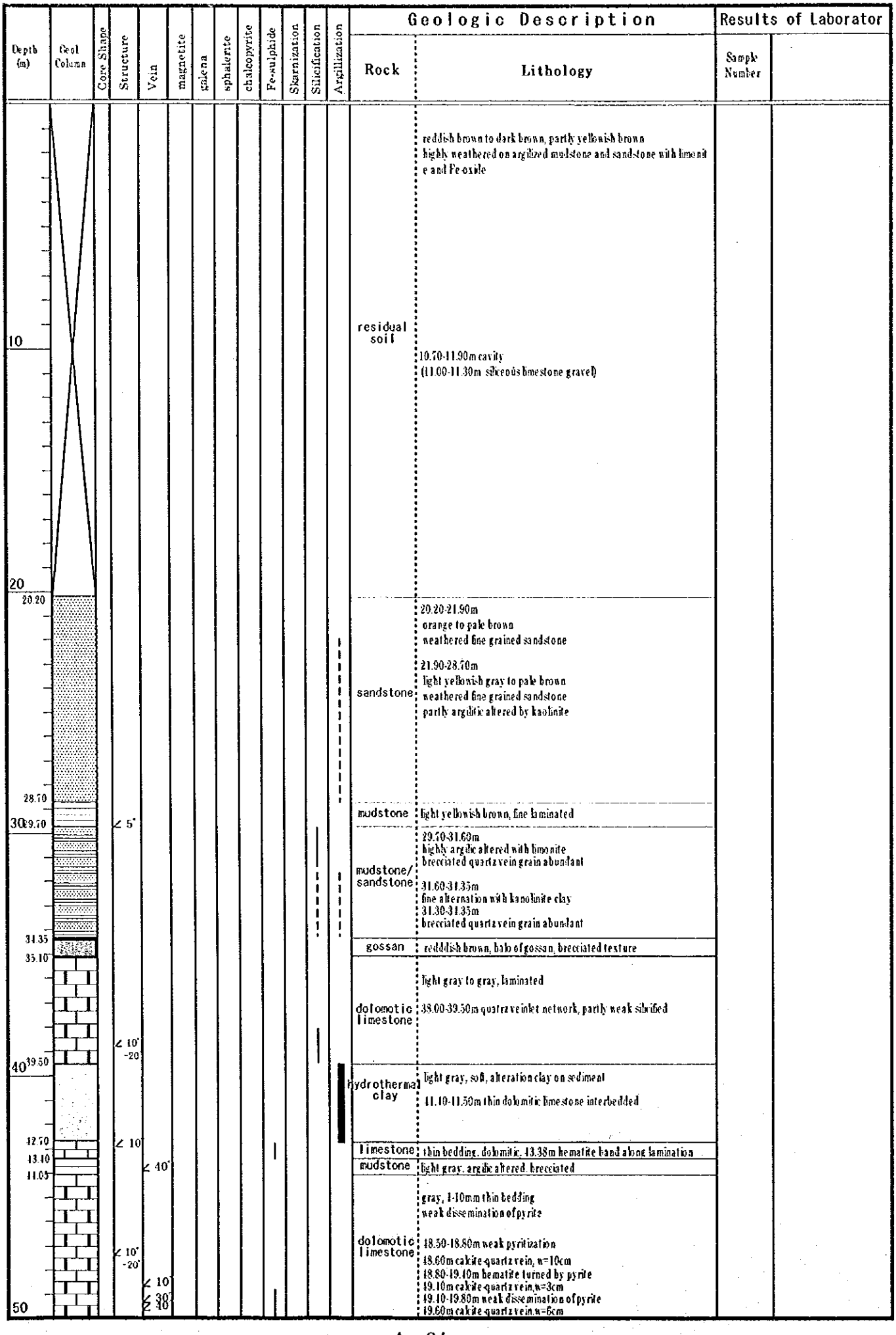
Mae Sariang, Thailand **MJTM-8** (Scale 1/200) (1/5) (Depth: 150 m - 200 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number
160			∠40°										silicified skarn	151.20m quartz seggrigtion seam w=1-1mm	
			∠40°												
			∠40°	∠50°											
														156.20-157.00m quartz-calcite hairline network remarkable	
			∠40°											158.00-159.00m quartz-calcite hairline network remarkable 158.80-158.90m pyrite chalcopyrite spot in quartz-calcite vein	
165.70			∠35°	∠20°									chert/ green skarn	light brown & green fine alternation quartz hairline well developing pyrite dissemination along chlorite veinlet	
														163.10-163.50m calcite-quartz vein w=5-10mm irregular form	
														165.20m pyrite abundant disseminated along chlorite vein	
170			∠40°	∠40°									green skarn	dark green to green, well banding structure pyrite dissemination not so much 166.20-166.25m quartz seggrigation seam 166.30-166.80m remarkable dissemination of pyrite	
														167.30m quartz seggrigtion seam w=1-1mm 168.10m quartz-chlorite vein	
				∠30°										170.50-173.10m pyrite moderate disseminated along bedding	
173.70			∠30°											171.15-171.30m quartz vein with chlorite	
													chert/ green skarn	light brown & green fine alternation pyrite dissemination along bedding	
180			∠35°											179.80m-181.50m quartz-calcite vein network w=1-10mm	
			∠30°											182.30-186.90m brittle core by shaer zone 185.10-185.70m water rush out 200l/minute 185.10-187.10m sandstone hornfels seam interbedded	
			∠5° -15°												
188.00			∠40°										sandstone hornfels	light purplish gray with light green seam by chlorite epidote pyrite dissemination weak	
190			∠35°												
			∠40°											191.60-191.80m pyrite dissemination moderate along bedding	
				∠15° -90°										195.70-197.60m quartz-calcite vein abundant w=3-5mm	
197.60													green skarn	dark green to green, massive	
199.00															
200															

Mae Sariang, Thailand **MJTM-8** (Scale 1/200) (5/5) (Depth: 300 m - 250 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
204.00													sandstone hornfels	light purplish gray with light green seam by chlorite-epidote pyrite dissemination weak		
209.20													green skarn	dark green to green, massive pyrite dissemination weak		
210			∠60° -85°											white, strong silicified, partly remain green skarn patch brecciated texture remarkable with chlorite hairline crack well developing with abundant pyrite		
			∠70° -85°											211.15-211.80m dark green massive skarn interbedding		
													silicified skarn	211.80-222.90m silicification weaker than above, chlorite rich brittle core pebble size		
220			∠70° -85°													
222.90																
23																
24																
25																

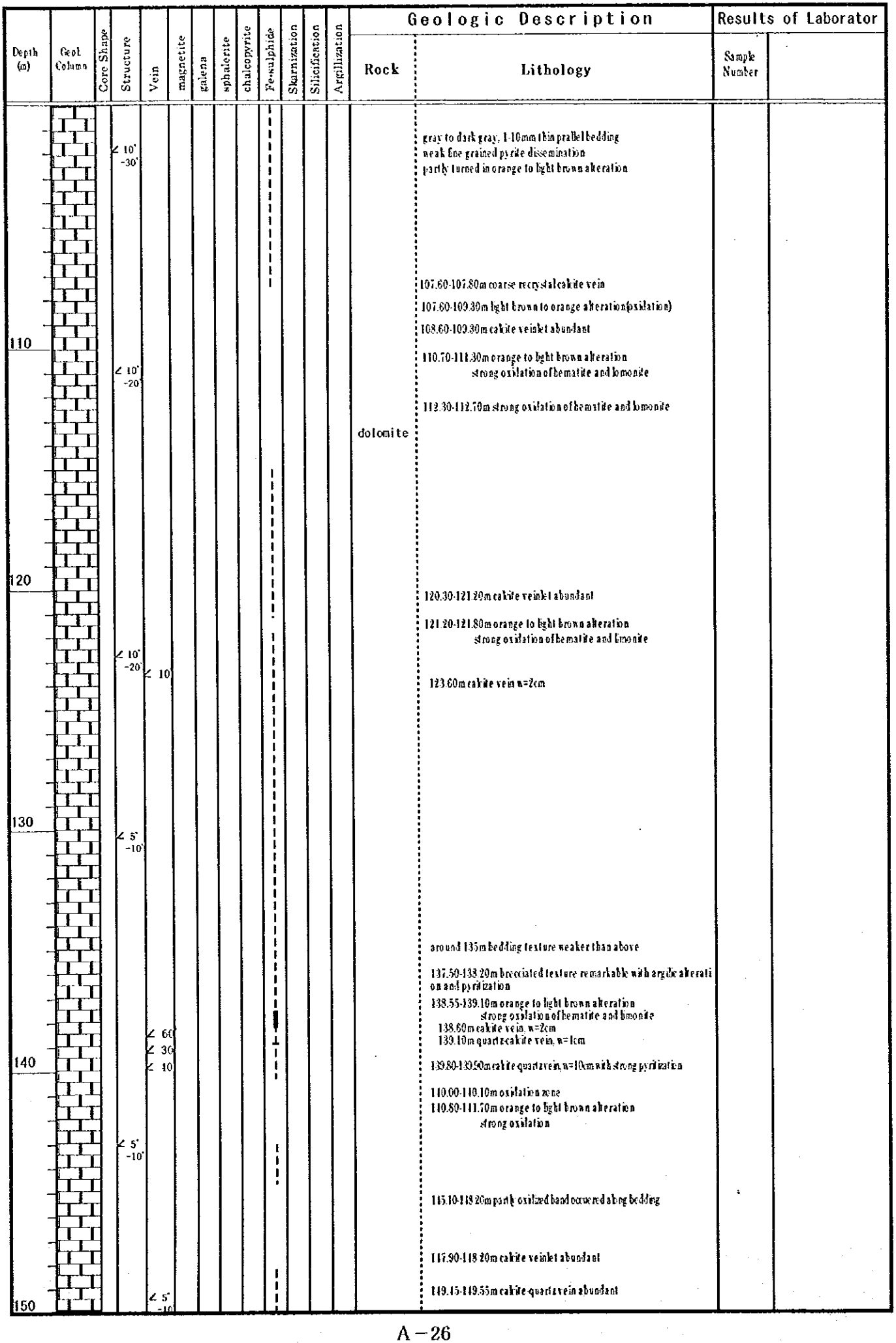
Mae Sariang, Thailand **MJTM-9** (Scale 1/200) (1/1) (Depth: 0 m - 50 m)



