

Appendix 1

Preface

This database are composed of metallic mineral deposits, mineral showings, geology of alteration zones and exploration history that were collected during the field reconnaissance spending two years in the Eastern Andean Area. A model of text was prepared using Microsoft Works, and information of each area was summarized in one page of A4 size.

(1) Topography

The topographic classification in the Republic of Argentina is adopted. The region under the present survey includes Cordillera Principal, Cordillera Frontal and Pre-cordillera. In addition, information of Famatina Metallogenic Province is also covered under the demarcation of Sistema de Famatina.

(2) Province

Province is abbreviated as follows:

LR La Rioja
SJ San Juan
MZ Mendoza

(3) No.

Serial numbers are given roughly from north to south. Owing to circumstances in arrangement of the data, numbers of 16, 17, 42, 85 and 86 are missing numbers.

(4) Name

Names of mineral showing, old working, prospect and zone of alteration are shown. Different name, if required, is given in parentheses. An area which covers plural old workings or mineral showings is expressed as a district.

(5) Minerals

Elements of minerals are shown with chemical symbols. A different perception on other records is shown in parentheses. When a specific description is not available such as in a case of alteration zone, an inference is given by the present survey team.

(6) Coordinates

Where the groundtruth is conducted, the coordinates of GPS (GPS40 FCC IPhi 3001 by Garmin Co.) are given. In other cases, a titled area is plotted on the Landsat image of 1:250,000, registered to UTM system. Then, the readings of coordinates on the image are recorded.

(7) Geology

General geology and outline of geological structure in the titled area are recorded.

(8) Mineralization

Mineralization, hydrothermal alteration, occurrence of ores and their constituents are described. Data of dimensions are recorded where data are available.

(9) Mining Right

Holders of mining right on the titled area are listed. The rights of prospecting or of preparation for exploitation are shown in some places. Prospecting investigations in the past are summarized in this section. Due to variability of right holders or prospecting results, readers are advised to confirm the information at the government office concerned of relevant provinces.

(10) References

References cited are listed, and the date of groundtruth is given when conducted.

(11) Satellite Images

Features of the area on the satellite image are described. Interpretation was conducted on the color ratio images, prepared for Satellite Data Analysis from 1:250,000 Landsat TM 5/7, 5/4, and 3/1 BGR. Where the titled area is clouded, TM data of different dates were used for analysis. Observations on various images of JERS-1 prepared in this year are also added.

(12) Maps

If published maps on geology, results of geochemical or geophysical investigations, or on drill-sites are available, the sources are recorded.

The text of the database is included in the CD-ROM, attached to the report in the GIS files on regional survey of Eastern Andes Region. Search of data can be made using Arc View Browser. Opening of Homepage of Metal Mining Agency Japan on Internet, www.mmai.go.jp, is under investigation. In details, dial Tokyo 3503-5222, and please contact Messrs. Miyatake and Yamamoto, Division of Survey, Japan Mining Engineering Center for international Cooperation.

Japan International Cooperation Agency, Metal Mining Agency of Japan, Japan Mining Engineering Center for International Cooperation and also SECEMAR, the counterpart of present investigation are not liable for any loss and disadvantage or dispute caused from using this database.

#	Name	Mineralization	La (S) (W)	La (S) (W)
77	Rodopis, others (Guardia Vieja, Pata de Indio)	Cu,Bi	30.42	69.32
78	Tocote District	Cu,Au,Bi	30.58	69.29
79	Quebrada de Páramos	Au	30.77	69.36
80	San Francisco de los Andes (Cerro Negro)	Au,Ag,Cu,Bi	30.50	69.36
81	Guanaqueles	Au,Ag,Cu	30.49	69.40
82	El Retamal	Au,Ag,Cu,Cu,Mo	30.57	69.32
83	Viscaínas	Au,Ag,Cu	30.57	69.49
84	Justano Viejo District	Pb,Zn,Ag,Cu,Au	30.55	69.38
87	Cerro Negro de la Cortadera	Pb,Zn,Ag,Cu	30.56	69.37
88	Quatro Amigos	Pb,Zn,Au,Ag	30.58	69.47
89	Azuarcitos	Au,Ag,Cu	31.04	69.46
90	Manaque	Au,Ag	31.04	69.56
91	Portezuelo de Las Bueñas	Au,Ag	31.01	69.32
92	Casero Nuevo	Au,Ag,Cu	31.13	70.17
93	Rinconera de Araya	Au,Ag,Cu	31.13	70.26
94	Califón	Au,Ag,Cu	31.13	70.26
95	Arroyo de Aler (El Aler - Rincon)	Au,Ag,Zn	31.28	70.29
98	La Ahumada de Amba La	Cu,Mo	31.25	69.51
97	Alumboro	Cu,Mo	31.55	69.51
98	Yaguajay	Cu,Au	31.52	70.17
99	Valle de las Pintas Norte	Au,Ag	31.57	70.07
100	Cerro Mecapato	Cu,Mo	32.00	69.34
101	Cerro Mecapato	Cu,Mo	32.00	69.34
102	Quebrada de la Honda	Cu,Au,Ag	32.13	70.09
103	Manuel	Pb,Zn		
104	San Santiago	Pb,Zn,Cu,U		
105	Puñillar, Quimán	Au,Ag	32.44	68.53
106	Santa Elena (Quebrada de la Ahumada)	Pb,Zn,Au,Ag	31.17	69.21
107	Alatorres	Cu,Mo	31.18	69.23
108	La Oza (San Juan)	Pb,Zn,Cu	31.08	69.23
109	Aguas Blancas and Hondonera	Au,Ag,Cu	29.28	69.49
110	San Juan	Cu,Ag,Ag	32.15	69.26
111	Yaguajay	Cu,Ag,Ag	32.08	69.26
112	Paramillos Sur	Cu,Ag	32.28	69.08
113	Paramillos Norte	Au,Ag,Cu,Pb,Zn	32.28	69.08
114	Paramillos Centro	Cu,Ag	32.28	69.08
115	Paramillos de Usajilla	Au,Ag,Cu	32.28	69.08
116	Grupo Oro del Sur	Au,Ag	32.31	69.08
117	Rio de las Pintas	Cu,Pb,Zn	32.32	69.08
118	La Iniesta	Au,Ag	32.32	69.08
119	Condadero - San Benicio	Cu	32.32	69.08
120	Piedra de Pona	Cu,Au	32.42	69.27
121	Piedra de Pona	Cu	32.42	69.27
122	Rio de las Vacas	Cu,Mo	32.42	69.27
123	Cajon del Robo	Cu,Mo,Pb,Zn	32.42	70.04
124	Cerro de los Deños	Cu,Pb,Zn	32.42	70.04
125	Las Cuevas (Mina San Juan)	Cu,Pb,Zn	32.42	70.04
126	Punta de Vetas	Cu,Pb,Zn	32.42	69.49
127	Mina Mantos Promesas	Cu	32.58	69.02
128	Pobresol	Cu	32.58	69.46
129	Santa Rita and Pango	Pb,Zn	32.67	69.02
130	Famatina (Mejorana, Ofr, La Estrechura, Los Bayos, Las Estrechuras)	Cu,Au,Mo	28.56	67.45
131	Famatina Oeste	Cu,Au,Cu,U		
132	Sierra de las Minas	Au,Ag		
133	Mina El Oro, Los Bayos, (El Oro)	Au,Ag	29.19	67.45
134	La Ventana, La Aranzosa	Pb,Zn		
135	Cerro Negro	Au,Pb,Zn	29.04	67.43
136	Corral	Au,Ag,Cu	29.27	69.05
137	Creson Amarillo	Au	32.27	69.26
138	Cerro Blanco	Au	32.05	69.26
139	Venezuela	Au,Ag	30.54	69.39
140	Portezuelo de Amantillo	Pb,Ag	30.57	69.49
141	Pogonillas	Au	31.01	69.44
142	Samoa	Au,Ag	30.57	69.43
143	Viscaínas (El Salado)	Cu,Mo	29.49	69.26
144	Paraná	W	29.48	69.19
145	Compañía	Pb,Zn,Ag	30.56	69.38
146	Dal Carmen	Au,Ag	30.01	69.55

