Table II-1-3-8 DDH MJPP-3 Sample List, Mt. Upao Area

Sample No.	Description of Sample	Interval: From	To	Width (m)	Assay results: Au	Ag	As	Sb	Cu	Pb	Zn	Fe %	Mo
UD-3-1	str arg ad w/ 3%py & 5%hm	15.50	18.00	2.50	<0.02	<0.2	<0.001	<0.001	0.025	<0.001	<0.001	1.40	<0.001
UD-3-2	wk arg porous ad w/ 17%hm	34.10	35.00	0.90	<0.02	<0.2	0.002	<0.001	0.004	<0.001	<0.001	4.75	<0.001
UD-3-3	ditto	35.00	36.60	1.60	<0.02	<0.2	0.001	<0.001	0.002	<0.001	<0.001	3.40	<0.001
UD-3-4	mod.slcf ad w/ 10%hm	50.40	51.05	0.65	<0.02	<0.2	<0.001	<0.001	<0.001	<0.001	<0.001	1.80	0.001
UD-3-5	wk arg porous ad w/ 20%hm	59.00	60.05	1.05	<0.02	<0.2	0.003	<0.001	0.001	<0.001	<0.001	5.50	<0.001
UD-3-6	ditto	69.15	70.35	1.20	<0.02	<0.2	0.004	<0.001	0.002	<0.001	<0.001	4.10	<0.001
UD-3-7	arg/slcf fn grnd ad w/ 5%hm	72.90	74.00	1.10	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	<0.001	2.50	<0.001
UD-3-8	mod silcf porous ad w/7%py	78.25	79.20	0.95	<0.02	<0.2	0.002	<0.001	0.014	<0.001	<0.001	4.30	<0.001
UD-3-9	str slcf ad w/ 15% hm dissem	101.60	102.75	1.15	<0.02	<0.2	0.007	<0.001	0.001	<0.001	<0.001	3.80	<0.001
UD-3-10	str slcf,10%py,15%hm	103.55	104.38	0.83	<0.02	<0.2	0.001	<0.001	0.010	<0.001	<0.001	3.90	<0.001
UD-3-11	str slcf brec ad w/ 15%py	104.38	105.20	0.82	<0.02	<0.2	0.002	<0.001	0.012	<0.001	<0.001	3.40	<0.001
UD-3-12	ditto porous ad w/ 20% hm	107.45	108.40	0.95	<0.02	<0.2	0.001	<0.001	0.002	<0.001	<0.001	7.40	<0.001
UD-3-13	ditto,w/ 15% hm	112.85	115.10	2.25	<0.02	<0.2	0.002	<0.001	0.002	<0.001	<0.001	2.70	<0.001
UD-3-14	ditto,w/ 10%py zone in it	115.80	116.50	0.70	<0.02	<0.2	<0.001	<0.001	0.014	<0.001	<0.001	2.90	<0.001
UD-3-15	ditto w/15% hm	118.00	119.15	1.15	<0.02	<0.2	<0.001	<0.001	<0.001	<0.001	<0.001	1.30	<0.001
UD-3-16	ditto,py & hm zones	127.25	128.00	0.75	<0.02	<0.2	<0.001	<0.001	0.010	<0.001	<0.001	7.00	<0.001
UD-3-17	ditto,porous ad w/ 20% hm	128.00	128.80	0.80	<0.02	<0.2	0.002	<0.001	0.003	<0.001	<0.001	5.50	<0.001
UD-3-18	ditto,py & hm zones	130.00	130.85	0.85	<0.02	<0.2	0.001	<0.001	0.009	<0.001	<0.001	7.80	<0.001
UD-3-19	ditto,porous ad w/ 15% fn py	142.50	143.05	0.55	<0.02	<0.2	0.001	<0.001	0.013	<0.001	<0.001	6.00	<0.001
UD-3-20	mod slcf porous ad w/25% hm	160.20	161.30	1.10	0.17	<0.2	0.001	<0.001	0.007	<0.001	<0.001	7.30	<0.001
UD-3-21	ditto	161.30	162.60	1.30	0.32	<0.2	0.006	<0.001	0.002	<0.001	<0.001	10.60	<0.001
UD-3-22	ditto	165.40	166.60	1.20	0.09	<0.2	0.019	<0.001	0.004	<0.001	<0.001	5.00	<0.001
UD-3-23	ditto	166.60	167.50	0.90	0.03	<0.2	0.020	<0.001	0.001	<0.001	<0.001	3.00	<0.001
UD-3-24	ditto,w/17% hm	175.70	176.75	1.05	<0.02	<0.2	0.002	<0.001	0.002	<0.001	<0.001	4.80	<0.001
UD-3-25	str slcf ad w/ 5% py	180.00	180.60	0.60	<0.02	<0.2	0.002	<0.001	0.037	<0.001	<0.001	4.50	<0.001
UD-3-26	ditto w/15% hm	180.60	181.80	1.20	0.06	<0.2	0.017	<0.001	0.002	<0.001	<0.001	1.30	<0.001
UD-3-27	ditto,porous w/20% hm	185.80	187.20	1.40	<0.02	<0.2	0.002	<0.001	<0.001	<0.001	<0.001	1.60	<0.001
UD-3-28	ditto,w/ 15% pyrite	192.15	193.00	0.85	<0.02	<0.2	<0.001	<0.001	0.015	<0.001	<0.001	3.10	<0.001
UD-3-29	ditto,porous 15% fn pyrite	197.00	197.80	0.80	<0.02	<0.2	0.002	<0.001	0.031	<0.001	<0.001	3.40	<0.001
UD-3-30	ditto,w/ 20% pyrite	199.00	200.00	1.00	<0.02	<0.2	0.010	<0.001	0.026	<0.001	<0.001	5.50	<0.001
UD-3-31	ditto,porous,w/ 15% hm	204.70	205.80	1.10	<0.02	<0.2	<0.001	<0.001	0.004	<0.001	<0.001	1.90	<0.001
UD-3-32	ditto,porous ad w/ 20% fn py	208.70	209.37	0.67	<0.02	<0.2	<0.001	<0.001	0.021	<0.001	<0.001	4.90	<0.001
UD-3-33	ditto w/ 20%py, cp?	213.40	214.60	1.20	<0.02	<0.2	<0.001	<0.001	0.020	<0.001	<0.001	3.40	<0.001
UD-3-34	15% py bg zone in the middle	215.90	216.90	1.00	<0.02	<0.2	<0.001	<0.001	0.027	<0.001	<0.001	1.80	<0.001
UD-3-35	str slcf ad w/ 20% pyrite	219.90	221.00	1.10	<0.02	<0.2	<0.001	<0.001	0.043	<0.001	<0.001	5.00	<0.001
UD-3-36	ditto,w/ 20% py rare cp?	226.85	228.05	1.20	<0.02	<0.2	0.001	<0.001	0.047	<0.001	<0.001	3.50	<0.001
UD-3-37	ditto,epidote bg	232.60	234.00	1.40	<0.02	<0.2	0.001	<0.001	0.010	<0.001	<0.001	2.60	<0.001
UD-3-38	ditto,w/ 7% py imp.	234.00	234.90	0.90	<0.02	<0.2	0.002	<0.001	0.012	<0.001	<0.001	2.90	<0.001
UD-3-39	ditto,porous brz ad w/5% py	244.10	245.15	1.05	<0.02	<0.2	0.013	<0.001	0.010	<0.001	<0.001	2.70	<0.001
UD-3-40	ditto,porph ad w/7% py	253.10	254.20	1.10	<0.02	<0.2	<0.001	<0.001	0.040	<0.001	0.295	2.10	<0.001
UD-3-41	grey colored clay	256.10	258.40	2.30	<0.02	<0.2	0.001	<0.001	0.012	<0.001	0.002	4.90	<0.001
UD-3-42	str slcf ad w/10% py,epidote	267.60	268.80	1.20	<0.02	<0.2	0.002	<0.001	0.007	<0.001	<0.001	2.40	<0.001
UD-3-43	ditto,w/15% v fn py, cp?	271.55	272.75	1.20	<0.02	<0.2	<0.001	<0.001	0.008	<0.001	<0.001	2.00	<0.001
UD-3-44	grey colored clay	278.20	279.20	1.00	<0.02	<0.2	<0.001	<0.001	0.012	<0.001	0.001	4.40	<0.001
UD-3-45	ditto	279.20	280.20	1.00	<0.02	<0.2	<0.001	<0.001	0.014	<0.001	0.001	4.10	<0.001
UD-3-46	ditto	287.50	288.50	1.00	<0.02	<0.2	0.001	<0.001	0.011	<0.001	0.001	4.50	<0.001
UD-3-47	ditto	293.80	295.00	1.20	<0.02	<0.2	0.001	<0.001	0.013	<0.001	0.001	4.50	<0.001
UD-3-48	ditto	295.00	296.20	1.20	<0.02	<0.2	<0.001	<0.001	0.005	<0.001	<0.001	2.00	<0.001
UD-3-49	ditto,str slcf ad at bottom	298.00	300.15	2.15	<0.02	<0.2	0.001	<0.001	0.012	<0.001	0.001	4.60	<0.001

moderate in upper section with 7% pyrite dissemination together with black colored pyritic veins(max 10mm wide). strongly silicified portion have max 2mm diameter pore.

293.26-294.90m: grey colored clayey zone with 7% pyrite.

294.90-301.00m(End of the Hole): weakly argillized brittle andesite with 8% pyrite dissemination and pyritic black veins. 298.02-298.40m; gray colored clayey zone.
7-12mm wide anhydrite veins at 299.60m and 301.0m. 1-2mm wide anhydrite veinlets can be seen sporadically throughout the section.

b) Analytical Results of the Core Samples

Similar to MJPP-1 Hole, although there are extensive pyritization and silicification in the core samples, no sample attained ore grade in any elements analyzed. The sample UD-2-1 contained 1.0g/t Ag and 0.2 to 0.6g/t Ag were demonstrated up to 96m. Minor copper mineralization of 0.005 to 0.040% Cu were detected below 116m.

1-3-2-3 MJPP-3 Hole

a) Geology

To 197.0m: Heavily hematite stained andesite predominates, some sections contain remnant pyritic andesite.

197.0-225m: Mostly pyrite disseminated andesite but contains thin beds of hematitized andesite.

225-272.75m: Silicified andesite with fine grained pyrite dissemination. Most plagioclase phenocrysts in highly silicified andesite are lost leaving only the skeleton and attain porous appearance. 0.5-5mm wide quartz veins forming network are frequent in the section, some show brecciated structure.

272.75-300.15m(End of Hole): grey colored clay with 5% pyrite dissemination recovered. Only rock in the section is seen at around 295m.

Details are as follow.

0.00-2.30m: yellowish brown colored soil.

2.30-5.20m: milky white colored strongly argillized andesite with 5% hematite dissemination. Kaoline is the dominant clay.

5.20-11.80m: reddish brown colored weakly argillized andesite with hematite dissemination and in 0.5-2mm wide veinlets totalling to 25% by volume.

11.80-15.50m: purplish brown colored strongly argillized andesite with 25% disseminated hematite. Irregular cracks of 1 to 8mm width filled by white-milky colored clay(kaolinite) predominate in the section.

15.50-22.50m: grey colored strongly argillized andesite with very fine grained pyrite dissemination(3%). 0.5mm wide cracks filled by clay and/ or anhydrite are ubiquitous in the section.

22.50-25.80m: reddish brown colored strongly argillized andesite with 20% hematite dissemination.

25.80-28.65m: grey brown colored strongly argillized andesite with 15% hematite dissemination. The section between 28.00 to 28.35m contains 5% magnetite in dissemination together with hematite.

28.65-33.25m: reddish brown colored weakly argillized andesite with 15% disseminated hematite. grey colored andesite islands with no apparent pyrite are seen in 10cm and 15cm diameters blocks at;30.50m, and at 31.70m respectively.

33.25-33.80m: grey colored weakly argillized andesite with very fine grained pyrite dissemination(5%).

33.80-36.20m: brownish grey colored weakly argillized porous andesite with abundant irregular cracks filled with hematite which may occupy 17% of total volume of the rock. At 34.60m there is a crack containing minute grained pyrite which stands at 32 degrees to the core axis.

36.20-36.60m: reddish brown colored clay zone with 20% hematite.

36.60-38.85m: reddish brown colored weakly silicified porous andesite with 20% hematite dissemination.

38.85-41.50m: purplish brown colored strongly argillized andesite with 10% hematite dissemination. Irregular cracks and fissures filled by white clay mineral predominate in the section hence the core tends to crumble easily.

41.50-52.60m: reddish brown colored weakly to moderately silicified porous andesite with 15% hematite dissemination. At 50.85m there is a 10mm wide very fine grained milky white colored quartz vein standing at 80 degrees to the core axis.

52.60-52.90m: grey colored very strongly silicified porous andesite with 5% hematite dissemination. The pores are filled by white colored clay.

52.90-53.60m: greenish grey colored strongly argillized and chloritized andesite with 7% hematite dissemination. strongly chloritized portion contains less than 1% very fine grained pyrite.

53.60-55.10m: purplish brown colored weakly silicified fine grained andesite with 8% hematite dissemination.

55.10-65.80m: dark reddish brown colored weakly argillized and silicified porous andesite with hematite in dissemination and in crack filling which amounts to 15% in total. Dark grey colored, 30 x 40mm rounded breccia of weakly argillized andesite which contain 10% disseminated pyrite occur at 58.90m.

65.80-67.70m: purplish brown colored strongly argillized andesite with 15% hematite dissemination.

67.70-72.90m: reddish brown colored weakly argillized porous andesite with 20% hematite in dissemination and in 0.5-2mm wide veinlets.

72.90-74.m: light grey colored weakly silicified fine grained andesite with no apparent pyrite. Hematite(5%) can be seen only in dendritic fractures.

74.00-76.20m: reddish brown colored moderately argillized porous andesite with 20% hematite dissemination.

76.20-78.25m: purplish grey colored weakly argillized andesite with dendritic irregular cracks/fractures filled with hematite which may occupy 5% of the total volume.

78.25-79.20m: dark grey colored moderately silicified porous andesite with very fine grained 7% pyrite in dissemination. 0.5mm wide fissures filled with white clay and hematite are seen sporadically in the section.

79.20-92.45m: reddish brown colored moderately argillized porous andesite with 18% hematite dissemination. Sections 81.20-83.0m, and 88.10-88.90m are intensely fractured and only broken core recovered.

92.45-99.10m: reddish brown colored moderately silicified andesite with 1-5mm diameter pores and 15% hematite dissemination. Milky white colored strongly silicified, breccia like pods occur sporadically(4 in 1m core length).
99.10-99.90m: yellowish brown colored weakly silicified, porous andesite with 10% hematite dissemination.
99.90-104.38m: reddish brown colored strongly silicified andesite. originally milky white colored andesite was intensely fractured and the fractures and cracks are filled with hematite/ limonite hence show overall reddish color. 103.55-104.05m; grey colored andesite that contains 10% pyrite dissemination.
104.38-105.20m: dark grey colored strongly silicified, brecciated andesite with very fine grained pyrite in dissemination and 5mm wide veinlets amounting to 15% total pyrite content.
105.20-108.40m: reddish brown to purple colored moderately to strongly silicified porous andesite with 20% hematite in network filling abundant fractures.
108.40-115.80m: reddish brown colored similar rock as above, with 15% hematite in dissemination.
115.80-117.25m: grey colored strongly silicified andesite with 10% fine grained pyrite dissemination. at 116.20m, epidote spot(2mm across) observed.
117.25-121.80m: reddish purple colored strongly silicified porous andesite with 15% hematite dissemination. 119.15 to 119.70m; grey colored strongly silicified andesite with 10% pyrite dissemination, apparently the survivor of the oxidation which caused the conversion of pyrite to hematite.
121.80-123.30m: grey colored strongly silicified porous andesite with 7% pyrite dissemination. at 122.80 and 123.15m there are 1mm wide fine grained, white quartz veinlets.
123.30-134.95m: reddish brown colored strongly silicified porous andesite with 20% hematite dissemination. Pyritic remnants observed at 127.5-127.8m, and 130.0-130.3m.
134.95-135.90m: grey colored strongly silicified andesite with 10% dissemination.
135.90-142.05m: reddish purple colored strongly silicified porous andesite with 15% hematite dissemination.
142.05-142.90m: dark grey colored strongly silicified porous andesite with 15% fine grained pyrite dissemination.
142.90-153.70m: reddish brown colored strongly silicified porous andesite with 20% hematite dissemination. weakly silicified zone with 20% hematite dissemination is seen at; 145.50-146.40m.
153.70-154.20m: grey colored weakly argillized andesite with 7% pyrite dissemination.
154.20-156.20m: reddish purple colored weakly argillized porous andesite with 17% disseminated hematite.
156.20-159.45m: grey colored weakly argillized andesite with 2% pyrite dissemination.
159.45-167.30m: dark reddish brown colored moderately silicified, porous andesite with 25% hematite in dissemination and in veinlets filling irregularly shaped fractures. the size of the pore ranges 0.5 to 2mm.
167.30-172.25m: reddish purple colored weakly argillized andesite with 20% hematite in dissemination and in dendritic fissure fillings.

172.25-172.95m: grey colored weakly argillized andesite with 3% very fine grained pyrite dissemination.

172.95-180.25m: red-brown colored weakly argillized porous andesite with 17% hematite in dissemination and in dendritic fissure fillings.

180.25-197.00m: reddish purple colored,strongly silicified andesite with 15% hematite in dissemination and in dendritic fissure fillings.

180.25-180.60m; grey colored strongly silicified andesite with 5% pyrite dissemination.

182.55-183.00m; similar andesite with 7% pyrite dissemination.

192.15-193.00m; similar,with 15% pyrite in fine grained dissemination and in veinlets.

195.15-195.40m; similar, with 10% pyrite dissemination.

197.00-212.20m: grey colored strongly silicified andesite with 20% very fine grained pyrite in dissemination and in veinlets(<1mm).

Following sections are hematite zones; 201.20-201.65m, 204.70-205.80m, 208.30-208.40m, 209.37-209.55m, 209.90-210.10m, 211.0-212.15m, and 211.85-212.20m. Hematite content on average is 15% in dissemination and infilling dendritic fissures.

212.20-215.90m: dark grey colored strongly silicified andesite with 20% fine grained pyrite dissemination. rare and minute chalcopyrite(?) associates pyrite. white colored, 1-8mm wide irregular quartz veins are dominant in the section.

215.90-226.85m: dark grey colored strongly silicified porous andesite with 20% very fine grained pyrite dissemination. Followings are hematite zones; 215.90-216.40m., and 216.90-217.20m contain 15% hematite dissemination. At 224.50m, and 225.05m, there are 30mm, and 10mm wide hematite stained blocks enclosed by 1mm wide white rims composed of quartz.

226.85-235.35m: dark grey colored strongly silicified andesite with 10% very fine grained pyrite dissemination. rare, minute chalcopyrite may exist in the section. At 233.80m there are abundant epidote replacing plagioclase phenocrysts. There are 30-40mm wide quartz network zones in every 20cm of core length.

235.35-244.10m: dark grey colored strongly silicified porphyritic andesite with 7% very fine grained pyrite dissemination.

244.10-251.30m: grey colored strongly silicified porous andesite with 5% very fine grained pyrite in dissemination. 5-40mm sized breccia predominate in the section;these might be formed by an autobrecciation process. Epidote replacing plagioclase seen ubiquitous, 20cm section around 249.75m has particularly abundant epidote.

251.30-256.10m: grey colored,strongly silicified porous andesite with 7% pyrite in dissemination and in veinlets.

256.10-258.40m: grey colored clay zone with 5% pyrite.

258.40-267.80m: light grey colored strongly silicified porphyritic andesite with 7% pyrite in spotty dissemination. Epidote still ubiquitous replacing plagioclase phenos and filling minute, discontinuous cracks.

267.80-272.25m: dark grey colored strongly silicified andesite with 15% very fine grained pyrite dissemination. Minute and rare chalcopyrite(?) may exist in the section. 5mm wide quartz veinlets are seen at; 271.55m, 272.0m, and

272.60m.

272.75-295.00m: grey colored clay zone with 5% pyrite.

295.00-296.60m: dark grey colored strongly silicified porous andesite with 15% very fine grained pyrite in dissemination. At 295.0-295.40m, there are five quartz veinlets with 2 to 5mm widths.

296.60-300.15m(End of Hole) grey colored clay zone with 5% pyrite. 10cm long core of silicified porous andesite recovered at near the end of the hole.

b) Analytical Results of the Core Samples

The best intersection of gold is 0.2g/t Au, 2.40m core length section from 161.2 to 162.6m.

The best copper grade of minor copper mineralization in pyritic andesite is; 0.047% Cu. Very minor chalcopyrite grains are observable.

1-3-2-4 Principal Component Analysis on Analytical Values of Drill Core Samples

Principal Component Analysis based on Correlation Matrix was executed to uncover the interrelationship among the elements concerned and to reveal the characteristics of the alteration and mineralization in the area.

Majority of the analytical values of silver, lead and manganese are under the detection limits, and they are eliminated from the analysis(Table II-1-3-9). Accordingly, analytical values of gold, arsenic, iron, mercury, molybdenum, antimony, selenium, and zinc are utilized.

All the analytical values of the element excepting that of iron can be approximated by log-normal distribution hence they are converted to logarithmic values.

Table II-1-3-9 Statistic Parameters, DDH Core Samples, Mt.Upao, 1992

COMP. NAME	UNIT ,	NUM. DATA	MAXIMUM	MINIMUM	MEAN (M)	STD. DEV. (SD)	M-2*SD	M-SD	M+SD	M+2*SD
AU	ppb	115	318	1	3.1	0.450 *	0.4	1.1	8.8	24.8
AG	ppm	14	1.0	0.2	0.28	0.223 *	0.10	0.17	0.47	0.78
AS	ppm	134	204	1	9.3	0.514 *	0.9	2.9	30.5	99.5
FE	%	135	10.60	1.00	3.963	1.664	0.635	2.299	5.626	7.290
CU	ppm	135	465	4	72.5	0.456 *	8.9	25.4	207.1	591.5
MN	ppm	123	1500	5	12.7	0.320 *	2.9	6.1	26.5	55.4
HG	ppb	135	600	10	56.9	0.474 *	6.4	19.1	169.5	505.0
MO	ppm	102	39	1	1.5	0.314 *	0.4	0.7	3.2	6.5
PB	ppm	37	20	1	3.5	0.350 *	0.7	1.6	7.9	17.7
SB	ppm	73	5.20	0.20	0.312	0.327 *	0.069	0.147	0.662	1.407
SE	ppm	134	43.00	0.60	3.723	0.349 *	0.748	1.669	8.307	18.534
ZN	ppm	124	950	1	3.6	0.513 *	0.3	1.1	11.8	38.4

* OF STD. DEV. IS SHOWN IN LOGARITHMIC SCALE

a) CORRELATION

Fe-Se(+0.50), Zn-Mn(+0.49), Au-Se(+0.42), Au-As(+0.42) and Zn-Cu(+0.38) show comparatively strong correlation.

