# PART III Conclusions and Recommendations

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## PART III Conclusions and Recommendations

#### **Chapter 1 Conclusions**

The Survey of during the first year leads the following conclusions.

There are three main prospects in the Survey area; the La Guanaca, the Rinconada, and the Central Prospects. These prospects may represent parts of the zonation related to a porphyry copper style mineralized system. Deeper parts of a zoned porphyry copper mineralized system could be expected at deeper levels of the La Guanaca prospect and in the deep parts of the Rinconada prospect.

Therefore, the areas around the three main prospects are the targets for the next stage of the Survey.

Chapter 2 Recommendations

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Based on the conclusions summarized above for the first years Survey, the following drilling program is recommended for the second phase of the Survey.

1. Drilling of the deeper parts of the Rinconada Prospect.

2. Drilling of the deeper parts of the Central Prospect.

3. Drilling of the deeper parts and around the La Guanaca Prospect.

## References

Alaıcon, B. F., 1993, Estudio petrografico-Calcografico:Proyecto No. 196-Guanaca, III
Región, ENAMI, Santiago, pp.28.
Cornejo P. P., Mpodozis C. M., Ramírez C.F.R., and Tomlinson, A. J., 1993,
ESTUDIO GEOLOGICO DE LA REGION DE PORTERILLOS Y EL
SALVADOR(26°-27°Lat.S). SERVICIO NACIONAL DE GEOLOGIA Y
MINERIA, CORPORACION NACIONAL DEL COBRE DE CHILE, pp. 469.
ENAMI, 1995, Proyecto la Guanaca, III Región-Chile,pp.7.
Godoy, L.G. and Gonzalez, W.F., 1994, Mina la Guanaca. Informe sobre el resultado de
los sondahes de polvo. ENAMI, Gerencia Regional III – Región. pp. 18.
Gustafson, L. B., and Hunt, J. P., 1975, The porphyry copper deposit at El Salvador,
Chile: ECON. GEOL., v. 70, p. 857-912.
Lang, J. R. and Eastoe, C. J., 1988, Relationships between a porphyry Cu-Mo deposit,
base and precious metal veins, and Laramide intrusions, Mineral Park, Arizona:
ECON. GEOL., v.83, p.551-567.
Mawó, J.C., 1993, Estudio de diagnostico específico geología y topografía mina la
Guanaca 1 al 600. ENAMI, Gerencia Regional III Región, Copiapó. pp.9.
Marcó , J.C., 1993, Informe prospecto la Guanaca. ENAMI, Gerencia Regional III
Región, Copiapó. pp. 8.
Mercado, M. W., 1978, Mapas geologicos preliminares de Chile. Avance geologico de
las hojas Chañaral y Potrerillos, Region de Atacama. Escara 1:250,000 - Institute
de Investigaciones Geologicas, Inscripcion No.48005, pp.24.
Mpodozis, C., and Ramos, V., 1990, The Andes of chile and Argentina: Circum-Pacific
Council for Energy and Mineral Resources, Earth Science Series, v. 11, p.59-90.
council for thirty white him that reconnects, that the open council, y. 11, p.05-00.
Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia
Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia
Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.
Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7. Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de</li> </ul>
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.</li> </ul>
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.</li> <li>Ortíz, F. J., Lowell, J. D., Bratt, J. A., Rojas, N. D., and Burns, P. J., 1986; Escondida</li> </ul>
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.</li> <li>Ortíz, F. J., Lowell, J. D., Bratt, J. A., Rojas, N. D., and Burns, P. J., 1986; Escondida porphyry copper deposit, II Región, Chile: history of the discovery, <i>in</i> Mining</li> </ul>
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.</li> <li>Ortíz, F. J., Lowell, J. D., Bratt, J. A., Rojas, N. D., and Burns, P. J., 1986; Escondida porphyry copper deposit, II Región, Chile: history of the discovery, <i>in</i> Mining Latin America: London, Institution of Mining and Metallurgy, p.319-331.</li> </ul>
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.</li> <li>Ortíz, F. J., Lowell, J. D., Bratt, J. A., Rojas, N. D., and Burns, P. J., 1986; Escondida porphyry copper deposit, II Región, Chile: history of the discovery, <i>in</i> Mining Latin America: London, Institution of Mining and Metallurgy, p.319-331.</li> <li>Potter, r. W., H, Clynne, M. A., and Brown, D. L., 1978, Freezing point depression of</li> </ul>
<ul> <li>Münchmeyer, C. F., 1992, Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.</li> <li>Neumann, H. J., 1973, Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.</li> <li>Ortíz, F. J., Lowell, J. D., Bratt, J. A., Rojas, N. D., and Burns, P. J., 1986; Escondida porphyry copper deposit, II Región, Chile: history of the discovery, <i>in</i> Mining Latin America: London, Institution of Mining and Metallurgy, p.319-331.</li> <li>Potter, r. W., H. Clynne, M. A., and Brown, D. L., 1978, Freezing point depression of aqueous sodium chloride solutions: ECON. GEOL., v. 73, p. 284-285.</li> </ul>

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#### References

1. Coggon J.H.(1971) : Electromagnetic and Electrical Modeling by the Finite Element Method. Geophysics, Vol. 36, No. 1, 115-132

2. Rijo Luiz(1977) : Modeling of Electric and Electromagnetic Data. PhD. Thesis. University of Utah.

3.Fink, J.B., Stemberg, B.K., McAlister, E.O., Wieduwilt, W.G. and Ward, S.H.(1990) : Induced polarization, applications and case histories, Soceity of Exploration Geophysics, Investigations in Geophysics, Vol.4

4. Interpex limited(1996) : RESIX IP2DIv3 User's Manual

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de fuente controlada en el proyecto Guanaca, III Región, Chile para Empresa Nacional de Minería. Quantac Geofisica Ltda.pp.17.

- Sillitoe, R. H., 1992, Gold and copper metallogeny of the Central Ándes Past, Present, and Future exploration objectives: ECON. GEOL., v. 87, p. 2205-2216.
- Sillitoe, R. H., and Mckee, E. H., 1996, Age of supergene oxidation and emichment in the Chilean popphyry copper province: ECON. GEOL., v. 91, p. 164-179.
- Thompson, J. F. H., 1993, Application of deposit models to exploration, *in* Kirkham, R. V., Sinclair, W. D., Thorpe, R. I., and Duke, J. M., eds., Mineral deposit modeling: Geological Association of Canada, Special Paper 40, p.51-67.
- Titley, S. R., 1993, Characteristics of Porphyry Copper Occurrence in the American Southwest : *in* Kirkham, R. V., Sinclair, W. D., Thorpe, R. I., and Duke, J. M., eds., Mineral deposit modeling: Geological Association of Canada, Special Paper 40, p.433-478.
- Vila, T and Sillitoe, R. H., 1991, Gold-rich porphyry system in the Maricunga belt, Northern Chile: ECON. GEOL., v. 86, p. 1238-1260.

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## **APENDICES**

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Appendix 1 Existing data list

[Documents]

- P.Cornejo P., C.Mpodozis M., C.F.Ramirez R., and A.J.Tomlinson(1993): ESTUDIO GEOLOGICO DE LA REGION DE PORTERILLOS Y EL SALVADOR(26°-27°Lat.S).
- SERVICIO NACIONAL DE GEOLOGIA Y MINERIA,CORPORACION NACIONAL DEL COBRE DE CHILE.pp.469.
- Godoy, L.G. and Gonzalez, W.F.(1994):Mina la Guanaca. Informe sobre el resultado de los sondahes de polvo. ENAMI, Gerencia Regional IIIRegion. pp. 18.
- Ridout, M. and Powell, J(1993):Informe geofisico de estudio de audiomagnetotelurica de fuente controlada en el proyecto Guanaca, IIIRegion, Chile para Empresa Nacional de Mineria. Quantac Geofisica Ltda.pp.17.
- ENAMI(1995): Proyecto la Guanaca, III Region-Chile, pp.7.
- Marco, J.C. (1993): Estudio de diagnostico especifico geologia y topografia mina la Guanaca 1 al 600. ENAMI, Gerencia Regional III Region, Copiapo. pp.9.
- Marco, J.C. (1993): Informe prospecto la Guanaca. ENAMI, Gerencia Regional III Region, Copiapo. pp. 8.
- Alarcon, B.F. (1993): Estudio petrografico-Calcografico: Proyecto No. 196-Guanaca, III Region. ENAMI, Santiago. Pp.28.
- Neumann,H.J.(1973): Prospecciones en la region de el Salvador reconocimientos preliminares. III Parte Insutitute de Investigaciones Geologicas, Division de Exploraciones. pp.10.
- Münchmeyer, C.F. (1992): Propiedad la Guanaca 1-600. CODELCO-CHILE-Grencia de Exploraciones. pp.7.
- Mercado, M.W. (1978): Mapas geologicos preliminares de Chile. Avance geologico de las hojas Chañaral y Potrerillos, Region de Atacama. Escara 1:250,000 Institute de Investigaciones Geologicas, Inscripcion No.48005, pp.24.