Mae Sariang, Thailand **MJTM-9** (Scale 1/200) (3/1) (Depth: 50 m - 100 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
60				∠ 10									muddy dolomite	dark gray to light gray 1-10mm thin parallel bedded hematite band developing several part 51.60-52.00m oxidization remarkable 52.00m-weak pyrite dissemination		
														55.60m calcite vein, w=3cm		
				∠ 70										58.80-59.20m calcite vein, w=1cm		
														60.60-60.70m calcite vein abundant		
64.00														dark gray to light gray 1-10mm thin parallel bedded weak pyritization with hematite		
			∠ 10° -20											67.90-68.10m calcite vein abundant		
70 70.00				∠ 20										69.90m calcite vein, w=1cm		
														71.00-73.00m oxidation remarkable		
				∠ 20										72.50m calcite vein, w=6cm		
														72.50-73.00m hematite rich		
				∠ 60										76.20m calcite vein, w=2cm		
				∠ 60										77.00m calcite vein, w=1cm		
														76.20-78.00m hematite rich		
80 80.00														79.00-79.20m oxidation remarkable		
82.00													tuffceous to muddy dolomite	light yellow to orange wavy bedding		
83.70													dolomite	gray to dark gray, thin prallel bedding weak fine grained pyrite dissemination		
													tuffceous to muddy dolomite	light yellow to orange wavy bedding very weak pyritization		
90 83.10			∠ 10° -20										dolomite	gray to dark gray, thin prallel bedding weak fine grained pyrite dissemination		
92.90																
													tuffceous to muddy dolomite	light yellow to orange wavy prallel bedding, partly lenticular shape very weak pyritization		
98.70													dolomite			
100																

Mae Sariang, Thailand **MJTM-9** (Scale 1/200) (3/4) (Depth: 100 m - 150 m)



Mae Sariang, Thailand **MJTM-9** (Scale 1/200) (1/1) (Depth: 150 m - 200 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
157.00			∠ 5° -10°	∠ 10°										gray to dark gray, 1-10mm thin prallel bedding weak fine grained pyrite dissemination		
				∠ 60°												
			∠ 10° -30°													
160.00				∠ 50°										light greenish gray weak argillic altered and weak pyrite dissemination 158.30-158.50m, 159.20-159.30m strong argillization 159.50m calcite-quartz vein, w=3cm		
														gray, brecciated calcite veinlet abundant 161.20-162.00m strong oxidation 162.60-165.60m weak silicification		
165.60														light gray to gray, massive compact moderate pyritization		
166.80													dolomite	dark gray to gray, 1-10mm thin bedded weak pyrite dissemination 167.50-168.80m light gray tuffaceous to muddy layer interbedded 168.80-169.70m light orange alteration		
170																
171.20														light gray to gray, massive compact moderate pyritization		
173.30																
														178.30-178.60m calcite veinlet abundant, orange to light brown alteration		
178.90																
180														light gray to gray, massive compact weak fine grained pyritization 178.90-183.90m weakly silicified		
				∠ 60°										183.90-184.10m calcite vein with abundant fine grained pyrite		
														185.10m quartz-calcite vein, w=2cm		
				∠ 50°										181.50-185.50m light brown alteration 187.50-188.70m light brown to light orange alteration		
														188.70-188.85m calcite vein abundant with fine grained pyrite		
				∠ 70°										189.70m calcite vein, w=1cm		
190.80				∠ 5°												
			∠ 10° -20°											dark gray to gray, 1-10mm thin bedded texture weak pyrite dissemination		
														195.90-196.00m calcite vein abundant		
														199.00-199.20m calcite vein abundant with oxidation		
														199.40-199.70m calcite vein abundant with oxidation		
			∠ 20° -30°													
200																

Mae Sariang, Thailand **MJTM-10** (Scale 1/200) (1/1) (Depth: 0 m - 50 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Rock	Lithology	Sample Number	Results of Laborator
													Top Soil	light brown to orange soil		
														white, strong silicified, partly remain green skarn patch brecciated texture remarkable with chlorite hairline crack well developing with abundant pyrite		
8.20													weathered altered rock	brecciated texture ramrkable matrix: yellow weathered sediment? brecciated part: orange to brown carbonate mineral		
10 10.00													sandstone	light brown to yellowish white strong weathered		
11.10													limestone	light gray to gray, brecciated texture breccia part light brown to orange alteration calcite-(quartz) veinlet well development		
														15.00-15.60m brown strong weathered and argilic alteration		
														15.60-17.00m yellow to pale orange strong alteration brecciated texture remarkable calcite-quartz veinlet abundant		
														17.00-20.70m light gray to gray, massive calcite-(quartz) veinlet network partly brown to orange alteration		
20			∠10 -30											20.70m- light gray to gray, bedded well		
														23.70-24.00m light greenish gray, silicified alteration		
			∠10 -20											24.60-25.00m brown alteration		
														25.00-25.70m fine grained pyrite weak dissemination		
27.50				∠60									dolomitic limestone	brown to light orange alteration calcite-quartz veinlet abundant 27.80m calcite-quartz vein w=5cm		
30																
30.50			∠30 -40										limestone	light green, bedded well, slightly chloritized calcite-quartz veinlet abundant		
35.00													dolomitic limestone to dolomite	light green, thin bedded well (w=1-10mm)		
														35.00-36.50m partly brown to orange, silicified alteration with a small amount of pyrite		
														35.00-36.50m partly brown to orange, silicified alteration with a small amount of pyrite		
40														40.00-45.00m light gray to gray, fine bedded(1-5mm) partly brown alteration band eveloping with pyrite		
			∠10 -20											42.50m calcite vein, w=2cm		
				∠40										43.10-44.80m brown carbonate mineral bands with pyrite		
45.00			∠20 -30										limestone	light gray to gray, fine beded with weak fine-grained pyritization		
49.00													dolomitic limestone	light gray to gray, massive calcite-quartz hairline well developing with weak pyritization		
50																

Mae Sariang, Thailand **MJTM-10** (Scale 1/200) (2/1) (Depth: 50 m - 100 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Rock	Lithology	Sample Number
50.50			∠10°										limestone	light gray to gray, fine laminated	
			∠10 -20											51.20-52.20m light brown to orange spongy alteration with breccia tion calcite veinlet abundant	
			∠10 -30	∠10°										53.20-54.00m massive without pyrite 54.00-56.20m fine laminated, partly green alteration	10-
56.20														55.00-55.10m milky quartz-calcite vein max w=10cm with pyrite	10-
56.50						I					I		shale	quartz vein developed with silicification, accopanied with pyrite an d galena	
													dolomitic limestone	light gray to gray, massive with weak pyritization	10-
58.50															10-
60			∠5° -10°			—							limestone	light gray to gray, well laminated 59.25-59.28m quartz-calcite vein with galena and brown mineral 60.00-65.00m strong fracture zone reddish brown to orange spongy vein including brecciated host limestone 62.30-62.60m and 63.30-63.50m reddish brown alteration very strong	
65.60			∠10 -20											dark gray to gray, well laminated 65.00-66.00m reddish brown spongy alteration veinlet abundant 67.10-68.10m yellow to light orange alteration	
			∠20 -30											69.80-70.20m green banding developing with pyrite	10-
70									I				dolomitic limestone	70.00-70.20m reddish brown spongy alteration	
			∠30°											73.50-73.80m silicified alteration 73.85-74.25m milky quartz vein network with pyrite 74.25-75.00m silicified alteration	10-
78.00														75.00-78.00m weak silicified alteration 76.00-78.00m milky quartz veinlet abundant with reddish brown to orange spongy alteration	10-
80													calcareous shale	dark gray, massive 78.60-81.40m reddish brown to orange to yellow spongy alteration strong Fe and Mn oxide abundant with pyrite quartz-calcite vein remarkable	10-
81.40				∠30° -60									dolomite	light gray to light green, well bedded, silicified and pyrite disseminated 81.80-83.00m milky quartz (calcite) vein abundant 82.00-82.50m pyritization strong 81.10-81.30m milky quartz-calcite vein 81.30-85.00m weak pyrite dissemination	10-
85.00			∠0° -5°	∠50°									limestone	light greenish gray, well fine laminated, partly with reddish brown to orange s pongy altered vein 86.50-89.50m brown to orange spongy alteration strong	
90			∠0° -5°	∠70°										90.00-98.60m light brown to light yellowish gray, well laminated 90.80m calcite vein w=1cm	
			∠0° -10°	∠40°										92.50m milky quartz-calcite vein with oxide mineral w=2cm 93.50m milky quartz-calcite vein with oxide mineral w=2cm	
99.20				∠40°										98.10-99.20m strong sheared zone limestone and shale fragment remaining in pulverized matrix	
100															