Table II-1-3-10 Correlation Matrix, DDH Core Samples, Mt.Upao,1992

	AU	AS	FE	CU	MN	HG	MO	SE	ZN
AU	---	114	115	115	106	115	86	114	106
AS	0.420	---	134	134	122	134	102	133	123
FE	0.187	0.237	---	135	123	135	102	134	124
CU	-0.187	-0.175	0.086	---	123	135	102	134	124
MN	-0.285	-0.110	0.194	0.137	---	123	90	122	113
HG	0.000	-0.196	-0.029	0.343	-0.281	---	102	134	124
MO	-0.036	0.013	0.040	-0.289	0.117	-0.160	---	101	93
SE	0.424	0.355	0.500	-0.374	-0.222	0.086	0.091	---	123
ZN	-0.034	0.072	0.148	0.375	0.431	-0.217	0.108	-0.234	---

*NOTE ; VARIANCES AND COVARIANCES ARE DIVIDED BY N-1
NUM. OF-DATA IS WRITTEN IN RIGHT-UPPER PART
CORR. COEF. IS WRITTEN IN LEFT-BOTTOM PART

b) PCA

1st Principal Component

The 1st principal component involves 28% of the total variance of the dataset. Se(67%), Au(47%), As(35%) show large positive contribution, and Cu(-33%), Mn(-22%), and Zn(-16%) reveal rather large negative contribution in the component.

The component thus apparently indicates the concentration of selenium, gold and arsenic. This however is completely different from the results of the PCA on the dataset of the trenches in the same area. The mean values of gold and lead in the trenches are 11.4ppb, and 11.9ppm compared with those of the drill core (3.1ppb, and 3.5ppm respectively), three times higher in the trenches. This fact indicates that these elements have been enriched by redistribution of elements caused by weathering and leaching processes at near the surface.

Gold enrichment(mineralization) depicted in the core samples which experienced far less influences from weathering and leaching associates selenium and arsenic. On the other hand, the gold contained in the gold anomaly occurring at the surface has acquired strong proximity with lead.

2nd Principal Component

Mn(47%), Zn(48%), and Fe(26%) show positive contribution while Hg(-35%) contributes negatively.

3rd Principal Component

Cu(50%), Hg(28%), and Fe(28%) have larger contribution and this component suggests the concentration of copper associated with mercury and iron. However, there is no significant copper values found in the drill core hence this component is of no significance. The cumulative contribution to the 3rd component reaches to 63%.

The meaning of the 4th principal component can not be explained clearly since no elements show any significant

Table II-1-3-11 PCA, DDH Core Samples, Mt.Upao, 1992

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		AU	AS	FE	CU	MN	HG	MO	SE	ZN
P 1	2.341	0.260	0.260	EIGENVECTOR	.446	.387	.236	-.374	-.305	-.025	.071	.536	-.265
				FACTOR LOADING	.682	.593	.361	-.572	-.466	-.038	.109	.820	-.405
				CONTRIBUTION	.465	.351	.130	.327	.217	.001	.012	.672	.164
P 2	1.817	0.202	0.462	EIGENVECTOR	.054	.260	.375	-.018	.508	-.438	.261	.077	.514
				FACTOR LOADING	.073	.351	.506	-.025	.685	-.590	.352	.103	.693
				CONTRIBUTION	.005	.123	.256	.001	.469	.348	.124	.011	.481
P 3	1.464	0.163	0.625	EIGENVECTOR	.201	.124	.410	.586	-.017	.436	-.419	.145	.217
				FACTOR LOADING	.243	.150	.495	.709	-.020	.527	-.506	.176	.262
				CONTRIBUTION	.059	.022	.245	.502	.000	.278	.256	.031	.069
P 4	1.023	0.114	0.738	EIGENVECTOR	.343	.439	-.425	.050	-.168	-.362	-.443	-.341	.187
				FACTOR LOADING	.347	.444	-.430	.051	-.170	-.366	-.448	-.345	.190
				CONTRIBUTION	.120	.197	.185	.003	.029	.134	.201	.119	.036
P 5	0.800	0.089	0.827	EIGENVECTOR	.309	.104	-.277	.193	-.252	.347	.682	-.124	.340
				FACTOR LOADING	.276	.093	-.248	.173	-.225	.310	.610	-.111	.304
				CONTRIBUTION	.076	.009	.061	.030	.051	.096	.372	.012	.093
P 6	0.547	0.061	0.888	EIGENVECTOR	-.652	.689	.044	.155	-.165	.068	.134	-.048	-.148
				FACTOR LOADING	-.483	.510	.033	.115	-.122	.050	.099	-.036	-.109
				CONTRIBUTION	.233	.260	.001	.013	.015	.002	.010	.001	.012
P 7	0.446	0.050	0.938	EIGENVECTOR	-.049	-.268	.375	.294	-.634	-.516	.130	-.119	.017
				FACTOR LOADING	-.033	-.179	.250	.196	-.423	-.344	.087	-.079	.011
				CONTRIBUTION	.001	.032	.063	.038	.179	.119	.008	.006	.000
P 8	0.345	0.038	0.976	EIGENVECTOR	.342	.126	.237	.220	.304	-.028	.208	-.489	-.622
				FACTOR LOADING	.201	.074	.139	.129	.178	-.017	.122	-.287	-.365
				CONTRIBUTION	.040	.005	.019	.017	.032	.000	.015	.082	.133
P 9	0.217	0.024	1.000	EIGENVECTOR	-.024	.037	.424	-.564	-.189	.309	-.110	-.546	.242
				FACTOR LOADING	-.011	.017	.197	-.263	-.088	.144	-.051	-.254	.113
				CONTRIBUTION	.000	.000	.039	.069	.008	.021	.003	.065	.013

contribution in the component.

The 5th Principal Component contains larger contribution of molybdenum(37%), but since the distribution of the Mo values show significantly skewed nature toward the detection limit of the element(1ppm), far from the log-normal distribution, the component can not be a reliable indicator for the molybdenum concentration.

1-4 DISCUSSION

The trenching executed in the gold anomalous zone confirmed the existence of the anomalous gold values. The rock in the trenches is strongly hematitized, and argillized but only weakly silicified. The principal component analysis on the trench samples uncovered the close relation between gold and lead; gold being concentrated with lead.

The drilling offered the evidence for the assumption that was presented in 1991, the highly hematitized, argillized and partly silicified rocks in the area, formerly designated to "Odiongan Volcanics" are in fact highly altered variety of the Sibala Formation. Hematite changes to pyrite and magnetite in the depth.

Gold mineralization encountered in the drill core are minimal, the highest value obtained is mere 0.32g/t Au in MJPP-3.

Hematitization continues to 170m above sea level(ASL) in MJPP-1 hole, 160m ASL in MJPP-2, and 125m ASL in MJPP-3. This suggests that the boundary of hematitization deepens toward the south. The most likely cross sectional shape of the hematitized zone is considered to be mushroom shaped as illustrated in Fig.I-4-4. Hematitization of the andesite probably occurred through abundant sheared zones and fractures in the area, some of them were seen in the drill core.

Similar argillization and silicification seen in hematitized rock continued into pyritic andesite in the depth, however no significant gold mineralization encountered. Minor copper mineralization with no economic significance was depicted in MJPP-3 hole.

Gold concentration(mineralization) in the core samples was revealed to be associated with selenium and arsenic by the principal component analysis of 135-drill core samples in the area. This contradicted with the result obtained from the PCA of trench samples, i.e., gold had close proximity with lead.

This finding may have significant implication for the exploration of similar type of gold mineralization, i.e., gold mineralization initially associated with selenium and arsenic could be altered by weathering and leaching processes on the surface and attain a new association with lead, and this modified characteristic is usually the only information obtainable from ordinary geochemical survey. The enrichment of lead in the rocks on the surface by weathering and leaching is apparent by simple comparison of the analytical values of lead with those of the drill core.

Chapter 2 Madarag Area

2-1 SURVEY METHOD

2-1-1 Trenching

Two trenches were excavated. The dimension of the trenches are; 1m wide, and 1m deep. The trenches were filled back immediately after the completion of the mapping and sampling.

Table II-2-1-1 Trenching, Madarag Area, 1992

Trench Name	Length in meter	Number of samples	Direction of Trench
MT-1	75m	17	210
MT-2	138m	27	300

2-1-2 Diamond Drilling

The location of the drill site together with those of the trenches are shown in Fig.I-2-1.

Two holes totalling to 600.91m were drilled. Detailed information on the equipments utilized and the drill progress etc. can be found in the appendix.

Table II-2-1-2 Diamond Drilling, Madarag Area, 1992

Drill Name	Length drilled(m)	Azimuth	Declination	Drill Machine
MJPP-4	300.00m	165	-40	Longyear L38
MJPP-5	300.91m	210	-40	ditto

2-2 GEOLOGY

Hematitized, argillized and silicified andesite formerly designated as "Odiongan Volcanics" covers the higher portion of the mountain, and various andesitic volcanics of Sibala Formation occupy the lower terrain. The drilling executed in 1992 has revealed that these hematitized rocks are a variety of highly altered Sibala Formation underlying "Odiongan". The transition of hematite to pyrite occurs at around 180m above the sea level and hematitized zone has a vertical extension of around 100m, much thinner compared with that at Mount Upao.

2-3 RESULTS

2-3-1 Trenching

2-3-1-1 Trench MT-1 (Plates 2-1, and 2-2)

Highly hematite stained andesite prevails in the trench. Hematite veins and/or veinlets often associate stronger silicification and the rock containing such tends to be harder than the surrounding rocks. Silicified breccia- like blebs with vague boundary occurs in argillized andesite.

Table II-2-3-1 shows the rock sample list together with brief description, and analytical values.

Table II-2-2-1 Sample List of Trenches, Madarag Area

Sample No.	Description of Sample	Analytical Results											
		Au	Ag	As	Sb	Cu	Pb	Zn	Mo	Fe %	Mn	Hg	Se
MT-1,004m	gry-pur weakly silicif fn grnd ad	22	0.2	36	0.8	16	60	5	63	4.50	<5	30	26.0
MT-1,010m	strong hm-Lm bg.wk arg soft ad	14	<0.2	10	0.2	40	46	6	10	6.20	<5	20	11.2
MT-1,015.0m	blue-gry brx(1cm)bg.milk wh alt ad	9	<0.2	12	0.6	34	143	4	26	5.00	<5	20	6.0
MT-1,018.7m	gry-pur colored weak arg soft ad	31	0.5	186	0.8	156	87	3	260	7.80	<5	10	34.0
MT-1,021m	ditto	9	<0.2	14	0.4	16	34	2	17	4.80	<5	10	10.0
MT-1,026m	gry-pur colored wkly silicif fn ad	18	0.4	26	0.4	13	90	3	43	5.10	<5	20	27.0
MT-1,030m	yel-brwn wkly silicif porous ad	12	<0.2	44	0.6	18	55	2	29	3.80	<5	10	1.8
MT-1,032m	hm-Lm/silicif black colored ad	58	0.4	64	0.4	86	197	5	55	19.00	<5	20	37.0
MT-1,038m	1-2mm hm v bg.wk arg alt andesite	47	<0.2	28	0.4	31	111	3	108	8.50	<5	20	32.0
MT-1,045m	bl-gry weakly silicif/hm v(1mm) bg.	54	0.4	58	0.2	24	91	3	48	8.30	<5	20	68.0
MT-1,050m	weakly arg soft andesite	26	0.3	14	0.2	92	112	3	133	5.00	10	20	34.0
MT-1,055m	ditto	37	<0.2	34	0.6	24	209	2	76	6.20	5	20	44.0
MT-1,059m	silicif-brx bg.gry-pur andesite	43	0.2	56	0.8	32	172	3	184	7.80	<5	60	53.0
MT-1,065m	lt gry brx bg.red-brwn andesite	333	0.5	374	6.4	79	104	3	138	6.60	<5	20	49.0
MT-1,066.5m	red-gry colored hard silicif ad	25	0.3	14	0.2	14	113	3	40	5.10	<5	20	38.0
MT-1,068.3m	dark gry v fine grained alt ad	97	<0.2	2	0.6	5	416	2	41	6.00	<5	10	<0.2
MT-1,073m	1-2mm hard surface bg.wk arg ad	36	<0.2	4	0.6	12	145		17	1.50	<5	20	<0.2
MT-2,002m	hm v(1mm) in crack,wk arg andesite	54	0.8	10	0.6	22	113	3	61	3.70	<5	20	20.0
MT-2,007m	ditto hm v bg.alt andesite	78	0.4	64	0.2	46	113	4	99	11.00	5	20	42.0
MT-2,013m	hd black surface(silicif) bg.arg ad	55	0.2	62	0.6	25	37	2	69	7.80	<5	20	41.0
MT-2,015m	silicif crack bg.alt andesite	21	<0.2	12	<0.2	62	31	3	116	7.50	<5	20	3.6
MT-2,020m	gry-pur colored arg alt andesite	17	<0.2	10	<0.2	13	165	2	18	4.60	<5	20	6.2
MT-2,025m	ditto, 1mm hm veinlets bg.	43	3.7	8	0.8	21	28	2	46	8.30	<5	20	11.0
MT-2,032m	ditto,1mm hm vein bg wk arg. ad	17	0.2	6	0.4	10	51	1	24	4.60	<5	20	5.8
MT-2,036m	ditto	22	0.5	4	0.4	19	95	2	42	5.80	<5	20	22.0
MT-2,040m	str silicif porous parts bg.	281	0.6	272	1.6	42	33	2	53	3.60	<5	10	45.0
MT-2,045m	ditto,with weaker silicif	551	0.4	84	0.8	86	10	3	38	3.80	<5	10	63.0
MT-2,050m	spotty hm bg.gry weakly arg ad	25	<0.2	8	<0.2	39	77	2	23	6.30	<5	20	12.0
MT-2,056m	milky wh wk arg alt andesite	30	<0.2	20	0.2	65	46	4	29	12.00	<5	20	18.0
MT-2,061m	gry wk arg andesite	323	0.3	150	1.2	47	8	1	41	3.30	<5	10	64.0
MT-2,065m	milky wh wk arg andesite	13	0.3	16	0.4	98	46	3	28	2.40	<5	10	32.0
MT-2,068.7m	hm vlt in ntwk bg. wk arg andesite	133	0.4	24	0.4	109	46	6	24	13.50	10	10	21.0
MT-2,075m	gry- pur colored wk arg andesite	24	<0.2	2	<0.2	44	42	1	6	2.90	<5	20	3.4
MT-2,078.5m	red-gry wk arg andesite	8	<0.2	2	0.2	10	68	2	5	2.00	<5	10	14.0
MT-2,084m	speccular hm bg. str arg ad	21	0.3	4	1.0	38	87	3	49	12.80	<5	20	38.0
MT-2,091m	ditto crystal bg.lt brwn ad	28	<0.2	2	0.2	12	52	1	50	1.60	<5	10	5.8
MT-2,095m	gry colored wk silicif/arg andesite	10	<0.2	2	<0.2	6	59	1	30	0.60	<5	10	5.6
MT-2,100m	bl-gry colored alt andesite	18	0.2	2	<0.2	22	43	2	21	7.80	<5	20	24.0
MT-2,105.5m	ditto	63	<0.2	4	0.2	24	104	2	80	6.50	<5	20	20.0
MT-2,111.7m	lt gry/milky wh alt andesite	9	0.9	32	<0.2	13	45	1	59	4.80	<5	20	5.4
MT-2,115.5m	red-gry v fn grained alt andesite	11	0.2	18	0.2	13	13	1	46	2.70	<5	30	31.0
MT-2,120m	bk hm grain(1-2mm)/vein bg.alt ad	10	<0.2	8	3.0	8	8	1	9	1.30	<5	30	1.6
MT-2,125m	1-2mm qtz pheno bg.wk silicif q-po?	212	0.5	2	1.0	10	10	1	15	1.20	<5	20	13.0
MT-2,130m	ditto	238	<0.2	26	0.6	30	30	2	15	3.80	<5	20	16.0

Au, Hg in ppb; Fe in %; other elements in ppm

The highest gold value, 333ppb Au was located at near the summit of the mountain. This sample also contains 374ppm As, 104ppm Pb, and 138ppm Mo. The values of lead, molybdenum are significantly higher than those in Mt. Upao Area.

2-3-1-2 Trench MT-2 (Plates 2-3, and 2-4)

Similarly hematitized andesitic rocks encountered in the trench.

The surface of the exposed rock often forms spherical silicified 1-3mm thick skin(coating) and this gives an appearance of overall intense silicification. These spherical silicified skin often accompany hematite and goethite hence tend to be dark colored.

Table II-2-3-1 includes the sample list etc. of Trench MT-2.

The highest gold value of 551ppb Au was found in the rock sample from a 8m high large exposure along the trench line. Silicified, breccia like blebs with no distinct boundary in porous andesite were often observed in the exposure. Comparing the highest gold value detected by the soil geochemical survey executed in 1991, 76ppb Au, to the above mentioned, the gold contained in the rock in the trench were much higher.

Quartz porphyry like rock with 1-2mm quartz phenocryst occurs at the western most part of the trench and contains 288ppb Au.

The rock around the sample MT-2-84m contains abundant hematite, specularite and minor maghemite.

2-3-1-3 Principal Component Analysis on Trench-Samples

The analytical data from the trenches MT-1 and 2(n=44) were subjected to the principal component analysis(PCA) based on the correlation matrix. The purpose of the analysis is to uncover the characteristics of the alteration and mineralization contained in the multi-elemental analytical dataset of the surfacial materials. This will be compared and discussed later with the results from similar analysis of the drill core samples.

a) Statistics

The mean values of molybdenum, 38.5ppm, lead, 64.1ppm, and of gold, 35.5ppb are 14.8, 5.4, and 3.1 times higher than those in Mt. Upao area. While the means of selenium and arsenic also are higher in the trenches in Madarag, copper, iron, and zinc contents are similar and slightly lower in antimony.

Table II-2-3-2 Statistic Parameters, Trenches in Madarag Area

COMP. NAME	UNIT	NUM. DATA	MAXIMUM	MINIMUM	MEAN (M)	STD. DEV. (SD)	M-2*SD	M-SD	M+SD	M+2*SD
Au	ppb	44	551	8	35.5	0.475 *	4.0	11.9	106.0	316.7
Ag	ppm	25	1.7	0.2	0.38	0.227 *	0.13	0.22	0.64	1.08
As	ppm	44	374	2	15.8	0.607 *	1.0	3.9	63.8	258.3
Fe	%	44	19.00	0.60	5.832	3.602	-1.371	2.230	9.433	13.035
Cu	ppm	44	156	5	26.5	0.356 *	5.1	11.7	60.2	136.7
Mn	ppm	5	10	5	7.6	0.147 *	3.8	5.4	10.6	14.9
Hg	ppb	44	60	10	17.4	0.169 *	8.0	11.8	25.7	38.0
Mo	ppm	44	260	5	38.5	0.369 *	7.0	16.5	89.9	210.1
Pb	ppm	44	416	8	64.1	0.342 *	13.3	29.2	140.8	309.3
Sb	ppm	37	6.40	0.20	0.509	0.342 *	0.105	0.231	1.118	2.457
Se	ppm	42	68.00	1.60	17.505	0.421 *	2.516	6.636	46.179	121.818
Zn	ppm	44	6	1	2.2	0.221 *	0.8	1.4	3.7	6.2

* OF STD. DEV. IS SHOWN IN LOGARITHMIC SCALE

Table II-2-3-3 Correlation Matrix, Trenches in Madarag Area

	Au	As	Fe	Cu	Hg	Mo	Pb	Sb	Se	Zn
Au	---	44	44	44	44	44	44	37	42	44
As	0.455	---	44	44	44	44	44	37	42	44
Fe	0.137	0.284	---	44	44	44	44	37	42	44
Cu	0.347	0.559	0.513	---	44	44	44	37	42	44
Hg	-0.154	-0.005	0.150	-0.099	---	44	44	37	42	44
Mo	0.250	0.539	0.354	0.370	0.172	---	44	37	42	44
Pb	-0.086	-0.136	0.282	-0.105	0.205	0.254	---	37	42	44
Sb	0.405	0.372	-0.143	0.065	0.048	0.105	-0.183	---	35	37
Se	0.541	0.523	0.357	0.437	0.052	0.502	0.161	-0.024	---	42
Zn	0.103	0.357	0.627	0.577	0.091	0.282	0.356	-0.181	0.409	---

*NOTE ; VARIANCES AND COVARIANCES ARE DIVIDED BY N-1
NUM. OF DATA IS WRITTEN IN RIGHT-UPPER PART
CORR. COEF. IS WRITTEN IN LEFT-BOTTOM PART

b) Correlation

Fe-Zn(0.63), Cu-Zn(0.58), Au-Se(0.54), As-Mo(0.54), Cu-Fe(0.51), and Se-Mo(0.50) are rather highly correlated.

Table II-2-3-4 PCA, Trenches in Madarag Area

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		Au	As	Fe	Cu	Hg	Mo	Pb	Sb	Se	Zn
P 1	3.518	0.352	0.352	EIGENVECTOR	.294	.405	.356	.408	.043	.366	.104	.075	.409	.370
				FACTOR LOADING	.552	.760	.668	.766	.081	.686	.196	.142	.766	.694
				CONTRIBUTION	.304	.577	.446	.586	.007	.470	.038	.020	.587	.481
P 2	1.903	0.190	0.542	EIGENVECTOR	.402	.286	-.317	.059	-.249	-.030	-.479	.499	.029	-.333
				FACTOR LOADING	.554	.394	-.437	.082	-.344	-.041	-.661	.688	.040	-.459
				CONTRIBUTION	.307	.155	.191	.007	.118	.002	.437	.473	.002	.211
P 3	1.202	0.120	0.662	EIGENVECTOR	.039	.064	-.130	-.352	.658	.331	.319	.400	.046	-.215
				FACTOR LOADING	.043	.071	-.142	-.386	.722	.363	.350	.439	.051	-.236
				CONTRIBUTION	.002	.005	.020	.149	.521	.132	.123	.193	.003	.056
P 4	0.886	0.089	0.751	EIGENVECTOR	.393	-.182	-.218	-.313	-.454	.109	.473	-.203	.402	-.149
				FACTOR LOADING	.370	-.171	-.206	-.295	-.427	.103	.445	-.191	.379	-.140
				CONTRIBUTION	.137	.029	.042	.087	.183	.011	.198	.037	.144	.020
P 5	0.703	0.070	0.821	EIGENVECTOR	-.252	.163	-.242	-.021	.141	.427	-.411	-.547	.317	-.283
				FACTOR LOADING	-.212	.137	-.203	-.018	.119	.358	-.344	-.459	.266	-.237
				CONTRIBUTION	.045	.019	.041	.000	.014	.128	.118	.210	.071	.056
P 6	0.630	0.063	0.884	EIGENVECTOR	-.428	.239	-.086	.033	-.479	.524	.251	.191	-.385	-.021
				FACTOR LOADING	-.340	.190	-.068	.026	-.380	.416	.199	.151	-.306	-.017
				CONTRIBUTION	.115	.036	.005	.001	.145	.173	.040	.023	.093	.000
P 7	0.433	0.043	0.928	EIGENVECTOR	.212	-.333	.677	-.015	-.069	.302	-.147	-.020	-.179	-.486
				FACTOR LOADING	.140	-.219	.445	-.010	-.045	.199	-.097	-.013	-.118	-.320
				CONTRIBUTION	.020	.048	.198	.000	.002	.039	.009	.000	.014	.102
P 8	0.310	0.031	0.959	EIGENVECTOR	.183	-.490	-.414	.661	.149	.230	.117	-.020	-.164	-.033
				FACTOR LOADING	.102	-.273	-.230	.368	.083	.128	.065	-.011	-.091	-.018
				CONTRIBUTION	.010	.074	.053	.135	.007	.016	.004	.000	.008	.000
P 9	0.221	0.022	0.981	EIGENVECTOR	.517	.211	-.106	-.263	.101	.183	-.091	-.368	-.577	.296
				FACTOR LOADING	.243	.099	-.050	-.124	.047	.086	-.043	-.173	-.271	.139
				CONTRIBUTION	.059	.010	.002	.015	.002	.007	.002	.030	.074	.019

The results of PCA were summarized in Table II-2-3-4
1st Principal Component

The component accounts for 35% of total variance contained in the dataset. As(58%), Se(59%), Cu(59%), Fe(45%), Zn(48%), and Mo(47%) show large contribution. Gold also shows significant contribution of 30% in the component.
The component accordingly indicates the concentration of the above mentioned. The combination of the concentrated elements however is considered to be modified from the original association of the elements, induced by weathering and leaching processes at the surface.