[maps]

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- · Geographical map 1:500,000;COPIAPO 2600-6815 2 sheets
- · Geographical map 1:250,000;EL SALVADOR 2600-6900
- · Geographical map 1:50,000;MOSTAZAL 2630-6930

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· Geographical map 1:50,000;PORTAL DEL INCA 2615-6930

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· Geographical map 1:50,000;SAN ANDRES 2645-6930(original)

· Geographical map 1:50,000;LLANO SAN PEDRO DE CACHIYOYO 2630-

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· Geographical map 1:50,000;ESTACION LLANTA 2615-6945

· Geographical map 1:50,000;INCA DE ORO 2645-6945

· Mining concession map 1:50,000;

Trail map of aerial photograph 1:250,000

#### [Photographs]

• aerial photographs 1:40,000 prints

 $\cdot$  aerial photographs -1:40,000 photographic possitive film

· Landsat image

· JERS-1dataOPS358

· JERS-1dataOPS678

## Appendix 2

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## Bulk composition of rock

sample No.	2554	2558	2714	571B	16220			
rock name	Ga	Ga	And	271B And	103021	137509	137515	137616
najer(1)	† <u></u>		N	A00	643	643	643	Ba
SiO2	57.74	57.28	49.33			·		
Ti02	0.8	0.83	0.86	50.9	61.52	63.05	63.62	55.32
A1203	16.74	16.91	· • · · · · · · · · · · · · · · · · · ·	0.83	0.67	0.59	0.61	1.15
Cr203	0	0	14.61	14.27	15.64	16.43	16.2	16.93
Fe203	6.65		0.01	0.01	0	0	0	0
Nn0	0.05	6.55	7.45	7.12	5.82	4.98	4.97	7.77
	<u>+</u>	0.2	0.12	0.14	0.03	0.1	0.12	0.09
Ea0	2.15	2.31	6.7	6.67	2.51	2.09	2.12	3.2
N320	4.14	3.8	6.07	6.53	4.96	4.43	4.23	4.3
N320	3.45	3.11	3.72	3.65	3.5	3.83	3.56	4.5
	4.21	5.53	2.05	1.95	2.34	2.94	3	1.95
P205	0.24	0.23	0.31	0.23	0.17	0.15	0.15	0.3
101	2.23	1.69	7.21	7.44	1.51	0.65	1.03	3.02
Total	98.61	98.44	98.41	93.8	99.73	99,24	99.67	98.53
trace(ppm)								
B3	1190	1625	550	570	709	990	800	440
Pb	124	142	86	- 82	88	94	94	96
Sr	430	438	572	586	458	452	416	302
No	8	8	6	6	18	14	14	8
<u>ک</u> ۲	192	201	114	111	120	165	150	150
<u> </u>	20	20	16	16	20	20	18	24
BEE(ppm)				Τ				
<u></u>	<u>no</u>	60	60	no	18	22	19	
Ce	no	RO	rio.	ca	42	45	42	00
Fr	60	nə	60	no	4.6	5.6	5.2	50
<u>NJ</u>	00	RO	ло	ng	21	22	22	no
Sne	no	กอ	£0	по	3	4	4	no
Eu	no	ເດ	 D0	no	1	1		60
ઉત્ર	(ci)	00	DØ	DO	3	3.8		no
16	£0	ר הס	10		0.7	0.6	3.6	<u></u> 0
Dy	00	ħΟ	ດດ	no	3.5	3.5	0.5	N
Ко	RO	on a	no	no NO	0.6	0.6	3	00
Er	no	no	ло	no	1.5		0.6	TK)
Tm	ĐO	RO	 09	ло Гю	0.3	1.5	1.5	<b>n</b> o
1b	ħ0	no		ño i	1.8	0.3	0.2	no –
Ľu	B)	ր <u>յ</u>	FiQ	no	0.2	1.5	1.5	F0
к	42100	55300	20500	19500		9.0	0.3	no
Norm(%)				13300	23100	29100	30000	19500
Q	10.42	7.41	0.1	2.05	f0 a7			
c				c.vJ	18.47	17.78		8.51
or	24.83	32.68	12.11	11 52				0.32
ab	29.19	26.32	31.43	11.52	13.83	17.37	17.73	11.52
an	17.76	15.85		30.89	29.62	32.41	30.12	38.03
		13,03	17.11	16.79	22.78	18.96	19.36	19.37
10			6.58	8.85		0.3		
			3.53	4.75		0.16		
fs -	··		3.05	4.1		0.14		
	5 30							
	5.36	5.75	13.61	12.51	6.25	5.07	5.28	7.97
en il	5.36	5.75	13.61	12.51	6.25	5.07	5.28	7.97
<u>i1</u>	0.43	0.43	0.26	0.3	0.19	0.21	0.26	0.19
tua	6.65	6.55	7.45	7.12	5.82	4.98	4.97	7.77
tn	0.86	1.06	1.78	1.65	0.5	1.17	0.45	
<u>ru</u>	0.23	0.17			0.35		0.29	1.05
ар	0.58	0.53	0.72	0.67	0.39	0.35	0.35	0.7
total	95.36	96.75	91.23	92.35	98.21	38.6	93.53	95.51

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sample No.	137618	137620	137632	96110418	96110419	96110420	96110421	96110422
sample No.	03	M	N	Ag	М	M	B3	NJ
Si02	53.58	61.36	74.56	68.44	59.81	59.76	57.21	56.06
Ti02	1.33	0.88	0.24	0.49	0.93	0.94	1.05	1.03
A1203	18.09	15.95	12.77	13.61	15.69	15.87	15.82	15.83
Cr203	0	0	0	0	0	0	0	0 ·
Fe203	8.64	5.98	1.04	2.99	5.62	5.8	6.99	6.79
<u>Mn0</u>	0.07	0.12	0.06	0.05	0.11	0.12	0.12	0.13
MgO	1.6	1.83	0.58	1.03	2.34	2.55	3.55	3.25
CaO	5.74	3.7	2.65	1.97	3.96	3.29	5.96	5.49
N320	3.26	3.8	1.68	1.98	3.72	3.19	3.23	3.76
K20	3.35	3.88	4.25	6.33	4.32	4.59	3.04	3.71
P205	0.43	0.22	0.06	0.1	0.27	0.25	0.27	0.26
LOI	2.18	1.22	1.17	1.41	2.01	2.22	1.43	2.22
Total	38.27	98.91	99.06	98.41	93.78	93.58	98.67	93.52
Pa	. 670	655	c20					
Ba Rb	<u> </u>	935	675	620	650	705	600	555
r Sr	334	114 276	126	340	195	208	122	178
Nb	10	12	230	128 18	404	414	402	374
Zr	276	303	189	318	14	14	16	14
<u>ү</u>	42	38	22	310	246 26	237	270	254
REE(pom)			<sup>2</sup>				26	26
La	 no	ло	no	167.57	8.11	200	86.49	
Ce	50	<u>го</u>	no	134.38	8.33	159.38	68.75	72.97 62.5
fr	no	T.O		107.14	9.23	157.14	57.14	52.14
Nd	ho	no	no	91.55	8.45	122.54	46.48	42.25
Sa	no	n0	ľi0	54.35	10.43	77.83	24.35	23.91
Eu	Fr0	no	лQ	24.44	7.78	50	14.44	14.44
િત	no	no	Гю)	50.65	9.35	47.74	20.32	19.03
Tb	no	DO.	no	46.67	10	33.33	15	13.33
Dy	no	no	60	50	9.21	26.05	13.16	13.95
Ho	00	ħØ	60	50	8.89	22.22	11.11	8.89
Er	no	ĥÔ	no	62	10	20	10	12
Ta	no	00	no	EŨ	7.5	15	7.5	10
<u>1</u> Ъ	nə	rio	T:0	64.8	6.8	16.8	7.2	9.2
Lu	no	то	00	50	10	15	10	7.5
К	33500	38800	42500	63300	43200	45900	30400	37100
Sorn								
<u> </u>	8.5	14.78	42,15	27.22	11.4	13.49	11.24	6.31
<u> </u>			0.73	0.16		0.27		
- 10	19.8	22.93	25.12	37.41	25.53	27.13	17.97	21.93
ab	27.59	32.15	14.22	16.75	31.48	26.99	27.33	31.82
an	24.83	15	12.75	9.12	13.35	14.69	19.69	15.36
					1.34		3.84	5.53
- WO				.	0.72		2.06	2.97
- En fc					0.62		1.78	2,56
fs	3.00							
	3.99	4.56	1.44	2.57	5.21	6.35	7.06	5.53
<u>en</u>	3.99	4.56	1.41	2.57	5.21	6.35	7.06	5.53
hm 1	0.15	0.26	0.13	0.13	0.23	0.26	0.26	0.28
hna to	8.64	5,98	1.04	2.99	5.62	5.8	6.99	6.79
tn	0.59	1.35	0.57		1.98		2.24	2.17
TU 3D	1.01	0.19	0.17	0.42		0.8		
ap	96.1	0.51 97.71	0.14 97.89	0.23 97	0.63 96.77	0.58 96.36	0.63	0.6

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Appen				/1008			1210	J110		ie ĉ	jid	11I(O	NCI K	CKS	5				
Total	2000	2000	2000	2000	2000	2000		2000	2000	2000		2000	2000	2000	0000	0007	2000	2000	2000
beio	61	49	47	89	68	8			17	46		02	8	42		41	87 8	39	- 84
silicate total	1939	1951	1953	1932	1932	1967		OBET	1983	1954		1930	1920	1958	10401		1952	1961	1952
maffic total	390		19.84%		17.86% 400	20.70% 208	10.57%	4.42%		260	13.31%	387 20.05%			13.48%	13.43%	547 22 00%		371
Maf	;			•	br index 201	pr index 74	r index	ind						2017 3	r index	r index	57 - inder	23	color index
Cab	0	16 16	color 4	color 2	color 14	100	color	color	10	0	color	0  color	4	0	color 0	color	0	5	0
Çpx	0	0	63	102	0	9		5	0	0		0	0	0		,	21	0	- 
QDX	0	0	0	0	0	0	c	,	ö	<b> </b> -	(	0	0	-	6		0	0	0
Ч	222	109	69	24	181	104		;	0	0		101	96	106	ß		220	117	213
Bio	0	14	- 26	49	4	24			0	~		3	28	154	46		168	136	152
felsic total	1549	1564 80 164	1730	1587	06.14%	1759	89.43% 1902	95.58%	1882  94.91%	1694	85.69%	79.95%	1764 91 882	1694	80.32%	86.57%	1505  77.10%	1685 85 93%	1581
Kf	446	608	411	378	732	660	972		1029	1037	400	* 70	752	214	140		121	259	162
Id	1026	689	1092	1126	708	881	370		245	212	1072	0 0 0	770	1118	1134		1031	986	1157
Q Z	22	267	227	8	32	218	560		TTC	445	146	4	242	362	422			438	262
crassificat ion on the geological map	PW	Ad	Ad	ру	PW	РЧ	Ag -		ž	Ag	×	: :	E	A (	Gd1	642	,	6d3	Gd4
	137911	96110419	96110420	96110421	96110422	137946	6-1		2	96110418	137621	000401	13/020	257	137796	137769	101	137515	6-8