Mae Sariang, Thailand **MJTM-10** (Scale 1/200) (3/1) (Depth: 100 m - 150 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number
110			∠ 10											dark gray to black, well banded	
														100.00-100.70m milky quartz(calcite)veinlet remarkable max. w=2cm	
														102.00-103.70m milky quartz(calcite)veinlet remarkable max. w=2cm	
														105.00-110.00m fractured part	
														109.50-109.70m quartz hairline network	
			∠ 30	∠ 3°										111.90m quartz vein w=6cm	
														112.00m quartz vein w=5cm	
			∠ 10° -20											112.00-112.50m fracture developing	
														112.50-120.00m partly fine-grained pyrite disseminated and partly fractured with orange to brown Fe-oxide	
120			∠ 5° -10°										shale		
														120.00-125.00m well bedding, partly pyrite dissemination	
			∠ 10											122.70-121.10m quartz(calcite) hairline well developed and partly fractured with Fe-oxidation	
			∠ 30	∠ 60										125.20m milky quartz vein (w=2cm) with pyrite	
														125.20-126.30m quartz veinlet partly observed	
				∠ 30										128.20m pyrite vein w=1cm	
130														128.20-129.00m pyrite mineralization along fine bedding	
														129.00-130.00m fine-grained pyrite dissemination	
				∠ 40°										130.10-130.70m hematite vein replaced pyrie in quartz vein	
														131.50-131.60m hematite-quartz vein	
				∠ 40										133.15-133.20m quartz vein w=3cm	
														135.60-137.80m massive texture with weak pyritization	
														136.10-136.30m and 137.15-137.30m chrolitoil porphyroblast abundant	
														137.80m- fine bedded well with strong pyritization along bedding	
				∠ 45°										139.00-139.40m quartz vein filled up fracture	
140															
				∠ 30° -80°										141.60-142.40m quartz vein network dominate	
				∠ 30										143.50-143.60m stained pyrite vein in quartz vein	
148.60															
150			∠ 65° -90°												

Mae Sariang, Thailand **MJTM-10** (Scale 1/200) (3/1) (Depth: 150 m - 200 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Rock	Lithology	Sample Number
													dolomitic limestone	light gray to white, massive fracture well developing plight brown to orange spongy alteration remarkable very weak pyrite dissemination	
														156.10-156.90m pyrite clot dissemination	
160															
161.00													dolomite	light gray to gray, massive weak fine-grained pyrite dissemination	
														163.20-163.50m brecciated part with calcite veinlet	
														164.90-166.30m light gray quartz veinlet developing, fine-grained pyrite disseminated	
														166.30-168.60m light greenish gray, weak chloritized 166.30-167.00m weak fine-grained pyritization	
170														166.30-168.60m light greenish gray, weak chloritized 166.30-167.00m weak fine-grained pyritization	
173.00			∠10° -20°										dolomite/ shale	light gray to white dolomite and calcareous mudstone fine alternation	
176.40														171.90-176.10m brecciated part with chloride alteration quartz-calcite veinlet network and weak pyritezation	
													shale	black, banded, silicified alteration quartz vein and veinlet well developed pyritization strong	
178.40															
180			∠60° -70°										dolomitic limestone	light gray to white, laminated weak fine-grained pyrite dissemination	
			∠60°											179.60-180.00m orange to light brown spongy alteration	
														183.30-184.70m fracture part with orange to light brown spongy alteration	
														186.30-186.50m dark gray to black shale interbedded	
				∠40°										186.90-187.00m calcite vein w=10cm with pyrite	
187.00															
			∠10°										dolomitic limestone/ mudstone	gray to light gray, well laminated intercalated with calcareous mudstone light brown to pink spongy alteration	
190															
190.40			∠0° -10°										dolomitic limestone	light gray to light green weak laminated	
														190.10-191.20m brown to orange spongy alteration	
														193.60-196.80m weak silicified and light green to white argillic (chlorite) alteration	
														196.80m- white to light green, massive	
200															

Mae Sariang, Thailand **MJTM-9x** (Scale 1/200) (1/1) (Depth: 0 m - 30 m)

Depth (m)	Geol Column	Core Shape	Structure	Vein	magnetite	galena	sphalerite	chalcopyrite	Fe-sulphide	Skarnization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Results of Laborator: Sample Number	Results of Laborator
2.50													gossan	red brown to dark brown cobble bed of gossan with Fe-oxide		
													mudstone/ sandstone	yellowish white to light gray completely turned into hydrothermal alteration clay		
			∠ 3°											5.90-5.95m dark brown clay with so much limonite		
			∠ 5°											7.10m gossan seam w=1cm along bedding		
10			∠ 5°											8.10-8.50m hydrothermal brecciated silicified zone along bedding with weak limonite		
			∠ 10°													
			∠ 5° -10°											11.10-11.50m gossan vein along bedding		
														11.90-11.95m gossan seam		
														16.50-16.55m hematite vein W=5cm 16.55m fracture with slickenside		
20			∠ 0° 50°													
20.40													mudstone	light gray, thin bedding hydrothermal argillization moderate vertical haircracks well developing with manganese oxide film		
														20.10-28.90m hydrothermal brecciated texture with weak silicification		
			∠ 5°											21.50m quart vein breccia w=1cm 21.85-21.90m gossan vein 21.90m idiomorphic quartz growth in open crack along bedding		
30			∠ 10°													
40																
50																

Appendix 8 Homogenized temperature and salinity of fluid inclusion

No	Sample No.	Locality	Description	Mineral	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	MJTM-6 63.50-63.60m	Dong Noi area		Calcite	288	291	289	288	332	285	262	292	291	262	262	268	331	291	292	292	291	292	285	282	278	274	274	275
					4.7	4.7	4.6	4.7	4.7	4.7	4.6	4.4	4.7	4.9	5.1	4.7	5.2	4.7	4.9	4.6	4.6	4.4	4.6	4.9	4.7	4.4	4.3	4.7
2	MJTM-6 129.6m	Dong Noi area	secondary inclusion partly liquid CO_2 rich	Quartz	176	177	174	155	156	156	149	167	215	216	214	240	239	238	236	218	224	335#	334#	333#	309#	308#	312#	
					1.6	1.6	1.4	1.6	1.6	1.4	1.4	1.7	1.4	1.60	1.4	1.7	1.4	1.2	1.6	1.4	1.6	-	-	-	-	-	-	
3	MJTM-6 178.7-178.8m	Dong Noi area	secondary inclusion partly multiphase	Quartz	186	195	149	189	174	178	177	179	164	180	169	161	186	170	190	173	174	164	167	187	169	97*	107*	
					19.3	8.4	15.9	13.7	11.7	10.9	10.7	10.3	9.1	23.3	20.6	23.1	8.4	21.4	7.8	21.7	10.8	-	-	-	21.3	27.9	28.2	
4	MJTM-7 94.90-94.95m	Mae Kanai area	secondary inclusion	Sphalerit	222	186	196	224	218	239	208	209	208	217														
					6.8	7.9	7.8	7.1	6.9	6.9	6.6	6.8	6.6	6.6														
5	MJTM-7 129.1-129.2m	Mae Kanai area	secondary inclusion	Quartz	308	302	305	301	306	305	302	303	301	299	300	300	301											
					8.4	8.5	8.4	7.4	7.2	7.4	7.5	8.2	7.4	7.7	8.4	8.4	8.2											
6	MJTM-7 245.7m	Mae Kanai area	secondary inclusion	Quartz	197	199	194																					
					7.2	7.1	6.9																					
7	MJTM-8 32.80-32.85m	Mae Kanai area	secondary inclusion	Quartz	148	184	168	124	123	183	117	122	127	106														
					1.9	2.3	2.1	2.3	2.1	2.3	8.3	8.1	2.1	1.9														
1	D20-01	Dong Noi area	secondary inclusion	Quartz	209	230	231	233	230	226	231	225	243	250	242	250	231	230	233	235	217	218	164	167	228	218		
					0.9	2.8	0.9	0.7	0.7	2.6	2.8	0.9	2.8	2.6	2.8	2.8	0.9	0.7	2.8	3.4	2.8	2.8	0.7	0.9	0.7	0.7		
2	D20-56	Dong Noi area	secondary inclusion	Quartz	204	207	206	205	218	224	204	201	242	230	242	220	218	230	321	374	373							
					7.7	7.5	7.7	7.8	7.4	7.5	7.4	7.7	4.4	4.7	7.7	7.5	7.4	7.5	7.4	7.5	7.4							

Upper: homogenized temperature unit:°C

; liquid CO_2 rich

* ; solid dissolution

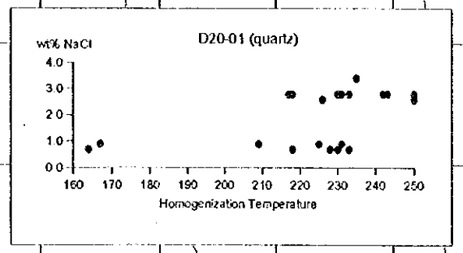
Lower: salinity unit: wt% NaCl equivalent