2nd Principal Component

The component involves 19% of the total variance in the dataset, and the cumulative contribution attains to 54%. Sb(47%), and Au(31%) have positive contribution and Pb(-44%) shows negative contribution in the component. This implies the existence of gold concentration associated with antimony.

3rd Principal Component

Hg(52%) shows large contribution but since the analytical values of mercury display skewed distribution toward lower values, far from the log-normal distribution with very narrow dynamic range, the legitimacy of the component is doubtful.

2-3-2 Diamond Drilling

Two diamond drills were drilled to examine the gold anomaly depicted by the geochemical survey in 1991. One drill site was utilized for the drilling operation shifting the azimuth from 165 degrees(MJPP-4) to 210 degrees(MJPP-5).

2-3-2-1 MJPP-4 Hole

a) Geology

Soil, talus deposit continued to 14.5m.
14.5-37.65m: purple colored argillized and silicified andesite with abundant hematite(associates specularite).
37.65-139.80m: greenish grey colored strongly pyritized, and silicified andesite. Black colored siliceous vein/veinlet containing very fine grained, black colored pyrite occurs frequently. These veins appear very similar to the "black vein" in Fujishima deposit at Kohnomai Gold Mine (closed now) in Japan. From 131m, magnetite appears together with pyrite.
139.80-300.0m(End of Hole): pyrite disseminated andesite, 145.3-290.5m; strongly silicified and contains abundant magnetite. The final 10m section consits of coarse grained porphyritic andesite.

The details are as follow.

0.00-14.50m: brown colored soil, and talus deposits.
14.50-16.10m: red-purple colored argillized and silicified andesite associating 1-2mm wide hematite veins.
16.10-17.00m: specularite bearing dark reddish brown colored strongly silicified andesite. Silicified part has porous texture. At 16.20m: 15-20mm wide milky white quartz vein.
17.00-24.45m: grey-purple colored strongly silicified andesite with spotted specular hematite. Numerous irregular cracks filled by milky white clay are developed, hence the core are badly broken.

24.45-25.35m: red-purple colored strongly argillized zone with abundant hematite. Some specularite can be seen in the section.
25.35-33.55m: dark grey colored strongly silicified zone with abundant hematite in network and in patch. Hematite rich portion are softer due to the associating clay.
33.55-37.65m: similar to the above but without hematite network. Minor specular hematite visible in the section.
37.65-51.05m: greenish grey colored weakly argillized andesite with 3% pyrite dissemination associating few patchy silicification. The core in the section are badly fractured and broken due to extensively developed irregular fracture/crack system which contain white clay. Slickenside also visible. Strongly argillized and fractured zones are at; 38.20-38.80m, and 40.70-41.30m.
51.05-52.23m: greenish grey colored strongly silicified very fine grained andesite containing 8% pyrite.
52.23-61.98m: greenish grey colored weakly argillized and locally silicified fine grained andesite with 5% pyrite dissemination.
At 60.87m,there is a 5mm wide quartz vein, both walls of it are composed of 1mm wide massive pyrite.
51.05-61.98m could be classified as tuff.
61.98-64.38m: grey andesite with 5% pyrite dissemination.
64.38-66.78m: dark grey colored moderately to strongly silicified andesite with pyrite in veins(1-5mm) and irregularly shaped patches. Overall content of pyrite; 8%. The frequency of pyrite vein is 1 to 2 per every 10cm. Pyrite veins are frequently dislocated 3mm to 30mm by diagonal dry fractures.
Minor chalcopyrite recognized at 65.90- 66.20m section.
66.78-79.10m: grey colored andesite with 5% pyrite. The core recovery from 61.98m on is excellent(95-100%).
79.10-81.30m: dark grey colored moddrately to strongly silicified andesite with 1-2mm pyrite veins. Also contains 7% disseminated pyrite. Strongly silicified portions are porous (max.1mm diameter).
81.30-82.55m: grey colored andesite with 5% pyrite impregnation. No trace of silicification in the section.
82.55-83.20m: dark grey colored moderately silicified andesite with 2-5mm wide pyrite veins(3 veins /every 10cm) and 8% pyrite impregnation.
83.20-91.70m: bluish grey colored andesite with 3% pyrite dissemination and very fine grained black pyrite bearing quartz vein(5mm) together with 3mm wide irregularly oriented pyrite veinlets. 3-slicken sided white clay bearing joints/cracks per every 1m interval can be seen.
91.70-97.75m: bluish grey colored strongly silicified porous andesite. The diameter of the largest pore is 2mm. 8% pyrite dissemination and 10 to 15-irregularly oriented pyrite veinlets(1-5mm wide) per every meter section.
97.75-98.50m: strongly silicified andesite with 10% pyrite dissemination. There are many 1-6mm wide pyrite-quartz veinlets subparallel to the drill axis.
98.50-114.10m: bluish grey colored strongly silicified andesite with 8% pyrite dissemination. There exist 1-3mm wide pyrite veinlets(10 veinlets per meter core). Slicken sided white clay filling in the joints/cracks are seen frequently (5/meter core).
114.10-114.40m: 20mm wide undulating strongly silicified zone observed in brecciated andesite. The size of the breccia is 5-

20mm with 7% pyrite.

114.40-122.00m: bluish grey colored andesite with 5% pyrite dissemination.

122.00-124.42m: moderately silicified andesite with 7% pyrite dissemination. 123.19-123.55m: bluish grey clay bearing strongly fracture zone.

124.42-132.00m: bluish-greenish grey colored moderately argillized/weakly silicified and chloritized andesite with 3-5% pyrite. the core in the section is badly fractured accompanying frequent occurrence of slickensides. 131.25-131.35m;minute magnetite bearing strongly silicified, dark green colored fine grained andesite.

132.00-135.50m: green-grey colored chloritized, and weakly argillized andesite with 3-4% pyrite. No magnetite in the section. at 134.20m there is a 7-8mm wide white quartz veinlet which stands at 10 degrees to the core axis.

135.50-139.80m: greenish grey colored strongly argillized andesite with 2-3% pyrite dissemination. No magnetite in the section.

139.80-143.60m: dark greenish grey colored moderately silicified porphyritic andesite with very fine grained pyritic veinlets of filmy to 5mm width which occurrence is 5 vlts per every 1m core length. Magnetite occurs as 1mm wide veinlets(5 veinlets/meter) and spots/patches replacing mafic with chlorite and pyrite. 5% magnetite and 3% pyrite dissemination throughout the section. also filmy to 2mm wide quartz veinlets can be seen (4 veinlets /meter).

143.60-145.30m: greenish grey colored moderately argillized porphyritic andesite with 5% pyrite. no magnetite in the section. There are ubiquitous cracks/fractures standing at 7 degrees to the core axis, hence the core are badly broken.

145.30-165.75m: greenish grey colored moderately silicified andesite with local weakly argillized zones. 1% pyrite, and patchy(20mm) and/or spotty magnetite occupies 5% of the total volume. Argillized parts do not contain magnetite,probably being replaced by hematite. Also occurs filmy to 5mm wide quartz veinlets(10 vlets/meter) throughout the section.

165.75-167.40m: dark greenish grey colored weakly argillized andesite with 5% pyrite. No magnetite in the section.

167.40-169.52m: dark greenish grey colored moderately silicified porphyritic andesite with only 1% pyrite, and 5% magnetite dissemination.

169.52m-172.30m: weakly argillized fine grained andesite with 5% pyrite.
No magnetite in this section probably replaced to hematite by argillization. 169.52-170.50m, and 172.50-172.30m; badly fractured due to the existence of clay in the fractures.

172.30-172.60m: only grey colored clay recovered.

172.60-175.60m: dark greenish grey weakly argillized andesite with 5% pyrite.

172.75-173.0m; light green colored strongly silicified biotite quartz feldspar porphyry. There are two quartz veinlets at;173.85m and 174.42m with up to 8mm width. Badly fractured core recovered from; 172.60-172.75m section.

175.60-179.75m: light green colored strongly silicified biotite quartz feldspar porphyry. Biotite phenocrysts are altered to chlorite and minute magnetite. no pyrite observed in the section. mafic may originally contain minor amphibole. At 175.60m,there is a quartz vein(10-30mm wide) that contains pinkish brown colored mineral.

179.75-191.18m: greenish grey colored andesite with local silicification and 2% pyrite dissemination throughout. Also very fine grained pyrite replacing mafic phenos occur together with 4% spotty magnetite. At 187.55m; 5mm wide light grey colored quartz veinlet(contains 3% pyrite). At 189.43m; 28mm wide white clay-quartz vein composed of network of 2-5mm veinlets,quartz occupy 30% of the volume. At 183.78m; 2mm wide fine grained pyritic veinlet standing at 10 degrees to the core axis. also at 190.10m; 5-7mm wide black fine grained pyrite vein standing at 62 deg to core axis.
183.78-184.99m; max 10mm wide epidote veins (3-zones) which were cut by 2-3mm wide quartz veinlets. Epidote rich part did not contain magnetite.
185.53-185.87m; grey strongly argillized, fractured zone.

191.18-192.20m: sheared zone with 5% pyrite dissemination.

192.20-196.02m: dark grey colored strongly argillized brittle andesite with 10% pyrite dissemination throughout. Also there are localized silicified parts where minor magnetite occur.

196.02-203.19m: light greenish grey colored andesite with 3% pyrite and 3% magnetite dissemination.

203.19-208.07m: dark grey colored strongly silicified andesite with 3% pyrite and 10% magnetite(in spots and in veinlets). Magnetitic spots also contain fine grained pyrite. There are numerous hair-line fractures that might contain clay originally hence the core in the section is badly fractured angularly.

208.07-212.13m: grey colored weakly argillized andesite with 10% pyrite dissemination. There are no magnetite in the section. 211.25-211.66m; there is a 12mm wide free quartz in the middle and the both sides are badly sheared and argillized.

212.13-226.68m: silicified and argillized andesite with 7% pyrite. No magnetite observed. 219.90-220.38m; strongly argillized and sheared zone. The orientation of the shear structure stands at 46 degrees to core axis.

226.68-229.61m: grey colored strongly argillized, brittle andesite with 10% pyrite dissemination and no magnetite. Numerous hair line cracks developed hence the core can easily be crumbled. At 227.70m there is a 20mm wide black muddy sheared zone standing at 43 degrees to core axis.

229.61-230.00m: black brittle and sheared mudstone like rock standing at 52 degrees to the core axis. The rock contains 5% visible pyrite and abundant microscopic pyrite which appears completely black.

230.00-231.40m: similar to 226.68-229.61m.

231.40-246.23m: greenish grey colored weakly argillized andesite with 6% pyrite dissemination throughout the section. No magnetite observed. 10mm wide quartz vein occurs at 233.00m.
235.45-236.30m, and 244.20-246.23m;strongly argillized and badly fractured zones frequently displaying slickenside structures.

246.23-257.20m: greenish grey colored alternating rocks composed of; weakly silicified and strongly argillized andesite with 3% pyrite dissemination. minor magnetite exist only in silicified portion of the section. Argillized portions are strongly sheared and badly fractured often displaying slickensides. 14mm wide white fine grained quartz vein observed at 249.70m standing at 64 degrees to the core axis.

257.20-275.00m: dark greenish grey colored strongly argillized

Table II-2-3-5 DDH MJPP-4 Sample List, Madarag Area

Sample No.	Description of Sample	Interval in m From	Interval in m To	Width (m)	Assay results Au g/t	Ag g/t	As %	Sb %	Cu %	Pb %	Zn %	Fe %	Mo %
MD-4-1	speccularite bg.silicif.porous ad	16.10	17.00	0.90	0.92	1.4	0.003	<0.001	0.006	0.004	<0.001	6.80	0.002
MD-4-2	dk gry-pur str.silicif./hm bg.	33.55	34.30	0.75	0.13	0.4	0.007	<0.001	0.008	0.002	<0.001	8.10	0.003
MD-4-3	grn-gry str silicif py(8%) bg.fn ad	51.05	52.23	1.18	0.03	0.3	<0.001	<0.001	0.110	<0.001	0.034	4.60	0.001
MD-4-4	weakly silicif.,fn py(8%) bg.ad	60.50	61.15	0.65	0.02	0.6	<0.001	<0.001	0.160	<0.001	0.085	3.60	<0.001
MD-4-5	1-5mm v/patchy py bg.mod.silicif ad	64.38	65.60	1.22	0.04	0.7	0.002	<0.001	0.150	0.001	0.001	3.30	0.001
MD-4-6	ditto,65.9-66.2m;spotty cp	65.60	66.78	1.18	0.02	0.3	0.001	<0.001	0.170	0.002	0.001	3.40	0.001
MD-4-7	1-2mm py v.w 1cm bg.silicif ad	79.10	80.15	1.05	0.03	0.4	0.020	<0.001	0.120	0.001	0.001	3.80	<0.001
MD-4-8	ditto,patchy py bg.	82.35	83.20	0.85	<0.02	0.5	0.010	<0.001	0.150	0.001	0.001	4.00	<0.001
MD-4-9	str silic porous ad w 8% py	92.35	93.55	1.20	0.03	1.3	0.007	<0.001	0.160	0.002	0.002	3.50	0.002
MD-4-10	12% py bg str silicif and	106.55	107.60	1.05	0.02	<0.2	0.084	<0.001	0.240	0.007	0.001	3.60	0.001
MD-4-11	2cmm wide wavy veins(2) bg	114.10	114.40	0.30	<0.02	<0.2	0.034	<0.001	0.120	0.008	0.001	2.90	<0.001
MD-4-12	7% py bg ad with py vlets	122.00	123.19	1.15	0.12	<0.2	0.062	<0.001	0.190	0.002	0.002	3.00	<0.001
MD-4-13	wk silic porph-andesite w 5%mt	140.68	141.80	1.12	<0.02	<0.2	<0.001	<0.001	0.043	<0.001	0.009	3.80	<0.001
MD-4-14	mod silicif/chl andesite w 5%mt	145.30	146.60	1.30	<0.02	<0.2	<0.001	<0.001	0.043	<0.001	0.008	4.00	<0.001
MD-4-15	ditto	146.60	147.60	1.00	<0.02	<0.2	<0.001	<0.001	0.035	<0.001	0.008	3.80	<0.001
MD-4-16	mod silicif porph-andesite w 5%mt	167.40	168.40	1.00	0.02	<0.2	<0.001	<0.001	0.044	0.001	0.011	3.70	<0.001
MD-4-17	str sil bt-qtz porphyry w minor mt	176.82	176.97	0.15	<0.02	<0.2	<0.001	<0.001	0.003	0.001	0.003	0.90	<0.001
MD-4-18	mod silicif ad w 5%mt	163.05	164.05	1.00	0.03	0.4	<0.001	<0.001	0.067	0.001	0.010	3.60	<0.001
MD-4-19	ep-qtz veinlets bg andesite	183.78	184.99	1.21	<0.02	0.3	<0.001	<0.001	0.055	0.001	0.012	3.60	<0.001
MD-4-20	str arg brittle ad w 10%py	193.68	194.70	1.02	0.03	0.6	<0.001	<0.001	0.066	0.015	0.039	4.40	0.001
MD-4-21	str silicif ad with 3%py & 10% mt	203.19	204.03	0.84	0.11	0.6	<0.001	<0.001	0.320	0.001	0.014	5.60	0.001
MD-4-22	arg & silicif ad with 10%py	211.93	213.42	1.49	0.03	0.4	<0.001	<0.001	0.160	0.001	0.010	4.50	0.001
MD-4-23	wk silicif & arg ad w 3% py	246.23	247.18	0.95	0.03	0.5	<0.001	<0.001	0.100	0.001	0.020	4.20	0.001
MD-4-24	wk arg ad w 8% fine py	272.65	273.1	0.45	0.04	0.4	<0.001	<0.001	0.160	0.002	0.023	4.80	0.001
MD-4-25	qtz vlts with py	288.05	288.27	0.22	0.03	0.3	<0.001	<0.001	0.068	0.002	0.012	4.20	0.001
MD-4-27	wk silicif w 8% mt/3% py	290.28	290.90	0.62	0.03	0.3	<0.001	<0.001	0.140	0.001	0.015	4.40	0.001
MD-4-28	wk silicif ad w 8% mt/2% py	294.90	295.60	0.70	0.02	0.6	<0.001	<0.001	0.130	0.001	0.031	4.30	0.002
MD-4-29	str chloritized porph ad w 2%py	298.70	299.20	0.50	0.02	0.2	<0.001	<0.001	0.043	0.001	0.019	3.90	<0.001
MD-4-26	str chloritized andesite w 3% py	260.98	262.04	1.06	0.02	0.3	<0.001	<0.001	0.120	0.001	0.026	4.10	0.001

andesite with 3% very fine grained pyrite dissemination. Irregular hair line cracks developed hence core tends to break easily. 3-minute quartz veinlets(1mm wide) occur every one meter core length. At 271.40m minor chalcopyrite observed.

275.00-278.58m: grey colored weakly argillized andesite with 7% pyrite dissemination/veinlets. 6-minute(1mm) quartz veinlets/ meter core observed.

278.58m-281.85m: light green colored very fine grained strongly chloritized andesite with very minor pyrite.

281.85-284.70m: greenish grey colored weakly argillized andesite with 8% pyrite dissemination.

284.70-287.00m: grey colored strongly argillized and sheared andesite with 5% pyrite dissemination.

287.00-288.90m: greenish grey colored strongly chloritized andesite with 5% pyrite dissemination.

288.90-290.50m: greenish grey colored strongly chloritized, weakly silicified andesite with very fine grained pyrite dissemination(3%). Magnetite observed sporadically, some portion contains up to 8% magnetite.

290.50-300.00m: greenish grey colored strongly chloritized porphyritic andesite with 2% pyrite dissemination. Following sections are strongly silicified and contain up to 8% magnetite; 293.25-294.60m and 294.90-295.60m.

b) Analytical Results of the Core Samples

The sample in hematite stained zone, MD-4-1(16.1-17.0m) carries 0.92g/t Au, and 1.4g/t Ag while MD-4-2(33.55-34.30m) contains 0.13g/t Au and 0.4g/t. In pyritic andesite MD-4-12(122.0-123.19m), and MD-4-21(203.19-204.03m) show 0.12, and 0.11g/t Au respectively. Although these are far from the ore grade of a gold and/or silver deposit, 76% out of 29 samples analysed show more than 0.02g/t gold, and 72% of the samples contain more than 0.2g/t silver. Accordingly the concentration of gold in the hole is much significant compared with that in any drills in Mt. Upao.

The highest copper assay value is 0.32% Cu in the sample MD-4-21 which also contains 0.11g/t Au as stated above. Higher arsenic content accompanys the copper value up around to 123m, hence the copper minerals are considered to be energite-luzonite while deeper in the hole, chalcopyrite associated with pyrite and magnetite are the prevailing copper minerals.

2-3-2-2 MJPP-5 Hole

a) Geology

0.00-13.85m: Soil and talus deposits

13.85-41.70m: Hematite stained andesite. There are several sections where remnant pyritic, bluish grey colored andesite remain. At around 25m, co-occurrence of hematite and pyrite noted, showing that the hematite was an oxidized product of pyrite.

41.70-238.70m: Heavily pyrite disseminated, and silicified andesite. The degree of the silicification varies. Minor amount of copper minerals, chalcopyrite, bornite, and chalcocite are noted; all of them very fine grained. Magnetite appears from around 199m, but highly argillized section lacks magnetite.

238.70-243.68m: Hornblende plagioclase porphyry. Hornblende phenocrysts are replaced by magnetite hence the rock is

strongly magnetic. This could be a later intrusion into the andesite of Sibala Formation.
243.68-266.45m: Intensely argillized, no magnetite survived.
266.45-290.35m: Silicified porphyritic andesite with 1% pyrite, and 5-10% magnetite.
290.35-300.91m(End of Hole): Argillized andesite and silicified andesite. Quartz veins surrounded by epidote occur near the bottom of the hole.

The details are as follow.
0-13.85m: talus deposit; hematite stained andesite boulder and or pebble bearing brown colored soil/clay.
13.85-15.00m: reddish purple colored weakly silicified andesite with 25% hematite in dissemination and in 0.5-2mm wide veinlets.
15.00-21.25m: reddish purple colored moderately argillized and silicified andesite with 15% hematite in dissem. and in veinlets. buff colored fine grained strongly silicified zone(vein) is seen at 18.35m to 18.65m(30cm wide) in which there are abundant irregular cracks filled with white clay (kaolinite?).
21.25-23.10m: grey colored weakly silicified andesite with 7% disseminated pyrite. Hematite occur only in fissures at 22.40m(10mm wide) and 22.50m(2mm wide).
23.10-25.07m: purplish grey colored moderately silicified porous, brecciated andesite with less than 1% pyrite and 5% hematite in dendritic cracks.
25.07-32.85m: light grey colored strongly silicified fine grained andesite with very minor pyrite. Hematite(5%) is seen only in dendritic cracks/fissures. 26.90-27.75m: porous andesite that has pyrite in the periphery of the pores which may amount to 2% of the total volume.
32.85-37.45m: grey colored moderately silicified, auto-brecciated andesite with 7% pyrite dissemination. Irregular 0.5 to 2mm wide network of cracks filled with white clay are ubiquitous in the section.
37.45-41.70m: purplish grey colored porous argillized andesite with 1% pyrite dissemination and specular hematite in wavy bands. Pores are also filled with specularite. Overall content of hematite is ca.20%.
41.70-46.25m: grey colored strongly silicified andesite with 10% pyrite in dissemination and in less than 1mm wide veinlets. Minor specks of chalcopyrite is seen at 42.35-46.20m section.
46.25-47.00m: grey colored strongly argillized andesite with 5% very fine grained pyrite.
47.00-53.90m: grey colored strongly silicified andesite with 8% pyrite in dissemination and 0.5mm to 8mm wide veinlets. At 51.80m and 52.90m there are quartz veins; the former being 7mm wide porous quartz vein standing at 27 degrees to the core axis, the former standing at 58 degrees to the core axis and has 10mm width with disseminated pyrite hence showing dark grey color. 10 to 15mm diameter anhydrite aggregates with blue and greenish tints are observed sporadically.
53.90-58.75m: grey colored weakly argillized andesite with 5% pyrite dissemination. There are abundant irregular cracks accompanied by frequent slickenside hence the core tend to crumble easily.

58.75-59.20m: light grey colored strongly silicified andesite with 7% pyrite dissemination accompanying very minute and rare chalcopyrite.

59.20-62.55m: dark grey colored weakly argillized andesite with 5% pyrite in dissemination and in veinlets.

62.55-78.25m: light grey colored strongly silicified fine grained andesite with 8% pyrite dissemination. minor chalcopyrite at around 65.0m. Minor magnetite detected at 74.95 to 75.30m section.

78.25-86.65m: Similar strongly silicified andesite as above with 7-10% pyrite in dissemination and in patchy concentration..
Sporadic chalcocite, bornite and possible cuprite specks are noted. At 79.0m lone chalcopyrite speck in pyrite concentrated patch.

86.65-88.50m: grey colored strongly silicified, brecciated andesite with 7% overall pyrite in dissemination and in 5mm diameter patches.

88.50-92.60m: grey colored strongly silicified andesite with 5% pyrite dissemination throughout. at 91.45-92.60m; possible minute chalcocite(?) spots can be observed.