## Appendix 3

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Modal composition of the granitoid rocks

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$\begin{array}{c c c c c c c c c c c c c c c c c c c $	sample No	Au(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	137759	2.5				1			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						05			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $								the second se	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				1					6
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				6					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	the second se				and the second s				
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		The second se				<u>_</u>			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	· · · · · · · · · · · · · · · · · · ·					<u> </u>	3		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $								and the second s	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				the second se		2			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						<u> </u>			V
$\begin{array}{c c c c c c c c c c c c c c c c c c c $								0.4	38
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$		- Hard and a state of the state	And the second s					1	28
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						0.5			30
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				i		1		0.1	20
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									40
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				and the second second		0.5			55
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									60
$\begin{array}{c c c c c c c c c c c c c c c c c c c $							0.5	0.4	14
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				10		2	70	1	2450
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						1	348	0.2	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $			0.1	10	142	2	0.5	0.4	
16250.11320.50.50.14518250.14750.50.50.50.19824250.112560.520.63626250.13060.50.51.427832.50.411190.50.50.2382132.50.11210271.2782272.50.161510.51.8552332.50.261650191020.124002362.50.118121210.2871375042.50.181770.50.50.4121375062.50.216291121.61081375252.50.11251141621375172.50.1822160.4681375522.50.1847240.1401376072.50.11250.50.2341375142.50.1847240.1401376072.50.1847240.1401376072.50.1847240.140137615			0.1	10	18	1	10		
18       25       0.1       4       75       0.5       0.5       0.1       98         24       25       0.1       12       56       0.5       2       0.6       36         26       2.5       0.1       30       6       0.5       0.5       1.4       27         83       2.5       0.4       1       119       0.5       0.5       0.2       38         213       2.5       0.1       12       10       2       7       1.2       78         227       2.5       0.1       6       15       1       0.5       1.8       55         233       2.5       0.2       6       1650       19       102       0.1       2400         236       2.5       0.1       18       121       2       1       0.2       87         137504       2.5       0.1       8       177       0.5       0.4       12         137507A       2.5       0.1       20       17       1       4       1.2       40         137517       2.5       0.1       8       22       1       6       0.4       68	16	2.5	0.1	1	32	0.5			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	18	2.5	0.1	4	75	and the second s			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	24	2.5	0.1	12					
33 $2.5$ $0.4$ $1$ $119$ $0.5$ $0.5$ $0.2$ $38$ $213$ $2.5$ $0.1$ $12$ $10$ $2$ $7$ $1.2$ $78$ $227$ $2.5$ $0.1$ $6$ $15$ $1$ $0.5$ $1.8$ $55$ $233$ $2.5$ $0.2$ $6$ $1650$ $19$ $102$ $0.1$ $2400$ $236$ $2.5$ $0.1$ $18$ $121$ $2$ $1$ $0.2$ $87$ $137504$ $2.5$ $0.1$ $8$ $177$ $0.5$ $0.4$ $12$ $137506$ $2.5$ $0.2$ $16$ $29$ $1$ $12$ $1.6$ $108$ $137507A$ $2.5$ $0.1$ $20$ $17$ $1$ $4$ $1.2$ $1.6$ $108$ $137525$ $2.5$ $0.1$ $12$ $2$ $0.5$ $0.4$ $44$ $137507$ $2.5$	26	2.5	0.1						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	83								The second se
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	213			12			7		
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$\begin{array}{c c c c c c c c c c c c c c c c c c c $			*				102		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						5			130
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									TAN DALLAND
$\begin{array}{c c c c c c c c c c c c c c c c c c c $						2	2		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $									
137629         2.5         0.1         12         3         2         5         0.2         19           137632         2.5         0.1         10         14         2         8         0.2         43           137634         2.5         0.1         26         51         2         14         1         92           137641         2.5         0.1         6         240         1         0.5         0.6         37           137643         2.5         0.1         38         23         1         0.5         2.2         36           137645         2.5         0.1         20         14         1         0.5         0.8         62           137645         2.5         0.4         12         176         1         8         1.6         94						1			
137632         2.5         0.1         10         14         2         8         0.2         43           137634         2.5         0.1         26         51         2         14         1         92           137634         2.5         0.1         26         51         2         14         1         92           137641         2.5         0.1         6         240         1         0.5         0.6         37           137643         2.5         0.1         38         23         1         0.5         2.2         36           137645         2.5         0.1         20         14         1         0.5         0.8         62           137645         2.5         0.4         12         176         1         8         1.6         94		2.5	0.1			2			
137634         2.5         0.1         26         51         2         14         1         92           137641         2.5         0.1         6         240         1         0.5         0.6         37           137643         2.5         0.1         38         23         1         0.5         2.2         36           137645         2.5         0.1         20         14         1         0.5         0.8         62           137646         2.5         0.4         12         176         1         8         1.6         94	137632	2.5							
137641         2.5         0.1         6         240         1         0.5         0.6         37           137643         2.5         0.1         38         23         1         0.5         2.2         36           137645         2.5         0.1         20         14         1         0.5         0.8         62           137646         2.5         0.4         12         176         1         8         1.6         94	137634					2			
137643         2.5         0.1         38         23         1         0.5         2.2         36           137645         2.5         0.1         20         14         1         0.5         0.8         62           137646         2.5         0.4         12         176         1         8         1.6         94					To and the second se				
137645         2.5         0.1         20         14         1         0.5         0.8         62           137646         2.5         0.4         12         176         1         8         1.6         94						; -			
<u>137646</u> <u>2.5</u> <u>0.4</u> <u>12</u> <u>176</u> <u>1</u> <u>8</u> <u>1.6</u> <u>94</u>									
107050 0.0 74	The second se								
137659 2.5 0.1 8 9 1 10 0.6 75	137659	2.5	0.4	8	9	<u>-</u>   -			

# Appendix 4 Results of chemical analysis of samples from geochemical survey

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sample No A	u(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Shlann	7.()
137660	2.5	0.1	22	75		1	Sb(ppm)	Zn(ppm)
137662	2.5	0.1	18	81		13		88
137663	2.5	0.2	32	146		8	0.8	78
137665	2.5	0.2		the second se	0.5	20	1	68
137668	2.5	0.2		15		5	1.4	60
137675	2.5	0.1	24	305	2	10	1.8	52
137678	2.5		16		4		2.2	54
137679	2.5	0.1	12	26	0.5	12	0.8	70
137680		0.1	10	33	1	10	0.4	55
	2.5	0.1	10	37	1	19		29
137681	2.5	0.1	4	13	0.5	6	0.4	25
137689	2.5	0.1	10	184	2	37	0.6	360
137701	2.5	0.6	4	830	2	0.5	0.6	48
137704	2.5	0.1	6	26	1	0.5	0.0	40
137710	2.5	0.1	20	63	1	20	3.2	
137712	2.5	0.1	1	81	2	37		135
137714	2.5	0.1	6	46	<u>2</u>		0.2	50
137718	2.5	0.2	6	145	2	0.5	0.6	· 28
137730	2.5	0.1	10	22	2	11	!	98
137731	2.5	0.1	1	56		2	1.8	86
137824	2.5	0.1	18	<u>30</u> 10	1	8	0.4	48
137827	2.5	0.1	10	and the second se	1	12	1.6	50
137828	2.5	0.1	10	26	1	1	0.2	26
78	2.5	0.1		16	1	3	3.8	68
137736	2.5		!}-	35	1	33	0.6	70
137738	2.5	0.1	![		2	7	0.2	7
137740		0.1	1	48	1	0.5	0.4	48
	2.5	0.1	1	4	1	9	0.4	10
137741	2.5	0.1	6	52	2	2	0.8	36
147745	2.5	0.1	18	25	0.5	11	0.8	112
137748	2.5	0.1	16	21	2	12	1.6	68
137749	2.5	0.1	10	7	0.5	3	0.4	60
137741	2.5	0.1	1	8	2	6	0.4	65
137909	2.5	0.1	6	102	0.5	0.5	0.1	
137910	2.5	0.1	24	9	0.5			62
137914	2.5	0.1	30	21	0.5			53
137920	2.5	0.1	1	100	0.5	14	1	44
137940	2.5	0.1	6	22			0.4	145
96102403	2.5	0.1	30	48		0.5	0.2	58
06102404	2.5	0.1	18		··	9		232
6102508	2.5	0.1	12	68	<u></u> ł	8	1.4	168
6102512	2.5	0.1		50	1	10	0.2	78
6102515	2.5	0.1	1	15	2	2	0.6	66
61	2.5		6	42	2	3	0.8	56
63	2.5	0.1	4	39	0.5	0.5	0.1	50
65		0.1	6	33	0.5	0.5	0,1	30
	2.5	0.1	12	275	0.5	0.5	0.8	27
69	2.5	0.2	1	32	0.5	4	0.2	72
71	2.5	0.1	Î	17	0.5	8	0.4	60
79	2.5	0.1	1	32	0.5	0.5	0.2	62
82	2.5	0.1	4	10	0.5	2	0.2	
91	25	0.1	26	255		4		70
92	2.5	0.1	6	19			1.8	113
93	2.5	0.1	6	30		0.5	0.4	54
94	2.5	0.1	14	3		0.5	0.1	9
95	2.5	0.1			0.5	0.5	0.4	60
97	2.5	0.1	10	28	<u> </u>	0.5	0.1	47
98	2.5	0.1	22	15	0.5	0.5	1.4	50
					11	1	0.4	87