#	Name	Mineralization	La (S) (W)	La (S) (W)
1	Yacua Piragayo	Pb,Zn,Ag	21.07	64.27
2	La Ventana and La Estrella	Cu	21.07	64.27
3	Cerro Cometa	Au	21.07	64.27
4	Cerro Capatzen	Au,Cu	21.18	69.29
5	El Dorado	Cu,Au	21.24	68.33
6	La Cometa and La Esmeralda	Cu,Au	21.24	68.33
7	Rio Blanco	Au,Ag	21.25	69.26
8	Rio Serrano	Cu,Ag	21.12	69.24
9	Cerro Catedral	Cu,Au	21.12	69.24
10	La Yocunga	Cu,Au	21.16	69.24
11	Rio las Jimbras, La Ollita	Cu,Au	21.16	69.24
12	Rio las Tamboras, Tamboras	Cu,Au	21.16	69.24
13	Carmen	Au,Ag	21.17	69.19
14	Playas Largas	Au,Ag	21.31	69.14
15	Ranchillos (Quebrada de Rancharillos)	Au,Ag	21.31	69.14
16	Laguna de las Bueñas	Au,Ag	21.35	69.21
17	Las Aguilas	Au	21.46	69.19
18	Holmea	Pb,Zn,Au,Ag	21.35	68.27
19	Los Sanjos	Au,Ag	21.37	69.10
20	Sarrazas de Rancharillos	Au,Ag	21.42	69.18
21	Rio la Flecha (Las Flechas)	Au,Cu	21.45	69.40
22	Bovop Atravesado, (Portezuelo del Inca)	Au,Ag	21.45	69.40
24	Mazante	Cu	21.40	69.21
25	Los Moroles	Cu	21.34	69.40
26	Los Moroles	Cu	21.34	69.40
27	Las Cañachas	Pb,Zn,Ag	21.45	69.26
28	Corcon de la Inca (Portezuelo del Inca)	Au,Cu	21.48	69.35
29	Salamanca - San Benito	Au,Cu	21.45	69.37
30	Rio Cuyaleman	Pb,Zn,Ag	21.41	68.38
31	Sim al sur del Cuyaleman	Pb,Zn,Ag	21.41	68.38
32	Cerro Pasado - El Pasado	Au	21.53	68.40
33	Los Caballos	Au	21.55	68.49
34	Quacha (Quacha)	Au,Ag	21.56	68.51
35	Al oeste de las minas de oro de Quacha	Cu		
36	Las Tojas, Sim al oeste de Quacha	Pb,Zn,Ag	21.55	68.51
37	Quebrada de Varela	Pb,Cu		
38	Guabrada del Rodeo	Mo		
39	La Punilla (Desaparecida)	Au,Cu,Pb,Ag	21.42	69.01
40	Sacaján Formation	Au		
41	El Cerro Alto (El Cerro)	Pb,Zn,Ag,Cu,As	21.26	69.28
42	El Cerro Bajo	Pb,Zn,Cu,Ag	21.26	69.28
43	El Cerro Alto	Cu	21.28	69.28
44	El Cerro Alto	Cu	21.28	69.28
45	El Cerro Alto	Cu	21.28	69.28
46	Cerro Amarillo (Trio Amarillo)	Cu,Ag	21.41	69.35
47	El Soborero	Au,Ag	21.09	69.53
48	Manifestacion N.	Au	21.12	69.53
49	Los Amantillo	Au,Ag	21.15	69.55
50	Arroyo Batadero	Au,Ag	21.15	69.55
51	La Oza	Au,Ag	21.15	69.55
52	Lama	Au,Ag,Cu	21.19	69.60
53	Los Desaparecidos	Au,Ag	21.27	69.52
54	Guamaco (Guamaco Zentó)	Au,Ag	21.25	69.59
55	Veladero Norte	Au,Ag	21.23	69.57
56	Veladero Sur	Au,Ag	21.31	69.54
57	Rio Fino	Au,Ag	21.48	69.53
58	Zacarcero (Chazarcero)	Au,Ag,Cu,Si,Ba	21.07	69.58
59	Rio Sierra del Tonal	Pb,Ag,Zn		
60	Rio Tercera de Guabaste	Pb,Ag		
61	Miraflores	Au,Ag,S	21.48	69.36
62	El Suroeste	Au,Pb,Zn	21.51	69.31
63	El Suroeste	Pb,Zn,Ag,Cu,Bi	21.49	69.24
64	Las Ojeras	Au	21.47	69.21
65	Chunguillos	Ag,Pb	21.41	69.06
66	Adriatico	Ag,Pb		
67	Corcon del Limite	Pb,Ag,Zn	31.06	69.37
68	Mina Mirra Cerro, others	Pb,Zn,Ag	30.04	69.24
69	El Carmen	Au,Ag,Cu	30.04	69.24
70	Buñales de Carmen	Au,Ag	30.04	69.24
71	Agua Blanca	Au,Cu	30.12	69.48
72	San Lorenzo	Au,Ag	30.14	69.46
73	La Poposa	Au,Ag,Cu	30.14	69.46
74	Quebrada de Chica (Pobuyvo Cu)	Au,Ag,Cu	30.14	69.31
75	Quebrada de Chica (Pormatillo)	Cu,Mo,Ag	30.14	69.31
76	Quebrada de Chica (Aucum)	Au	30.14	69.31

No. 2
Province: LR
Topography: Pre-Cordillera

Name: La Verdiona and La Estrella

Minerals: Cu

Latitude: 28° 07'S

Longitude: 68° 21'W

Location: About 80 km north of Jague, La Rioja. Ascending Rio Potrero Grande from Jague, the site is accessible with a four-wheel driven vehicle and by several kilometers' walk. The altitude is 3,800 m a.s.l.

Geology: The area comprises Precambrian metamorphic rocks, Permo-Carboniferous sediments with limestone and granitic intrusives.

Mineralization: Verdiona is the copper deposit of vein-type. Ore minerals consist of chalcopyrite, malachite, azurite, cuprite and chalcocite. Gangue minerals are formed of hematite and quartz. Estrella is identified as replacement deposit in limestone.

Mining Right: Unknown. Trenches and inclined shafts remain at Verdiona. A small-scale mining was recorded at Estrella.

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report, pp 211 (in Japanese).

Satellite Images: Chilcico, A56, A57. Limestone is discernible being of gray color and of lens-like appearance on TM-ratio images. At Estrella, a rock mass with the major axis of about two kilometers occurs in argillaceous strata and an intrusive rock with a two-kilometers diameter is located three kilometers east of it.

Maps: N.A.

No. 1
Province: LR
Topography: Pre-Cordillera

Name: Yegua Pirada

Minerals: Pb, Zn, Ag

Latitude: 28° 07'S

Longitude: 68° 22'W

Location: About 80 km north of Jague, La Rioja. Ascending Rio Potrero Grande from Jague, the site is accessible with a four-wheel driven vehicle and by several kilometers' walk. The elevation is 3,800 m a.s.l.