92.60-95.00m: dark grey colored strongly argillized andesite with 5% pyrite dissemination. the breccia contained in the clay are all consisted of strongly silicified andesite.

95.00-106.60m: grey colored strongly silicified andesite with 5-7% pyrite in dissemination and in 0.5-1mm wide veinlets. Minute black possible chalcocite spots are observed in the section.

106.60-109.10m: grey colored weakly argillized andesite with 8% pyrite in dissemination and in 0.5-2mm wide veinlets. Joints/fractures standing at 40-50 degrees to the core axis predominate and they are filled with white clay(kaolinite).

109.10-113.30m: grey colored strongly silicified andesite with 5% pyrite dissemination. very rare minute chalcocite spots are still visible in the section.

113.30-114.50m: dark grey colored weakly argillized andesite with 10% pyrite in dissemination and in 1-5mm wide veinlets. 3-sheared fractures filled with pyrite which stand at 10 degrees to the core axis observed in the section.

114.50-133.00m: grey colored strongly silicified andesite with 5 to 10% pyrite in dissemination and in 5-10mm wide veinlets. Minor chalcocite specks are visible throughout the section.
Pyrite filling dendritic fractures can be seen at 118.0-121.0m.

133.00-150.60m: grey colored strongly silicified andesite with 15-18% pyrite in dissemination and in less than 1mm wide veinlets. Minor chalcocite specks observed throughout the section.
At 147.80-148.80m; two chalcopyrite specks observed. At 148.40 to 148.50m there is a coarser grained 20mm wide pyrite vein cutting much finer grained pyrite bearing quartz vein(black vein).

150.60-155.80m: dark grey colored weakly argillized andesite with 15% pyrite dissemination. very minor chalcopyrite specks occur sporadically.

155.80-157.50m: grey colored clay zone with 5% pyrite dissemination. No solid rock recovered from the section.

157.50-158.50m: grey colored moderately argillized andesite with 7% pyrite dissemination.

158.50-160.55m: grey colored clay zone with 5% pyrite dissemination, no solid rock contained in the section.

160.55-161.70m: dark grey colored moderately argillized andesite with 10% pyrite dissemination.

161.70-162.90m: dark grey colored moderately silicified andesite with 10% pyrite dissemination. Very rare minute chalcocite specks observed.

162.90-167.05m: dark grey colored weakly argillized andesite with 10% pyrite dissemination. Chalcopyrite speck observed at 163.50m.

167.05-170.05m: dark grey colored moderately argillized andesite with 8% pyrite dissemination.

170.05-176.45m: grey colored strongly argillized andesite with 5% pyrite dissemination.

176.45-177.30m: greenish grey colored moderately argillized, chloritized feldspar porphyry with 7% pyrite dissemination.

173.30-185.15m: grey colored strongly argillized andesite with 5% pyrite dissemination. 5 to 10mm sized strongly silicified rock fragments seen in the clayey matrix.

185.15-185.40m: only sludge recovered, the grain in the sludge consisted of quartz.

185.40-198.90m: grey colored strongly argillized andesite with 2% pyrite.
At 189.60-193.10m, and 198.10-198.90m there occur minor very fine spotty chalcocite.

198.90-202.00m: dark bluish green colored chloritized andesite with 3% pyrite in dissemination/veinlets and 15% magnetite in patchy concentration.

202.00-203.60m: light greenish grey colored chloritized, argillized andesite with 2% pyrite dissemination. No magnetite in the section.

203.60-215.50m: dark bluish green colored chloritized,weakly argillized andesite with 3% pyrite in dissemination and in 0.5mm wide veinlets. Average magnetite content is 15% in patchy concentration and/or in veinlets. At 210.80m there is 6cm core length wide network white quartz veinlets zone.

215.50-216.60m: grey colored argillized andesite with 3% pyrite in dissemination. No magnetite in the section.

216.60-227.40m: dark greenish grey colored weakly silicified andesite with 3% pyrite in dissemination and 15% magnetite in dissemination and in patchy concentration. Rare and minute chalcopyrite specks occur in the section.

227.40-237.70m: light greenish grey colored weakly argillized andesite with 5% pyrite in dissemination and in veinlets. No magnetite in the section. At 235.10-235.40m; very strongly argillized zone with 5% pyrite in dissemination.

237.70-238.70m: Strongly sheared, dark grey colored clayey zone containing 5-10mm diameter sub-angular breccia.
10% disseminated pyrite seen in the clay.

238.70-243.68m: light green colored strongly silicified hornblende feldspar porphyry with 1% pyrite dissemination. Magnetite replacing hornblende phenocrysts with chlorite is ubiquitous.

243.68-244.00m: strongly sheared zone similar to the above(237.7-238.7m) with 20% in dissemination.

244.00-266.45m: greenish grey colored chloritized, argillized andesite with 3 to 5% pyrite in dissemination and in veinlets. no magnetite in the section.

3 to 12mm wide white quartz veinlets are seen at; 246.72m, 246.85m, 248.05m, 249.10m, 252.0m, 253.2m, 256.8m, and 266.1m.

252.45-252.90m; strongly argillized, possibly sheared zone with 7% pyrite dissemination.

266.45-282.30m: greenish grey colored moderately silicified porphyritic andesite with 1% pyrite dissemination and 10% magnetite. Minute specks of chalcopyrite seen rather abundantly at; 277.75-278.30m. minor amount of chalcopyrite can be observed throughout the section together with minor chalcocite(?) specks. Up to 0.5mm wide quartz veinlet occurs in every 5cm core length. At 278.40m there is 8mm wide quartz vein containing pinkish red colored mineral.

282.30-284.05m: dark greenish grey colored moderately silicified fine grained andesite with 1% pyrite in dissemination and 10% magnetite in dissemination/ patchy concentration. Very minor chalcocite(?) seen throughout the section.

0.5 to 3mm wide white quartz vein can be seen in every 5cm of core length.

284.05-290.35m: greenish grey colored weakly silicified porphyritic andesite with 1% pyrite in dissemination, and 10% magnetite. Very fine grained minor chalcopyrite(?) occurs in the section.

290.35-294.85m: greenish grey colored chloritized, argillized andesite with 5% pyrite in dissemination. no magnetite in the section. Minute and minor chalcocite specks at 293.05m.

quartz veins are seen at; 292.5m(2mm wide,contains lone minute chalcopyrite),292.75m(12mm wide), 293.0m(10mm wide), and 294.6m(7mm wide).

294.85-300.91m(End of the Hole): greenish grey colored moderately silicified porphyritic andesite with 5% pyrite and 5% magnetite in dissemination. Rare and minute chalcocite and chalcopyrite specks seen in the section. Quartz veins associating epidote concentration at the periphery of the veins are seen at; 297.2m(12mm wide), 297.25m(10mm wide), and 299.35m(10mm wide).

b) Analytical Results of the Core Samples

Sample MD-5-12(38.8-39.6m), heavily hematite stained silicified andesite shows the highest gold value of 0.54g/t. Similar to the case in MJPP-4, most samples contain more than 0.02g/t Au, only 13 out of 87 samples show less than 0.02g/t Au. The highest silver value obtained is 2.1g/t Ag(MD-5-33), and 82% of the samples show more than 0.2g/t Ag.

59% of the samples show more than 0.10% copper values, the highest being 0.83% in the sample MD-5-33, which shows the highest silver, and arsenic values too. Judging from the higher contents in arsenic at 87 to 148.8m section, the principal copper mineral there is considered to be energite-luzonite.

The section from 189 to 227m contains 0.3 to 0.4% copper without much visible chalcopyrite, the mineral must be minute grained chalcocite. The section between 277.75 and 278.30m contains very fine grained chalcocite together with

Table II-2-3-6 DDH MJPP-5 Sample List, Madarag Area

Sample No.	Description of Sample	Interval: From	To	Width (m)	Au g/t	Ag g/t	As %	Sb %	Cu %	Pb %	Zn %	Fe %	Mo %
MD-5-1	str silcf ad w/10% hm & 2% py	18.05	18.65	0.60	0.05	1.1	0.001	<0.001	0.006	0.001	<0.001	3.20	<0.001
MD-5-2	silcf ad w/ 15% hm	18.65	20.00	1.35	0.03	1.0	0.002	<0.001	0.049	0.005	0.002	4.30	0.001
MD-5-3	wk silcf ad w/ 2%py	20.00	20.85	0.85	<0.02	0.6	0.003	<0.001	0.011	<0.001	<0.001	4.90	<0.001
MD-5-4	silcf ad w/ 7%py,rare cp spot	21.83	23.20	1.37	0.06	2.0	<0.001	<0.001	0.250	0.001	0.001	3.70	0.002
MD-5-5	qtz vlts bg silcf ad w/ 5% hm	24.50	25.07	0.57	0.03	0.3	0.002	<0.001	0.006	0.001	<0.001	3.80	0.001
MD-5-6	slcf ad w/ specul hm(5%)	25.07	25.70	0.63	0.05	1.7	0.001	<0.001	0.012	0.001	<0.001	0.60	0.001
MD-5-7	slcf porous ad w/ 25% hm	26.90	27.75	0.85	0.10	0.5	0.001	<0.001	0.049	0.001	<0.001	4.90	0.002
MD-5-8	ditto,w/ py vlts	27.75	28.55	0.80	0.08	1.8	0.005	<0.001	0.058	0.001	<0.001	2.15	0.004
MD-5-9	porous ad w/ bk py y 10% hm	29.80	30.90	1.10	0.05	0.3	0.002	<0.001	0.036	0.001	<0.001	0.90	0.001
MD-5-10	ditto,w/ 5% py y 10% hm	30.90	31.42	0.52	0.02	0.2	0.001	<0.001	0.006	0.001	<0.001	0.90	0.001
MD-5-11	ditto,brecciated ad w/7% py	34.20	35.40	1.20	0.05	0.2	0.003	<0.001	0.130	0.001	<0.001	4.20	0.002
MD-5-12	porous slcf ad w/ spec hm(20%)	38.80	39.60	0.80	0.54	0.8	0.010	<0.001	0.335	0.005	<0.001	3.95	0.002
MD-5-13	ditto,w/ minor py	40.70	41.70	1.00	0.05	1.8	0.003	<0.001	0.055	0.002	<0.001	6.10	0.002
MD-5-14	str slcf ad w/ 10%py,v rare cp	42.35	43.05	0.70	0.05	0.4	0.003	<0.001	0.183	0.001	0.001	3.70	0.007
MD-5-15	ditto, w/ v minor cp	44.50	46.25	1.75	0.04	<0.2	0.001	<0.001	0.216	<0.001	0.001	3.20	0.003
MD-5-16	ditto,w/ 8% py	49.10	50.10	1.00	0.03	0.6	0.004	<0.001	0.162	0.001	0.001	3.30	0.002
MD-5-17	anhydrite spots bg,8%py bg	51.10	52.00	0.90	0.04	0.5	0.003	<0.001	0.164	0.001	0.001	3.60	0.005
MD-5-18	1cm wide qtz v(2) bg str silcf	52.65	53.90	1.05	0.04	0.5	0.009	<0.001	0.082	0.003	0.001	3.70	0.001
MD-5-19	arg ad w/ minor cp	56.10	57.10	1.00	0.02	0.2	0.002	<0.001	0.064	0.001	0.001	3.85	0.004
MD-5-20	str silcf ad w/ 7%py rare cp?	58.75	59.20	0.45	<0.02	0.2	0.003	<0.001	0.021	0.001	0.001	2.35	0.002
MD-5-21	str slcf porous ad w/ 8% py	62.55	63.8	1.25	0.02	0.3	<0.001	<0.001	0.076	0.001	<0.001	3.40	<0.001
MD-5-22	ditto,w/ v minor cp?	65.00	66.00	1.00	0.03	0.2	0.004	<0.001	0.058	0.004	0.001	2.30	0.001
MD-5-23	ditto,fn ad w/ 8% py rare cp?	67.00	67.85	0.85	0.04	1.0	<0.001	<0.001	0.140	0.003	<0.001	2.10	0.001
MD-5-24	ditto,w/ 10% py & rare cp	78.25	79.45	1.20	0.03	0.6	<0.001	<0.001	0.156	<0.001	<0.001	3.70	0.001
MD-5-25	ditto,10% py w/ bo,cc?	79.45	80.65	1.20	0.03	0.7	<0.001	<0.001	0.156	0.001	<0.001	3.30	0.007
MD-5-26	ditto,7% py,rare cc bo,cup?	80.65	81.95	1.30	0.03	0.7	<0.001	<0.001	0.175	0.002	<0.001	3.40	0.003
MD-5-27	ditto,7%py,rare bo cup & cp	81.95	83.05	1.10	0.03	0.4	<0.001	<0.001	0.108	0.002	<0.001	3.00	<0.001
MD-5-28	ditto,w/ 10% py,rare cc,bo	85.45	86.65	1.20	0.03	0.3	0.003	<0.001	0.046	0.003	<0.001	3.60	0.001
MD-5-29	ditto porous ad w/ 7% py	86.65	87.85	1.20	0.07	1.1	0.009	<0.001	0.165	<0.001	<0.001	4.30	0.001
MD-5-30	ditto,w/ 5% py, rare cc?	87.65	89.05	1.20	0.05	1.7	0.007	<0.001	0.186	0.003	0.002	4.40	<0.001
MD-5-31	ditto	89.05	90.05	1.00	<0.02	0.6	0.002	<0.001	0.079	0.002	0.001	4.60	<0.001
MD-5-32	ditto,porous ad w/ 5% py & cc	91.45	92.60	1.15	0.05	2.1	0.290	0.001	0.839	0.002	0.003	3.50	0.001
MD-5-33	ditto w/ 7% py & rare cc	97.70	98.80	1.10	0.02	0.6	0.010	<0.001	0.093	<0.001	<0.001	3.10	<0.001
MD-5-34	ditto w/ 5% py,rare cc?	99.90	100.60	0.70	<0.02	0.3	0.006	<0.001	0.075	0.002	0.002	3.30	0.001
MD-5-35	ditto,w/ 7% py & rare cc	100.60	101.60	1.00	0.06	0.5	0.003	<0.001	0.100	0.003	0.001	3.40	0.001
MD-5-36	ditto, w/5% py & rare cc?	105.00	106.10	1.10	0.07	0.6	0.019	<0.001	0.118	0.005	0.002	3.50	0.004
MD-5-37	ditto,w/ 5% py & v rare cc	110.90	112.10	1.20	0.04	<0.2	0.036	<0.001	0.102	<0.001	<0.001	3.80	0.001
MD-5-38	ditto,w/ 7% py	115.70	116.90	1.20	<0.02	<0.2	0.033	<0.001	0.086	0.001	0.002	3.60	0.001
MD-5-39	str slcf ad w/ 10% py	118.05	119.30	1.25	0.03	0.5	0.049	<0.001	0.130	0.005	0.002	4.50	0.002
MD-5-40	ditto,w/ fn grnd 5% py	125.55	126.95	1.40	<0.02	0.3	0.030	<0.001	0.074	<0.001	0.002	3.80	0.004
MD-5-41	ditto	126.95	128.15	1.20	0.02	<0.2	0.043	<0.001	0.125	<0.001	0.003	3.50	0.004
MD-5-42	ditto,w/10% py,rare cc specks?	129.05	129.80	0.75	<0.02	<0.2	0.041	<0.001	0.115	<0.001	0.002	3.70	0.007
MD-5-43	ditto,w/ 15% py imp	133.45	134.40	0.95	<0.02	0.2	0.007	<0.001	0.194	0.001	0.002	3.00	0.002
MD-5-44	ditto, rare cc?	139.75	140.55	0.80	0.03	<0.2	0.031	<0.001	0.092	<0.001	0.002	3.40	0.011
MD-5-45	ditto,w/ 18% py	145.00	145.95	0.95	0.04	<0.2	0.035	<0.001	0.100	<0.001	0.003	4.20	0.007
MD-5-46	ditto,w/ 15% py,rare cc?	147.80	148.80	1.00	0.06	<0.2	0.042	<0.001	0.102	0.003	0.005	5.70	0.011
MD-5-47	ditto	150.60	151.55	0.95	0.07	0.3	0.003	<0.001	0.097	0.001	0.185	3.[illegible]	0.002
MD-5-48	wk arg ad w 15% py imp,rare cp	153.20	154.60	1.40	0.05	<0.2	0.002	<0.001	0.097	<0.001	0.022	3.50	0.005
MD-5-49	clay w/ 5% py	155.80	157.50	1.70	0.04	0.4	<0.001	<0.001	0.244	0.003	0.019	3.50	<0.001
MD-5-50	slcf ad w/ 10% py,rare cc?	161.70	162.90	1.20	0.08	<0.2	0.007	<0.001	0.035	<0.001	0.001	2.60	0.008
MD-5-51	wk arg ad w/ 10%py,v rare cp	162.90	163.80	0.90	0.18	0.3	0.030	<0.001	0.106	<0.001	0.002	4.80	0.017
MD-5-52	wk arg ad w/ 10% py imp	166.20	167.05	0.85	0.03	<0.2	0.008	<0.001	0.076	<0.001	0.020	3.40	0.003
MD-5-53	str arg clayey w/5% py	171.25	172.45	1.20	0.04	0.3	0.002	<0.001	0.244	0.001	0.019	3.70	0.002
MD-5-54	chloritized F-porphyry,7% py	176.45	177.30	0.85	0.02	1.5	<0.001	<0.001	0.292	<0.001	0.018	4.70	<0.001
MD-5-55	str.arg ad w/ 2% py,rare cc	189.60	191.60	[illegible].00	0.05	0.4	<0.001	<0.001	0.398	0.004	0.007	4.00	0.001
MD-5-56	ditto	191.60	193.10	1.50	0.04	0.4	<0.001	<0.001	0.326	0.003	0.011	4.00	<0.001
MD-5-57	ditto	198.10	198.90	0.80	0.04	0.5	<0.001	<0.001	0.382	0.004	0.012	3.70	<0.001
MD-5-58	wk arg,chl,w/ 3% py & 15% mt	198.90	200.70	1.80	0.04	0.8	<0.001	<0.001	0.365	<0.001	<0.001	4.50	<0.001
MD-5-59	ditto,w/ 10% py & 3% py	200.70	201.90	1.20	0.05	0.5	<0.001	<0.001	0.394	<0.001	0.009	4.20	<0.001
MD-5-60	ditto,w/ 2% py,no mt	202.85	203.75	0.90	0.05	0.6	<0.001	<0.001	0.470	<0.001	0.009	4.00	<0.001
MD-5-61	wk slcf ad w/ 3% py & 15% mt	204.15	205.35	1.20	0.06	0.9	<0.001	<0.001	0.427	<0.001	0.007	4.40	<0.001
MD-5-62	ditto,w/ 20% mt	205.35	206.55	1.20	0.06	1.0	<0.001	<0.001	0.422	<0.001	0.008	4.90	<0.001
MD-5-63	wk arg,chlzd,3% py & 15% mt	209.60	210.37	0.77	0.04	0.9	<0.001	<0.001	0.430	<0.001	0.008	4.10	<0.001
MD-5-64	ditto,w/ qtz v	210.[illegible]	211.75	0.[illegible]	0.03	0.4	<0.001	<0.001	0.287	<0.001	0.011	4.[illegible]	<0.001
MD-5-65	slcf ad w/ 3% py & 15% mt	218.[illegible]	219.28	0.[illegible]	<0.02	0.5	<0.001	<0.001	0.333	<0.001	0.020	4.70	<0.001
MD-5-66	3%py & 15% mt,rare cp	221.95	223.00	1.05	0.03	0.5	<0.001	<0.001	0.320	<0.001	0.015	4.70	<0.001
MD-5-67	ditto	226.15	227.40	1.25	0.04	0.5	<0.001	<0.001	0.362	<0.001	0.013	4.00	<0.001
MD-5-68	chl arg ad w/ 5% py,no mt	227.40	228.60	1.20	0.04	0.5	<0.001	<0.001	0.277	<0.001	0.022	4.20	<0.001
MD-5-69	ditto	235.80	237.00	1.20	0.07	0.9	<0.001	<0.001	0.355	0.004	0.013	4.40	<0.001
MD-5-70	ab-flspar porph w/ 15% mt	239.05	240.25	1.20	<0.02	<0.2	<0.001	<0.001	0.006	0.004	0.009	1.90	<0.001
MD-5-71	wk chl/arg ad w/ 5% py,no mt	250.15	251.30	1.15	0.04	<0.2	<0.001	<0.001	0.177	<0.001	0.004	3.40	<0.001
MD-5-72	ditto w/ 3% py	255.00	255.78	0.78	<0.02	<0.2	<0.001	<0.001	0.034	<0.001	0.015	3.30	<0.001
MD-5-73	slcf/arg w/ 2% py	265.75	266.95	1.20	<0.02	0.3	0.001	<0.001	0.048	0.002	0.013	3.60	<0.001
MD-5-74	slcf porph ad w/ 1%py/epidote	266.95	268.05	1.10	<0.02	0.4	<0.001	<0.001	0.065	0.008	0.025	3.40	<0.001
MD-5-75	ditto,w/ 2% py,10% mt	274.05	275.25	1.20	0.02	0.2	<0.001	<0.001	0.051	<0.001	0.011	3.40	<0.001
MD-5-76	ditto,w/ fn cp,15%mt	278.20	279.05	0.85	0.09	0.6	<0.001	<0.001	0.295	0.001	0.018	3.90	<0.001
MD-5-77	slcf fn ad w 10%mt,rare cc	282.30	283.40	1.10	0.03	0.2	<0.001	<0.001	0.094	<0.001	0.013	3.50	<0.001
MD-5-78	ditto	283.40	284.05	0.65	0.04	0.4	<0.001	<0.001	0.106	0.001	0.012	3.40	<0.001
MD-5-79	porph ad w 1%,10%mt,rare cc	284.75	285.90	1.15	0.03	<0.2	<0.001	<0.001	0.065	<0.001	0.009	3.40	<0.001
MD-5-80	ditto,5% py,no mt,rare cc & cp	292.40	293.75	1.35	0.03	0.8	<0.001	<0.001	0.122	0.004	0.013	3.40	<0.001
MD-5-81	por ad w/5%py & mt,rare cc,cp	296.85	297.70	0.85	0.03	0.5	<0.001	<0.001	0.082	0.006	0.013	3.50	<0.001
MD-5-82	ditto	298.01	299.24	1.23	0.09	0.4	<0.001	<0.001	0.175	0.002	0.011	3.30	<0.001
MD-5-83	ditto	299.95	300.91	0.96	0.08	0.4	<0.001	<0.001	0.155	<0.001	0.010	3.20	<0.001
MD-5-84	15%mt,3%py,cp at the end 40cm	277.05	278.20	1.15	0.11	0.7	<0.001	<0.001	0.310	<0.001	0.012	4.60	<0.001
MD-5-85	slcf por ad 10%mt,rare cp	279.05	280.10	1.05	0.03	<0.2	<0.001	<0.001	0.082	<0.001	0.011	3.60	<0.001
MD-5-86	ditto	280.10	281.15	1.05	0.05	0.2	<0.001	<0.001	0.152	<0.001	0.014	3.70	<0.001
MD-5-87	ditto,w/ rarer cp	281.15	282.30	1.15	0.03	0.2	<0.001	<0.001	0.085	<0.001	0.013	3.70	<0.001

chalcopyrite.

Molybdenum contents are insignificant; 140-163m section contain more than 0.01% Mo, highest being 0.017%.

c) Principal Component Analysis On Analytical Values of Drill Core Samples in Madarag

PCA based on the Correlation Matrix was performed to uncover the inter-relation among the elements and to reveal the characteristics of the alteration and mineralization in the area.