1995900
1995880
1995860
1995840
1995820
1995800
1995780
1995760
1995740
1995720
1995700
1995680
1995660
1995640

brecciated quartz vein with silicification and veinlet and brown carbonate mineral
Pb 658ppm Zn 1150ppm
dolomitic limestone
D20-28 L=20m Zn=615ppm Pb=215ppm Mn=7410ppm Mg=3.95%
Pb 3190ppm Zn 2140ppm
D20-27 L=20m Zn=330ppm Pb=180ppm Mn=1.24% Mg=8.24%
quartz vein w=80cm occurring along bedding with galena, shalerite
Pb 1485ppm Zn 2010ppm
D20-26 Zn=7.86% Pb=2.82% Mn=1.72% Mg=5.65%
D20-25 L=20m Zn=1.60% Pb=1.43% Mn=4910ppm Mg=1.66%
Pb 494ppm Zn 1550ppm
D20-24 L=20m Zn=50ppm Mn=550ppm Mg=0.19%
D20-23 L=20m Zn=45ppm Mn=360ppm Mg=0.21%
Pb 474ppm Zn 3350ppm
D20-22 L=20m Zn=25ppm Pb=95ppm Mn=700ppm Mg=0.17%
brecciated quartz vein and quartz veinlet with silicification and brown carbonate mineral
quartz vein w=70cm+ brecciated texture with silicification and brown carbonate mineral
brecciated quartz vein with silicification and brown carbonate mineral filling up joint
Pb 1180ppm Zn 1960ppm
Pb 902ppm Zn 2020ppm
Pb 1205ppm Zn 2550ppm
Pb 1610ppm Zn 2210ppm
Pb 870ppm Zn 2010ppm
Pb 932ppm Zn 3380ppm
D20-35 L=20m Zn=450ppm Pb=65ppm Mn=1.09% Mg=6.05%
D20-34 L=22m Zn=820ppm Pb=50ppm Mn=3.07% Mg=4.93%
D20-33 L=20m Zn=1880ppm Pb=50ppm Mn=6060ppm Mg=3.18%
D20-32 L=21m Zn=340ppm Pb=55ppm Mn=6970ppm Mg=4.98%
D20-31 L=21m Zn=2230ppm Pb=970ppm Mn=1.43% Mg=3.22%
Pb 834ppm Zn 1940ppm
D20-30 L=24m Zn=80ppm Pb=5ppm Mn=1100ppm Mg=0.22%
D20-21 L=20m Zn=75ppm Pb=25ppm Mn=2180ppm Mg=0.82%
Pb 496ppm Zn 1610ppm
Pb 512ppm Zn 1480ppm
Pb 914ppm Zn 2410ppm
Pb 656ppm Zn 1120ppm
D20-29 L=7m+float chip Zn=1840ppm Pb=345ppm Mn=6370ppm Mg=4.14%
D20-01 Zn=65ppm Pb=65ppm Mn=450ppm Mg=0.17%
Pb 434ppm Zn 838ppm
Pb 420ppm Zn 1010ppm
Pb 430ppm Zn 834ppm
quartz vein w=30cm with galena and zinc mineral along bedding
quartz veinlet with brown carbonate in bug
D20-03 Zn=120ppm Pb=1.12% Mn=2.34% Mg=9.78%
D20-02 quatrz vein with brown carbonate mineral along bedding
Zn=995ppm Pb=150ppm Mn=1.51% Mg=1.81%
D20-04 Zn=120ppm Pb=50ppm Mn=6540ppm Mg=3.37%
D20-20 L=17m Zn=100ppm Pb=50ppm Mn=1080ppm Mg=0.30%
D20-19 L=17m Zn=100ppm Pb=50ppm Mn=1080ppm Mg=0.30%
D20-17 L=17m Zn=100ppm Pb=50ppm Mn=1080ppm Mg=0.30%
D20-16 L=11.5m Zn=65ppm Pb=35ppm Mn=750ppm Mg=0.26%
D20-14 L=14m Zn=45ppm Pb=20ppm Mn=950ppm Mg=0.23%
D20-12 L=12m Zn=40ppm Pb=5ppm Mn=1190ppm Mg=0.36%
quartz vein w=40cm
Pb 968ppm Zn 2200ppm
Pb 1220ppm Zn 3150ppm
Pb 1000ppm Zn 2630ppm
Pb 726ppm Zn 1885ppm
D20-18 silicified zone w=1m+ Zn=3180ppm Pb=95ppm
Pb 400ppm Zn 1610ppm
D20-15 L=16m Zn=30ppm Mn=910 Mg=0.25%
brecciated silicified vein w=2m
quartz vein w=30cm
D20-13 Zn=70ppm Pb=20ppm
D20-11 L=28.5m Zn=60ppm
D20-10 L=15m
D20-05 L=10m Zn=125ppm Pb=100ppm Mn=1430ppm Mg=0.24%
D20-06 L=10m Zn=90ppm Pb=25ppm Mn=1050ppm Mg=0.26%
D20-07 L=10m Zn=75ppm Pb=35ppm Mn=1090ppm Mg=0.23%
D20-08 L=10m Zn=110ppm Pb=60ppm Mn=1470ppm Mg=0.18%
D20-09
limestone partly developing dolomite & quartz seam

D20 01 (quartz)
wt% NaCl
4.0
3.0
2.0
1.0
0.0
160 170 180 190 200 210 220 230 240 250
Homogenizaton Temperature

limestone
dolomitic limestone
960
1000
1060
1100



1060
1100
1160
D20-23
L=20m
Zn=45ppm
Mn=860ppm
Mg=0.21%
D20-22
L=20m
Zn=25ppm
Pb=95ppm
Mn=700ppm
Mg=0.17%
D20-21
L=20m
Zn=75ppm
Pb=25ppm
Mn=2180ppm
Mg=0.82%
Pb 512ppm Zn 1480ppm
Pb 914ppm Zn 2470ppm
Pb 656ppm Zn 3120ppm
Pb 434ppm Zn 838ppm
Pb 420ppm Zn 1010ppm
dolomitic limestone
D20-01
Zn=65ppm
Pb=65ppm
Mn=450ppm
Mg=0.17%
quartz vein w=30cm with galena and zinc mineral along bedding
quartz veinlet with brown carbonate in bug
D20-03
Zn=120ppm
Pb=1.12%
Mn=2.34%
Mg=9.78%
D20-02
quatrz vein with brown carbonate mineral along bedding
Zn=995ppm
Pb=150ppm
Pb 924ppm Zn 1615ppm
D20-16
Zn=65ppm
Pb=35ppm
Mn=750ppm
Mg=0.26%
D20-14
L=14m
Zn=45ppm
Pb=20ppm
Mn=950ppm
Mg=0.23%
D20-12
L=12m
Zn=40ppm
Pb=5ppm
Mn=1190ppm
Mg=0.36%
quartz vein with brown carbonate mineral
D20-04
Zn=120ppm
Pb=50ppm
Mn=6540ppm
Mg=3.37%
limestone
D20-05
L=10m
Zn=125ppm
Pb=100ppm
Mn=1430ppm
Mg=0.24%
D20-06
L=10m
Zn=90ppm
Pb=25ppm
Mn=1050ppm
Mg=0.26%
D20-07
L=10m
Zn=75ppm
Pb=35ppm
Mn=1090ppm
Mg=0.23%
D20-15
L=16m
Zn=30ppm
Mn=910
Mg=0.25%
brecciated silicified vein w=2m
quartz vein w=30cm
D20-13
Zn=10ppm
Pb=20ppm
D20-11
L=28.5m
Zn=60ppm
D20-10
L=15m
limestone partly develping dolomite & quartz seam
D20-08
L=10m
Zn=110ppm
Pb=60ppm
Mn=1470ppm
Mg=0.18%
D20-09
dolomitic limestone
Pb 404ppm Zn 1225ppm