Geology: Cambrian-Ordovician sediments with limestone are intruded by plutonic rocks.

Mineralization: Vein-type deposit? Details are unknown.

Mining Right: Private-owned. Adits to extend 133 m.

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report, pp 211 (in Japanese). Hearing from Mr. Osvaldo V. Cravero, SEGEMAR, Personal communication with Mr. Osvaldo V.

Satellite Images: La Puntilla & Chilcico, A63. Situated on the boundary of argillaceous and non-argillaceous strata. Configurations of plutonic rocks are illegible. Alteration is also not noticed.

Maps: N.A.

No. 4
Province: LR
Topography: Cordillera Frontal

Name: Cerro Colorado
Minerals: Au,Cu
Latitude: 28° 18' S
Longitude: 68° 29' W
Location: Near the provincial border between La Rio and San Juan, the upper most stream of Rio Elmejo, a branch of Rio Blanco. The elevation is more than 4,000 m a.s.l.
Geology: Permo-Carboniferous sedimentary rocks and Tertiary volcanic rock.
Mineralization: A zone of silicification exists. Details are unknown.
Mining Right: Unknown.
References: Hearing from Mr.Osvaldo V. Cravero, SEGEVAP.
Satellite Images: La Puntilla-AA. Zone of argillaceous alteration in the caldera of 1.5 km across. A part of eastern edge of the area is limonitized.
Maps: N.A.

No. 3
Province: LR
Topography: Pre-Cordillera

Name: Cerro Bonete
Minerals: Au
Latitude: 28° 07' S
Longitude: 68° 40' W
Location: About 80 km north-northwest of Jague, La Rioja. One way trip by don key back requires more than two days, more than 50 km. Access is difficult due to steep mountains with an elevation over 5,000 m a.s.l.
Geology: Calderas comprising Permo-Triassic acidic igneous rocks, Pliocene andesites and granitic rocks. Situated at intersections of tectonic lines, extending northwest to southeast and northeast to southwest.
Mineralization: Zones of epithermal alteration developed. Alteration into white is general. Geochemical anomalies of Au, Ag, and other metals are noticed. Siliceous sinters occurs in this region.
Mining Right: YAMIRI S.A.
References: JMBC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report, pp 211 (in Japanese). YAMIRI S.A.(1997): Boletin Informativo Septiembre de 1997.
Satellite Images: Location is inferred from the satellite image of Chilecito. Place names of Rio Bonete, and Rio de Oro can be found in the vicinity. Mineralization is considered to be related with Permo-Triassic acidic igneous rocks which were accompanied with argillization. Three rock bodies can be found out on the image, one of which is in the north exceeds 5 km on the major axis. Known deposits have possibilities to be of placer.
Maps: N.A.

No. 6
Province: LR
Topography: Pre-Cordillera

Name: La Criollita and La Ramada

Minerals: Cu, Au
Latitude: 28° 24'S
Longitude: 68° 37'W

Location: By four-wheel driven vehicle it takes seven hours from Jague to Criollita campsite, a pasture for horses, being at 28° 26'12" and 68° 33'30". Riding horseback needs five hours from campsite to Criollita (about 5 km). The altitude is 3,600 m a.s.l. El Ramada takes another several hours on horseback. Topography is steep.

Geology: Calcareous mudstone and limestone of Ordovician are intruded by Devonian granodiorite.

Mineralization: Old workings of Criollita is skarn-type deposit of iron and copper. A zone of skarn comprising magnetite, epidote and copper minerals develops along the contact between granite and limestone, being 3 m in width. Outer margin of skarn deposit is metamorphosed into marble. Silicification of limestone and quartz veins are also recognized. At Criollita, a silicified zone (2 km x 0.5 km) extends in northeast to southwest direction. Quartz sample, No. 63673 taken by SEGEMAR is with 1.3% Cu and 0.2 g/t Au. At Ramada, only silicification and brecciation of limestone are identified with anomalies of Au and Se contents.

Mining Right: In 1996, Argentina Gold acquired the mining right and conducted the geochemical survey, and suspends it at present. Old workings were of a small scale implemented about forty years ago.

References: Groundtruth Nov.12,1998. Cravero (1993): Informe geológico del área de mina La Criollita, Provincia de La Rioja, Secretaría de Estado de Minería Delegación La Rioja.

Satellite Images: Chilicito. Limestone of a lens shape, white gray to pale red, is identified at CRC. Intrusive rocks with intensive argillization occur 5 km east of Criollita. Fracture zones trending north-south to north-northeast predominate.

Maps: Cravero (1993): Analyses of Air Photos of 1:50,000, and Geological Maps of 1:2,000.

No. 5
Province: LR
Topography: Cordillera Frontal

Name: El Petro

Minerals: Au, Cu
Latitude: 28° 24'S
Longitude: 69° 33'W

Location: Near the Chile border, at the upper reach of Rio Blanco, being of about 150 km northwest of Jague, La Rioja. Accessible with four-wheel driven vehicle. The elevation is about 4,500 to 5,000 m a.s.l.

Geology: Perno-Triassic granites and andesitic volcanic rocks are intruded by Tertiary rhyolites of. Many diabasic dikes are associated. But so-called Perno-Triassic diorite samples collected by the present investigation gave the value of 74 Ma of K-Ar year, correlative with the late Cretaceous in age.

Mineralization: Gold and copper deposits of porphyry-type. Characterized by the highly silicified zones and geochemical anomalies of copper. Besides the silicified zones limestones with limonite, chalcopyrite and native sulfur occur. Pyrite and alunite are widely distributed. Ore grades are remarkably variable, reaching at 15 g/t Au. Mineral showings were discovered during the Plan La Rioja of 1970's.

Mining Right: YAMIRI. 9759-Y-91, El Petro, black, with the prospecting right owned by YAMIRI-SEM. Since 1994, Minera El Dolado S.A. conducted investigations of geochemical exploration, trenching, and DDH/HC drilling as the joint venture with YAMIRI, then pulled out.

References: Groundtruth Mar.10,1998. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report, pp 211 (in Japanese). National Mining Secretariat (1994): Directory of Opportunities, 1994, Fig.9 of p.175. Cravero (1995): Carta mineralogénica Pastillos, Provincia de La Rioja.

Satellite Images: La Puntilla, AA6063. Zones of remarkable argillaceous alteration occur in the south and north of the road, being of 1 km in diameter. They are rich in iron-oxides, compared with group of alteration zones in the vicinity. Zoning of alteration by JERS-1 describes alunite and kaolinite.

Maps: N.A.

No. 7
Province: LR
Topography: Cordillera Frontal

Name: Rio Blanco
Minerals: Au
Latitude: 28° 25'S
Longitude: 69° 26'W

Location: Situated at 15 km east of El Porro, along Rio Blanco the province border between La Rioja and San Juan. Accessible with a four-wheel driven vehicle. The elevation is 4,000 to 4,100 m a.s.l.

Geology: A domo-shape dacite intruded Tertiary into rhyolite and andesite. These are covered by brecciated andesite and basalt.

Mineralization: Alteration zone of a porphyry-type. Dacite intrusives are said to be subject to potassic alteration. Geochemical anomalies of 10 to 150 ppb Au have been reported at the surface and a grain of gold has been observed from pan concentrate. Hydrothermal breccias occur in the west of the area. The present investigation recognized the stockwork of quartz veins (2 to 3 cm in width) with 0.17 g/t Au. Silicification and sericitization are remarkable in the dacite, and overprinting of phyllic alteration is suggested possible.