The majority of antimony values were under the detection limit of 0.2ppm, and they were excluded from the analysis. The dataset consists of 116 analytical values of Au, Ag, As, Fe, Cu, Pb, Zn, Fe, Hg, Mo, and Se.

Table II-2-3-7 Statistic Parameters, DDH Core Samples, Madarag

COMP. NAME	UNIT	NUM. DATA	MAXIMUM	MINIMUM	MEAN (M)	STD. DEV. (SD)	M-2*SD	M-SD	M+SD	M+2*SD
AU	ppb	114	919	7	35.3	0.311 *	8.4	17.3	72.3	147.9
AG	ppm	92	2.1	0.2	0.50	0.259 *	0.15	0.27	0.91	1.65
AS	ppm	112	2300	1	12.6	0.817 *	0.3	1.9	82.5	541.0
FE	%	116	8.10	0.60	3.761	0.991	1.778	2.770	4.753	5.744
CU	ppm	116	8300	28	997.0	0.460 *	119.6	345.3	2878.2	8309.4
MN	ppm	105	1600	5	91.1	0.929 *	1.3	10.7	773.1	6563.7
HG	ppb	116	600	10	23.7	0.354 *	4.6	10.5	53.5	120.9
MO	ppm	116	173	1	8.4	0.479 *	0.9	2.8	25.2	76.0
PB	ppm	104	150	1	11.1	0.428 *	1.5	4.2	29.8	79.8
SB	ppm	44	15.50	0.20	0.550	0.492 *	0.057	0.177	1.708	5.304
SE	ppm	109	56.00	0.40	2.297	0.422 *	0.329	0.869	6.067	16.028
ZN	ppm	115	1850	1	30.8	0.748 *	1.0	5.5	172.1	963.2

* OF STD. DEV. IS SHOWN IN LOGARITHMIC SCALE

a) CORRELATION

Zn-Mn(0.77), Mo-Se(0.61), Se-As(0.60), As-Mo(0.57), and As-Hg(0.49) show relatively strong positive correlation while Se-Mn(-0.73), Mn-As(-0.67), Se-Zn(-0.55), Mn-Hg(-0.53), and Mn-Mo(-0.53) correlate negatively.

Table II-2-3-8 Correlation Matrix, DDH Core Samples, Madarag

	AU	AG	AS	FE	CU	MN	HG	MO	PB	SE	ZN
AU	---	92	110	114	114	103	114	114	102	109	113
AG	0.366	---	88	92	92	88	92	92	83	90	91
AS	0.136	0.163	---	112	112	101	112	112	100	105	111
FE	0.271	0.150	0.039	---	116	105	116	116	104	109	115
CU	0.129	0.197	-0.019	0.232	---	105	116	116	104	109	115
MN	-0.218	-0.209	-0.673	0.144	0.173	---	105	105	94	98	104
HG	0.021	0.033	0.494	-0.015	0.067	-0.534	---	116	104	109	115
MO	0.281	0.053	0.571	0.149	0.069	-0.533	0.380	---	104	109	115
PB	0.085	-0.142	0.186	0.037	-0.007	-0.223	0.213	-0.003	---	98	103
SE	0.405	0.375	0.603	-0.026	-0.083	-0.726	0.401	0.613	0.134	---	108
ZN	-0.178	-0.209	-0.402	0.166	0.298	0.765	-0.056	-0.296	-0.045	-0.549	---

*NOTE ; VARIANCES AND COVARIANCES ARE DIVIDED BY N-1
NUM. OF DATA IS WRITTEN IN RIGHT-UPPER PART
CORR. COEF. IS WRITTEN IN LEFT-BOTTOM PART

Table II-2-3-9 PCA, DDH Core Samples, Madarag, 1992

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		AU	AG	AS	FE	CU	MN	HG	MO	PB	SE	ZN
P 1	3.848	0.350	0.350	EIGENVECTOR	-.203	-.181	-.403	-.002	.043	.464	-.287	-.360	-.125	-.448	.343
				FACTOR LOADING	-.398	-.355	-.791	-.004	.084	.910	-.563	-.707	-.246	-.878	.673
				CONTRIBUTION	.158	.126	.626	.000	.007	.829	.317	.500	.061	.771	.453
P 2	1.711	0.156	0.505	EIGENVECTOR	.428	.374	-.027	.534	.518	.186	-.017	.105	.066	.033	.268
				FACTOR LOADING	.560	.489	-.036	.698	.677	.244	-.023	.137	.086	.044	.350
				CONTRIBUTION	.313	.239	.001	.488	.458	.059	.001	.019	.007	.002	.123
P 3	1.273	0.116	0.621	EIGENVECTOR	-.358	-.401	.245	.069	.270	.016	.564	.218	.148	-.115	.415
				FACTOR LOADING	-.404	-.453	.277	.078	.305	.018	.636	.246	.167	-.130	.468
				CONTRIBUTION	.163	.205	.076	.006	.093	.000	.405	.061	.028	.017	.219
P 4	1.066	0.097	0.718	EIGENVECTOR	-.062	.305	-.041	-.158	-.024	-.054	.128	-.412	.825	-.065	.041
				FACTOR LOADING	-.064	.315	-.043	-.163	-.025	-.056	.132	-.426	.852	-.067	.043
				CONTRIBUTION	.004	.099	.002	.027	.001	.003	.017	.181	.726	.004	.002
P 5	0.834	0.076	0.794	EIGENVECTOR	-.187	.395	-.018	-.592	.558	-.040	.121	-.120	-.334	.071	.004
				FACTOR LOADING	-.171	.360	-.016	-.541	.509	-.037	.111	-.109	-.305	.065	.004
				CONTRIBUTION	.029	.130	.000	.292	.260	.001	.012	.012	.093	.004	.000
P 6	0.620	0.056	0.850	EIGENVECTOR	.657	-.327	-.267	-.498	-.021	.074	.113	.148	.119	.131	.266
				FACTOR LOADING	.517	-.257	-.210	-.392	-.017	.058	.089	.117	.094	.103	.209
				CONTRIBUTION	.267	.066	.044	.154	.000	.003	.008	.014	.009	.011	.044
P 7	0.559	0.051	0.901	EIGENVECTOR	-.060	-.379	.072	-.088	.526	-.087	-.525	.217	.330	-.111	-.334
				FACTOR LOADING	-.045	-.283	.054	-.066	.393	-.065	-.393	.162	.246	-.083	-.250
				CONTRIBUTION	.002	.080	.003	.004	.154	.004	.154	.026	.061	.007	.062
P 8	0.446	0.041	0.941	EIGENVECTOR	-.225	.268	.285	-.219	-.227	.333	-.402	.435	.150	.231	.397
				FACTOR LOADING	-.150	.179	.191	-.146	-.152	.223	-.269	.291	.100	.154	.265
				CONTRIBUTION	.023	.032	.036	.021	.023	.050	.072	.084	.010	.024	.070
P 9	0.345	0.031	0.973	EIGENVECTOR	.321	-.110	.780	-.100	-.004	.062	-.120	-.423	-.126	-.211	.099
				FACTOR LOADING	.189	-.064	.458	-.059	-.002	.037	-.070	-.248	-.074	-.124	.058
				CONTRIBUTION	.036	.004	.210	.003	.000	.001	.005	.062	.005	.015	.003
P10	0.223	0.020	0.993	EIGENVECTOR	-.138	-.289	-.018	.135	.129	.111	-.100	-.430	-.009	.804	.090
				FACTOR LOADING	-.065	-.136	-.009	.064	.061	.053	-.047	-.203	-.004	.380	.043
				CONTRIBUTION	.004	.019	.000	.004	.004	.003	.002	.041	.000	.144	.002
P11	0.076	0.007	1.000	EIGENVECTOR	.033	-.009	.090	-.050	.013	.778	.306	.070	.069	.039	-.528
				FACTOR LOADING	.009	-.002	.025	-.014	.003	.214	.084	.019	.019	.011	-.146
				CONTRIBUTION	.000	.000	.001	.000	.000	.046	.007	.000	.000	.000	.021

b) PCA

1st Principal Component

The component involves 35% of the total variance in the dataset. Mn(83%) and Zn(45%) show large positive contribution while Se(-77%), As(-63%), and Mo(-50%) contribute negatively. Au(-16%), and Ag(-13%) show small contribution although they have much bigger contribution in the 2nd principal component. The component indicates the concentration of manganese and zinc against the depletion of selenium, arsenic and molybdenum associating minor gold and silver.

2nd Principal Component

The component has a contribution of 16%. Fe(49%), Cu(46%), Au(31%), and Ag(24%) show large contribution. The component most likely indicates the sulphide copper mineralization encountered in the drill core associated with pyrite and magnetite, which accompanies some gold and silver.

3rd Principal Component

The component indicates the concentration of mercury(41%).

4th Principal Component

Pb(73%) has very large contribution here not showing any major contribution in the preceding component. This could be predicted from the poor correlation of lead to other elements. Such an independent behaviour of lead differs completely from that of the trench samples in the same area. The cumulative contribution to the 4th principal component reaches 72%.

In 5th principal component, iron and copper show contradictly behaviour, the meaning of which can not readily be explained.

The 6th component shows fairly large contribution of gold(27%), and negative contribution of iron(-15%). This may suggests the concentration of gold at shallower depth where the weathering and leaching play significant role on the original accumulation.

2-4 DISCUSSION

The trenching excavated on the gold anomaly depicted by the geochemical survey executed in 1991 confirmed the existence of anomalous gold concentration. The argillized, andesitic rock in the trench contained significant amount of hematite. Silicification in general is not very strong. Silicified spherical coating on the outcrop and sub-outcrop are rather ubiquitous. These are considered to be the product of re-deposition of subsurface materials through the weathering and leaching processes.

The geochemical survey in 1991 revealed that the mean values of gold, lead, copper, molybdenum and silver are much higher than those of Mt. Upao Area, but the highest gold value obtained in Madarag Area was much lower than that in Mt. Upao.

The drilling here however disclosed stronger gold concentration in the depth. Also, an occurrence of sub-economic copper mineralization was found by the drilling.

The PCA on the trench materials revealed a strong intimacy of gold with arsenic, selenium, copper, iron and zinc in the 1st principal component while in the 2nd principal component, similar amount of variance in gold values were found to be associated with antimony contradicting with the concentration of lead. The former is a similar behaviour of gold found also in Mt. Upao indicating a concentration of the said elements in the processes of weathering and leaching. The latter is quite different from that in Mt. Upao area where gold shows strong association with lead.

On the other hand, the PCA on the core samples revealed that gold is concentrated with iron and copper in the 2nd principal component; this implys the existence of gold with copper mineralization discovered in the drill holes. Since the contribution of gold in the 2nd component is much larger than that in the 1st, this may suggest that the original and principal gold mineralization in the area is related to the copper rather than selenium and/or arsenic.

Chapter 3 Nipa Area

3-1 SURVEY METHOD

3-1-1 Drilling

One vertical drill, MJPP-6 was drill using a Stratadrill. The location of the drill was shown in Fig.I-4-3 together with that of the geochemical survey executed in 1992. Fracturing, and argillization of the rock in the hole were very intense hence the progress of the drilling was very slow and many drill bits were consumed. The details on drill operation was attached in the appendix.

3-1-2 Geochemical Survey

Moderate molybdenum and copper anomaly near the Puntales village, and the gold anomaly found at the southern portion of Mount Apiton were needed to be covered by more detailed geochemical surveys utilizing systematic sampling on cut lines. Accordingly, further detailed geochimical surveys were executed in both the sub-areas. Hereafter, the former will be referred as Puntales area, and the latter as Apiton area for the convenience for the description.

3-2 GEOLOGY

The higher portion of the Mount Apiton is covered by heavily hematite stained volcanics formerly designated as "Odiongan Volcanics". The lower terrains are covered by the andesitic volcanics of Sibala Formation.

The "Odiongan" was found by the drillings in Mt. Upao and Madarag Areas to be a variety of highly hematitized Sibala Formation, changing to intesely pyritized andesite in the depths. This obviously will apply to the "Odiongan" in the area. The area covered by the geochemical survey in Apiton Area has extensive distribution of "Odiongan" while that in Puntales Area is covered by andesitic rocks of ordinary Sibala Formation.

Occurrences of minor vein type copper-gold veins have been known prior to the World War II, but the geochemical survey executed in 1991 confirmed the smallish nature of the mineralization.

3-3 RESULTS

3-3-1 Drilling, MJPP-6 Hole

a) Geology

To 7.30m: Intensely weathered, argillized milky white colored dacitic rock. The original rock may be andesite. Hematite and limonite fills in the cracks.

7.30-17.60m: Phenocryst like quartz bearing, quartz porphyritic rock. This also be a strongly silicified, and argillized variety of andesite.

17.60-22.20m: Only clayey material containg quartz grains recovered; looks like quartz porphyry but the above mentioned may apply here.

22.20-41.80m: No core recovered, only clayey sludge recovered.

41.80-61.70m: Intensely fractured propylitic andesite with minor pyrite dissemination. Mafics are completely chloritized and plagioclase are argillized. FRom 52m on, some magnetite recognized.

61.70-106.07m: Strongly silicified porphyrite with 3x7mm hornblende(completely altered to chlorite) and 3x8mm plagioclase phenocrysts. The rock could be the coarse grained porphyritic andesite frequently observed in the Sibala Formation. 3% pyrite dissemination is ubiquitous.

85.2-87.6m: Clay zone, includes rock chips of propylite.

92.25-94.80m: strongly silicified fine grained tuffaceous andesite.

106.07-305.10m(Bottom of the Hole): Altered andesite of various degrees.

113-142m: strongly silicified and contains drusey quartz veinlets.

126.5-131.8m, and 188.2-194.1m: Badly fractured, strongly silicified andesite with abundant magnetite.

182.2-194.1m, 286.45-305.10m: strongly silicified fine grained andesite.

From 188m on, irregular anhydrite veinlets with 0.5-5mm

widths occur frequently hence rock tends to be brittle, and crumble easily.
207.8-208.6m, and 214.2-215.1m: Quartz lens srrounded by anhydrite.
The details are as follow.

0-6.30m: Milky white strongly weathered & argillized dacite. Intense limonite and hematite impregnation along cracks showing black and/or red color. Badly fractured core to 6.30m.
6.30-7.30m: milky white, moderately argillized(kaolinite) dacite.
7.30-8.60m: light grey colored weakly silicified propylite, contains up to 3% pyrite. Minute drusy quartz vein around 8.40m.
8.60-17.60m: light grey colored intensely argillized quartz porphyry. Quartz phenos(1mm) visible in slimy core together with 3% pyrite dissemination. 11.55m: max 1mm qtz-v.
16.74-17.60m: drusy qtz-v(max 1mm).
17.60-19.95m: white to milky white colored strongly argillized quartz porphyry.
contains 1mm qtz pheno and 3% pyrite.
19.95-22.20m: white, strongly argillized quartz porphyry.
22.20-28.70m: strongly argillized grey colored clayey zone, containing 2-3% pyrite.
28.70-32.60m: milky white colored strongly argillized zone.
32.60-38.60m: light brownish colored strongly argillized zone.
38.60-41.80m: white to milky white colored strongly argillized zone.
22.20m to 41.80m probably represents strongly argillized quartz porphyry.
41.80-44.70m: grey colored, weakly silicified and argillized propylite. Chlorite replacing hornblende. Irregular cracks, joints developed, along them filmy thin qtz veinlets developed together with 1% pyrite dissemination throughout the rock. 0.5mm diameter pores after plagioclase phenos ubiquitous.
44.70-47.70m: no core, only sludge recovered. 1mm qtz grains and 2.5% pyrite visible in the slime.
47.70-61.70m: dark green colored propylite. the core has been fractured badly due to the development of irregular fractures, joints system. Around 0.5% pyrite dissemination throughout the section.
0.5-1.0mm wide qtz-py-veinlets in irregularly shaped druse.
Pyroxene completely replaced by chlorite. Plagioclase phenos replaced by kaolinitic clay. Although the cracks are irregularly oriented, those with 60 degrees to the core axis frequently contain 0.5mm wide quartz veinlets.
56.20-57.25m: 1-2mm drusy quartz veinlets bearing weakly silicified zone. Dark green propylite below 52m is strongly magnetic due to existence of magnetite together with pyrite.
61.70-85.20m: dark grey-green strongly silicified porphyrite with 7x3mm chloritized amphibole and 8x3mm plagioclase phenos with 3% pyrite dissemination. Cracks standing at 30 degrees to core axis predominate and the core badly fractured. Lone minute Mo(?) speck at 70.0m.
5-quartz veins(1-10mm wide) and 1-pyrite veinlet(2mm wide)

occur in the section.
85.20-87.60m: badly fractured clayey zone with porphyrite fragments. The clay contains 2% pyrite.
87.60-92.25m: greenish grey colored porphyrite with 3% pyrite dissemination. Porphyrite contain 3x6mm chloritized amphibole and 4x5mm argillized white plagioclase. Filmy cracks contains pyrite. At 88.50m; 4-10mm wide white drusy quartz vein.
92.25-94.80m: greenish grey strongly silicified fine grained tuffaceous andesite with 2% pyrite.
94.80-106.07m: greenish grey strongly silicified porphyrite with gradually smaller amphibole(2x5mm) and plagioclase(4x5mm) phenocrysts. Pyrite content in the section; less than 2%.
106.07-113.72m: dark greenish grey weakly silicified andesite with 3% pyrite. Occurrences of irregularly shaped magnetite patches increases toward depth,i.e., 6% mt in 106.07-108.0m, 8% mt at 108.0-110.0m, and 10% magnetite at 110.0-113.72m intervals respectively.
113.72-122.35m: greenish grey colored moderately silicified andesite with up to 3mm wide quartz veinlets(7 to 15 vein per one meter) which contain spotty epidote, and 3% pyrite dissemination throughout. Detailed magnetite content are as follows: 113.72-116.0m;15%, 116.0-118.36m;5%, 118.36-119.0m; 15%, and also at 119.30-119.38m is a massive magnetite trending subparallel to the core axis. 119.38-122.35m; contains 5% magnetite.
122.35-123.50m: badly fractured core recovered. 10% magnetite throughout the section.
123.50-126.50m: strongly silicified andesite,contains 5 per meter of core length filmy to 2mm wide white quartz veinlets. also contains 5% pyrite and 8% magnetite.
126.50-131.80m: dark grey colored strongly fractured and silicified brittle andesite with 3% pyrite and 10% magnetite throughout.
131.80-132.57m: strongly silicified andesite.
132.57-133.16m: network of white drusey quartz veinlets. quartz content of the section; 80%. The cracks are filled with chlorite hence show greenish color. Contains 5% pyrite, but no magnetite throughout the section.
133.16-134.44m: dark grey colored strongly silicified andesite with 3% pyrite and 7% magnetite. 7-drusy quartz veinlets in the section.
134.44-137.69m: drusy quartz vein-network(qtz content; 80%) zone in greenish grey strongly silicified andesite with 5% pyrite. No magnetite in the section. Fracture/cracks are filled in with chlorite.
137.69-141.46m: greenish grey moderately silicified andesite with 5% pyrite and same amount of magnetite. Chloritization in the section is particularly significant.
141.46-142.25m: white drusy quartz network zone(50% quartz content) in dark greenish grey andesite with 5% pyrite and magnetite.
142.25-146.50m: greenish grey colored moderately silicified, and strongly chloritized andesite with 5% magnetite and 5% pyrite dissemination.
146.50-147.80m: dark greenish grey colored strongly silicified andesite with numerous hair line cracks which are spaced 5-10mm interval-networks, consequently the rock is very brittle. Also 25% magnetite and 3% pyrite dissemination are

seen throughout the section.

147.80-149.90m: greenish grey colored strongly silicified andesite with 5% pyrite dissemination but no magnetite.

149.90-152.20m: strongly argillized andesite associating modest silicification. The core in the section are badly fractured.

152.20-182.70m: greenish grey colored strongly silicified and argillized porous andesite. There are numerous irregularly oriented cracks and/or fractures, hence the core are brittle and easily be crumbled. 4-5% magnetite and 2% pyrite dissemination throughout. Max. 5mm wide quartz vein occurs every 0.5m of core length.

182.70-188.20m: very fine grained strongly silicified andesite that looks like mudstone. Hair cracks/fractures occur in 25mm-spaced grid/network, hence the core is very brittle and fragile. 5% pyrite and 5% magnetite dissemination throughout the section.

188.20-194.10m: greenish grey colored strongly silicified andesite with 3% pyrite dissemination throughout. Magnetite can be seen only at 192.70m. 0.5-2mm wide anhydride veinlets are ubiquitous hence core are easily crumbled and fractured.

194.10-213.70m: greenish grey colored strongly silicified andesite with 3% pyrite dissemination. Magnetite can be seen only sporadically; at 197.20-197.45m, contains 25% magnetite in spotty aggregations.
Irregular anhydride veinlets(0.5-5mm wide) are ubiquitous and the core are easily be crumbled.
Mafic are chloritized and spotty epidote are seen in the section.
207.80-208.60m; lensoidal strongly silicified fine quartz(10-30mm across) masses are surrounded by anhydride masses which in turn surrounded by strongly chloritized andesite.

213.70-222.25m: greenish grey colored silicified and argillized andesite with 3% pyrite throughout. No magnetite in the section. Anhydride veinlets are ubiquitous(0.5-2mm wide) and core tends to easily crumble. 214.20-215.10m; similar lensoid quartz(10-20mm wide) masses surrounded by anhydride seen in the section 207.8-208.6m exist. Following section contain ca.20% pyrite dissemination; 214.10-214.20m,and 215.40-215.50m.
220.90-222.25m; badly fractured core recovered.

222.25-223.80m: probably represent a fault zone, the contact at 223.80m to strongly silicified andesite below stands at 32 degrees to the core axis. Minute pyrite ubiquitous.

223.80-229.90m: greenish grey colored strongly silicified andesite with 2-3% pyrite dissemination. No magnetite detected. The core in the section also is very brittle and tends to crumble easily.

229.90-234.70m: dark greenish grey colored strongly silicified very fine grained andesite with 5% pyrite. 229.90-231.20m; contains 20% magnetite. Other portion contains only minor and sporadic amount of magnetite.
The core in the section also very brittle and crumbly.

234.70-237.10m: Strongly silicified and chloritized 'quartz porphyry' like rock containing quartz phenocrysts with 1-2% pyrite dissemination and 1-2mm pyrite veinlets. The core in the section also badly fractured.