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sample No	Au(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
99	2.5	0.1	8	26	1	87	0.2	125
257	2.5	0.2	4	57	1	12	0,1	15
259	2.5	0.1	4	88	2	31	0.2	56
262	2.5	0.1	4	8	1	0.5	0.1	17
264	25	0.1	1	59	1	5	0.1	150
267	2.5	0.1	54	21	1	0.5	0.8	23
278	2.5	0.1	1	300	0.5	3	0.1	27
300	2.5	0.1	1	9	í	0.5	0.1	55
137569	2.5	0.4	14	230	0.5	22	0,1	138
137577	2.5	0.1	6	184	1	0.5	0.1	170
137580	2.5	0.1	4	16	1	2	0,1	78
137581	2.5	0.1	10	210	0.5	17	0.1	150
137582	2.5	0.1	1	65	1	8	0.1	62
137583	2.5	0.1	1	52	1	0.5	0.1	53
137584	2.5	0.1	8	62	0.5	0.5	0.1	52
137585	2.5	0.1	12	70	0.5	11	0.1	120
137588	2.5	0.1	12	24	1	9	1	28
137594	2.5	0.1	1	8	0.5	0.5	0.1	15
137596	2.5	0.1	8	5	1	0.5	0.2	105
137597	2.5	0.1	14	· 9	2	3	0.8	94
137709	2.5	0.1	4	50	1	6	0.8	68
137713	2.5	0.1	1	6	2	0.5	0.4	105
137724	2.5	0.1	1	19	2	0.5	0.2	60
137728	2.5	0.2	1	63	1	60	6.4	90
137899	2.5	0.1	i	27	2	13	0.1	26
137931	70	0.4	6	600	2	98	0.8	276
137657	2.5	0.1	í	28	0.5	4	0.1	9
137677	2.5	0.1	10	67	0.5	7	0.2	24
285	2.5	0.2	10	116	1	24	0.8	74
286	2.5	<u>0,1</u>	8	83	2	32	0.6	83
137508	2.5	0.1	6	62	2	15	0.8	63
137624	2.5	0.1	18	157	2	18	1.2	78
137625	2.5	0.1	14	115	2	11	1	75
137636	2.5	0.1	18	116	2	14	.0.8	100
137637	2.5	0.1	10	78	2	14	0.6	72
137638	2.5	0.1	12	90		12	0.6	82
137639	2.5	0.1	10	69	1	12	0.8	- 72
137640	2.5	0.1	16	129	2	10	8.0	58
137711	2.5	0.1	14	105	2	14	0.8	76
137734	2.5	0.1	14	153	2	15	1	72
137834	2.5	0.1	4	69	4	7	0.8	42
137695	2.5	0.1	20	38	2	14	0.6	50
137735	2.5	0.1	8	101	1	11	1	74
96110418	2.5	0.1	1	40	2	10	0.8	43
137554	2.5	0.1	4	175		13	0.1	48
137812	35	0.1	28	56	0.5	0.5	1.8	50
137818	10	0.1	18	54	0.5	0.5	0.6	30
137820	5	0.1	16	22	1	18	1	29
137838	10	0.1	8	92	2	0.5	0.4	33
137843	2.5	0.1	8	63	1	14	0.4	90
137844	15	0.1	12	26	0.5	4	0.6	43
137856	2.5	0.1	6	35	0.5	0.5	0.1	35
137858	2.5	0.1	6	27	2	0.5	0.1	24
137894	2.5	0.1	1	14	2	<u>7</u>	0.1	65
137895	2.5	0.1	1	74	3	7	0.2	30

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sample No A	Au(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
137526	2.5	0.1	4			1		50
137527	2.5	0.1	1	58	1	2		31
137752	2.5	0.1	6		1	5		3
137764	2.5	0.1	1	42	1	4		4
137765	2.5	0.1	1	33	0.5	7	0.2	33
137767	2.5		1	12	2	3	0.2	4
137773	2.5	0.1	1	50	2	10	0.2	
137792	2.5	0.1		43	<u>_</u>	2	0.2	3
137795	2.5	0.1	1	8	1	5		9
137796	2.5	0.1	1	11	1	4	0.2	7
137797	2.5	0.1		16	1	4	0.4	6
137548	2.5	0.1	4	56	2		0.2	
137912	2.5	0.1		30	0.5			4
137912H	2.5	0.1	6			0.5	0.2	1
137913	2.5	0.1	8	<u> </u>	0.5	0.5	0.2	2
137924	2.5		8	39	0.5	0.5	0.2	18
		0.2	10	153	1	3	0.2	4
<u>137937</u> 137941	10	0.1	12	81	1	2	0.4	7
	2.5	0.1	14	107	0.5	7	0.8	6
137946	10	0.1	10	86	2	7	0.1	4
57	2.5	0.1	4	72	0.5	2	0.2	5
62	2.5	0.1	6	125	0.5	0.5	0.1	3
	2.5	0.1	1	121	0.5		0.1	3
85	2.5	0.1	1	56	1	9	0.1	5
275	2.5	0.1	1	73	0.5	9	0.1	3
281	2.5	0.1	1	75	1	2	0.1	2
137557	2.5	0.1	10	89	2	5	0.1	4
137809	40	0.1		10	1	2	1.2	5
137871	2.5	0.1	20	196	2	11	0.2	6
137891	2.5	0.1	1	76	1	8	0.1	4
137840	2.5	0.1	8	81	0.5	· 21	0.2	7
137837	2.5	0.1	6	109	1	0.5	0.2	5
137563	2.5	0.1	6	51	2	2	0.1	4
137564	2.5	0.1	6	42	1	0.5	0.1	3
137823	2.5	0.1	10	16	2	6	0.2	
137539	2.5	0.1	20	31	0.5	6	0.1	4
137544	2.5	0.1	44	58	1	3	2.4	2
137546	2.5	0.1	10	23	1	9	0.4	4
137670	2.5	0.1	1	52	2	12	0.1	3
137755	2.5	0.1	94	340	2	5	1.2	4
137757	2.5	0.1	1	2	<u>_</u> 1	0.5	0.2	2
137760	2.5	0.1	14	33	1	0.5	0.2	3
137761	2.5	0.1	1	4	' 1	0.5	0.0	3
137530	215	30	130	22700	15	145	5	12
137516	2.5	0.1	4	74	13	23	0.1	
137517	2.5	0.1	20	13	1		0.1	7(
137518	2.5	0.1	20	10	<u> </u> 1	<u>5</u> 2		3
103006	2.5	1.2	4	7200			0.8	2
103008	2.5	2.8	4	9200	10	0.5	1.0	6
103008			THE R. LEWIS CO., LANSING MICH.		15	0.5	0.2	7
	2.5	0	0	0	0	0	0	
103014	2.5	0.4	1	1300	3	0.5	0.1	3
103015	2.5	0.1	8	690	1	0.5	0.1	4 <sup>,</sup>
103021	2.5	0.1	1	92	2	0.5	0.1	34
103022	2.5	0.1	1	210	1	0.5	0.1	3:
103024	2.5	0.2	4	850	1	0.5	0.1	34
	2.5	0.2	6	800	2	2	0.1	6

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sample No	Au(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
103026	2.5	0.2	4	49	1	0.5	<u>, 0,1</u>	28
103032	2.5	0.8	8	2200	<u>'</u>	0.5	0.1	65
103034	2.5	3.2	18	770	385	2	0.1	
103035	2.5	0.3	58	1050	146	0.5	4.6	3
137528	2.5	0.1	0	550	140	<u> </u>		9
137529	2.5	0.1	<u>'</u>	45	1	0.5	0.1	55
137537	2.5	0.1		47	2	220	0.1	· 27
137762	2.5	0.1	<u>_</u>		2		0.6	800
137763	2.5	0.1	'	53		0.5	0.1	46
137543	2.5	0.1		200		0.5	0.1	40
137985	2.5	0.1	12		2	6 0.5	0.1	47
137954	15	0.1	18	240	2		0.4	29
96102815	2.5	0.2	10	15	2	4	0.2	50
137611	2.5	0.1	6	13	!		1	178
137612	2.5	0.1	14	13	2	5	0.1	22
137620	2.5	0.1	4	122	2	0.5	0.2	43
137621	2.5	0.1	10	26		5	0.1	26
137778	2.5	0.1	1	20	1	12	0.4	66
137779	2.5	0.1	!	<u>24</u> 26	1	5	0.6	72
137781	2.5	0.1	4		2	0.5	0.2	32
137783	2.5	0,1	4	14	1	2	1.2	150
137800	10	0.1	4	106	2	12	0.2	18
137906	2.5	0.1		9	2	11	2.4	70
137930	2.5	0.1			0.5	52	1.2	206
137932	40	0.1	41 1		0.5	2	0.2	48
137935	2.5	0.2	<u> </u>	11	I	6	0.4	48
137939	125	0.1	18	13	0.5	3	0.2	25
137944	40	0.1	18	38		/	0.6	96
137949	15	0.1	10	112	0.5	0.5	0.6	72
137996	2.5	0.1	8	126	0.5	9	1.2	95
137998	2.5	0.1	8	6		3	0.6	42
96102501	2.5	0.1	8	215	0.5	0.5	0.2	63
96102504	2.5	0.1	6	<u> </u>	0.5	3	0.1	
96102505	2.5	0.1	6	8	0.5	0.5	0.2	2
96102506	2.5	0.1	8	23	2	4	0.2	22
96102507	2.5	0.1	and the second se	<u> </u>	3	5		11
96102509	2.5	0.1	18 14	7	2	3	0.2	8
96102510	2.5	0.1				6	0.2	22
96102513	2.5	0.1	6	5	4	- 1	0.4	4
96102514	2.5	0.1	6		6	26	0.2	19
137522	2.5	0.1	12	<u>38</u> 12		5	0.4	75
137523	2.5	0.1				0.5	0.8	43
137541	2.5	0.1	<u>14</u> 10	18	<u>  </u>	5	1.8	45
137542	2.5	0.1		17		6	<u> </u>	48
137589	2.5	0.1		24	2	0.5	0.2	24
137595	2.5	0.1	12	6		0.5	0.4	35
137595	2.5		10	12	0.5	2	0.1	30
		0.1	40	36	1	3	0.6	136
137682	25	0.1	<u>!</u>	15	0.5	5	0.4	32
137686	2.5	0.1	8	2	1	2	0.2	34
137691	2.5	0.1	8	12	0.5	7	0.1	35
137692	25	0.1	6	18	1	4	0,1	28
137693	2.5	0.1	8	7	1	4	0.2	27
137903	2.5	0.1	12	25	2	0.5	0.8	26
137907	2.5	0.3	22	255	0.5	11	1.2	100
137928	2.5	0.3	2	245	1	0.5	0.4	58