Mining Right: 73-H-96; Tanya I, red. It had been investigated by El Dolado, but standstill at present.

References: Groundtruth Mar.11.1998. Cravero (1995): Carta minero-metalogenetica Pastillos, Provincia de La Rioja. Hearing from Mr. SM Carrizo.

Satellite Images: La Puntilla, AA6066. Remarkable alteration zone of argillization being of 2 km by 1 km. Iron-oxide may be rich at the north of the alteration zone. Zoning of JERS-1 recorded the wide alteration zone of kaolinite, the zone of alunite in the north and zones of sericite on the periphery of the area.

Maps: N.A.

No. 8
Province: LR
Topography: Cordillera Frontal

Name: Rio Belmejo
Minerals: Au(?)
Latitude: 28° 23'S
Longitude: 69° 30'W

Location: Ascending about 5 km of Rio Belmejo, from the road along Rio Blanco to El Porro. The altitude is 4,500 m a.s.l.

Geology: Rhyolite porphyry and its dikes were intruded by granitic rocks. The east of the area adjoins to the caldera lake.

Mineralization: Plagioclase of granite is chloritized or epidotized. The periphery of the intrusive rock is sericitized. General trends of fracture zones are N70° W and N50° E, dipping vertically. Quartz veins are of two systems, one being white thin veins and the other being dark gray to black of later stage. Rhyolite porphyry is intensively silicified, and contains limonite of pyrite origin. Breccias, silicified on the whole, occur in the north. Cravero(1995) reported the prospect to be of very low value.

Mining Right: Solitario-C-96, Solitario 17, red. El Dorado S.A. implemented an investigation 1994 to 1995.

References: Osvaldo Cravero (1995): Carta Minero-Metalogenetica Pastillos, Provincia de La Rioja.

Satellite Images: La Puntilla. Weak argillization is noticed. The structure of caldera is obvious. Weak alteration of argillization at small scales are scattered on the image JERS-1. Results of alteration zoning are indistinct.

Maps: N.A.

No. 9
Province: LR
Topography: Cordillera Frontal

Name: Cerro Caserones
Minerals: Cu,Au
Latitude: 28° 14'S
Longitude: 69° 28'W

Location: Near the Chile border, at the upstream of Rio de la Pena Negra. The elevation is more than 4,000 m a.s.l.

Geology: Acidic volcanic rocks of Permo-Triassic and overlying andesite or basalt. Dacite dikes were identified, which caused hydrothermal alteration.

Mineralization: Primary sulfides are unknown. Limonite is noticed.

Mining Right: YAMIRI, 9760-Y-91, Vicunia, black.

References: Osvaldo Cravero (1995): Carta Minero-Metalogenetica "Pastillos", Provincia de La Rioja, (No.12).

Satellite Images: La Puntilla. Sporadic argillization alteration of weak and of a small scale. Many ring- or dome-structures exist in the vicinity.

Maps: N.A.

No. 10
Province: LR
Topography: Cordillera Frontal

Name: La Vicunia
Minerals: Cu,Au
Latitude: 28° 17'S
Longitude: 69° 24'W

Location: Situated on the bank of Homonimal river, a tributary of Pena Negras. About twenty minutes by the four-wheel driven vehicle from El Dolado camp. The elevation is 4,000 to 4,100 m a.s.l.

Geology: Dacite to rhyodacite intruded to the Tertiary volcanic rocks of Pena Negra Formation. These are widely overlain by alluvium of 2 m thick at the maximum.

Mineralization: Upper margins of alteration and mineralization coincide with the basement of white andesite which is moderately permeable. A part of mountain top sustained intensive sericitic alteration, and also silicification and pyritization. In the intrusive rocks, intensive phyllic alteration and quartz veinlets predominate. Channel sampling conducted by El Dorado S.A. reported results of 0.01 to 0.5 g/t Au, and 2.5 to 3.3 ppm in parts. High contents occur in the silicified zone. Zones of argillic alteration developed in the periphery of silicified zones, and were replaced at their outer margins with propylitized andesite.

Mining Right: Owned by YAMIRI SEM. 9760-Y-91, Vicunia, black, YAMIRI-SEM. El Dorado S.A. conducted geochemical, geophysical, and trenching investigations as joint venture with YAMIRI.

References: Groundtruth Mar.9, 1998, on the alteration zone, 2 km south of La Vicunia. Osvaldo Cravero (1995): Carta Minero-Metalogenetica "Pastillos", Provincia de La Rioja, (No.14).

Satellite Images: La Puntilla. Intensive argillization and limonitization are inferred. Alteration zonings by JERS-1 described the broad sericitization and noticed kaolinite in places.

Maps: N.A.

No. 11
Province: LR
Topography: Cordillera Frontal

Name: Rio las Tamberias; La Ollita
Minerals: Cu,Au
Latitude: 28° 18' S
Longitude: 69° 26' W

Location: Adjacent to the Chile border, at the upper stream of Rio de la Pena Negra. A four-wheel driven vehicle requires 15 minutes from the camp of El Dorado S.A. (28° 19'07", 69° 25'26"). The elevation is uncertain.

Geology: Sedimentary rocks of Carboniferous, Granites of Perno-Triassic, and overlying andesitic rocks and porphyritic dacite. Dacite is of a dome-shape and intruded into andesite.

Mineralization: The volcanic rocks were undergone intensive sericitization. Quartz veins at heights contain pyrrhotite, chalcocite, pyrite and chrysocolla. The pyrrhotite was altered to scorodite. The veins strike N70° E and dip 40 to 45° NW, being harmonious with the essential structure of fracture zones. Copper reaches up to 20% in places. Assay yielded highest values of 2.7 g/t Au and 7 g/t Ag from samples of quartz veins collected by present investigation. Drilling by El Dorado S.A. intersected diorite at a depth, and potassic alteration was noticed.

Mining Right: Owned by YAMIRI SEM. 9760-Y-91, Vicuña, black. YAMIRI-SEM is a joint venture of YAMIRI with a private sector. Being of a joint venture, El Dorado conducted geochemical, geophysical investigations and drilled 5,000 m, but suspended at present.

References: Groundtruth Mar.8,1998. Hearing from Mr. SM Carrizo. Osvaldo Cravero (1995): Carta Minero-Metalogenetica "Pastillos" Provincia de La Rioja, (No.16).

Satellite Images: La Puntilla, AA6068. Intensive argillization and limonitization are inferred, though being of a small scale with a diameter of 1 to 2 km.

Maps: N.A.

No. 12
Province: LR
Topography: Cordillera Frontal

Name: Rio las Tamberias; Tamberias
Minerals: Cu,Au
Latitude: 28° 19' S
Longitude: 69° 26' W

Location: Two kilometers south of La Ollita, adjoining to the camp of El Dorado S.A. Accessible with a four-wheel driven vehicle. The elevation is uncertain.

Geology: Tertiary andesitic rocks of with dacite-porphyrty of a small scale.

Mineralization: The alteration zone along the bank of Tamberias which extends 700 m. Volcanic rocks of rhyodacite intersected the dacite-porphyrty of NE-SW trend. At the eastern margin of the alteration zone, intensively silicified and brocciated intrusive rocks occur. Pyrite is a sole sulfide mineral. Under the present investigation, a float of quartz vein reported 2.92 g/t Au, 107 g/t Ag and 0.35% Pb.

Mining Right: 72-II-96, Natasha 4, red. Minera Solitario investigated by drilling. A standstill at present.

References: Groundtruth Mar.8,1998. Osvaldo Cravero (1995): Carta Minero-Metalogenetica "Pastillos" Provincia de La Rioja, (No.16).