237.10-242.80m: dark greenish grey colored very fine grained

Table II-3-3-1 DDH MJPP-6 Sample List, Nipa Area

Sample No.	Description of Sample	Interval in m		Width	Assay results								
		From	To	(m)	Au g/t	Ag g/t	As %	Sb %	Cu %	Pb %	Zn %	Fe %	Mo %
ND-6-1	1mm drusy qv bg wk sil prpyl	16.74	17.60	0.86	<0.02	<0.2	<0.001	<0.001	0.017	0.020	0.020	1.90	<0.001
ND-6-2	1%py bg fn propyl	41.80	43.00	1.20	<0.02	<0.2	<0.001	<0.001	0.004	<0.001	0.006	2.10	<0.001
ND-6-3	q vlt bg prpyl	43.00	44.70	1.70	<0.02	<0.2	<0.001	<0.001	0.006	<0.001	0.009	3.30	0.001
ND-6-4	q-py-drusy v bg prpyl	49.00	51.15	2.15	<0.02	<0.2	<0.001	<0.001	<0.001	0.001	0.011	4.60	<0.001
ND-6-5	drusy q(1-2mm)bg wk sil prpyl	56.20	57.25	1.05	<0.02	<0.2	<0.001	<0.001	0.005	<0.001	0.008	3.60	<0.001
ND-6-6	0.5mm q-v bg wk sil prpyl	59.20	59.30	0.10	<0.02	0.6	<0.001	<0.001	0.010	<0.001	0.006	3.80	<0.001
ND-6-7	drsy qv bg wk silic prpyl	11.55	13.10	1.55	<0.02	0.2	<0.001	<0.001	0.037	0.002	0.007	1.90	<0.001
ND-6-8	dk gry str silicified porph	69.00	70.05	1.05	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	0.006	5.10	<0.001
ND-6-9	arg str fractured porph	85.20	87.60	2.40	0.08	<0.2	<0.001	<0.001	0.001	<0.001	0.007	3.90	<0.001
ND-6-10	6% mt bg andesite	106.18	108.00	1.82	<0.02	<0.2	<0.001	<0.001	0.003	<0.001	0.007	3.30	<0.001
ND-6-11	15%mt,qtz vlts bg ad	113.72	116.00	2.28	<0.02	<0.2	<0.001	<0.001	0.003	<0.001	0.007	4.80	<0.001
ND-6-12	ditto,20mm qtz v bg	117.36	119.00	1.64	<0.02	<0.2	<0.001	<0.001	0.004	<0.001	0.005	4.90	<0.001
ND-6-13	qtz vlts,mass mt(8cm) bg	119.00	119.93	0.93	<0.02	<0.2	<0.001	<0.001	0.009	<0.001	0.005	4.80	<0.001
ND-6-14	ditto	124.67	125.19	0.52	<0.02	<0.2	<0.001	<0.001	0.004	<0.001	0.006	4.20	<0.001
ND-6-15	qtz ntwk, no mt	134.44	136.40	1.96	<0.02	<0.2	<0.001	<0.001	0.002	<0.001	0.005	3.80	<0.001
ND-6-16	ditto	136.40	137.69	1.29	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	0.003	1.10	<0.001
ND-6-17	str silicif ad w 25%mt & 3% py	146.50	147.80	1.30	<0.02	<0.2	<0.001	<0.001	0.005	<0.001	0.006	5.00	0.002
ND-6-18	ditto,with 5%mt & 3% py	171.00	171.90	0.90	0.07	<0.2	<0.001	<0.001	0.010	<0.001	0.004	3.90	<0.001
ND-6-19	fn str silicf ad w 5%-mt & py	185.00	186.20	1.20	<0.02	<0.2	<0.001	<0.001	0.307	<0.001	0.014	7.40	<0.001
ND-6-20	silicif ad w 3%py & local mt	191.85	192.70	0.85	<0.02	<0.2	<0.001	<0.001	0.010	<0.001	0.011	4.30	<0.001
ND-6-21	qtz vlets w anhyd	207.70	208.60	0.90	<0.02	<0.2	<0.001	<0.001	0.003	<0.001	0.008	3.70	<0.001
ND-6-22	str silcf ad w 3%py	209.40	210.60	1.20	<0.02	<0.2	<0.001	<0.001	0.004	<0.001	0.008	2.20	<0.001
ND-6-23	ditto	210.60	212.40	1.80	<0.02	<0.2	<0.001	<0.001	0.002	<0.001	0.008	2.20	<0.001
ND-6-24	qtz/anhyd veins	214.20	215.10	0.90	<0.02	<0.2	<0.001	<0.001	0.002	<0.001	0.007	2.10	<0.001
ND-6-25	silicif ad w 3%py(cp speck?)	224.00	224.85	0.85	<0.02	<0.2	<0.001	<0.001	0.008	<0.001	0.005	3.30	<0.001
ND-6-26	str slcf ad w 5%py & local mt	229.90	231.20	1.30	<0.02	<0.2	<0.001	<0.001	0.010	<0.001	0.012	6.60	<0.001
ND-6-27	str slcf qtz porph like rox	234.70	235.90	1.20	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	0.003	0.90	<0.001
ND-6-28	ditto	235.90	237.10	1.20	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	0.003	1.30	<0.001
ND-6-29	str silcf ad w rare cp	242.80	243.73	0.93	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	0.004	1.50	<0.001
ND-6-30	glassy bk fn grnd ad w 2%py	252.35	254.20	1.85	<0.02	<0.2	<0.001	<0.001	0.004	<0.001	0.011	6.00	<0.001
ND-6-31	str silicif ad w 2%py	264.40	265.70	1.30	<0.02	<0.2	<0.001	<0.001	0.001	<0.001	0.003	1.10	<0.001
ND-6-32	ditto	282.40	283.35	0.95	<0.02	<0.2	<0.001	<0.001	0.003	<0.001	0.007	8.60	<0.001
ND-6-33	str silicif ad w py,mt(cp?)	290.05	291.40	1.35	<0.02	<0.2	<0.001	<0.001	0.017	<0.001	0.009	6.60	<0.001
ND-6-34	ditto,w 10% mt	302.50	305.10	2.60	<0.02	<0.2	<0.001	<0.001	0.014	<0.001	0.007	5.85	<0.001

andesite with 3% pyrite dissemination. No magnetite in the section. The core here also be easily crumbled.

242.80-245.40m: greenish grey colored strongly silicified andesite with 3% spotty fine grained pyrite which accompany minute rare chalcopyrite.
Pink colored portion consisted of ankerite(?) particularly abundant at 242.90m. Anhydride veinlets predominates hence the core tends to crumble easily.

245.40-252.35m: greenish grey fine grained andesite with 3% dissemination. No magnetite detected in the section. The core here also very crumbly due to anhydride in irregularly oriented hair line cracks.

252.35-255.15m: dark greenish grey colored fine grained andesite with pink colored mineral and 2% pyrite dissemination. No magnetite detected in the section. The core throughout the section is badly fractured.

251.15-286.45m: light greenish grey colored strongly silicified fine grained andesite with 2.5% pyrite dissemination. Irregular fractures filled by anhydride(less than 0.5mm) are abundant and hence the core in the section very brittle and crumbly.

286.45-305.10m(End of the Hole): dark greenish grey colored strongly silicified and chloritized andesite with 5% pyrite dissemination. Magnetite content in the section is not significant, though the following sections contain significant amount of magnetite: 290.05-291.40m; 5% magnetite, and 302.50-305.10m; 10% disseminated magnetite. Chalcopyrite can be seen sporadically at; 290.05-291.40m section. At 302.60m there is a 20mm wide pinkish white colored quartz veinlet which stands at 15 degrees to the core axis. There are abundant anhydride veinlets(less than 0.5mm wide) throughout the section hence the core tends to crumble easily and very brittle.

b) Analytical Results of the Core Samples (Table II-3-3-1)

34-core samples were analysed and revealed very low level of gold and other elements; no sample shows more than 0.10g/t Au. The highest silver value was 0.8g/t Ag, found in MD-5-6 sample. No samples contain more than 0.02% Cu. Expected molybdenum value also were very low; the highest being only 0.002% Mo.

3-3-2 Geochemical Survey

The soil samples collected were sun dried and sieved to under 80 mesh. Sieved samples weighing 50 to 80 grams each were shipped to Chemex Labs in Canada for the analyses.
The analysed elements were; gold, silver, aesenic, iron, copper, zinc, lead, manganese, mercury, molybdenum, antimony, and selenium. The analutica procedures, detection lmits of elements analysed were shown in Table II-3-3-1.

The statistic parameters were shown in Table II-3-3-2.
The computation of mean excludes the samples with the values of the detection limit hence the mean values in the table tend to be higher than the real mean. This was done deliberately to avoid any artificial effects to the correlation from the insertation of 'artificial' data, say, half a value of the detection limit of that element for the data with the under the limit.

Table II-3-3-2 Analytical Procedures

DESCRIPTION	METHOD	DETECTION LIMIT	UPPER LIMIT
Au ppb: Fuse 30 g sample	FA-NAA	1	10000
Ag ppm: HNO3-aqua regia digest	AAS-BKGD CORR	0.2	100.0
As ppm: HNO3-aqua regia digest	AAS-HYDRIDE/EDL	1	10000
Fe %: HNO3-aqua regia digest	AAS	0.05	20.0
Cu ppm: HNO3-aqua regia digest	AAS	1	10000
Mn ppm: HNO3-aqua regia digest	AAS	5	10000
Hg ppb: HNO3-HCl digestion	AAS-FLAMELESS	10	100000
Mo ppm: HNO3-aqua regia digest	AAS	1	1000
Pb ppm: HNO3-aqua regia digest	AAS-BKGD CORR	1	10000
Sb ppm: HCl-KClO3 digest, extrac	AAS-BKGD CORR	0.2	1000
Se ppm: HCl-KClO3 digest, ext	AAS-BKGD CORR	0.2	100.0
Zn ppm: HNO3-aqua regia digest	AAS	1	10000

3-3-2-1 Puntales Area

The area is located at the northern part of the Nipa Area. 108 soil samples were collected at every 50m interval from four parallel lines cut in north-south direction which were spaced 200m apart.

a) Statistics

The mean value of gold in Nipa Area executed in 1991 was 5.37ppb Au. The mean for Puntales Area was 3.7ppb Au, slightly lower than the regional value while that of molybdenum, 2.9ppm Mo was higher than the regional value of 1.22ppm Mo. Also the mean of copper, 38.6ppm Cu, was higher than the regional value of 24.8ppm Cu.

The highest values of copper and molybdenum were, 232ppm and 35ppm, both being not significant values.

The highest value of gold was 99ppb, and only four samples showed more than 15ppb Au.

Table II-3-3-3 Statistic Parameters, Puntales, 1992

COMP. NAME	UNIT	NUM. DATA	MAXIMUM	MINIMUM	MEAN (M)	STD. DEV. (SD)	M-2*SD	M-SD	M+SD	M+2*SD
AU	ppb	95	99	1	3.7	0.324 *	0.8	1.8	7.8	16.5
AG	ppm	4	0.2	0.2	0.20	0.000 *	0.20	0.20	0.20	0.20
AS	ppm	94	46	1	3.7	0.401 *	0.6	1.5	9.2	23.2
FE	%	108	9.10	0.30	3.274	1.714	-0.154	1.560	4.987	6.701
CU	ppm	108	232	1	38.6	0.355 *	7.5	17.0	87.4	198.1
MN	ppm	108	2200	20	130.4	0.653 *	6.4	29.0	586.9	2642.2
HG	ppb	108	80	10	37.3	0.184 *	16.0	24.5	57.0	87.0
MO	ppm	97	35	1	2.9	0.443 *	0.4	1.0	8.0	22.2
PB	ppm	91	70	1	4.6	0.359 *	0.9	2.0	10.5	24.1
SB	ppm	93	2.8	0.2	0.26	0.218 *	0.10	0.16	0.44	0.72
SE	ppm	93	6.2	0.2	0.74	0.332 *	0.16	0.35	1.59	3.43
ZN	ppm	108	190	1	14.5	0.609 *	0.9	3.6	59.0	239.5

* OF STD. DEV. IS SHOWN IN LOGARITHMIC SCALE

b) Correlation

Zn-Mn(0.90), Cu-Fe(0.63), Zn-Fe(0.54), Mn-Hg(0.53), Au-Se(0.53), and Au-As(0.50) show strong correlation.

Zn-Mo(-0.68), Mo-Mn(-0.66), and Mo-Hg(-0.56) have negative correlation.

Table II-3-3-4 Correlation Matrix, Puntales, 1992

	AU	AS	FE	CU	MN	HG	MO	PB	SB	SE	ZN
AU	---	84	95	95	95	95	86	80	85	85	95
AS	0.497	---	94	94	94	94	85	80	83	81	94
FE	0.188	0.042	---	108	108	108	97	91	93	93	108
CU	0.201	-0.063	0.633	---	108	108	97	91	93	93	108
MN	-0.361	-0.326	0.448	0.373	---	108	97	91	93	93	108
HG	-0.141	-0.101	0.384	0.124	0.529	---	97	91	93	93	108
MO	0.458	0.338	-0.176	0.017	-0.656	-0.561	---	80	83	83	97
PB	-0.009	-0.169	0.183	0.226	0.229	0.386	-0.234	---	79	80	91
SB	0.319	0.477	0.041	-0.122	-0.264	0.063	0.167	0.095	---	85	93
SE	0.527	0.354	0.253	0.296	-0.463	0.063	0.456	0.122	0.347	---	93
ZN	-0.311	-0.310	0.538	0.420	0.900	0.530	-0.683	0.273	-0.206	-0.371	---

*NOTE ; VARIANCES AND COVARIANCES ARE DIVIDED BY N-1
NUM. OF DATA IS WRITTEN IN RIGHT-UPPER PART
CORR. COEF. IS WRITTEN IN LEFT-BOTTOM PART

c) PCA

Table II-3-3-5 PCA, Puntales, 1992

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		AU	AS	FE	CU	MN	HG	MO	PB	SB	SE	ZN
P 1	3.997	0.363	0.363	EIGENVECTOR	-.260	-.263	.215	.161	.457	.305	-.402	.172	-.183	-.238	.456
				FACTOR LOADING	-.519	-.526	.430	.323	.913	.610	-.804	.345	-.366	-.477	.911
				CONTRIBUTION	.269	.276	.185	.104	.834	.372	.646	.119	.134	.227	.830
P 2	2.452	0.223	0.586	EIGENVECTOR	.388	.261	.465	.419	.061	.224	.092	.223	.260	.440	.124
				FACTOR LOADING	.608	.409	.729	.657	.095	.351	.144	.349	.407	.689	.194
				CONTRIBUTION	.370	.167	.531	.432	.009	.123	.021	.122	.166	.475	.038
P 3	1.293	0.118	0.704	EIGENVECTOR	-.069	.256	-.200	-.490	-.035	.419	-.305	.270	.553	-.013	-.026
				FACTOR LOADING	-.079	.291	-.227	-.558	-.040	.477	-.347	.307	.629	-.015	-.030
				CONTRIBUTION	.006	.084	.052	.311	.002	.227	.121	.094	.395	.000	.001
P 4	0.985	0.090	0.793	EIGENVECTOR	-.101	-.501	-.190	.063	-.221	.084	.098	.694	-.159	.293	-.200
				FACTOR LOADING	-.100	-.497	-.189	.063	-.219	.083	.097	.689	-.158	.291	-.199
				CONTRIBUTION	.010	.247	.036	.004	.048	.007	.009	.475	.025	.085	.040
P 5	0.597	0.054	0.848	EIGENVECTOR	-.157	-.138	.139	-.169	-.165	.546	-.108	-.485	-.299	.470	-.160
				FACTOR LOADING	-.122	-.106	.107	-.131	-.127	.422	-.083	-.375	-.231	.363	-.124
				CONTRIBUTION	.015	.011	.011	.017	.016	.178	.007	.141	.053	.132	.015
P 6	0.510	0.046	0.894	EIGENVECTOR	.597	.300	-.188	-.183	.050	.195	-.122	.197	-.607	-.149	-.017
				FACTOR LOADING	.427	.214	-.134	-.131	.036	.139	-.087	.141	-.433	-.106	-.012
				CONTRIBUTION	.182	.046	.018	.017	.001	.019	.008	.020	.188	.011	.000
P 7	0.388	0.035	0.929	EIGENVECTOR	-.609	.651	-.112	.188	.040	.027	.151	.197	-.281	.117	-.036
				FACTOR LOADING	-.379	.406	-.070	.117	.025	.017	.094	.123	-.175	.073	-.023
				CONTRIBUTION	.144	.165	.005	.014	.001	.000	.009	.015	.031	.005	.001
P 8	0.283	0.026	0.955	EIGENVECTOR	-.120	.057	.748	-.482	-.217	-.215	.013	.227	-.159	-.128	-.061
				FACTOR LOADING	-.064	.031	.398	-.256	-.115	-.114	.007	.121	-.085	-.068	-.032
				CONTRIBUTION	.004	.001	.158	.066	.013	.013	.000	.015	.007	.005	.001
P 9	0.274	0.025	0.980	EIGENVECTOR	-.004	-.101	.037	-.198	.303	.392	.804	.007	.043	-.232	.028
				FACTOR LOADING	-.002	-.053	.019	-.104	.159	.205	.421	.004	.022	-.122	.015
				CONTRIBUTION	.000	.003	.000	.011	.025	.042	.177	.000	.000	.015	.000
P10	0.139	0.013	0.993	EIGENVECTOR	-.021	.012	.163	.421	-.266	.330	-.107	-.006	.062	-.553	-.543
				FACTOR LOADING	-.008	.004	.061	.157	-.099	.123	-.040	-.002	.023	-.206	-.203
				CONTRIBUTION	.000	.000	.004	.025	.010	.015	.002	.000	.001	.043	.041
P11	0.081	0.007	1.000	EIGENVECTOR	.012	-.021	.080	-.087	.705	-.168	-.140	.028	.019	.174	-.640
				FACTOR LOADING	.003	-.006	.023	-.025	.201	-.048	-.040	.008	.005	.050	-.182
				CONTRIBUTION	.000	.000	.001	.001	.040	.002	.002	.000	.000	.002	.033

Eleven elements excluding silver were studied by PCA.

1st Principal Component

Mn(83%), and Zn(83%) have very large contribution, together with Hg(37%) while Mo(-65%), As(-28%), and Au(-27%) show negative contribution. The contribution of the component was 36.3%. Gold shows a larger contribution in the 2nd component. The component shows the concentration of manganese and zinc which contradicts with that of molybdenum.

2nd Principal Component

Fe(53%), Se(48%), Cu(43%), and Au(37%) have large contribution. This component may indicate an iron-copper sulphide mineralization which accompanies selenium and gold. The cumulative contribution to the 2nd component is 59%.

The 3rd component has positive contribution of Sb(40%) and negative one of copper(-31%). The dynamic range of antimony values are so narrow that the validity of the antipathetic relation with copper delineated here is rather doubtful. Pb(48%) and As(-25%) show larger contribution in the 4th Principal Component but the highest value of lead is only 70ppm, hence there would be no practical use of the component. The cumulative contribution to the 4th component is 79%.

3-3-2-2 Apiton Area

202 soil samples were collected on seven lines cut in N45W direction and on the base-line. The samples were taken at every 50m interval on the lines.

a) Statistics

Table II-3-3-6 Statistic Parameters, Apiton, 1992

COMP. NAME	UNIT	NUM. DATA	MAXIMUM	MINIMUM	MEAN (M)	STD. DEV. (SD)	M-2*SD	M-SD	M+SD	M+2*SD
AU	ppb	202	165	1	19.4	0.405 *	3.0	7.6	49.4	125.6
AG	ppm	9	0.4	0.2	0.26	0.107 *	0.16	0.20	0.33	0.42
AS	ppm	202	384	2	21.7	0.447 *	2.8	7.7	60.7	170.0
FE	%	202	9.70	0.60	3.962	1.900	0.161	2.061	5.862	7.763
CU	ppm	202	158	2	22.4	0.314 *	5.3	10.9	46.0	94.3
MN	ppm	202	1200	5	63.0	0.495 *	6.4	20.2	197.3	617.2
HG	ppb	202	100	20	55.6	0.120 *	32.0	42.2	73.3	96.6
MO	ppm	199	33	1	2.6	0.319 *	0.6	1.3	5.5	11.4
PB	ppm	201	68	1	13.8	0.348 *	2.8	6.2	30.7	68.4
SB	ppm	173	15.0	0.2	0.70	0.438 *	0.09	0.25	1.90	5.21
SE	ppm	190	6.4	0.2	1.18	0.354 *	0.23	0.52	2.67	6.04
ZN	ppm	202	106	3	7.5	0.296 *	1.9	3.8	14.9	29.3

* STD. DEV. IS SHOWN IN LOGARITHMIC SCALE

The mean gold value of 19.4ppb Au is significantly higher than that of the regional value of Nipa Area, 1991. The value is higher than the mean plus 1 Standard Deviation of the Nipa Area, 1991. However, this is not very surprising because the Puntales Area is located in the gold anomalous zone detected by the previous year's geochemical survey in the Nipa area. The mean for arsenic, 21.7ppm also is significantly higher compared with those of Puntales(3.7ppm), and the regional Nipa(5.4ppm). Compared with Puntales Area, the mean for molybdenum is similar(2.6ppm vs. 2.9ppm), but other elements such as Pb(13.8 vs. 4.6), arsenic(21.7 vs.3.7), antimony(0.7 vs. 0.26) are much higher in Apiton Area.

b) Correlation

As-Sb(0.74), Fe-Se(0.72), Au-Pb(0.67), Zn-Mn(0.65), Au-Sb(0.65), Au-As(0.54), Pb-Sb(0.52), and Cu-Zn(0.52) show strong positive correlation while Se-Mn(-0.55), and Mn-Mo(-0.47) correlate negatively.

Table II-3-3-7 Correlation Matrix, Apiton, 1992

	AU	AS	FE	CU	MN	HG	MO	PB	SB	SE	ZN
AU	---	202	202	202	202	202	199	201	173	190	202
AS	0.538	---	202	202	202	202	199	201	173	190	202
FE	0.318	0.473	---	202	202	202	199	201	173	190	202
CU	0.017	0.070	0.292	---	202	202	199	201	173	190	202
MN	-0.106	-0.235	-0.320	0.222	---	202	199	201	173	190	202
HG	0.459	0.243	0.023	-0.047	0.203	---	199	201	173	190	202
MO	0.232	0.150	0.247	0.076	-0.473	-0.108	---	198	171	188	199
PB	0.665	0.478	0.185	0.091	-0.052	0.344	0.177	---	172	189	201
SB	0.650	0.737	0.436	0.053	-0.202	0.242	0.189	0.524	---	164	173
SE	0.371	0.476	0.716	0.186	-0.550	0.002	0.457	0.345	0.417	---	190
ZN	-0.249	-0.248	-0.032	0.524	0.652	-0.077	-0.268	-0.289	-0.204	-0.367	---

*NOTE ; VARIANCES AND COVARIANCES ARE DIVIDED BY N-1
NUM. OF DATA IS WRITTEN IN RIGHT-UPPER PART
CORR. COEF. IS WRITTEN IN LEFT-BOTTOM PART

c) PCA (Table II-3-3-8)

Silver was excluded from the analysis.

1st Principal Component

Sb(61%), As(60%), Se(60%), Au(56%), Pb(41%), Fe(41%) and Mo(22%) display large contribution while Mn(-26%) and Zn(-24%) contribute negatively. The component has a significant contribution of 36.7%.

The component clearly indicates the concentration of gold associated with antimony, arsenic, selenium, lead and iron. Accordingly the high scored places by this component are expected to be the loci of the gold concentration with the above stated elements. In the PCA executed on the data of the geochemical survey in Nipa, Mt. Upao, and Madarag Areas, 1991, manganese and zinc had much larger contribution in the 1st component with a contradicting relation to the other elements including gold etc.

2nd Principal Component

Mn(57%), Zn(33%), and Hg(29%) have larger contribution in the component. The component apparently suggests the close association of manganese and zinc.

3rd Principal Component

Cu(58%), and Zn(29%) have larger contribution hence the component suggests a concentration of these elements although the highest values of copper and zinc in the dataset are only 158, and 106ppm respectively. The cumulative contribution to the 3rd component is 70%.

The 4th component contains significant(38%) contribution of molybdenum, but the highest value and the standard deviation of molybdenum are smallish, no practical usage of the component can be expected. The cumulative contribution to the 4th component attains 78%.