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A-10

sample No	Au(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
137943			4	300		0.5		98
80			1	191	0.5	2	Commence of the second s	<del>5</del> 6
221	2.5	0.5	10	940		4		130
266		0.6	8	245		5	0.2	165
137770	2.5	0.1	1	27	3	10	0.2	6
137790	2.5	0.1	10	12		0.5	0.4	120
137801	2.5	0.2	1	147	2	20	0.2	52
137805	2.5	0.2	1	178	3	2	0.2	56
96110401		0.1	1	7	2	4	0.6	55
96110410		0.1	1	18	2	14	0.4	93
a-5	2.5	2.7	4	320	2	62	1	242
<u>c-1-a</u>	2.5		4	210	2	82	2	205
<u>c-1-b</u>	2.5		1	220	I	100	0	214
d-4	2.5	2	1	820	2	110	1.4	270
e	2.5	0.1		139	1	3	1	68
e-8	2.5	6.2	4	375	2	167	1.8	280
f-2	2.5	10.8	4	610	2	9650	0	212
g-1	2.5	6.5	1	1280	1	170	2.4	285
g-7	2.5	3.6	4	900	2	70	1.2	195
<u>h-2</u>	2.5	3.4	1	1050	1	140	1.2	206
<u>h-3</u>	25	2.8	1	1900	1	530	2.2	315
h0515	15	0.4	20	1100	2	13	2.2	110
<u>Z-1</u>	2.5	0.1	1	11	1	5	0.4	100
Z-2 Z-3	2.5	0.2	!	25	2	4	0.4	83
Z-3 Z-7	2.5	0.1		16	1	13	0.6	26
Z-9	<u> </u>	· 0.1	1	19	1	3	0.2	70
Z-10	2.5	0.1		53	2	6	0.4	114
Z-11	2.5	3.6	1	20	2	6	0.8	80
2-13	2.5	0.1	2	620	2	. 74	1.6	160
Z-14	2.5	0.1	2	<u>26</u> 26	2	6	0.2	65
Z-17	2.5	0.1	2	30	<u>-</u>	<u>13</u> 25	0.2	90
Z-18	2.5	0.1	4	31	<u> </u>	36	0.2	63
Z-19	2.5	0.1	1	39	2	30		<u>102</u> 58
Z-20	2.5	0.2		67	<u>_</u> 1	42	1.4	270
Z-24	2.5	0.1	i	17	1	3	2	
Z-26	2.5	0.1	i	24	2	19	0.4	<u>96</u> 55
i-3	2.5	4.6	1	360	0.5	125	1.4	285
k~3	2.5	7.7	4	2800	0.5	120	<u></u> 11	60
L-4	2.5	13.6	2	1650	0.5	5300	1.4	215
<u>N-4</u>	2.5	0.8	1	92	0.5	166	2	170
RO-0	2.5	0.5	1	235	1	130	0.8	103
205	405	43	20	6690	5	560	5	260
206	430	3	20	365	2.5	95	5	190
0	2.5	0.1	1	101	0.5	5	0.1	64
2	2.5	0.1	1	48	0.5	0.5	0.1	44
H7	2.5	0.1	1	36	0.5	5	0.1	36
J9	2.5	0.1	1	26	0.5	8	0.1	50
GCA12A	2.5	0.1	4	78	0.5	3	0.1	28
GCA12B	2.5	0.1	1	121	0.5	8	0.4	420
54	2.5	0.1	6	34	0.5	19	1	50
55	2.5	0.1	6	61	0.5	2	1.2	51
81	2.5	0.1	1	4	0.5	0.5	0.2	66
86	2.5	0.1	1	31	1	5	0.4	40
87	2.5	0.1	4	27	1	11	0.1	41

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A-11

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sample No	Au(oph)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
	2.5	0.1	1	22	0.5	7	0.1	37
88 89	2.5	0.1	4	23	0.5	0.5	0.2	116
	<u>2.5</u> 115	0.1	1	33	2		0.8	55
90	2.5	0.1	4	49	<u> </u>	28	0.1	63
270	2.5	0.1		36	1	32	0.1	150
282		0.1	4	42	2	14	0.1	50
283	2.5	0.1		10	2	8		75
293	2.5		4	35	0.5	20		53
296	2.5	0.1	4					26
298	2.5	0.1	4	f		21	0.6	67
137697	2.5		4			3		102
137699	2.5					310	1	180
RO-0	10		1				0.8	
RO-1	. 2.5				\$			
RO-3	2.5		+					212
RO-3-2	2.5							
RO-4	15							250
RO-4-2	175							
RO-5	2.5						and the second s	
RO-6	2.5			50				
R0-7	2.5							the second se
RO-8	2.5					and the second se		
RO-9	10							and the second s
RO-10	2.5							
R0-11	2.5		the second se					
RO-12	2.5			180				
RO-13	2.5			1 7				
RO-14	2.5			2 1050				
RO-15	2.5		· · · · · · · · · · · · · · · · · · ·	3				
RO-16	2.5			1	the second se			
X-3	2.5			2 {				
X-6	2.5			4 20		the second se		
X-7	2.5			1 1				
X-9	2.5	and the second s		1 14				
X-11	2.5			1 20				
X-13	2.5		- Internet	2 1				
X-14	2.5			1 2			<u> 0.4</u>	
X-16	2.			1 1				
X-18	2.			<u>1 - 1</u>			2 0.4	
X-20	2.			1 1		·	2	86
X-21	2.			2 6		1 10		
X-23	2.			2 1			B <u>0.</u>	
X-25	2.			4 2		2 1		
X-27	2			1			6 0.4	
X-29	2.			1 1		-	7 2:	
X-32	2.	5 0.	second statements in the second statement of the secon				3 0.	
Y-3	· 2.			2 3		2 1		
Y-5	2.		1	2		1 1		
Y-6	2		1	1			<u>3 0.</u>	
Y-7	2.			1			3 0.	
Y-9	2			1 3			0 0.	
Y-10	2.			1 1	2		4 0.	
Y-12	2				3	1	3 0.	
Y-14	2						5 0.	6 140
Y-16	2				0	1	5 0.	8 75
		5 0.		1 1	7 0	-1	9 0.	

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A-12

sample No	Au(ppb)	Ag(ppm)	As(ppm)	Cu(ppm)	Mo(ppm)	Pb(ppm)	Sb(ppm)	Zn(ppm)
Y-18	10	0.1	1	5	0.5	4	0.6	
Y-19	2.5	0.1	4	9	1	8	0.4	74
Y-20	2.5	0.1	1	12	1	13	0.6	114
Y-21	2.5	0.1	2	31	1	4	1.2	124
Y-23	2.5		1	4	1	6	1	144
137810	15	0.1	10	24	. 1	4	0.8	50
137815	20	0.1	22	58	2	0.5	0.8	11
137846	2.5	0.1	6	51	3	55	0.6	186
137850	2.5	0.1	1	12	0.5	6	0.4	33
137853	2.5	0.1	1	47	0.5	0.5	0.2	35
137854	2.5	0.1	1	79	0.5	68	3.8	125
137855	2.5	0.1	1	33	0.5	11	0.4	37
137857	2.5	0.1	8	10	1	5	0.1	20
137861	2.5	0.1	4	28	1	6	0.1	17
137866	2.5	0.1	1	53	1	23	1	180
137870	2.5	0.1	1	74	2	65	0.8	120
137876	2.5	0.1	4	36	2	6	0.6	110
137882	2.5	0.1	1	15	2	5	0.1	36
137884	2.5	0.1	4	84	1	12	0.2	32
137885	2.5	0.1	6	92	2	24	0.2	58
137890	2.5	0.1	4	34	2	. 14	0.1	40
137896	2.5	0.1	4	40	. 2	13	0.2	17
137898	2.5	0.1	10	66	1	104	0.2	185
137602	2.5	0.1	1	145	2	0.5	0.1	42