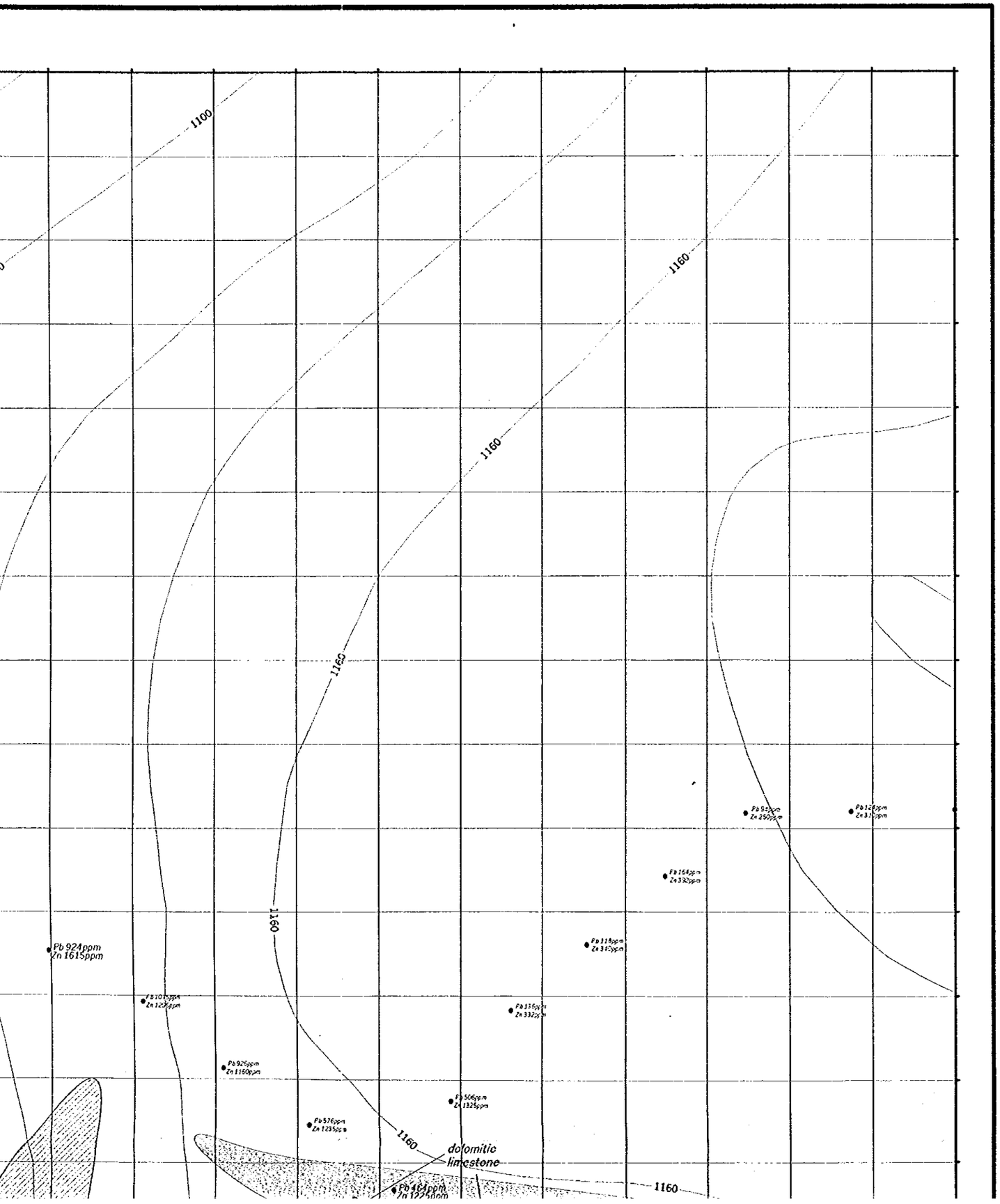
PLATE-1

COOPERATIVE MINERAL EXPLORATION IN THE MAE SARIANG AREA, THAILAND

PHASE III

MARCH, 2000

MINERAL OCCURRENCE SURVEY RESULT AT THE NORTHWESTERN PART OF THE DONG NOI AREA

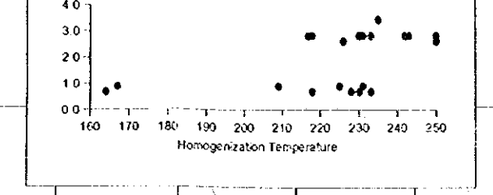


1995760
1995740
1995720
1995700
1995680
1995660
1995640
1995620
1995600
1995580
1995560
1995540
1995520
1995500
1995480

Homogenization Temperature
160 170 180 190 200 210 220 230 240 250
0 1 2 3

D20-35 L=20m Zn=450ppm Pb=65ppm Mn=1.09% Mg=6.05%
D20-34 L=22m Zn=820ppm Pb=50ppm Mn=3.07% Mg=4.93%
D20-33 L=20m Zn=1860ppm Pb=50ppm Mn=6060ppm Mg=3.18%
D20-32 L=21m Zn=340ppm Pb=55ppm Mn=6970ppm Mg=4.96%
D20-31 L=21m Zn=2230ppm Pb=970ppm Mn=1.43% Mg=3.22%
D20-30 L=24m Zn=80ppm Pb=5ppm Mn=1100ppm Mg=0.22%
D20-29 L=7m↑float chip Zn=1840ppm Pb=345ppm Mn=6370ppm Mg=4.14%
D20-21 L=20m Zn=75ppm Pb=25ppm Mn=2180ppm Mg=0.82%
D20-01 Zn=65ppm Pb=65ppm Mn=450ppm Mg=0.17%
D20-02 quartz vein with brown carbonate mineral along bedding Zn=995ppm Pb=150ppm Mn=1.51% Mg=1.81%
D20-03 Zn=120ppm Pb=1.12% Mn=2.34% Mg=9.78%
D20-04 Zn=120ppm Pb=50ppm Mn=6540ppm Mg=3.37%
D20-05 L=10m Zn=125ppm Pb=100ppm Mn=1430ppm Mg=0.24%
D20-06 L=10m Zn=90ppm Pb=25ppm Mn=1050ppm Mg=0.26%
D20-07 L=10m Zn=75ppm Pb=35ppm Mn=1090ppm Mg=0.23%
D20-08 L=10m Zn=110ppm Pb=60ppm Mn=1470ppm Mg=0.18%
D20-09 L=9m Zn=190ppm Pb=140ppm Mn=1790ppm Mg=0.35%
D20-10 L=15m Zn=45ppm Pb=25ppm Mn=990ppm Mg=0.15%
D20-11 L=28.5m Zn=60ppm Pb=25ppm Mn=1160ppm Mg=0.26%
D20-12 L=12m Zn=40ppm Pb=5ppm Mn=1190ppm Mg=0.36%
D20-13 Zn=70ppm Pb=20ppm Mn=1900ppm Mg=0.30%
D20-14 L=14m Zn=45ppm Pb=20ppm Mn=950ppm Mg=0.23%
D20-15 L=16m Zn=30ppm Mn=910 Mg=0.25%
D20-16 L=11.5m Zn=65ppm Pb=35ppm Mn=750ppm Mg=0.26%
D20-17 L=17m Zn=100ppm Pb=50ppm Mn=1080ppm Mg=0.30%
D20-18 silicified zone w=1m↑ Zn=3180ppm Pb=95ppm Mn=8240ppm Mg=1.81% Ba=240ppm As=270ppm
D20-19 L=17m Zn=100ppm Pb=50ppm Mn=1080ppm Mg=0.30%
D20-20 L=17m Zn=100ppm Pb=50ppm Mn=1080ppm Mg=0.30%
D20-37 Zn=130ppm Pb=65ppm Mn=1650ppm Mg=0.11%
D20-38 Zn=80ppm Mn=1520ppm Mg=0.20%
D20-39 L=22.5m Zn=135ppm Pb=35ppm Mn=1880ppm Mg=0.26%
D20-40 L=21.5m Zn=3020ppm Pb=30ppm Mn=1.32% Mg=0.21%
D20-41 L=10m Zn=590ppm Pb=210ppm Mn=1810ppm Mg=0.31%
D20-42 L=10m Zn=65ppm Pb=5ppm Mn=3170ppm Mg=0.80%
D20-43 L=10m Zn=160ppm Pb=535ppm Mn=3880ppm Mg=2.22%
D20-44 L=10m Zn=80ppm Pb=20ppm Mn=1080ppm Mg=0.21%
D20-45 L=10m Zn=110ppm Pb=15ppm Mn=2900ppm Mg=1.63%
D20-46 L=20m Zn=75ppm Pb=15ppm Mn=1020ppm Mg=0.15%
D20-47 L=12m Zn=130ppm Pb=65ppm Mn=1650ppm Mg=0.11%
D20-48 L=25m Zn=675ppm Pb=105ppm Mn=1860ppm Mg=0.16%
D20-49 L=25m Zn=380ppm Pb=170ppm Mn=1980ppm Mg=0.13%
D20-50 L=25m Zn=355ppm Pb=125ppm Mn=1460ppm Mg=0.08%
D20-51 L=23m Zn=210ppm Pb=85ppm Mn=1040ppm Mg=0.16%

dolomitic limestone
limestone
quartz vein w=40cm
quartz vein w=30cm with galena and zinc mineral along bedding
quartz veinlet with brown carbonate in bug
quartz vein with brown carbonate mineral
brecciated silicified vein w=2m
quartz veinlet network
quartz vein and veinlet
silicified alteration
silicification with brown carbonate
limestone partly developing dolomite & quartz seam
quartz vein and veinlet network abundant
quartz vein



D20-21
L=20m
Zn=75ppm
Pb=25ppm
Mn=2180ppm
Mg=0.82%

Pb 495ppm
Zn 1610ppm

Pb 512ppm
Zn 1480ppm

Pb 914ppm
Zn 2470ppm

Pb 656ppm
Zn 1120ppm

dolomitic limestone

D20-29
L=7m+float chip
Zn=1840ppm
Pb=345ppm
Mn=6370ppm
Mg=4.14%

Pb 431ppm
Zn 838ppm

Pb 420ppm
Zn 1010ppm

D20-01
Zn=65ppm
Pb=65ppm
Mn=450ppm
Mg=0.17%

quartz vein w=30cm with galena and zinc mineral along bedding

quartz veinlet with brown carbonate in bug

D20-03
Zn=120ppm
Pb=1.12%
Mn=2.34%
Mg=9.78%

D20-02
quatrz vein with brown carbonate mineral along bedding
Zn=995ppm
Pb=150ppm
Mn=1.51%
Mg=1.81%