Satellite Images: La Puntilla. Situated about 2 km south of alteration zone AA6068. A zone of intensive argillization and limonitization. Zoning of alteration JERS-1, categorized it to sericite.

Maps: N.A.

No. 13
Province: SJ
Topography: Cordillera Frontal

Name: Camerito
Minerals: Au(?)
Latitude: 28° 27'S
Longitude: 69° 15'W

Location: About 10 km south-southeast of the confluence of Rio Macho Muerto and Rio Blanco.

Geology: Dacite stocks intruded into Permo-Triassic granite.

Mineralization: Developed are quartz veins, alunite-rich silicified zones and zones of argillization. Silica sinter grew up on the top. Norwest reported the assay results of 10 samples collected at the zone of alteration in the north of AA6073. Gold contents range from 0.02 to 0.03 g/t over the samples of silicified rhyolite, quartz vein, altered andesite and altered rock of quartz-sericite-alunite.

Mining Right: 59-C-96; Rio Camerito, red/night of exploitation preparation for two years after a public notice). El Dorado investigated the prospect in 1996 and ceased the operation at present.

References: Norwest Mine Services Inc.(1992). Hearing from Mt.Oswaldo V. Cravero, SECEMAR.

Satellite Images: La Puntilla, two alteration zones in the south of AA6073. Prominent alteration zones of argillization, partially rich in limonite. A great number of north-northeast trending lineaments predominate in the vicinity. The trend coincides with a direction of elongation of alteration zones. Zoning of alteration JERS-1 described the zone of alunite at the northern margin and the zone of sericite at the south of the former.

Maps: N.A.

No. 14
Province: SJ
Topography: Cordillera Frontal

Name: Pasos Largos
Minerals: Au,Ag
Latitude: 28° 31'S
Longitude: 69° 12'W

Location: Six kilometers northeast of Ranchillos. About one hour taking on a four-wheel driven vehicle from Margarita camp (28°41'01", 69°19'18") of Cordón de la Brea. The elevation is 3,800 to 4,000 m a.s.l.

Geology: Granite porphyry and intersecting dikes of basaltic andesite. Stocks of dacite also occur.

Mineralization: A veinlike silicified zone strikes N20°W. A zone of stringers comprising quartz and calcite occurs at the outer margin of the silicified zone. Two localities of brecciated parts are noticed, and one sample is with 0.4 g/t Au. Ore minerals are scarce on the whole. Dacite in the east of the silicified zone is slightly altered. A number of quartz veins trending north-south are noticed within the area of field survey. The maximum width on the outcrop is 1.2 m including gangue rocks. Sulfide can not be found. Calcite veins are eminent in the east of the alteration zone.

Mining Right: 9845-S-93, Pasillos 1 I., black (Sovereign Gold Argentina? or CIA, Minera Solitario Argentina?).

References: Groundtruth, Nov.15,1998 in the east of mineral showing. Hearing from Mr. Osvaldo V. Cravero, SECEMAR.

Satellite Images: La Puntilla. Situated on the northern extension of lineament extended from Ranchillos. Noticeable argillization with scarce limonite. Zoning of alteration by JERS-1 indicates chiefly sericite but indistinct.

Maps: N.A.

No. 15
Province: SJ
Topography: Cordillera Frontal

Name: Laguna de las Huaycas
Minerals: Au,Ag
Latitude: 28° 33'S
Longitude: 69° 21'W

Location: Twelve kilometers west of Margarita camp of Cordon de la Brea. About one hour riding on a four-wheel driven vehicle is required from the camp to the site.

Geology: There are limestone, rhyolite, rhyolitic pyroclastic rocks and ignimbrite. The limestone was undergone obvious shear deformation, trending N28°E and dipping 80°E.

Mineralization: A small silicified ledge of 2 m wide runs along the shearing zone. Silicified rocks are porous and rich in limonite and alunite. Geochemical anomaly of gold has been reported.

Mining Right: Minera Macho Muero.

References: Groundtruth, Nov.16,1998. Hearing from Mr. Osvaldo V. Cravero, SEGEMAR.

Satellite Images: La Puntilla. Slight argillization along lineaments of NNE system. Three kilometers long of the major axis. Zoning of alteration JERS-1 indicates alunite of a small extent and sericitization in the periphery.

Maps: N.A.

No. 15
Province: SJ
Topography: Cordillera Frontal

Name: Ranchillos (Quebrada de Ranchillos)
Minerals: Au,Ag
Latitude: 28° 33'S
Longitude: 69° 14'W

Location: Margarita camp (28°41'01", 69°19'18") of Cordon de la Brea can be reached by riding around six hours over a distance of about 200 km from Jague. The site is 18 km from the camp, taking one hour on a four-wheel driven vehicle. The elevation is 4,000 to 4,500 m a.s.l. Accessible from November.

Geology: Ranchillos Formation of Carboniferous, comprising sandstone and concomitant limestone was intruded by Permo-Thassic granite. Sedimentary rocks are metamorphosed to hornfels.

Mineralization: Both sedimentary rocks and granite are sericitized and silicified. Limonitization is also intensive. Quartz veins and limonitized sulfide veins occur, but they are scarce. According to Mr. Cravero, a sample of hornfels is said to be with 10 g/t Au.

Mining Right: 10076-S-94, Pasillos IV, black (CIA Minera Solitari o Arg.). Solitario S.A. acquired the mine lot, and drilled three holes. Prospecting is now suspended.

References: Groundtruth, Nov. 15, 1998. Osvaldo Cravero (1995): Carta Minero-Metalogenetica "Pasillos" Provincia de La Rioja. Hearing from Mr. Osvaldo V. Cravero, SEGEMAR

Satellite Images: La Puntilla, AA6059. Patterns of intrusives are noticed at three sites, accompanying argillization alteration. These are situated in the west of a NNE lineament. Zoning of alteration by JERS-1 indicates to consist mainly of sericite.

Maps: N.A.

No. 20
Province: LR
Topography: Pre-Cordillera

Name: Helvecia
Minerals: Pre-Cordillera
Latitude: 29° 33'S
Longitude: 68° 47'W

Location: Patquia is 72 km away from La Rioja by National Road No.38. Villa Union is at 210 km distance from Patquia by National Road No.26. 45 km road from Villa Union to Guadaoal has not been paved. The site is 45 km away from Guadaoal, requiring 3 hours 30 minutes. Distance is 369 km in total. Topography is rather steep, and is covered with snow in winter time.

Geology: Dolomitic limestone of Ordovician is unconformably overlain by Permian Carboniferous terrigenous and marine deposits. These were intruded by andesite Triassic dykes and Neogene Tertiary monzonitic.

Mineralization: Exhaustive-sedimentary deposits of lead and zinc in the dolomitic limestone. Being of cementing breccias which fill cavities, regeneration of the deposits due to contact metamorphism is noticed. Dimensions of deposits are of 225 m long with 1 to 5 m in width. A sum of 361,000 tons of ore, being 8.3% Pb, 18.8% Zn with 91 g/t Ag, has been estimated in the underground. Deposits are similar to Aguilar of Jujuy Province. Many old workings remained. Alteration around ore deposits is not noticed under the present investigation. Mineralization is inferred to be of Mississippi valley type from mineral assemblages.