Table II-3-3-8 PCA, Apiton 1992

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		AU	AS	FE	CU	MN	HG	MO	PB	SB	SE	ZN
P 1	4.032	0.367	0.367	EIGENVECTOR	.373	.386	.319	.025	-.256	.139	.233	.331	.390	.385	-.245
				FACTOR LOADING	.750	.776	.640	.050	-.514	.280	.467	.665	.782	.774	-.492
				CONTRIBUTION	.562	.602	.410	.002	.264	.078	.218	.443	.612	.599	.242
P 2	2.006	0.182	0.549	EIGENVECTOR	.260	.157	-.004	.301	.532	.383	-.298	.247	.197	-.184	.405
				FACTOR LOADING	.369	.222	-.005	.427	.754	.542	-.422	.350	.279	-.261	.574
				CONTRIBUTION	.136	.049	.000	.182	.568	.294	.178	.122	.078	.068	.330
P 3	1.673	0.152	0.701	EIGENVECTOR	-.188	-.007	.421	.591	-.006	-.345	.179	-.189	-.040	.281	.414
				FACTOR LOADING	-.243	-.009	.544	.764	-.008	-.446	.232	-.244	-.051	.363	.536
				CONTRIBUTION	.059	.000	.296	.584	.000	.199	.054	.060	.003	.132	.287
P 4	0.835	0.076	0.777	EIGENVECTOR	.203	-.372	-.325	.266	.053	.136	.673	.334	-.240	-.030	.009
				FACTOR LOADING	.185	-.340	-.297	.243	.049	.124	.615	.305	-.220	-.027	.008
				CONTRIBUTION	.034	.116	.088	.059	.002	.015	.378	.093	.048	.001	.000
P 5	0.666	0.061	0.837	EIGENVECTOR	-.033	-.241	.352	-.005	-.068	.720	-.089	-.249	-.375	.279	-.072
				FACTOR LOADING	-.027	-.197	.288	-.004	-.056	.587	-.072	-.203	-.306	.228	-.058
				CONTRIBUTION	.001	.039	.083	.000	.003	.345	.005	.041	.094	.052	.003
P 6	0.525	0.048	0.885	EIGENVECTOR	-.091	-.173	-.015	.258	-.029	-.211	-.516	.578	-.313	.258	-.292
				FACTOR LOADING	-.066	-.125	-.011	.187	-.021	-.153	-.374	.419	-.226	.187	-.211
				CONTRIBUTION	.004	.016	.000	.035	.000	.023	.140	.176	.051	.035	.045
P 7	0.394	0.036	0.921	EIGENVECTOR	-.424	.452	-.402	.481	-.274	.306	.006	-.093	.022	-.099	-.188
				FACTOR LOADING	-.266	.284	-.252	.302	-.172	.192	.003	-.058	.014	-.062	-.118
				CONTRIBUTION	.071	.080	.064	.091	.030	.037	.000	.003	.000	.004	.014
P 8	0.299	0.027	0.948	EIGENVECTOR	.478	-.393	-.108	.330	-.491	-.016	-.288	-.258	.259	-.195	-.010
				FACTOR LOADING	.261	-.215	-.058	.181	-.269	-.009	-.158	-.141	.142	-.107	-.005
				CONTRIBUTION	.068	.046	.003	.033	.072	.000	.025	.020	.020	.011	.000
P 9	0.217	0.020	0.968	EIGENVECTOR	.546	.459	-.126	.065	.078	-.183	-.037	-.276	-.590	.046	-.059
				FACTOR LOADING	.254	.214	-.059	.030	.036	-.085	-.017	-.128	-.275	.022	-.028
				CONTRIBUTION	.065	.046	.003	.001	.001	.007	.000	.016	.076	.000	.001
P10	0.193	0.018	0.986	EIGENVECTOR	-.037	.165	.362	-.097	-.455	.046	.030	.350	-.307	-.566	.290
				FACTOR LOADING	-.016	.072	.159	-.043	-.200	.020	.013	.154	-.135	-.249	.127
				CONTRIBUTION	.000	.005	.025	.002	.040	.000	.000	.024	.018	.062	.016
P11	0.158	0.014	1.000	EIGENVECTOR	-.002	-.048	.415	.261	.335	-.070	.115	-.111	.038	-.471	-.625
				FACTOR LOADING	-.001	-.019	.165	.104	.134	-.028	.046	-.044	.015	-.188	-.249
				CONTRIBUTION	.000	.000	.027	.011	.018	.001	.002	.002	.000	.035	.062

3-3-2-3 Principal Component Analysis on the Combined Data of Puntales, and Apiton Areas, 1992

Puntales and Apiton Areas are situated closely in the Nipa Area as seen in Fig. I-4-3, and since the whole of Apiton Area is considered to be very anomalous in gold, it is more appropriate to treat the combined data from the both areas simultaneously. The combined dataset has 310 samples analysed for the same elements.

PCA on the combined data is expected to yield more regionally valid behaviour of the elements. Brief discussion utilizing also the gold values from the previous year's geochemical survey in Nipa Area will be find in the discussion.

a) Statistics

Table II-3-3-9 Statistic Parameters, Puntales + Apiton, 1992

COMP. NAME	UNIT	NUM. DATA	MAXIMUM	MINIMUM	MEAN (M)	STD. DEV. (SD)	M-2*SD	M-SD	M+SD	M+2*SD
AU	ppb	297	165	1	11.5	0.507 *	1.1	3.6	36.8	118.4
AG	ppm	13	0.4	0.2	0.24	0.103 *	0.15	0.19	0.30	0.38
AS	ppm	296	384	1	12.3	0.563 *	0.9	3.4	45.0	164.5
FE	%	310	9.70	0.30	3.722	1.867	-0.011	1.855	5.589	7.455
CU	ppm	310	232	1	27.0	0.348 *	5.5	12.1	60.2	134.1
MN	ppm	310	2200	5	81.2	0.576 *	5.7	21.6	305.6	1149.9
HG	ppb	310	100	10	48.4	0.167 *	22.4	32.9	71.1	104.4
MO	ppm	256	35	1	2.7	0.365 *	0.5	1.2	6.3	14.5
PB	ppm	292	70	1	9.8	0.415 *	1.4	3.8	25.4	66.2
SB	ppm	266	15.0	0.2	0.50	0.426 *	0.07	0.19	1.32	3.52
SE	ppm	283	6.4	0.2	1.02	0.360 *	0.19	0.44	2.32	5.32
ZN	ppm	310	190	1	9.5	0.452 *	1.2	3.3	26.8	75.9

* OF STD. DEV. IS SHOWN IN LOGARITHMIC SCALE

Because the gold values of Apiton are so high, the mean in the combined dataset becomes 11.5ppb Au, which is about two times higher than that of the Nipa Area,1991.

The threshold of anomalous, strongly anomalous values for gold, molybdenum and Principal Component scores in the figures and plates are taken from those of the combined dataset. For example, the threshold for the anomalous gold is 37ppb(M + SD), and that for the strongly anomalous being 118ppb(M + 2SD).

b) Correlation

Table II-3-3-10 Correlation Matrix, Puntales + Apiton

	AU	AS	FE	CU	MN	HG	MO	PB	SB	SE	ZN
AU	---	286	297	297	297	297	285	281	258	275	297
AS	0.714	---	296	296	296	296	284	281	256	271	296
FE	0.291	0.388	---	310	310	310	296	292	266	283	310
CU	-0.190	-0.168	0.325	---	310	310	296	292	266	283	310
MN	-0.307	-0.341	-0.066	0.348	---	310	296	292	266	283	310
HG	0.459	0.411	0.233	-0.131	0.183	---	296	292	266	283	310
MO	0.159	0.100	0.071	0.064	-0.533	-0.320	---	278	254	271	296
PB	0.658	0.529	0.223	-0.084	-0.125	0.504	0.025	---	251	269	292
SB	0.687	0.738	0.392	-0.148	-0.296	0.361	0.096	0.559	---	249	266
SE	0.451	0.496	0.596	0.105	-0.543	0.154	0.409	0.364	0.468	---	283
ZN	-0.371	-0.361	0.164	0.501	0.797	0.101	-0.471	-0.219	-0.278	-0.390	---

*NOTE ; VARIANCES AND COVARIANCES ARE DIVIDED BY N-1
NUM. OF DATA IS WRITTEN IN RIGHT-UPPER PART
CORR. COEF. IS WRITTEN IN LEFT-BOTTOM PART

Mn-Zn(0.80), As-Sb(0.74), Au-As(0.71), Au-Sb(0.69), Au-Pb(0.66), Se-Fe(0.60), Sb-Pb(0.56), Pb-Hg(0.50) and Cu-Zn(0.50) show positive correlation while Mn-Se(-0.54), Mn-Mo(-0.53) are negatively correlated.

Similar features are also found in the individual dataset.

c) PCA, Puntales + Apiton, 1992

Table II-3-3-11 PCA, Puntales + Apiton, 1992

PRIN COMP	EIGEN VALUE	CONTRIB	CUM CONTRIB		AU	AS	FE	CU	MN	HG	MO	PB	SB	SE	ZN
P 1	4.280	0.389	0.389	EIGENVECTOR	.405	.405	.215	-.116	-.286	.197	.160	.331	.390	.355	-.281
				FACTOR LOADING	.838	.837	.445	-.239	-.592	.408	.331	.685	.807	.733	-.581
				CONTRIBUTION	.702	.700	.198	.057	.351	.167	.110	.469	.651	.538	.338
P 2	2.313	0.210	0.599	EIGENVECTOR	.125	.124	.264	.230	.460	.426	-.409	.225	.149	-.061	.459
				FACTOR LOADING	.190	.189	.401	.349	.699	.647	-.622	.342	.226	-.092	.698
				CONTRIBUTION	.036	.036	.161	.122	.489	.419	.386	.117	.051	.008	.487
P 3	1.644	0.149	0.749	EIGENVECTOR	-.124	-.057	.489	.596	-.042	-.260	.336	-.143	-.038	.386	.185
				FACTOR LOADING	-.159	-.074	.627	.764	-.054	-.333	.430	-.183	-.048	.494	.237
				CONTRIBUTION	.025	.005	.393	.584	.003	.111	.185	.033	.002	.244	.056
P 4	0.681	0.062	0.811	EIGENVECTOR	.246	-.121	-.449	.401	.207	-.035	.454	.521	-.053	-.193	-.011
				FACTOR LOADING	.203	-.100	-.371	.331	.171	-.029	.375	.430	-.044	-.160	-.009
				CONTRIBUTION	.041	.010	.137	.110	.029	.001	.140	.185	.002	.025	.000
P 5	0.543	0.049	0.860	EIGENVECTOR	-.134	-.378	.073	-.089	-.117	.570	.048	.227	-.537	.364	-.117
				FACTOR LOADING	-.098	-.279	.054	-.065	-.086	.420	.035	.167	-.396	.268	-.086
				CONTRIBUTION	.010	.078	.003	.004	.007	.176	.001	.028	.157	.072	.007
P 6	0.389	0.035	0.895	EIGENVECTOR	.178	.149	.046	-.167	.191	.436	.600	-.521	-.022	-.192	.143
				FACTOR LOADING	.111	.093	.029	-.104	.119	.272	.374	-.325	-.014	-.120	.089
				CONTRIBUTION	.012	.009	.001	.011	.014	.074	.140	.106	.000	.014	.008
P 7	0.330	0.030	0.925	EIGENVECTOR	-.018	-.425	.398	-.533	.145	-.246	.272	.336	.192	-.111	.242
				FACTOR LOADING	-.011	-.244	.229	-.306	.083	-.141	.156	.193	.110	-.064	.139
				CONTRIBUTION	.000	.060	.052	.094	.007	.020	.024	.037	.012	.004	.019
P 8	0.264	0.024	0.949	EIGENVECTOR	.653	.105	.265	-.064	.048	-.288	-.142	-.029	-.605	-.125	-.042
				FACTOR LOADING	.335	.054	.136	-.033	.025	-.147	-.073	-.015	-.311	-.064	-.022
				CONTRIBUTION	.113	.003	.019	.001	.001	.022	.005	.000	.097	.004	.000
P 9	0.230	0.021	0.970	EIGENVECTOR	-.513	.636	.156	-.124	.147	-.073	.174	.312	-.336	-.155	-.049
				FACTOR LOADING	-.246	.305	.075	-.060	.070	-.035	.084	.149	-.161	-.074	-.023
				CONTRIBUTION	.060	.093	.006	.004	.005	.001	.007	.022	.026	.006	.001
P10	0.182	0.017	0.987	EIGENVECTOR	.052	.107	-.323	-.250	.559	-.215	.013	-.088	-.036	.669	.061
				FACTOR LOADING	.022	.046	-.138	-.107	.239	-.092	.006	-.038	-.015	.286	.026
				CONTRIBUTION	.000	.002	.019	.011	.057	.008	.000	.001	.000	.082	.001
P11	0.144	0.013	1.000	EIGENVECTOR	-.059	-.174	.279	.125	.504	.040	-.041	-.080	.129	-.128	-.759
				FACTOR LOADING	-.022	-.066	.106	.047	.191	.015	-.016	-.030	.049	-.048	-.288
				CONTRIBUTION	.001	.004	.011	.002	.037	.000	.000	.001	.002	.002	.083

1st Principal Component

Au(70%), As(70%), Sb(65%), Se(54%), and Pb(47%) have large contribution while Mn(-35%), and Zn(-34%) contribute negatively. Obviously from the above, gold mineralization associating arsenic, antimony, selenium and lead can be delineated from the plotting of the 1st principal component scores. The dataset of Apiton alone showed similar contribution of the elements in the 1st component, but that from gold and arsenic here are more significant, and the simplicity of the combined dataset expressed in much larger contribution of the component, 39%, is also noteworthy.

2nd Principal Component

Mn(49%), Zn(49%), and Hg(39%) show large contribution and Mo(-39%) contributes negatively. This too resembles to the 2nd component in the Apiton dataset. Having 21% of contribution, the cumulative contribution to the 2nd component reaches 60%, which is a significantly high proportion for a geochemical dataset.

3rd Principal Component

Cu(58%), and Fe(39%) show large contribution, but the contribution from zinc(6%) is lesser compared with the result of Apiton alone. The cumulative contribution to the 3rd component is 75%.

3-3-2-4 Comparison of the Gold Anomaly with that of the Geochemical Survey executed in 1991, Nipa Area

316 soil samples had been collected in Nipa Area in the course of the geochemical survey in 1991. The background(mean) of gold was 5.3ppb. The computation of statistics of 626 gold values(joining the above mentioned data to this year's 310 samples) revealed the mean value of 8.1ppb Au which is much lower than that of the Apiton Area. The logarithmic standard deviation of gold(N=626) was 0.507, making 26.0ppb the threshold for moderate anomaly, and 83.5ppb for that of strong anomaly.
The distribution of gold anomaly based on 626-gold values was added to the Comrehensive Geochemical Anomaly Map.
Plate 3-5 showed the plot of all gold values available in Nipa Area.

3-4 DISCUSSION

3-4-1 Puntales Area

MJPP-6 hole drilled on the top of the gossanous hill encountered highly argillized, silicified rocks albeit the copper and molybdenum mineralization in the hole were minimal.
The core recovered indicated that in the gossanous area strong fracturing prevailed and weathering and leaching effected deep downwards through the fractures. Also ubiquitous anhydrite and clay which filled in the fractures/cracks enhanced the brittleness and crumbliness of the rocks.
The geochemical survey delineated a weak molybdenum anomaly stretching from the vicinity of the drill site to towards west for 600m. The highest molybdenum value obtained was only 35ppm and the western extension of the anomaly albeit the highest value was located on the western most cut line,the geochemical survey executed in 1991 has demonstrated that no anomalous molybdenum value occurred to the west. Accordingly, no real potential for molybdenum mineralization remains. Furthermore, although the PCA executed on 1991 geochemical data revealed possible existence of molybdenum-copper mineralization in the Puntales Area, present work on the area did not indicate such a combination of mineralization.
Considering the above together with the result from the drilling, the possibility to locate molybdenum and copper mineralization in the area is concluded as remote.

3-4-2 Apiton Area

The area demonstrated highly anomalous in gold by the geochemical survey, 1992. The mean value of gold is 19ppb Au which is higher than the threshold value for the moderately anomalous gold in the Nipa area(M + SD=14.6ppb Au), calculated for the data obtained in 1991 which encloses the Apiton area. Accordingly, the results of statistical analysis of combined dataset (Puntales + Apiton) have been utilized to delineate gold anomalies etc. This makes the comparison and evaluation of the gold potential possible with other similarly anomalous prospects.

Gold anomalies were detected on the southern and southwestern ridges of Mount Apiton by 37ppb Au(M + SD). The location of anomalies coincide well with the anomalous gold area delineated by 1991-geochemical survey. The occurrence of gold anomalies, located mostly on the ridges, is similar to those of Mt. Upao and Madarag Areas. Consequently similar kind of mineralization could be expected in the area. However, the drilling results obtained from Mt. Upao and Madarag discount significantly the potential to locate any ore grade material.

Chapter 4 Laboratory Tests

4-1 X-RAY DIFFRACTION

4-1-1 Drill Core Samples

4-1-1-1 Mt. Upao Area

The shallower core samples contain moderate to abundant kaolinite. Pyrophyllite exists in deeper section of MJPP-2. Minor diaspore and sericite are identified in deeper section of MJPP-1. Abundant quartz contains in all the samples analysed. Pyrite predominates in deeper section while hematite prevails in shallower depth. Pyrite grains are so small that the estimation of quantity in the core samples has been overvalued the actual content. Significant portion of hematite is limonitized hence the quantity also overestimated in the drill core description.

Alunite and Na-alunite are found abundantly in MJPP-1, while in MJPP-2 only the latter has been detected. MJPP-3 does not contain either of them.

4-1-1-2 Madarag Area

Sericite and chlorite have been identified and kaoline has been determined only in the middle section of MJPP-4. Quartz prevails in all the samples. All samples examined belong to pyritic zone hence almost no hematite detected while pyrite is found in all the samples. No alunite exists, minor Na-alunite is found in JPP-5.

4-1-1-3 Nipa Area

Apart from quartz and pyrite, sericite and chlorite have been identified. Albite is found in silicified andesite.

4-1-2 Rock Samples from Trenches

4-1-2-1 Mt. Upao Area

Ubiquitous quartz and hematite and kaolinite and pyrophyllite are identified in some samples. Abundant Na-alunite is commonly found in UT-2 trench.

4-1-2-2 Madarag Area

Alunite is rather common, some contain pyrophyllite and diaspore. Some samples contain remnant pyrite together with hematite. Quartz is the most abundant mineral.

4-1-3 Rock samples from the geochemical Survey

4-1-3-1 Puntales Area

Abundant quartz found in most samples and some chlorite and montmorillonite, together with pyrite and hematite have

Table II-4-1 (a) X—Ray Diffraction

Region: Philippine Total: 85 Samples

◎ Abundant, ○ Moderate, o Minor, • Very minor

		Ser No.	Sample Name	Montmorillonit	Saponite	Chl/Mont mixed	Ser/Mont mixed	Chlorite	Sericite	Hydrohalloysit	Halloysite	Kaolinite	Dickite	Nacrite	Pyrophyllite	Diaspore	Clinoptilolite	Heulandite	Stilbite	Mordenite	Analcime	Laumontie	Yugawaralite	Wairakaite	Opal	Cristobalite	Tridymite	Quartz
				Silicate Minerals: Clay Minerals													Zeolites								Silica M			
Drill core	Mt. Upao	1	UD-1- 1.90m									○																◎
		2	-188.50m																									◎
		3	-194.80m				•?																					◎
		4	-211.90m																									◎
		5	-252.60m				o					o																◎
		6	-260.50m						•			o				•												◎
		7	UD-2- 67.60m																									◎
		8	-183.65m									•			o													◎
		9	-229.60m																									◎
		10	-245.92m																									◎
		11	-273.10m									○			o													◎
		12	-293.50m									o																◎
		13	UD-3- 4.60m									o																◎
		14	- 15.60m					•				o																◎
		15	- 20.50m									o																◎
	Madarag	16	MD-4-126.30m					•	•			o			•?													◎
		17	-267.80m					•	o																			◎
		18	MD-5- 94.20m					•	o																			◎
		19	-113.35m																									◎
		20	-156.00m						•																			◎
		21	-168.90m						•																			◎
		22	-238.00m						•																			◎
		23	-252.95m						•																			◎
	Nipa	24	ND-6- 9.80m						•																			◎
		25	- 38.30m																									◎
		26	- 44.80m																									◎
		27	-114.75m																			○						
		28	-242.95m					•	•																			○
Geochemical Survey	Nipa	29	PB -11NR																									◎
		30	-11SR	o				o																				◎
		31	PC -05NR					•?																				◎
		32	-10SR					•																				◎
		33	PD -02SR																									○
		34	AB -03SR									o																◎
		35	AC -00R																									◎
		36	-07NR																									◎
		37	-02SR									o																
		38	-05SR																									◎
		39	AD -04NR																									◎
		40	-05SR																									◎
		41	AE -07NR																									◎
		42	-05NR													•												◎
		43	-10SR																									◎
		44	AF -05NR																									◎
		45	-04NR																									◎

Ser No.	Sample Name	K-feldspar	Albite	Plagioclase	Biotite	Hornblende	Pyroxene	Epidote	Pyrite	Goethite	Hematite	Magnetite	Maghemite	Alunite	Gypsum	Anhydrite	Jarosite	Na-alunite	Bassnite	Hauyne	Calcite	Siderite	Rutile	Anatase	Gibbsite	Brucite	Sulfur	REMARKS
		Silicate Minerals: Others							Iron Minerals					Salfate Minerals							Others							
1	UD-1- 1.90m										o			o														
2	-188.50m										•			○				◎					•					
3	-194.80m										•			o				◎					•					
4	-211.90m								o					o				◎		•							•	
5	-252.60m							•?			o	•?	o					•?					•					
6	-260.50m								o									•?										
7	UD-2- 67.60m										•							o										
8	-183.65m																	•?										
9	-229.60m										•		•?					o										
10	-245.92m								•									○										
11	-273.10m								○																			
12	-293.50m								○		o							•?						o				
13	UD-3- 4.60m										•		•?							•				•				
14	- 15.60m								o															•				
15	- 20.50m								o		o		•															
16	MD-4-126.30m								o		•							•?					•					
17	-267.80m								o																			
18	MD-5- 94.20m								o																			
19	-113.35m								o									o										
20	-156.00m								•														•					
21	-168.90m								o														•					
22	-238.00m								o																			
23	-252.95m								o												o							
24	ND-6- 9.80m								•																			
25	- 38.30m								o														•					
26	- 44.80m								o																			
27	-114.75m		◎						•?			•																
28	-242.95m		◎						o																			
29	PB -11NR										o															•		
30	-11SR									•?										•								
31	PC -05NR									o										•						•		
32	-10SR								o		•?			•?														
33	PD -02SR										o																	
34	AB -03SR									•?	o			•?									•					
35	AC -00R										o												•			o		
36	-07NR										o															o		
37	-02SR										o																	
38	-05SR										•			o									•					
39	AD -04NR																			•			•			•		
40	-05SR										o			o														
41	AE -07NR										•		•															
42	-05NR													•						•								
43	-10SR									•	•							◎										
44	AF -05NR										o							○					o			•		
45	-04NR							•			o												•					