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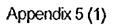
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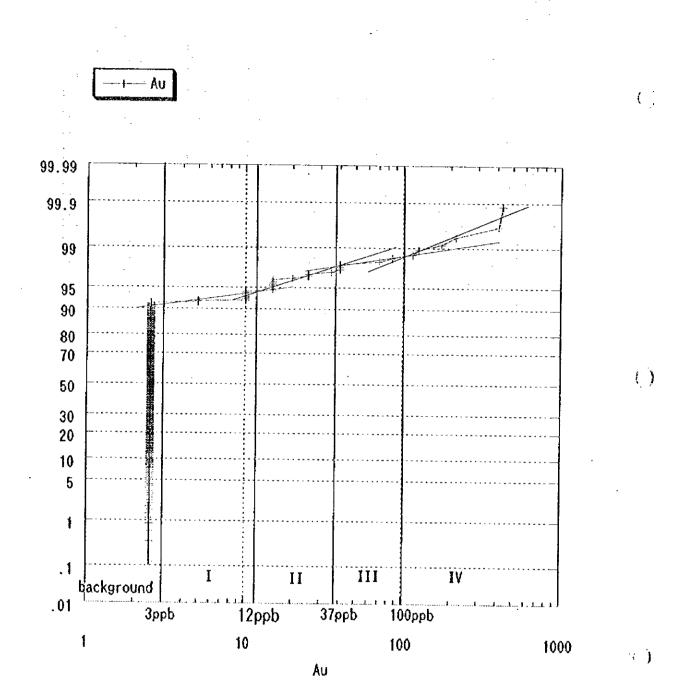
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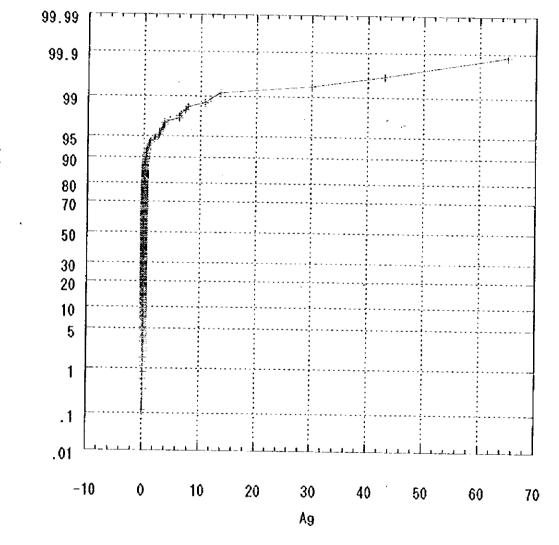
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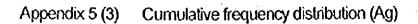


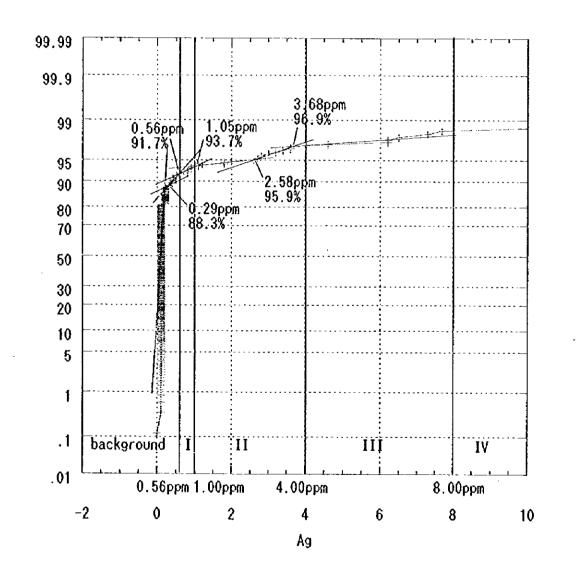


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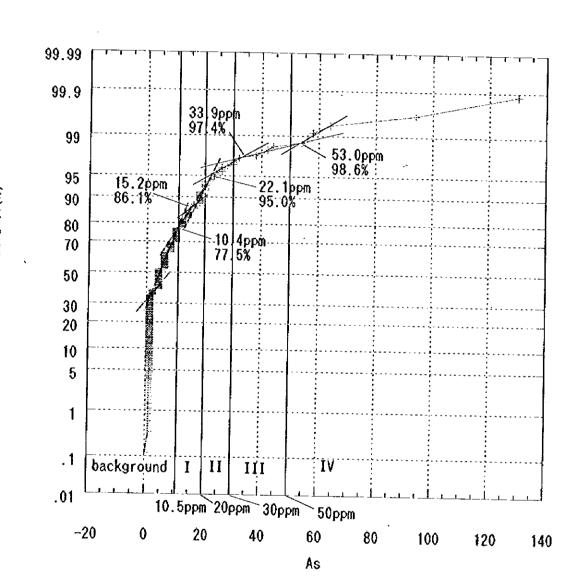


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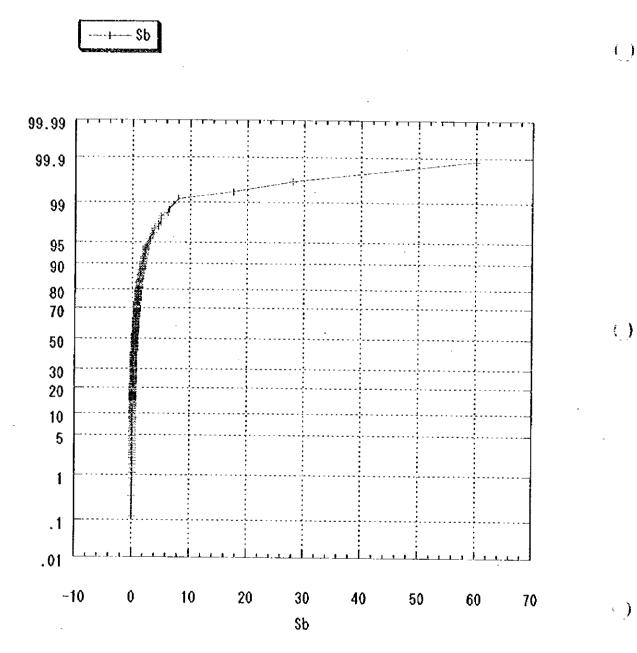
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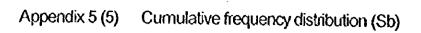
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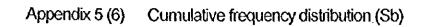
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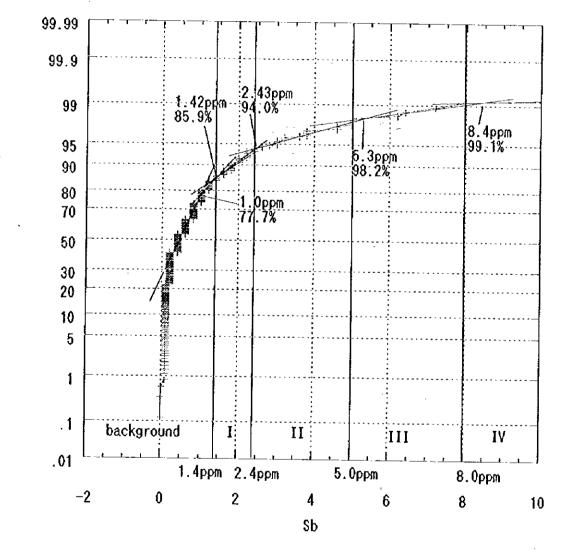




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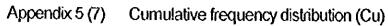
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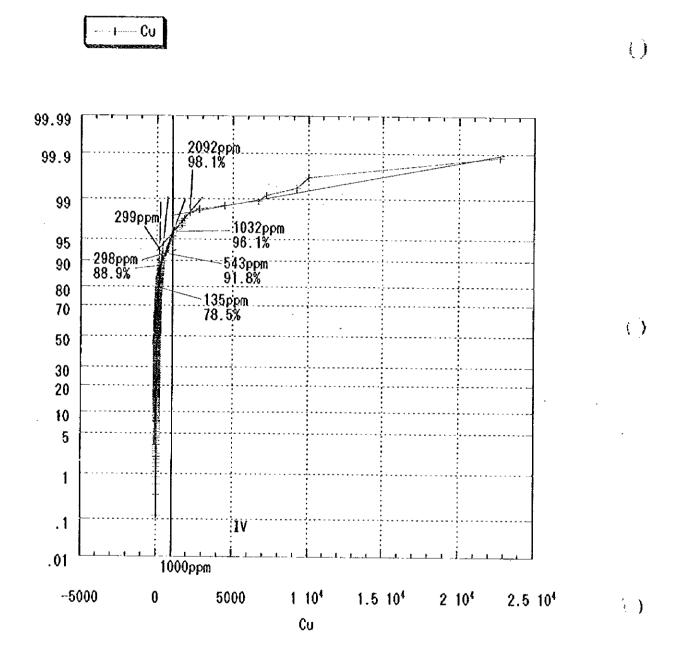
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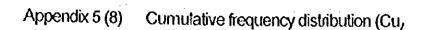
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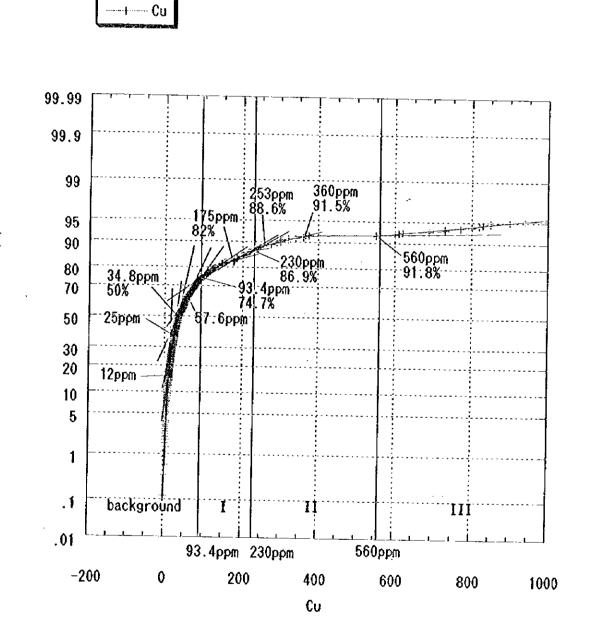
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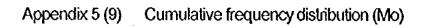