Mining Right: Mined from 1945 to 1982 for lead and zinc. Barite was also produced since 1970. About 15,000 t of lead and zinc ores with 35% of lead and zinc were produced. Since 1996, the joint venture between YAMIRI-SEM and Plata Minerals Ltd. implemented geochemical, geophysical investigations, DDH/RC drilling and road construction. Expenditure for phase 1 accumulated to US\$2,000,000. When the survey team visited the site in October, 1997, the phase 1 seemed to have completed and proceeding to the phase 2 seemed subtle. Geological analyses is by contract with Watts, Griffiths & MacCort, Canada.

References: Groundtruth(underground), Oct.24,1997. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report, pp.211(in Japanese). Geological Survey, Department of Mines, Argentina (1995): A Proposal to the Government of Japan for Technical Cooperation. SEG Newsletter (1999): A Report for Project Finding in Argentina, and Satellite Data Analyses. YAMIRI S.A. (1997): Boletín Informativo Septiembre de 1997.

Satellite Images: San Jose A76. Changed position. Rock mass of Ordovician extends to Image of San Jose-Chilecito, the major axis being of 20 km. The mass is chiefly made up with limestone. No alteration is noticed.

Maps: National Mining Secretariat(1994): Directory of opportunities, 1994. Fig. 9 (p.175).

No. 19
Province: LR
Topography: Pre-Cordillera

Name: Las Aguaditas
Minerals: Au
Latitude: 29° 46'S
Longitude: 69° 14'W

Location: Situated at Llanos del Molic, 30 km north-northwest of Mallman, Province of San Juan. Accessible with a four-wheel driven vehicle. The elevation is 3,200 m a.s.l.

Geology: Green sandstone of Devonian and sandstone of Carboniferous were intruded by Permian basic rocks.

Mineralization: Vein-type gold deposits in diorite, being of 0.6 to 0.9 m in width. The diorite was replaced in parts with quartz and tourmaline. Ore minerals comprise native gold, chalcopyrite, and copper oxide. Gangue minerals are of quartz and accompanying limonite. The samples of quartz vein by the present investigation graded 3.6 g/t Au. According to Mr.S.M Raul, samples with 5 to 20 g/t Au have been reported. The site of mineral showing is situated at the periphery of magnetic anomaly. The parts replaced with quartz and tourmaline is resistive against erosion and formed small hills of 50 to 100m in widths by 200 to 300 m in lengths. Brecciation is intensive in parts.

Mining Right: Las Aguaditas S.R.L. Small trenches remain at the site.

References: National Mining Secretariat (1994): Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analyses. MMAJ/JMEC Internal Report, pp.211(in Japanese).

Satellite Images: Vicuna, San Jose, A80. Argillaceous geology of about 2 km in diameter is on the western bank of Rio Blanco, being of a weak alteration zone.

Maps: N.A.

No. 22
Province: SJ
Topography: Cordillera Frontal

Name: Barrales de Ranchillos
Minerals: Au,Ag
Latitude: 28° 42'S
Longitude: 69° 13'W

Location: The junction of Rio Blanco and Arroyo de Cajoncito, being of 10 km south of Las Sapiros.

Geology: The Ranchillos formation of Carboniferous sedimentary rocks and intrusive rocks.

Mineralization: Small scale brecciation and concomitant weak silicification are observed in the sedimentary rocks. Geochemical anomaly of gold is detected and the maximum tenor is reported in the order of 0.3 g/t Au.

Mining Right: Unknown.

References: Hearing from Mr. Osvaldo V. Cravero, SECEMAR.

Satellite Images: La Puntilla. Small alteration zone of less than 1 km in the major axis. Alteration zoning by JERS-1 describes it as sericitic.

Maps: N.A.

No. 21
Province: SJ
Topography: Cordillera Frontal

Name: Los Sapiros
Minerals: Au,Ag
Latitude: 28° 37'S
Longitude: 69° 10'W

Location: Riding on a four-wheel driven vehicle takes about 6 hours over a distance of 140 km from Jagua, La Rioja. The elevation is 3,800 m a.s.l.

Geology: Sandstone and mudstone of Ranchillos formation of Carboniferous were intruded by dikes of andesitic to rhyolitic rocks.

Mineralization: Alteration zones occur in the vicinity of dikes being rich in pyrite. Drilling by Solitario revealed that mineralization and alteration did not reach to a depth of 50 m. In the trenches, sandstone with white clay, and andesite with argillization and local silicification are observed, indicating that the ore deposit is of epithermal in origin.

Mining Right: 10075-S-94, Patillos V. black (CIA Minera Solitario A.R.). Solitario S.A. called the prospect as Ranchillos, and implemented regional geochemical and geophysical surveys, trenching of 500 m, and drilling of 500m, and then pulled out.

References: Groundtruth, Oct. 20, 1997. Hearing from Mr. Osvaldo V. Cravero, SECEMAR A field investigation. Departamento de Minería de San Juan (1997). Empresas Mineras con Proyectos de Exploración en San Juan - Mayo, 1997.

Satellite Images: La Puntilla, AA6060. The zone of remarkable argillization alteration, being of 3 km in the major axis, occurs in the central depression of the mountain composed of sedimentary rocks. The lineament of a north-south direction confines the western margin of alteration zone. Alteration zoning by JERS-1 indicates chiefly sericitic.

Maps: N.A.

No. 24
Province: SJ
Topography: Cordillera Frontal

Name: Bordo Atravesado (Portezuelo del Inca)

Minerals: Au(?)

Latitude: 28° 43'S

Longitude: 69° 35'W

Location: Situated on the southern bank of Rio del Inca, a tributary of Rio Macho Muerto. Around three hours may be required on the four-wheel driven vehicle from the Margarita camp of Cordón de la Brea.

Geology: Sandstone and limestone of Carboniferous were intruded by Tertiary rhyodacite and andesite. Intrusives extend in a direction of NE-SW.

Mineralization: Both sandstone and volcanic rocks were intensively silicified. A silicified ledge extends in a direction of N30°E with a width ranging 8 to 15 m. It terminates at steep cliffs at Rio Macho Muerto. Stockworks of quartz stringers were developed in the silicified sandstone of the ledge. Limonite veins around the silicified ledge is with 0.4 g/t Au. Drilling by Macho Muerto seems to have intersected a 100m wide silicified zone.

Mining Right: Minera Macho Muerto. Geochemical survey and drilling of three holes were conducted and standstill is at present.

References: Groundtruth, Mar.12, 1998. Osvaldo Cravero (1995): Carta Minero-Metalogenetica, "Pasillos", Provincia de La Rioja. Hearing from Mr. Osvaldo V. Cravero, SEOBEMAR.

Satellite Images: La Puntilla. Remarkable alteration zone of argillization and limonitization, being of 1.5 km in diameter, is situated in the south of a high-angle fault. Alteration zoning by JERS-1 describes it as a combination of kaolinite and alunite.

Maps: N.A.

No. 23
Province: SJ
Topography: Cordillera Frontal

Name: Rio la Flecha (Las Flechas)

Minerals: Au, Cu.

Latitude: 28° 43'S

Longitude: 69° 40'W

Location: From November to March, the vicinity of alteration zone is accessible with a four-wheel driven vehicle. It takes about five hours from the Margarita camp of Cajon de la Brea.

Geology: Tuff breccia and Tertiary andesitic volcanic breccia.

Mineralization: An alteration zone of silicification with alunite. A silicified ledge has a strike of N30°E. The central top part of the alteration zone is rich in pyrite. Great quantities of native sulfur and gypsum are common throughout the alteration zone. Ore minerals are chiefly of pyrite with a very small amount of copper oxides. Propylite alteration was developed around the periphery of the zone of acidic alteration. A vein-type ore deposit, Mina Virginia Susana, is situated in the west of Rio la Flecha alteration zone, but no detail is available.