Pb 924ppm
Zn 1615ppm

D20-16
L=11.5m
Zn=65ppm
Pb=35ppm
Mn=750ppm
Mg=0.26%

D20-14
L=14m
Zn=45ppm
Pb=20ppm
Mn=950ppm
Mg=0.23%

dolomitic limestone

D20-04
Zn=120ppm
Pb=50ppm
Mn=6540ppm
Mg=3.37%

quartz vein with brown carbonate mineral

D20-12
L=12m
Zn=40ppm
Pb=5ppm
Mn=1190ppm
Mg=0.36%

D20-05
L=10m
Zn=125ppm
Pb=100ppm
Mn=1430ppm
Mg=0.24%

D20-06
L=10m
Zn=90ppm
Pb=25ppm
Mn=1050ppm
Mg=0.26%

D20-07
L=10m
Zn=75ppm
Pb=35ppm
Mn=1090ppm
Mg=0.23%

limestone

limestone

D20-15
L=16m
Zn=30ppm
Mn=910
Mg=0.25%

brecciated silicified vein w=2m

quartz vein w=30cm

D20-08
L=10m
Zn=110ppm
Pb=60ppm
Mn=1470ppm
Mg=0.15%

limestone partly develping dolomite & quartz seam

D20-13
Zn=70ppm
Pb=20ppm
Mn=1190ppm
Mg=0.30%

D20-11
L=28.5m
Zn=60ppm
Pb=25ppm
Mn=1160ppm
Mg=0.26%

D20-10
L=15m
Zn=45ppm
Pb=25ppm
Mn=990ppm
Mg=0.15%

D20-09
L=9m
Zn=190ppm
Pb=140ppm
Mn=1790ppm
Mg=0.35%

Pb 868ppm
Zn 1280ppm

et network

Pb 844ppm
Zn 1920ppm

Pb 1530ppm
Zn 2310ppm

quartz vein and veinlet

Pb 3650ppm
Zn 4460ppm

D20-40
L=21.5m
Zn=3020ppm
Pb=30ppm
Mn=1.32%
Mg=0.27%

D20-52
L=26m
Zn=80ppm
Pb=15ppm
Mn=5870ppm
Mn=2.95%

Pb 656ppm
Zn 1500ppm

D20-45
L=10m
Zn=70ppm
Pb=15ppm
Mn=2900ppm
Mg=1.63%

D20-44
L=10m
Zn=80ppm
Pb=20ppm
Mg=1080ppm
Mg=0.21%

D20-43
L=10m
Zn=180ppm
Pb=535ppm
Mn=3880ppm
Mg=2.22%

D20-42
L=10m
Zn=65ppm
Pb=5ppm
Mn=3170ppm
Mg=0.80%

quartz vein

Pb 1043ppm
Zn 3220ppm

silicification with brown carbonate

Pb 568ppm
Zn 1710ppm

D20-39
L=22.5m
Zn=135ppm
Pb=35ppm
Mn=1880ppm
Mg=0.26%

silicified alteration

Pb 468ppm
Zn 1125ppm

D20-37
some floats
Zn=75ppm
Pb=5ppm
Mn=960ppm
Mg=0.11%

quartz vein w=20cm w=50cm w=10cm

D20-53
L=13m
Zn=1385ppm
Pb=290ppm
Mn=1890ppm
Mg=0.15%

Pb 254ppm
Zn 1640ppm

D20-41
L=10m
Zn=590ppm
Pb=210ppm
Mn=1810ppm
Mg=0.31%

limestone

D20-51
L=23m
Zn=210ppm
Pb=85ppm
Mn=1040ppm
Mg=0.16%

D20-38
Zn=80ppm
Mn=1520ppm
Mg=0.20%

D20-46
L=20m
Zn=75ppm
Pb=15ppm
Mn=1020ppm
Mg=0.15%

Pb 1085ppm
Zn 2600ppm

Pb 1075ppm
Zn 930ppm

Pb 240ppm
Zn 1015ppm

D20-55
L=22m
Zn=40ppm
Mn=1370ppm
Mg=0.10%

D20-54
L=12m
Zn=90ppm
Pb=25ppm
Mn=1530ppm
Mg=0.19%

D20-56
L=18m
Zn=75ppm
Pb=25ppm
Mn=1480ppm
Mg=0.12%

limestone

Pb 1330ppm
Zn 1965ppm

D20-57
Zn=115ppm
Pb=30ppm
Mn=1670ppm
Mg=0.31%

D20-50
L=25m
Zn=355ppm
Pb=125ppm
Mn=1160ppm
Mg=0.08%

Pb 1026ppm
Zn 4190ppm

Pb 935ppm
Zn 2610ppm

quartz vein along joint and silicified alteration

Pb 1230ppm
Zn 5570ppm

Pb 1305ppm
Zn 2000ppm

D20-49
L=25m
Zn=380ppm
Pb=170ppm
Mn=1880ppm
Mg=0.13%

D20-47
L=12m
Zn=130ppm
Pb=65ppm
Mn=1650ppm
Mg=0.11%

D20-48
L=25m
Zn=675ppm
Pb=105ppm
Mn=1860ppm
Mg=0.16%

quartz vein w=30cm to 3m replacing along bedding with brown carbonate mineral vein silicification strong

D20-58
L=18m
Zn=580ppm
Pb=100ppm
Mn=7270ppm
Mg=0.54%

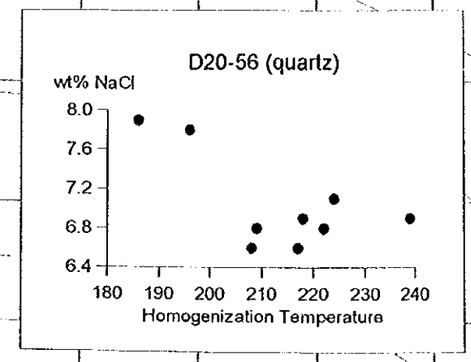
brown carbonate vein w=7m

D20-60
L=23m
Zn=185ppm
Pb=65ppm
Mn=1350ppm
Mg=0.29%

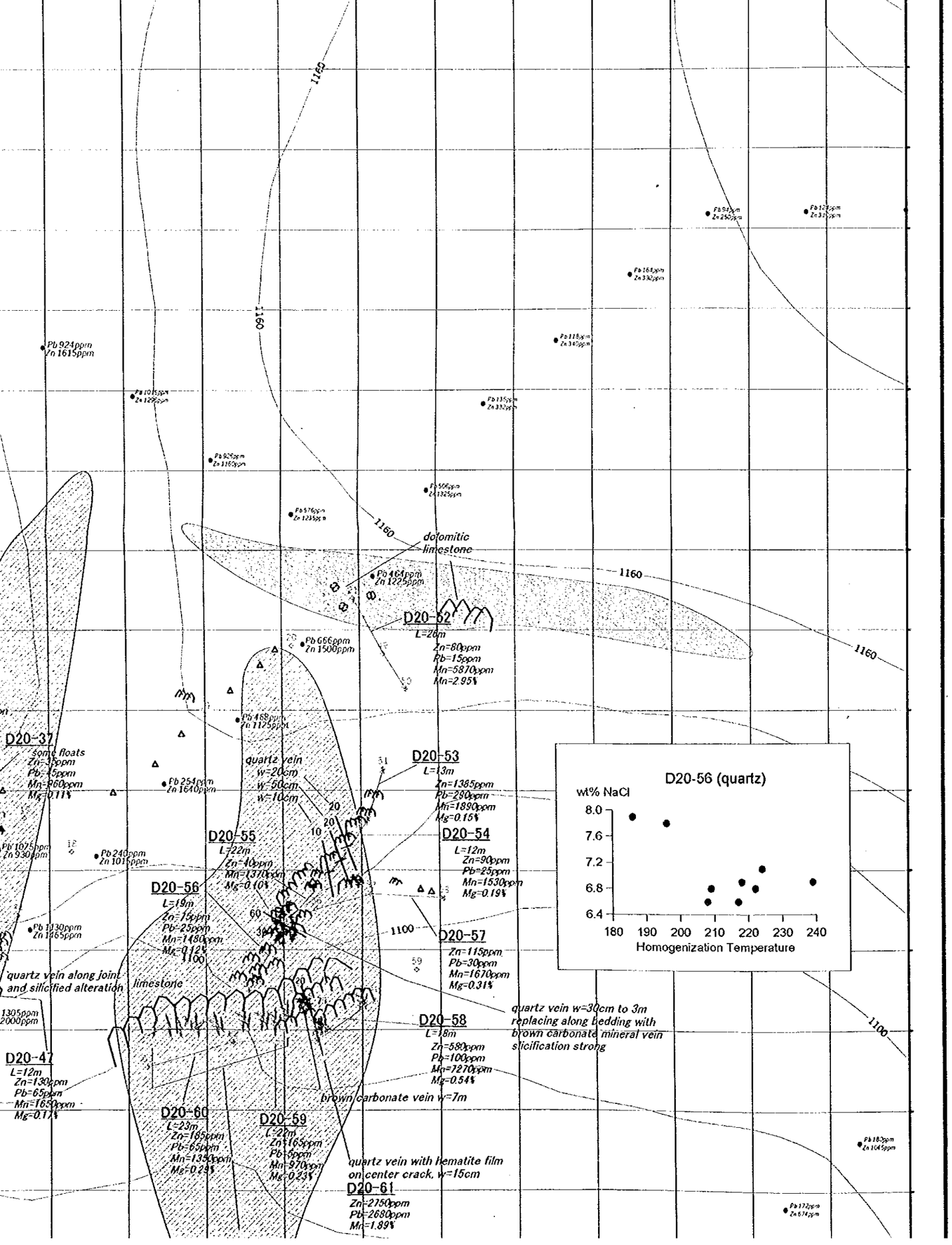
D20-59
L=22m
Zn=165ppm
Pb=5ppm
Mn=970ppm
Mg=0.23%