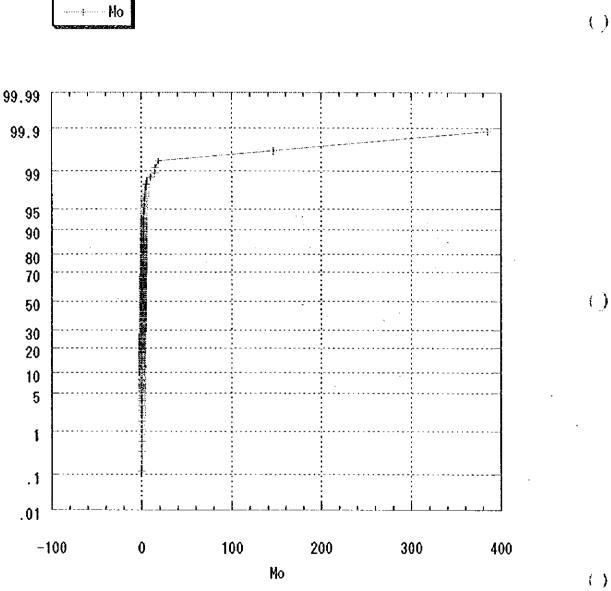
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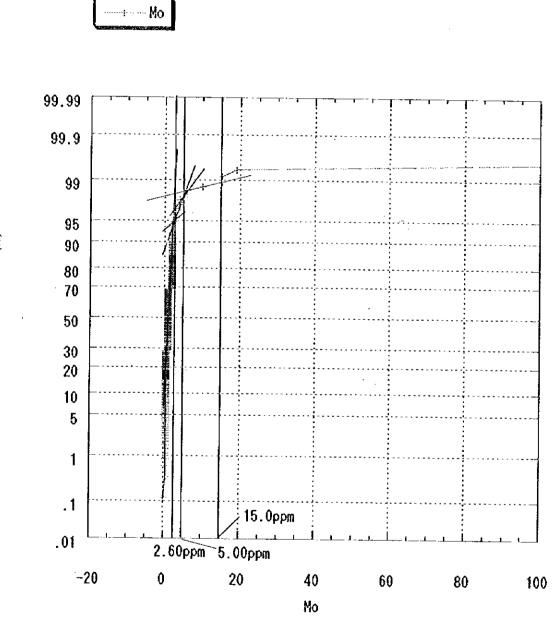
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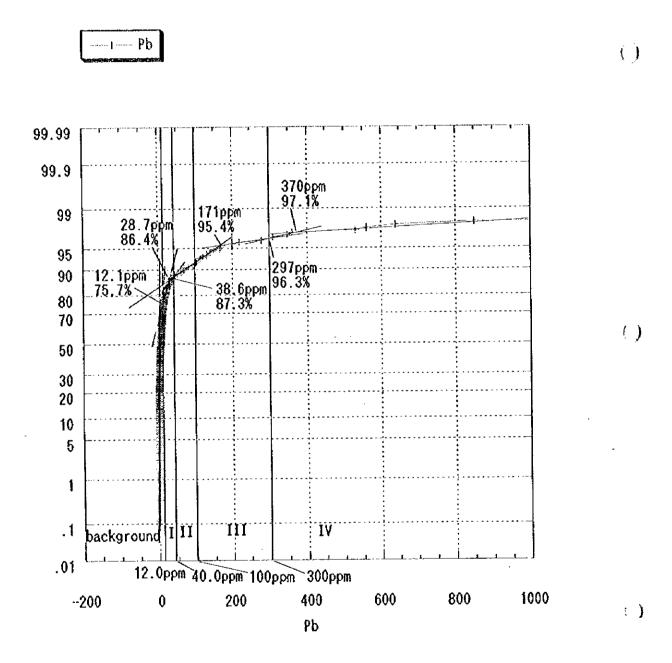


CUMULATIVE FREQUENCY(%)

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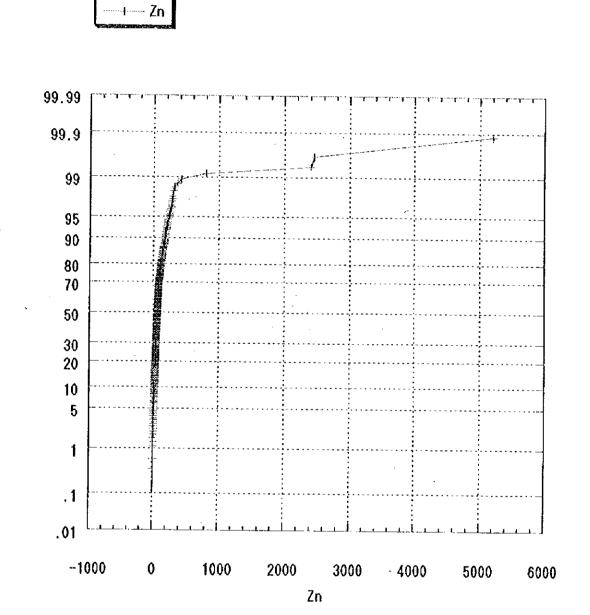
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Appendix 5 (11) Cumutative frequency distribution (Pb)

CUMULATIVE FREQUENCY(%)

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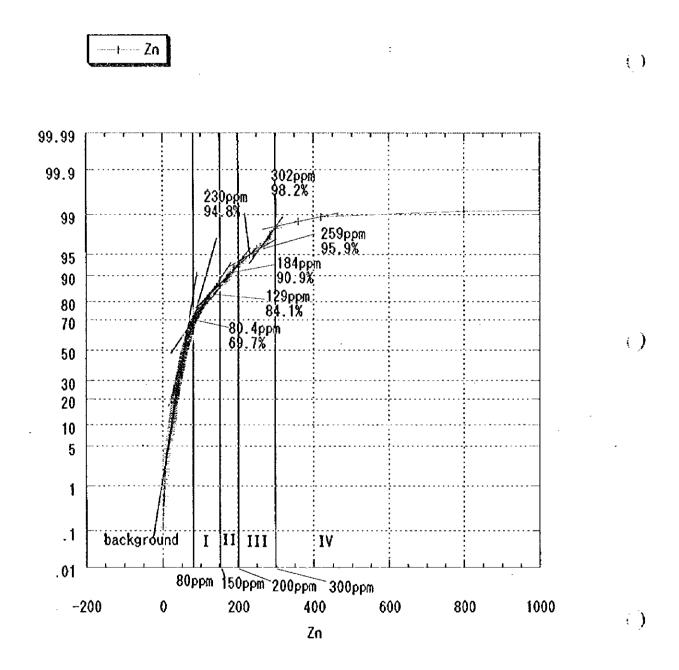


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mineral (d	number)	peak height fro	om background	(dimennsio	n:chart divisions)
	· · · · · · · · · · · · · · · · · · ·	© : (much)	O:(middle)	$\triangle$ : (little)	· : (trace)
Quartz	(3.34)				
cristbalite	(4.05)	100<	99~50	49~10	< 1 0
trydimite	(4.27)		· ·		
feldsper	(3.17)	4 0 <	39~20	19~10	< 9
k-feldsper	(3.3)	2 0 <	1 9~1 0	9~5	< 5
albite	(3.2)		· .		
sericite	(10.1)		· · ·		
chlorite	(7.1)			-	
smectite	(15.15)	· · · ·			
kaolinite	(7.18)	2 0 <	19~10	$9 \sim 5$	< 5
pyrophyllite	(3.04)				
halloysite	(4.42)			•	
laumontite	(9.49)				
clinoptilolite	(8.93)	45<	19~10	$9\sim 5$	< 5
mordenite	(3.48)			-	
heulandite	(7.89)				
alunite	(2.99)				
natro-alunite	(3.08)	2 0 <	44~20	19~10	< 1 0
jarosite	(3.07)				
hornblende	(8.4)	2 0 <	19~10	9~5	< 5
augite	(3.31)				
pyrite	(2.71)				
hematite	(2.7)	10<	9~5	4~3	< 3
goethite	(4.18)				
siderite	(3.52)				

# Appendix 6 Criteria for the assignment of symbols to X-ray diffraction analysis X-ray attatched sheet is made by following standard of X-ray relative strength

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## Results of X-ray powder diffraction analysis