Table II-4-2 (b) X–Ray Diffraction

Region: Philippine Total: 85 Samples

◎ Abundant, ○ Moderate, o Minor, • Very minor

Region: Philippine Total: 85 Samples				Silicate Minerals: Clay Minerals													Zeolites								Silica M				Others							Iron Minerals					Salfate Minerals							Others							REMARKS
Samples		Ser No.	Sample Name	Montmorillonit	Saponite	Chl/Mont mixed	Ser/Mont mixed	Chlorite	Sericite	Hydrohalloysit	Halloysite	Kaolinite	Dickite	Nacrite	Pyrophyllite	Diaspore	Clinoptilolite	Heulandite	Stilbite	Mordenite	Analcime	Laumontie	Yugawaralite	Wairakaite	Opal	Cristobalite	Tridymite	Quartz	K-feldspar	Albite	Plagioclase	Biotite	Hornblende	Pyroxene	Epidote	Pyrite	Goethite	Hematite	Magnetite	Maghemite	Alunite	Gypsum	Anhydrite	Jarosite	Na-alunite	Bassnite	Hauyne	Calcite	Siderite	Rutile	Anatase	Gibbsite	Brucite	Sulfur	
Geochemical Survey	Nipa	46	AF -02NR									o																◎									o	•?												•?					
Geochemical Survey	Nipa	47	-11SR																									◎										•							○									•?		
Geochemical Survey	Nipa	48	-19SR				•?																					◎										o							◎											
Geochemical Survey	Nipa	49	AL -07R									•																										•			◎														
Geochemical Survey	Nipa	50	-09R																									◎										•							o										
Geochemical Survey	Nipa	51	AA -05NR									•																◎										•																	
Geochemical Survey	Nipa	52	-03NR																									◎										•							o										
Geochemical Survey	Nipa	53	-00R									o			•													◎										•																	
Geochemical Survey	Nipa	54	-02SR																									◎										o			○													•?		
Geochemical Survey	Nipa	55	-05SR																									◎													o						o							•?		
Geochemical Survey	Nipa	56	AG -05NR					•				o				o												◎											•?								•			•					
Geochemical Survey	Nipa	57	-02NR																									◎					•?			•?									o		•						o		
Geochemical Survey	Nipa	58	-01NR																									◎								•?					o						•								
Geochemical Survey	Nipa	59	-02SR									•				•												◎																			•						•		
Geochemical Survey	Nipa	60	-08SR									o																◎										o												•					
Trench Survey	Mt. Upao	61	UT-1- 0.0m																									◎							•			o																	
Trench Survey	Mt. Upao	62	- 30.0m																									◎										o							○					•					
Trench Survey	Mt. Upao	63	- 59.0m												•?													◎										o								•?									
Trench Survey	Mt. Upao	64	- 95.0m									○																○																	•?										
Trench Survey	Mt. Upao	65	-120.0m									•?																◎										o																	
Trench Survey	Mt. Upao	66	-150.0m									•																◎										•																	
Trench Survey	Mt. Upao	67	-183.0m									o																◎										•			o									•?					
Trench Survey	Mt. Upao	68	-212.0m																									◎										o												•					
Trench Survey	Mt. Upao	69	UT-2- 1.0m																									◎										•			•														
Trench Survey	Mt. Upao	70	- 32.0m																									◎										•							◎		•			o					
Trench Survey	Mt. Upao	71	- 65.0m																									◎										o							◎					•					
Trench Survey	Mt. Upao	72	- 94.0m																									◎										o							◎					•					
Trench Survey	Mt. Upao	73	-126.0m																									◎										•							o					•					
Trench Survey	Mt. Upao	74	-165.0m																									◎										•												•					
Trench Survey	Mt. Upao	75	-212.0m									•																◎										•																	
Trench Survey	Madarag	76	MT-1- 21.0m												•	o												◎								•		o							•										
Trench Survey	Madarag	77	- 38.0m													•												◎										o			○									•					
Trench Survey	Madarag	78	- 73.0m									o				•												◎										o			o	•								•			o		
Trench Survey	Madarag	79	MT-2- 2.0m									o			•													◎								•	•	o							o					•					
Trench Survey	Madarag	80	- 37.0m												o													◎										o		•	○									•					
Trench Survey	Madarag	81	- 65.0m																									◎										•									•			•					
Trench Survey	Madarag	82	- 91.0m																									◎																			•								
Trench Survey	Madarag	83	-115.5m						•						o	•												◎								•?		•?		•										•?					
Trench Survey	Madarag	84	-130.0m									•?																◎										•			o														
Trench Survey		85	ODIONGAN						o			o																◎					•?																						

Table II-4-2 (a) Rock Thin Sections

No.	sample No.	rock name	texture	phenocryst or fragment	groundmass or matrix	altered minerals	remarks
1	UD-2 004.97m	altered andesitic tuff	tuffaceous texture	Qtz?	Qtz	Kao(Feld) Qtz:~0.02mm,mosaic dissem. Py	strongly altered
2	UD-2 061.00m	silicified andesite	tuffaceous texture (fine-grained)		Qtz (mosaic)	Ser:~0.02mm flaky Hem:~0.05mm dissem.,patch	strongly silicified original rock-tuff
3	MD-4 064.73m	silicified andesite	tuffaceous texture	Qtz:~0.2mm EPi:~0.3mm		Qtz:0.03mm mosaic,vein Ser:~0.03mm,flaky Opq:~0.02mm	strongly silicified original rock-tuff?
4	MD-4 146.70m	Hb-Bi andesite	porphyritic holocrystalline	Pl:~0.5mm Hb:~1mm Bi:~0.3mm Cpx:0.2mm Opq:~0.3mm	Qtz:~0.05mm	Cal(Pl) Chl(Pl,Hb,Bi) Opq(Bi) Cal-Zeo vein	
5	MD-4 184.40m	andesite	sub-porphyritic	Pl:~2.0mm Bi?:0.5mm Qtz:1.5mm	Qtz:~0.05mm (mosaic) Opq	Chl(Bi?) Opq(Bi?) Cal(Pl) Ser(Pl) Qtz-Epi,Cal,Zeo vein	weakly silicified
6	MD-5 209.72m	silicified andesite tuff	tuffaceous texture	Qtz:1.0mm	Qtz:~0.1mm (mosaic)	Ser:~0.01mm Cal:~0.1mm Smec(Feld) Chl:~0.1mm Opq:0.2~0.4mm Qtz,Cal vein	strongly silicified original rock-tuff?
7	MD-5 219.25m	silicified andesite tuff	tuffaceous texture (fine-grained)		Qtz:~0.05mm (mosaic)	Ser:~0.01mm Cal:~0.1mm,patch Smec(Feld) Chl:~0.1mm Opq:~0.1mm Qtz,Cal vein	strongly silicified original rock-tuff?
8	MD-5 239.20m	Qtz-Feld porphyry	porphyritic holocrystalline	Qtz:~1.2mm Pl:~1.5mm Bi?	Qtz(mosaic) Pl (mosaic) Opq Apa,Zir	Chl(Bi?) Ser,flaky Cal-Zeo vein	

Table II-4-2 (b) Rock Thin Sections

No.	sample No.	rock name	texture	phenocryst or fragment	groundmass or matrix	altered minerals	remarks
9	ND-6 020.00m	argillized Qtz porphyry	porphyritic	Qtz:~0.15mm	Qtz(mosaic) Opq	Ser:~0.01mm Smec:~0.01mm	silicified
10	ND-6 081.50m	silicified agglomerate	tuffaceous texture	Qtz:~3.0mm Feld:~2.5mm Opq:~0.3mm	Qtz(mosaic) Opq	Smec(Feld) Ser(Feld) Qtz-Ser vein	
11	ND-6 185.55m	andesite	trachytic (fine-grained)	Pl:0.3mm	Qtz:~0.1mm Opq:~0.1mm Pl	Cal(-Chl) vein	
12	ND-6 235.76m	Qtz porphyry like rock	porphyritic	Qtz:~2.0mm Feld?	Qtz(mosaic)	Ser(Feld?),flaky Qtz(Qtz) Qtz vein	
13	PB-11-SR	argillized andesite	porphyritic			Kao(Pl) Ser(Feld?) Qtz(Pl),mosaic Lim(Feld) Smec?(Feld?)	
14	AB-03-SR	silicified sandstone	arenaceous	Qtz(mosaic)	Opq:~0.05mm	Qtz:0.01mm Kao:~0.01mm	original rock-sand stone(medium grained) strongly silicified
15	AL-07-R	Alu-Qtz rock	mosaic,dusty			Alu:~0.4mm,mosaic Opq:~0.02mm Qtz Kao?	
16	AA-05-SR	andesitic tuff	tuffaceous texture	Qtz:~0.4mm		Qtz:~0.01mm (mosaic) Alu:~0.15mm,flaky Opq	
17	AG-05-NR	altered tuff breccia?	Qtz fragment Epi-Qtz fragment Smec-Qtz fragment Chal.Qtz fragment Qtz-Kao rock				original rock-tuff breccia? acidic hydrothermal alteration?

abbreviation:Alu=Alinite Apa=Apatite Bi=Biotite Cal=Calcite Chal.Qtz=Chalcedonic Quartz
Chl=Chlorite Cpx=Clinopyroxne Epi=Epidote Feld=Feldspar Hb=Hornblende
Hem=Hematite Kao=Kaolinite Lim=Limonite Opq=Opaque mineral Pl=Plagioclase
Py=Pyrite Qtz=Quartz Ser=Serisite Smec=Smectite Zeo=Zeolite Zir=Zircon

Table II-4-3 (a) Plished Sections

No.	sample No.	ore name	texture	minerals	remarks
1	UD-1 205.60m	Py ore	network-dissem. vein	Py:max.0.05mm (~0.1mm in vein)	
2	UD-1 245.10m	Py ore	undul.~collo.	Py:max.0.05mm	
3	UD-2 190.75m	Py-Cp-Tt-Sp-Mt vein	vein composed of Py	Py:max.0.3mm Cp:max.0.12mm Tt:max.0.15mm Sp:max.0.15mm Mt:max.0.3mm Cp,Tt,Sp droplets in Py	
4	UD-2 249.95m	Py ore	dissem.~network	Py:max.0.05mm	
5	UD-2 245.00m	Py vein	dissem. vein	Py:max.0.05mm Hem:max.0.8mm	
6	MD-4 060.87m	Py-Cp-Sp ore	dissem.(Py,Cp) vein(Py,Cp,Sp)	Py:max.0.2mm Cp:max.0.2mm Sp:~0.01mm Bo:~0.01mm Tt:~0.01mm Sp,Bo,Tt droplets in Py	
7	MD-4 064.73m	Py-Bo-Cp-Qtz vein	dissem.(Py,Bo,Cp) vein(Py)	Py:max.0.1mm Bo:0.05mm Cp:max.0.05mm Tt,Sp,Bo droplets in Py	
8	MD-4 184.40m	Py-Cp ore	dissem.	Py:max.0.25mm Cp:max.0.1mm	
9	MD-5 092.00m	Py-Po?-Di? ore	mosaic(Py)	Py:max.0.2mm Po?:max.0.2mm droplets in Py Di?:max.0.3mm Cp:max.0.01mm droplets in Py	

Table II-4-3 (b) Plished Sections

No.	sample No.	ore name	texture	minerals	remarks
10	ND-6 063.77m	Py-Sp ore	dissem.(Py) vein(Py)	Py:max.0.9mm Sp:max.0.07mm St:max.0.02mm	
11	ND-6 088.50m	Py ore	dissem.	Py:max.0.4mm Cp:max.0.02mm Sp:max.0.05mm St:max.0.02mm	
12	ND-6 119.30m	Py ore	dissem.	Py:max.0.1mm Hem:max.0.02mm	
13	AC-02-SR	Hem-Mn ore	network~filmy	Hem:max.0.01mm Mn:max.0.05mm collo.~oolitic Ru:max.0.02mm	

abbreviation : Bo=Bornite Cp=Chalcopyrite Di=Digenite Hem=Hematite
Mn=Mn oxide Mt=Magnetite Po=Polybasite Py=Pyrite
Qtz=Quartz Ru=Rutile Sp=Sphalerite St=Stannite
Tt=Tetrahedrite
collo.=colloform dissem.=dissemination
undul.=undulating flow structure

been identified in some samples.

4-1-3-2 Apiton Area

Kaolinite, diaspore and pyrophyllite are found in some samples. Abundant quartz and hematite are ubiquitous while some contain pyrite.

4-2 THIN SECTIONS

Thin sections of the drill core and the rock samples from the geochemical survey executed in Nipa Area were prepared. The rock samples from the trenches were avoided since all of them were strongly weathered. The resluts of the observation of the thin sections were tabulated in Table II-4-2.

4-2-1 Drill Core Samples

The rock from 5m depth of MJPP-2 hole in Mt. Upao Area was strongly argillized and showed tuffaceous texture. Intensely hematite stained andesitic rock around 61m of the same hole was strongly silicified, 10 to 20 microns quartz grains showing a mosaic texture and sericite filling in the periphery of the quartz grains.

Intensely pyritic andesite from 64.73m of MJPP-4 hole of Madarag Area was very strongly silicified and the original texture was completely lost. The rock at 146.70m depth was found to be holocrystalline, porphyritic hornblende andesite associating a few biotite. Hornblende and biotite were chloritized.

The rocks from 209.72m, and 219.25m of MJPP-5 hole in Madarag Area also were so strongly silicified that the texture resembled that of tuffaceous rock. The quartz-feldspar porphyry at around 239m of the same hole contained biotite, but they were completely chloritized.

In MJPP-6 hole in Nipa Area, the gossanous materials continued to 22m. Dacitic rock at 20m was found to show a texture of poorly sorted greywacke. Porphyritic andesite at 81m depth also showed sandy sedimentary texture, this could be an andesitic agglomerate. Fine grained andesite at 185m depth had abandant lath like plagioclase(100x300 microns) showing a trachytic texture. Quartz porphyritic rock at 235m was determined to be a highly sericitized greywacke.

4-2-2 Rock Samples from Geochemical Survey in Nipa Area

The rock samples collected for various tests were tabulated in Table II-4-4.

The rock from Puntales Area(PB-11SR) was strongly kaolinitized and sericitized, the cracks were filled by limonite.

Quartz bearing tuff breccia(AG-05NR) contained epidote. Quartz in the rock was found to be the product of silicification and showed a mosaic texture(0.2 to 1mm grains). Abundant alunite was found to exist together with quartz in the AA-05SR, and AL-07R samples. The original rock was hard to determine and inferred to be an andesitic pyroclastic rock.

4-3 POLISHED SECTIONS (Table II-4-3)

All but one sample examined were from the drill core.

Pyritic andesite in MJPP-1 hole in Nipa Area contained 5 to 10 microns, and 50 microns pyrite grains in dissemination.

Pyrite in quartz veins had larger dimension of 50 to 100 microns. Pyrite in "black vein" such as found at 245.10m of the same hole were consisted of anhedral, very fine grain size(5 to 10 microns).

At 245m in MJPP-2 hole, hematite replacing pyrite was observed in pyritic quartz veinlet.

The copper mineralization encountered in Madarag Area was found to be consisted of abundant pyrite, significant chalcopyrite and minor minute grained droplets of sphalerite, bornite and tetrahedrite(60.87m, MJPP-4). The sample from 64.73m also contained bornite together with chalcopyrite, but the sample at 184.4m did not.

The sample at 88.50m in MJPP-6 in Nipa Area contained 10 to 20 microns droplets of sphalerite, chalcopyrite and stannite in pyrite. Grain size of pyrite is 50 to 400 microns.

The rock sample collected in Apiton Area(AC-02SR) contained minute(<5 microns) hematite in network and impregnation showing colloform and oolitic textures.

4-4 HOMOGENIZATION TEMPERATURE OF FLUID INCLUSION

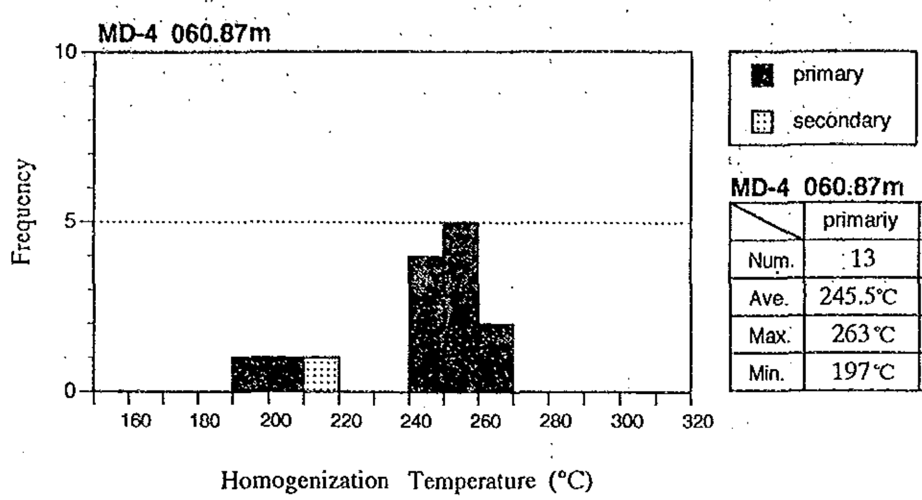
Nine specimens from the drill core were examined, but only two samples contained suitable inclusions. The results of the measurement were illustrated in Fig.II-4-1.

The sample from 60.87m of MJPP-4 hole in Madarag Area contained two phases of inclusions; one around 200 degrees C, and the other around 250 degrees C, the average being 245.5 degrees C.

The sample from 63.77m of MJPP-6 hole in Nipa Area contained higher temperatured gasseous inclusions(around 290-300 degrees C), and lower temperatured non-gasseous one(160, 180 degrees C). The average temperature was 285.5 degrees C.

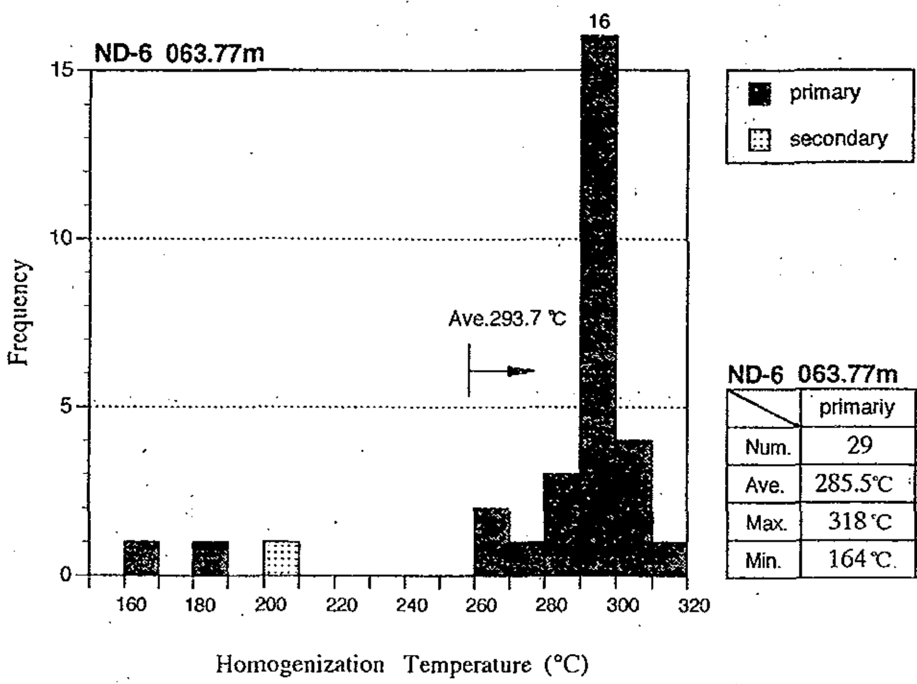
4-5 ASSAYING OF MINERALIZED MATERIALS

Twenty rock samples from the geochemical survey in Nipa Area were analysed for 12-elements as shown in Table II-4-5. The highest gold value depicted was 77ppb Au of AC-05SR samples in Apiton area. Many samples contained more than 10 percent of iron, indicating the existence of abundant limonite and hematite staining on the surface.



MD-4 060.87m

	primariy	secondary
Num.	13	1
Ave.	245.5℃	
Max.	263℃	213℃
Min.	197℃	



ND-6 063.77m

	primariy	secondary
Num.	29	1
Ave.	285.5℃	
Max.	318℃	202℃
Min.	164℃	

Fig. II-4-1 Homogenization Temperature Measurement of Fluid Inclusions

Table II-4-4 Rock Sample List

Geochemical Survey, Nipa Area

Sample #	Location	T.S.	P.S.	XRD	Assay	Remark
PB-11NR	Puntales			X	X	T.S.:Thin Section
PB-11SR	Puntales	X		X	X	P.S.:Polished Section
PC-05NR	Puntales			X		XRD: X-Ray Diffraction
PC-10SR	Puntales			X	X	Assay: Au, Ag, As, Sb,
PD-02SR	Puntales			X	X	Cu, Pb, Zn, Mo, Fe,
AB-03SR	MT.APITON	X		X	X	Mn, Hg, and Se
AC-00R	MT.APITON			X		
AC-07NR	MT.APITON			X		
AC-02SR	MT.APITON		X	X	X	
AC-05SR	MT.APITON			X	X	
AD-04NR	MT.APITON			X	X	
AD-05SR	MT.APITON			X	X	
AE-07NR	MT.APITON			X		
AE-05NR	MT.APITON			X	X	
AE-10SR	MT.APITON			X	X	
AF-05NR	MT.APITON			X		
AF-04NR	MT.APITON			X	X	
AF-02NR	MT.APITON			X	X	
AF-11SR	MT.APITON			X	X	
AF-19SR	MT.APITON			X	X	
AL-07R	MT.APITON	X		X	X	on Base Line
AL-09R	MT.APITON			X	X	ditto
AA-05NR	MT.APITON			X		
AA-03NR	MT.APITON			X	X	
AA00R	MT.APITON			X		
AA-02SR	MT.APITON			X		
AA-05SR	MT.APITON	X		X	X	
AG-05NR	MT.APITON	X		X	X	
AG-02NR	MT.APITON			X		
AG-01NR	MT.APITON			X		
AG-02SR	MT.APITON			X		
AG-08SR	MT.APITON			X		

Table II-4-5 Analytical Results of rock Samples, Nipa Area, 1992

Sample No.	Analytical Results											
	Au	Ag	As	Sb	Cu	Pb	Zn	Mo	Fe %	Mn	Hg	Se
AA-03NR	<1	<0.2	62	11.0	19	42	5	14	4.70	40	10	3.8
AA-05SR	6	<0.2	4	0.8	9	61	2	1	0.30	20	10	<0.2
AB-03SR	4	0.8	170	7.0	17	80	10	7	9.00	160	30	11.4
AC-02SR	6	<0.2	62	3.0	2	70	3	2	6.70	<5	240	2.8
AC-05SR	77	0.3	120	15.0	28	63	5	<1	13.20	10	40	32
AD-04NR	2	<0.2	14	0.2	8	<1	4	<1	2.90	5	20	1.0
AD-05SR	<1	<0.2	24	11.2	2	2	3	1	8.70	5	10	1.2
AE-05NR	<1	<0.2	12	0.2	16	5	2	2	1.60	<5	10	2.0
AE-10SR	16	<0.2	44	2.2	44	12	3	3	5.00	<5	20	7.8
AF-02NR	6	<0.2	40	0.2	74	8	25	5	16.60	5	10	7.8
AF-04NR	1	<0.2	30	0.2	64	6	9	4	18.40	10	10	5.4
AF-11SR	14	<0.2	4	0.2	23	12	3	1	6.00	<5	10	5.4
AF-19SR	4	<0.2	2	0.2	12	<1	4	<1	9.00	130	10	4.8
AG-05NR	<1	<0.2	2	0.2	1	2	1	2	1.50	<5	10	1.2
AG-07SR	3	<0.2	22	1.0	<1	49	<1	<1	1.40	5	10	1.2
AL-09R	5	<0.2	52	0.4	2	3	2	2	3.50	<5	60	2.2
PB-11NR	<1	<0.2	2	0.2	325	3	9	3	10.00	20	10	5.2
PB-11SR	<1	<0.2	4	0.2	44	4	55	2	3.60	900	10	0.4
PC-10SR	6	0.3	14	0.2	11	<1	3	1	2.50	20	10	4.6
PD-02SR	<1	<0.2	2	0.2	59	2	87	1	>20.00	320	10	2.2

Au, Hg in ppb; Fe in %; other elements in ppm