quartz vein with hematite film on center crack, w=15cm

D20-61
Zn=2750ppm
Pb=2680ppm
Mn=1.89%

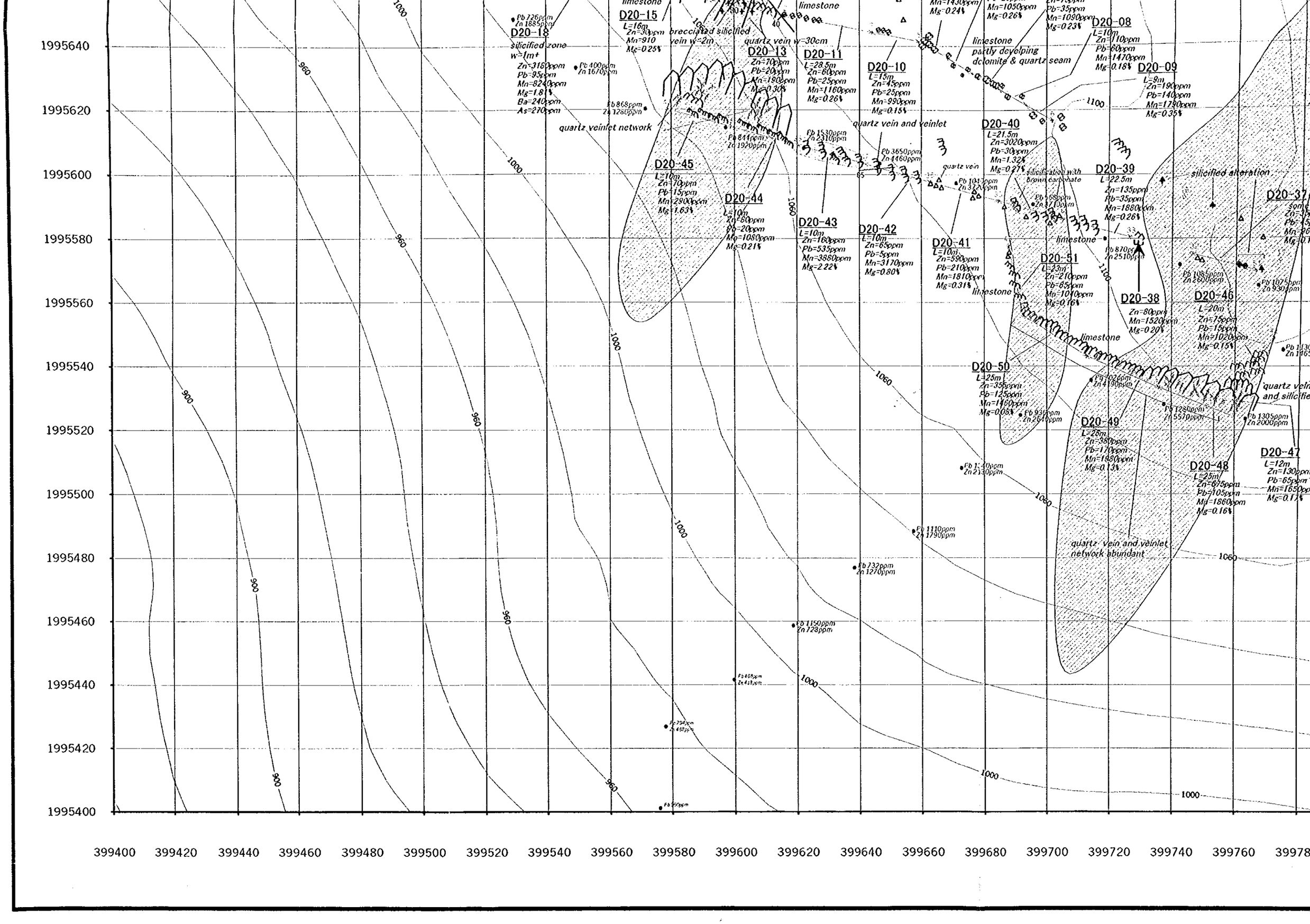


1160
1100
1060
1080
1000



LEGEND

- 325ppm / 1558ppm — Soil sample location in Second phase
- D20-20 — Rock sample section along survey line
- D20-26 — Rock sample of vein and spot
- Silicified alteration with brecciated texture and brown carbonate minerals
- Quartz vein and veinlet network with silicified alteration
- Silicified alteration
- 20 — Quartz vein and veinlet network


D20-18
silicified zone
w=1m+
Zn=3180ppm
Pb=95ppm
Mn=8240ppm
Mg=1.8%
Ba=240ppm
As=270ppm
Pb 726ppm
Zn 1885ppm
Pb 400ppm
Zn 1670ppm
Pb 868ppm
Zn 1280ppm
D20-15
L=16m
Zn=30ppm
Mn=910
Mg=0.25%
brecciated silicified
vein w=2m
limestone
quartz vein w=30cm
D20-13
Zn=70ppm
Pb=20ppm
Mn=1900ppm
Mg=0.30%
D20-11
L=28.5m
Zn=60ppm
Pb=25ppm
Mn=1160ppm
Mg=0.26%
D20-10
L=15m
Zn=45ppm
Pb=25ppm
Mn=990ppm
Mg=0.15%
limestone
partly develping
dolomite & quartz seam
D20-08
L=10m
Zn=110ppm
Pb=60ppm
Mn=1470ppm
Mg=0.18%
D20-09
L=9m
Zn=190ppm
Pb=140ppm
Mn=1780ppm
Mg=0.35%
quartz veinlet network
Pb 841ppm
Zn 1920ppm
Pb 1530ppm
Zn 2310ppm
quartz vein and veinlet
Pb 3650ppm
Zn 4460ppm
D20-45
L=10m
Zn=70ppm
Pb=15ppm
Mn=2900ppm
Mg=1.63%
D20-44
L=10m
Zn=80ppm
Pb=20ppm
Mn=1080ppm
Mg=0.21%
D20-43
L=10m
Zn=160ppm
Pb=535ppm
Mn=3880ppm
Mg=2.22%
D20-42
L=10m
Zn=65ppm
Pb=5ppm
Mn=3170ppm
Mg=0.80%
D20-40
L=21.5m
Zn=3020ppm
Pb=30ppm
Mn=1.32%
Mg=0.71%
quartz vein
Pb 1043ppm
Zn 3120ppm
silicification with
brown carbonate
D20-39
L=22.5m
Zn=135ppm
Pb=35ppm
Mn=1880ppm
Mg=0.26%
silicified alteration
D20-41
L=10m
Zn=590ppm
Pb=210ppm
Mn=1810ppm
Mg=0.31%
limestone
D20-51
L=23m
Zn=210ppm
Pb=85ppm
Mn=1040ppm
Mg=0.16%
Pb 870ppm
Zn 2510ppm
D20-38
Zn=80ppm
Mn=1520ppm
Mg=0.20%
D20-46
L=20m
Zn=75ppm
Pb=15ppm
Mn=1020ppm
Mg=0.15%
limestone
D20-50
L=25m
Zn=355ppm
Pb=125ppm
Mn=1460ppm
Mg=0.05%
Pb 1026ppm
Zn 4190ppm
Pb 938ppm
Zn 2640ppm
D20-49
L=28m
Zn=380ppm
Pb=170ppm
Mn=1850ppm
Mg=0.13%
Pb 1280ppm
Zn 5570ppm
Pb 1305ppm
Zn 2000ppm
quartz vein
and silicifie
D20-48
L=25m
Zn=675ppm
Pb=105ppm
Mn=1860ppm
Mg=0.16%
D20-47
L=12m
Zn=130ppm
Pb=65ppm
Mn=1650pp
Mg=0.11%
Pb 1140ppm
Zn 2130ppm
Pb 1110ppm
Zn 1790ppm
quartz vein and veinlet
network abundant
Pb 732ppm
Zn 1270ppm
Pb 1150ppm
Zn 728ppm
Pb 485ppm
Zn 413ppm
Pb 754ppm
Zn 482ppm
Pb 360ppm
900
920
940
960
980
1000
1020
1040
1060
1080
1100
1995640
1995620
1995600
1995580
1995560
1995540
1995520
1995500
1995480
1995460
1995440
1995420
1995400
399400
399420
399440
399460
399480
399500
399520
399540
399560
399580
399600
399620
399640
399660
399680
399700
399720
399740
399760