C/S; chlorite-smectite interlayer clay mineral

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|                                  | s/a                   |         | Γ       | ſ        | T         |             | Π       |              |         |          | 1          |          |     |    |            | ┢         | ╞         | t            | T  | ╞━       |                    |          |                  |         |          |         |          | -               | 1               | eral tr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| rals                             | <b>\$/</b> \$         |         |         |          |           |             |         |              |         |          |            |          |     |    |            |           |           |              |    |          |                    |          |                  |         |          |         |          |                 |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| n<br>L<br>L<br>L                 | atizyollar            | ·       | ļ       | L        | <b> </b>  |             |         |              |         |          | _          |          |     | _  |            | 1         |           |              |    |          |                    |          |                  |         |          | -       |          |                 |                 | av n                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| aine                             | ojijoid               | I       |         | -        | _         | Ц           |         |              | _       | _        | _          |          | _   | _  |            | +         |           |              | L  |          |                    |          |                  |         |          |         |          |                 |                 | 12 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| silicate minera<br>clay minerals | kaolinite<br>smeetite |         | ┠       | $\vdash$ | -         | $\parallel$ |         |              | 4       | 4        | 4          | ┦        | -   | -  | ╀          | ╉         | 1         | -            | ŀ  | <b> </b> | Ŀ                  | 0        | Ц                | L.,     |          | ٠       |          | _               | <u></u>         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| 50                               | ehinife               |         | 1       | -        | <u></u>   | Ô           | -       | <u>©</u>     | <u></u> | ୍ଚ       | • (        | <u>a</u> | . 1 | ត់ | <u></u>    |           | -         |              | ŀ  | 4        | $\left  - \right $ | -        | 0                |         | 0        |         | 0        | ᅱ               |                 | ter⊳                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
|                                  | sericițe              |         |         |          |           | ©<br>©      |         | چ<br>ح       | 4       |          | <u>o</u> ľ | •        | -1  | j  | Ť          | _         | *<br>1    | ╀            | ╞  | ╞        | 0                  |          | H                | 2       | -        |         | 4        | _               | Ô               | t ggi.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| ۲ <sup>8</sup>                   | ətidlə                |         |         |          | f         | F           |         | -1           | -†      | ╉        | ╧╋         | ╉        | ╀   | -  | ╉          | $\dagger$ | ┨         | ╀            | ╞╴ |          | Ħ                  | Η        |                  |         |          | Ť       | Ť        | -               | 6               | © 1 10 0 1 1 1 1 1 0 0 0 1 1 1 1 1 0 0 0 1 much 0 1 middle △ 1 little • S/S:sericite-smectite interlayer clay min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| teldspar                         | k-feldspar            | <u></u> |         |          |           | Η           | ĝ       |              |         | ĉ.       | ି          | 1        | ତ   | ╋  | 3          | 6         | $\dagger$ | 0            | 0  |          | H                  | Ĉ        | 6                |         | ·        |         | •        | 9               |                 | © O P                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
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| licate                           | - əfimtbiri           | _       |         |          | $\square$ |             |         |              |         |          | 1          |          | I   | 1  | Τ          | T         | Τ         | Γ            |    |          |                    |          |                  |         |          |         |          | 1               |                 | eric                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| lic                              | eristobalite          |         |         |          |           |             |         |              |         |          |            |          |     |    |            |           |           |              |    |          |                    |          |                  |         |          |         |          |                 | Ι               | 11111111111111111111111111111111111111                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |  |
| 5                                | <b>sj</b> ienp        | Ô       | <u></u> | <u></u>  | 2         | <u>©</u>    | <u></u> | <u>ି</u>     | -       | -        | 4          | 4        | ₽   | 1  | <u>)</u> ( | 23        | 1         | 4            | ⊲  | .ĝ       | 0                  |          | 0                | <u></u> | 9        | 0       | Î        | ŝ               | Ţ               | ୖୖୖୖୖୖୖୖ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |
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|                              | e əjiyənin                            | -<br>1   | ╉          | ╉        | ╉         | ╋        | -      | ╉          | ╉        |             | ╉          | ╉          | ╉         | ╀         | ┢        | ╀         | -  | +        | -         | -         | { .                                                                                                                  |
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| other<br>minerals            | ethite solution                       | -        | +-         | ╏        | -         | ╈        | ╉      | ╋          | t        | ╉           | ┽          | ╋          | ┢         | ╉         | ╋        | ┢         | ╋  | +        | ╉         |           | $\{\cdot\}$                                                                                                          |
| n tr                         | - əsejeur                             | -        | -          |          | $\dagger$ | ╈        | ╈      | ╋          | ╈        | ╋           | $^{+}$     | ╋          | ╈         | ╉         | ╀        | +         | +  | -        | ╉         | ╈         |                                                                                                                      |
| 7                            | ej i j tener                          | _        | +-         | T        | Ť         | ϯ        | ╋      | ╀          | t        | ╋           | ╀          | ╉          | t         | ╀         | ┢        | ╀         | ╉  | ╋        | ╀         | ╋         | - 1                                                                                                                  |
|                              | oyrite                                |          | Ť          | ╞        |           | t        | ┢      | ╋          | ╊        | t           | ╈          | ┢          | ╋         | ╀╴        | ┢        | ╋         | +- |          | +-        | +-        |                                                                                                                      |
| ate                          |                                       | t        | t          | t        | t         | 1        | ╋      | ┢          | ┢        | 1           | ╈          | $\dagger$  | $\dagger$ | ╋         | ┢        | $\dagger$ | ╀  | Ť        | ╋         |           |                                                                                                                      |
| carbonate<br>minerals        | eficolot                              | Ţ        | T          | t        | 1-        | Ť        | t      | ╀          | t        | t           | t          | ϯ          | $\dagger$ | $\dagger$ | ┢        | ╀         | ϯ  | ╋        | $\dagger$ | 1-        | 1 3                                                                                                                  |
| car<br>mir                   | etiolso                               | •        | T          | Ť        | T         | 1        | t      | ┢          | 1.       | t           | ┢          | t          | t         | ╀         | t        | ╀╴        | 1- | 1-       | $\dagger$ | +         | ©:much O:middle ∆:little •:trace<br>S/S:sericite-smectite interlayer clay minemal 0/S · shlomito_cmontite interlated |
| tte<br>Mis                   |                                       | Γ        | T          | T        | Ť         | T        | T      | T          | T        | T           | T          | 1          | T         | ┢         | t        | t         | 1  | t        | t         | 1-        |                                                                                                                      |
| sulphate<br>minerals         | unsqx3                                |          | ŀ          | I        | T         | 1        | T      | 1          | T        | 1           | T          | T          | t         | t         | 1-       | ╞         | t  | 1-       | 1         | ╋         |                                                                                                                      |
| Su)<br>B                     | alunite                               | Γ        | Γ          |          | Γ         |          |        | 1          | T        | T           | ľ          |            | t         |           | T        | t         | ╞  | t        | 1         | 1         |                                                                                                                      |
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| others                       | grossylat                             |          |            | L        | L         |          |        |            |          | Γ           | Γ          | Γ          |           | Γ         | Γ        | ſ         | T  |          | 1-        | T         | 1 4                                                                                                                  |
| -                            | hor nol end                           | L        | L          |          |           |          |        |            |          |             | Γ          |            |           |           |          | Γ         | T  | Τ        | ľ         |           |                                                                                                                      |
| Ð                            | əfidlife                              |          |            |          | L         |          |        |            |          |             |            |            |           |           |          | Γ         |    |          | T         | Τ         |                                                                                                                      |
| zeolite                      | estitace                              | F        |            |          |           |          |        |            | L        |             |            |            |           |           |          |           | Γ  |          | Γ         | Т         |                                                                                                                      |
| 260                          | etinebrom                             | <u> </u> | L          | L        | L         | ŀ        |        |            |          |             |            | L          |           |           |          |           | ſ  |          | Γ         |           | 9                                                                                                                    |
|                              | efilolitqonilo                        | ⊢        | L          |          |           | L        |        | L          |          |             |            | L          |           |           |          |           |    | Γ        | Γ         | Ċ         | : trace                                                                                                              |
| s                            | s/o                                   | L        | L          | L        | Ļ         | L        | L      |            |          | L           |            |            |           |           |          |           |    | Γ        | Γ         |           | د نب [<br>2 •• [                                                                                                     |
| icate minerals<br>V minerals | \$/\$                                 |          | _          | Į.,      | L         | L        | Ļ      |            | Ŀ        | ŀ           | L          | L          |           |           |          |           | Ĺ  |          |           |           | ] · `                                                                                                                |
| ral                          | halloysite                            |          | L          | <b>İ</b> |           | L.       |        |            | _        |             |            | <b> </b>   |           |           |          |           |    |          |           |           | : little                                                                                                             |
| tine                         | etite bioto                           | _        |            |          |           |          | L      | L          | L        |             | L          | L          |           | L         | L        | Ĺ         |    | L        | L         |           | itt<br>'                                                                                                             |
|                              | ejijojae                              | ļ        |            | ŀ        | ŀ         | Ŀ        | L      | <u> </u> . | L        | L           | L          | Ŀ          | Ŀ         | Ŀ         | ŀ        | Ŀ         | ŀ  |          | L         |           |                                                                                                                      |
| 돌려                           | kaolinite                             | L_       |            | L        | L         | <b> </b> | _      | L          | <b> </b> |             | L          | Ļ          | L         | Ц         | Ĺ        | <b>[</b>  | L  | L        | L         |           | <u>،</u> ک                                                                                                           |
|                              | chlorite<br>                          |          | Ľ          | •        | ŀ         | <b> </b> | •      | ŀ          |          |             |            | L          | _         | <b> </b>  |          |           | Ŀ  | Ŀ        | Ŀ         | ⊴         | 11e                                                                                                                  |
|                              | sericite                              | •        | <b> </b> - | Ŀ        | ┡         |          | Ŀ      | Ŀ          |          | L           | L          | Ŀ          | <b> </b>  | $\square$ | •        | Ŀ         | Ŀ  | L        | Ŀ         |           | O:middle ∆<br>te-smertite ;                                                                                          |
| feldspar                     | alidie<br>etidie                      |          |            |          | -         |          |        |            |          |             | Ĺ          | -          |           |           |          | _         | Ļ  | Ļ        | -         | $\square$ |                                                                                                                      |
| eld                          | k-feldspar                            |          |            |          |           |          |        |            | -        | ۵           | ĵ)<br>O    | 9          | <u> </u>  |           | <u>C</u> | 0         |    |          |           |           | O, ŧ                                                                                                                 |
| - 1                          | feldspar<br>feldspar                  | ୍        | 0          | 9        | S<br>-    | Q.       | 0      | 0          | Ĉ        | Ċ           | 0          | ŝ.         | Ĉ         | 9         | 0        | Ô         | 9  |          | 9         | Ĵ         | - a - c<br>- c                                                                                                       |
| cat                          | etim(bin)                             |          |            |          |           |          |        |            | Ц        |             |            |            |           | _         |          |           | -  | _        | L         |           | auci                                                                                                                 |
| silicate                     | cristobalite<br>duarts                | ~        |            |          |           | ~        | -      |            |          |             |            |            | Ļ         |           |          |           |    | _        |           | Ц         | ©: much<br>S/S: ser                                                                                                  |
| 1°                           | quarte                                | 9        | 9          | 0        | <u>.</u>  | 0        | S,     | (i)<br>    | 0        | S)          | 0          | Ċ          | 0         | ĝ         | <u>©</u> | 9         | 0  | <u>ې</u> | Î         | 9         | 0 Y                                                                                                                  |
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|                              | ł                                     | ~1       | ~          | ×        | $\leq$    | $\sim$   | $\sim$ | $\sim$     | >•       | >-          | <u>-</u> - | <u>-</u> - |           | ≥         | 2        | 2         | 23 | $^{1}$   | î٩)       | ല         |                                                                                                                      |

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