Mining Right: Minera Macho Muerto. Geological, and geochemical surveys were conducted and DDH/RC drilling was implemented in 1995-96. Mina Virginia Susana is also owned by Macho Muerto.

References: Groundtruth, Nov.17, 1998. Hearing from Mr. SM Cravero, Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo, 1997.

Satellite Images: La Puntilla, AA6053. Remarkable alteration zone of argillization and limonitization. Alteration zoning by JERS-1 records a zonal arrangement of alunite, kaolinite and sericite, from the inside to outward.

Maps: N.A.

No. 25
Province: SJ
Topography: Cordillera Frontal

Name: Margarita
Minerals: Cu.
Latitude: 28° 40'S
Longitude: 69° 21'W

Location: The Margarita camp (28°41'01", 69°19'18") at Cordon de la Brea is accessible by taking a four-wheel driven vehicle for five hours over a distance of 200 km.

Geology: Alternation of sandstone and mudstone of Ranchillos formation of Carboniferous and intrusive rocks.

Mineralization: Old workings were mined for copper. Primary mineralization comprises a tourmaline-bearing breccia-type and a vein-type deposits. Due to erosion, oxidation and leaching of the deposits, oxide copper was concentrated into the bottom of diluvium bed, where open cut mining was conducted. Ore minerals consist of chalcocopyrite, chalcocite, pyrite, pyrrhotite, chrysocolla, malachite, cuprite, atacamite. Gangue minerals are made up of quartz, tourmaline and barite. Macho Muerto S.A. drilled the tourmaline-bearing breccia but results are not available.

Mining Right: Minera Macho Muerto. Prospecting is now suspended.

References: Groundtruth, Nov.16, 1998, only for an area of prospect. Osvaldo Cravero (1995): Carta Minero-Metalogenetica, "Pastillos", Provincia de La Rioja. Hearing from Mr. Osvaldo V. Cravero, SEGEMAR, Moguiler, M.R.(1985). Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo, 1997.

Satellite Images: La Puntilla. Small spot-like argillization is identified. Besides an annular structure in the periphery, comparatively weak argillization alteration is noticed in an area of 6 by 3 km which covers AA6057. The eastern end of alteration is confined by lineaments of NNE direction. Zoning of alteration by JERS-1 described it as sericite, being of ambiguity.

Maps: N.A.

No. 26
Province: SJ
Topography: Cordillera Frontal

Name: Los Mogotes
Minerals: Cu.
Latitude: 28° 34'S
Longitude: 69° 40'W

Location: Near the Chile border, at the headwater of Rio Macho Muerto. Accessible with a vehicle in summer time only. The elevation is 4,400 to 4,700 m a.s.l. Ridges are covered with perpetual snow.

Geology: Glacial sediments composed of dacite porphyry, its tuff breccia, and welded tuff.

Mineralization: Porphyry-copper type deposits. A horizon of alluvial fan is rich in gypsum and native sulfur, which is overlain by blocks of andesite impregnated with pyrite, chalcocopyrite, bornite and chalcocite. Noted are rocks of phyllic, argillic, and propylitic alterations and of silicification. An occurrence of the breccia, matrix of which is filled with silica and barite, is observed in the southern end of the area. Sinter is being built up in a hot spring. Within the area of present investigation, mineralization of molybdenum is noticed, but copper mineralization is not known.

Mining Right: Minera Macho Muerto (Mendoza).

References: Groundtruth, Mar.12, 1998. Osvaldo Cravero (1995): Carta Minero-Metalogenetica, "Pastillos", Provincia de La Rioja. Hearing from Mr. Osvaldo V. Cravero, SEGEMAR.

Satellite Images: La Puntilla, AA6058. The glacial field, Alteration zone of argillization and limonitization, being of 4 by 1.5 km, was developed in the ridge of the Chile-Argentina border. Alteration zoning by JERS-1 recorded a broad zone of kaolinite and a local zone of alunite. Misconception of alunite with gypsum can be possible.

Maps: N.A.

No. 27
Province: SJ
Topography: Cordillera Frontal

Name: Los Mogotes West
Minerals: Cu.
Latitude: 28° 33'S
Longitude: 69° 35'W

Location: At the upper reach of A Pirca de los Bueyes, a tributary of Rio Macho Muerto.

Geology:

Mineralization:

Mining Right:

References: Mougliner, M.R. (1985).

Satellite Images: La Puntilla. Granitic rock are assumed, with the elongation of a NNE-SSW direction.

Maps: N.A.

No. 28
Province: SJ
Topography: Cordillera Frontal

Name: Las Carachas
Minerals: Pb, Zn, Ag.
Latitude: 28° 48'S
Longitude: 69° 26'W

Location: Going upstream of Arroyo de Agua de la Guanaca, a tributary of Rio Blanco. Five and half hours are required from Jag on a four-wheel driven vehicle. Accessible with a car. The elevation is 4,100 m a.s.l.

Geology: Distributed are granite, diorite, porphyry of Permo-Triassic, and Tertiary andesite to dacite.

Mineralization: Lead and zinc deposits of a vein-type. Ore minerals comprise galena, sphalerite, anglesite, cerussite and pyrite. Gangue minerals consist of quartz, barite and limonite. There are many veins striking N30°W to N60°W, and dipping 60° to 85° SW, which extend 100 m in the strike direction being of 0.3 to 0.6 m in width. Mineralization was also developed in wall rocks in places. Ore deposits are 12,500 t, with grades of 13 to 20 % Pb and 600 g/t Ag. According to Mougliner, M.R., an output stands at 25,671 t Pb, 5,328 t Zn and 15,236 kg Ag. Main deposits are La Negra, La Argentina, Josefina, and Maruja, etc.

Mining Right: Owned by Viveroy (USA). Solitario Argentina had owned before. Galleries of 3,000 m in total remained.

References: Secretaria de Minera de la Nacion (1994): Mapa Metalogenico de la frontera Argentino-Chilena. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report, PP.211 (in Japanese). Mougliner, M.R. (1985).

Satellite Images: La Puntilla. Asgillization and limonitization alterations, being of 4 km in the major axis, extend along lineaments of NE to NNE direction. On the image of JERS-1, a zone of small scattering alteration can be inferred to extend along Rio Santa Rosa, with a length of about 10 km and 3 km in width. Results of alteration zoning over the area are indistinct.

Maps: Mougliner, M.R. (1985).

No. 30
Province: SJ
Topography: Pre-Cordillera

Name: Salamanca-San Barrera
Minerals: Au,Cu
Latitude: 29° 43' S
Longitude: 68° 37' W

Location: Twenty kilometers south of La Huelvecia. Two kilometers north of Gualacamayco. Accessible with a four-wheel driven vehicle. The elevation is 1,900 m a.s.l.

Geology: Diorite intruded into limestone, sandstone and mudstone of upper Ordovician and Permian sandstone and conglomerate.

Mineralization: Mesothermal vein-type and skarn-type deposits in limestone. The rhyolite above of diorite was metamorphosed into skarn, yielding massive pyritic bodies. An occurrence of mineralized zone is confined by thrust faults. Ore minerals comprise chalcocopyrite, malachite, azurite, pyrite, pyrrhotite, with gangue minerals of limonite, hematite, and anhydrite.

Mining Right: Anglo American prospected the area in late 80's. Minas Argentina possesses the mine lot, and is reported to have drilled 7 holes totalling 685 m, having encountered 2.1 g/t Au over an interval of 36 cm, and 3.2 g/t Au of 19 cm.

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MAM/JMEC Internal Report, pp.211 (in Japanese). Oro Bell's documents for public relations.