D20-15
L=16m
Zn=30ppm
Mn=910
Mg=0.25%

brecciated silicified vein w=2m

quartz vein w=30cm

limestone

D20-13
Zn=70ppm
Pb=20ppm
Mn=180ppm
Mg=0.30%

D20-11
L=28.5m
Zn=60ppm
Pb=25ppm
Mn=1160ppm
Mg=0.26%

D20-10
L=15m
Zn=45ppm
Pb=25ppm
Mn=990ppm
Mg=0.15%

limestone partly developing dolomite & quartz seam

Mn=1050ppm Mg=0.26%

Pb=35ppm Mn=1090ppm Mg=0.23%

D20-08
L=10m
Zn=110ppm
Pb=60ppm
Mn=1470ppm
Mg=0.18%

D20-09
L=9m
Zn=190ppm
Pb=140ppm
Mn=1790ppm
Mg=0.35%

network

Pb 844ppm Zn 1920ppm

Pb 1530ppm Zn 2310ppm

quartz vein and veinlet

Pb 3650ppm Zn 1460ppm

D20-40
L=21.5m
Zn=3020ppm
Pb=30ppm
Mn=1.32%
Mg=0.27%

silicification with brown carbonate

D20-45
L=10m
Zn=70ppm
Pb=15ppm
Mn=2900ppm
Mg=1.63%

D20-44
L=10m
Zn=80ppm
Pb=20ppm
Mn=1080ppm
Mg=0.21%

D20-43
L=10m
Zn=160ppm
Pb=535ppm
Mn=3880ppm
Mg=2.22%

D20-42
L=10m
Zn=65ppm
Pb=5ppm
Mn=3170ppm
Mg=0.60%

quartz vein

Pb 1015ppm Zn 312ppm

D20-41
L=10m
Zn=590ppm
Pb=210ppm
Mn=1810ppm
Mg=0.31%

limestone

Pb 565ppm Zn 1710ppm

D20-51
L=23m
Zn=210ppm
Pb=85ppm
Mn=1040ppm
Mg=0.16%

D20-39
L=22.5m
Zn=135ppm
Pb=35ppm
Mn=1880ppm
Mg=0.26%

silicified alteration

limestone

Pb 870ppm Zn 2510ppm

D20-38
Zn=80ppm
Mn=1520ppm
Mg=0.20%

D20-37
some floats
Zn=35ppm
Pb=5ppm
Mn=960ppm
Mg=0.11%

Pb 1085ppm Zn 2600ppm

D20-46
L=20m
Zn=75ppm
Pb=15ppm
Mn=1020ppm
Mg=0.15%

Pb 1075ppm Zn 930ppm

Pb 240ppm Zn 1015ppm

Pb 1130ppm Zn 1665ppm

D20-50
L=25m
Zn=355ppm
Pb=125ppm
Mn=1460ppm
Mg=0.08%

Pb 702ppm Zn 4190ppm

Pb 936ppm Zn 2610ppm

quartz vein along joint and silicified alteration

D20-49
L=25m
Zn=380ppm
Pb=170ppm
Mn=1880ppm
Mg=0.13%

Pb 1280ppm Zn 5570ppm

Pb 1305ppm Zn 2000ppm

D20-48
L=25m
Zn=675ppm
Pb=105ppm
Mn=1860ppm
Mg=0.16%

D20-47
L=12m
Zn=130ppm
Pb=65ppm
Mn=1650ppm
Mg=0.11%

Pb 1140ppm Zn 2130ppm

quartz vein and veinlet network abundant

Pb 1110ppm Zn 1790ppm

Pb 732ppm Zn 1270ppm

Pb 1150ppm Zn 728ppm

Pb 455ppm Zn 418ppm

Pb 752ppm Zn 432ppm

Pb 776ppm

Pb 576ppm Zn 1235ppm

dolomitic limestone

Pb 464ppm Zn 1225ppm

D20-52
L=26m
Zn=60ppm
Pb=15ppm
Mn=5870ppm
Mn=2.95%

Pb 666ppm Zn 1500ppm

Pb 468ppm Zn 1125ppm

quartz vein w=20cm w=50cm w=10cm

Pb 2540ppm Zn 1640ppm

D20-53
L=13m
Zn=1385ppm
Pb=290ppm
Mn=1890ppm
Mg=0.15%

D20-54
L=12m
Zn=90ppm
Pb=25ppm
Mn=1530ppm
Mg=0.19%

D20-55
L=22m
Zn=40ppm
Mn=1370ppm
Mg=0.10%

D20-56
L=19m
Zn=75ppm
Pb=25ppm
Mn=1480ppm
Mg=0.12%

D20-57
Zn=115ppm
Pb=30ppm
Mn=1670ppm
Mg=0.31%

limestone

quartz vein w=30cm to 3m replacing along bedding with brown carbonate mineral vein silicification strong

D20-58
L=18m
Zn=580ppm
Pb=100ppm
Mn=7270ppm
Mg=0.54%

brown carbonate vein w=7m

D20-60
L=23m
Zn=185ppm
Pb=65ppm
Mn=1350ppm
Mg=0.29%

D20-59
L=22m
Zn=165ppm
Pb=5ppm
Mn=970ppm
Mg=0.23%

quartz veinlet network remarkable

quartz vein with hematite film on center crack, w=15cm

D20-61
Zn=2750ppm
Pb=2680ppm
Mn=1.89%

Pb 1772ppm Zn 674ppm

Pb 513ppm Zn 130ppm

Pb 196ppm Zn 430ppm

Pb 216ppm Zn 536ppm

Pb 408ppm Zn 814ppm

D20-56 (quartz)

wt% NaCl

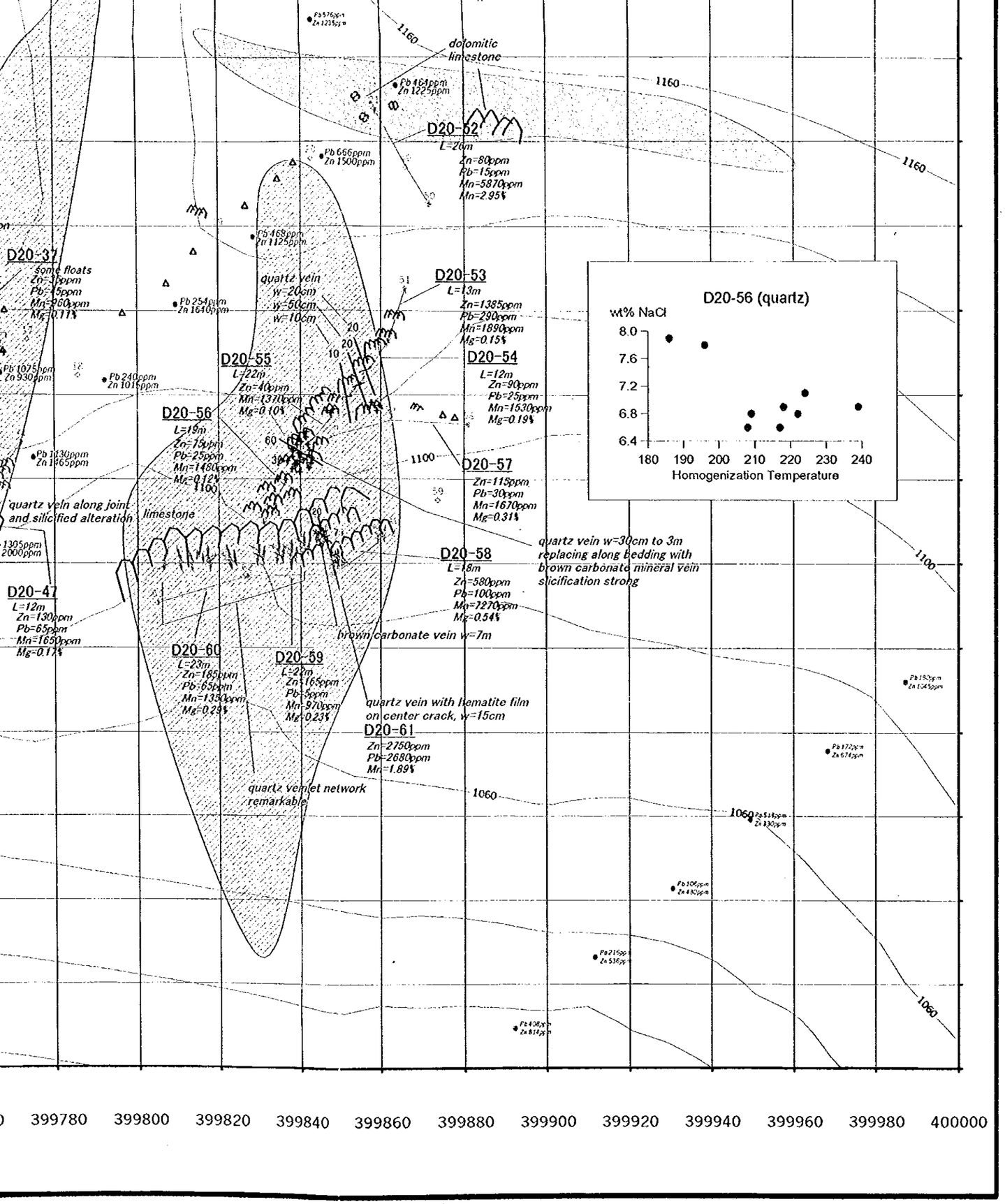
8.0
7.6
7.2
6.8
6.4

180 190 200 210 220 230 240

Homogenization Temperature

1160 1100 1060 1000

399560 399580 399600 399620 399640 399660 399680 399700 399720 399740 399760 399780 399800 399820 399840 399860 399880 399900 399920 399940 399960 399980



LEGEND

325ppm
1558ppm — Soil sample location in Second phase

D20-20 — Rock sample section along survey line

D20-26 — Rock sample of vein and spot

Silicified alteration with brecciated texture and brown carbonate minerals

Quartz vein and veinlet network with silicified alteration

Silicified alteration

20 / 75 — Quartz vein, strike and dipping

40 / 40 — Bedding, strike and dipping

Silicified alteration zone

Dolomitized alteration zone

JICA