Satellite Images: San Jose de Jachal, A79. Mineralized zones of Salamanca, and Gualacamayco, etc occur in limestone of 6 km in a NW-SE direction and 2.5 km in a NE-SW direction. Ordovician limestone abuts on Carboniferous sediments with thrust faults.

Maps: N.A.

No. 29
Province: SJ
Topography: Cordillera Frontal

Name: Cordón de la Inca (Portezuelo del Inca)
Minerals: Au,Cu
Latitude: 28° 49' S
Longitude: 69° 35' W

Location: On the southern bank of Rio Macho Muerto. Around two hours required on a four-wheel driven vehicle over a distance of about 40 km from the Margarita camp. The elevation is 4,200 to 4,500 m a.s.l.

Geology: Outcrops of dacitic rocks were noticed in the area of the present investigation. Outcrops are scarce, and intensive hydrothermal alteration is common. The floats are rich in granitic rocks.

Mineralization: A large alteration zone of argillization, chiefly of sericitization, and silicification. Northwest assayed six samples from two places in the east, within three clots in the alteration zone AA6055. Limonitized quartz vein is with 0.37 ppm Au, 65 ppm Cu, 324 ppm Pb, and 204 ppm Zn. Quartz-tourmaline-pyrite vein is with 0.17 ppm Au, 64 ppm Cu, 324 ppm Pb, and 184 ppm As. Comparatively high contents up to 13 ppm Se are distinctive. Intensive alteration of silicification accompanied by albite was noticed within the area of the present investigation.

Mining Right: Solitario Argentina S.A. spent \$250,000 for geochemical, geophysical investigations, trenching and core drilling. Prospecting is being suspended at present.

References: Groundtruth, Nov.18,1998 over the area in the east, one of three altered heights. Northwest Mine Services, Inc. (1993). Hearing from Osvaldo V. Cravero, SEGEMAR. Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo, 1997.

Satellite Images: La Puntilla, A62, AA6055. Location revised. Three clots of intensive argillization are located in the alteration zone of 8.5 km long and 2 km wide. The alteration zone is situated at the intersection of a tectonic line of NE direction(being of normal fault ?), and lineaments extend to the south of the area with a direction of NNE.

Maps: N.A.

No. 31
 Province: SJ
 Topography: Pre-Cordillera

Name: Rio Gualcamayo
 Minerals: Au, Cu
 Latitude: 29° 41' S
 Longitude: 68° 38' W

Location: Situated at Rio Gualcamayo, 60 km north of San Jose de Jachal. About two hours are required from Jachal, by a four-wheel driven vehicle. The elevation is 1,900 m a.s.l.

Geology: Limestone in San Juan formation of Ordovician and Ordovician conglomerate were intruded by granite of 6.9 Ma in Miocene.

Mineralization: Skarn-type deposit of gold and copper. The field investigation at Belgrano recognized intensive skarnization and concomitant impregnation of pyrite and pyrrhotite. The granite is locally rich in quartz stringers, carrying pyrite and pyrrhotite. Moguiner (1985) recorded the prospect to be of vein-type deposit. Due to the contact metasomatism, trends of veins vary diversely with irregular widths. Grades are of 13 g/t Au and 180 g/t Ag in average. Virgen de Lourdes and General Belgrano are the main mines.

Mining Right: Minas Argentina S.A. holds 60 % to be of optionee and operator, and Mincorp Exploraciones S.A. holds 40 % to be of optioner. Minas Argentina is a subsidiary wholly owned by Viceroy Resource Corp. Mincorp Exploraciones is an affiliated company of a joint capital between Minoreo and Perez Copac at a ratio of 1 : 1. Anglo American investigated in late 80's. The mine was mined with a small scale in the past but no detail is available.

References: Groundtruth, Nov.13,1997. Moguiner M.R.(1985).

Satellite Images: San Jose de Jachal, A79. Mineralized zones of Salamanea, and Gualcamayo, etc. are situated in limestone, being of 6 km in NW-SE direction and 2.5 km in NE-SW direction. Ordovician limestone abuts on Carboniferous sedimentary rocks with thrust faults.

Maps: N.A.

No. 32
 Province: SJ
 Topography: Pre-Cordillera

Name: 5 km al sur del Gualcamayo
 Minerals: Pb, Zn, Ag
 Latitude: -
 Longitude: -

Location: Five kilometers south of Virgen de Lourdes mine, the zone of gold mineralization of Gualcamayo.

Geology: Intensely folded limestone of San Juan formation of Ordovician. Faults of post-mineralization are observed.

Mineralization: Ore minerals comprise galena, sphalerite, argentite, and covellite. Veins strike N-S, with the maximum width of 2.5 m. Volceto is a main mine.

Mining Right: Minas Argentina (?)

References: Moguiner, M.R.(1985)

Satellite Images: -

Maps: N.A.

No. 33
Province: SJ
Topography: Pre-Cordillera

Name: Cerro Pescado - El Pescado
Minerals: Au.
Latitude: 29° 53'S
Longitude: 68° 40'W

Location: Forty kilometers north of San Jose de Jacha, at an elevation of 2,100 m.

Geology: Sedimentary rocks of upper Carboniferous.

Mineralization: Dissemination-type.

Mining Right: unknown.

References: Secretaria de Minera (1995): Mapa geologico de la provincia de San Juan 1:500,000. Moguilner (1985).

Satellite Images: San Jose. Remarkable alteration is not recognized. Ore deposits are situated at the intersections of a number of lineaments. Observed lineaments trend NE, NNE-SSW, and NW-SE.

Maps: N.A.

No. 34
Province: SJ
Topography: Pre-Cordillera

Name: Los Caballos
Minerals: Au.
Latitude: 29° 55'S
Longitude: 68° 49'W

Location: Thirty-eight kilometers northwest of San Jose de Jacha.

Geology: Plutonic rocks of Tertiary intruded into sedimentary rocks (?) of upper Carboniferous.

Mineralization: Mineralization occurs in dacite of unknown age. Ore mineral is electrum. Gangue minerals comprise quartz, limonite, hematite, calcite, and anhydrite. Gold is reported to grade 3 to 4 g/t Au in the mineralized zone and 13 g/t Au in veins. Dimensions are unknown. Accompanied with high magnetic anomalies at a depth.

Mining Right: 62-C-96, Come Caballos I, red. 103-H-96, Quebrada de Oro, red. 9841-S-93, Come Caballos II, black (CIA Minera Sollizano Argentina S.A.)

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report, pp.211 (in Japanese).

Satellite Images: San Jose, A83. Three small alteration zones of argillization are located in the periphery of ore deposit, the north being of Caballos, and the south being of Guachi. The alteration zone A87003, situated 2.5 km southwest and being of Las Tolas, is of 2 km in the major axis and seems to be associated with dissemination of limonite.

Maps: N.A.

No. 35
Province: SJ
Topography: Pre-Cordillera

Name: Guachi (Huachi)
Minerals: Au, Ag
Latitude: 29° 56'S
Longitude: 68° 51'W

Location: Thirty-eight kilometers northwest of San Jose de Jachal, and about 1 km south of Los Caballos. A distance is of two hours in a four-wheel driven vehicle and two hours on donkey-back. The elevation is 3,400 m a.s.l.

Geology: The plutonic rocks of Tertiary intruded into the sedimentary rocks of Carboniferous and ophiolite of Ordovician consisting mainly of gabbro. Dacite of El Aspero formation is distributed.

Mineralization: Mesothermal vein-type gold deposits in andesitic of unknown age. The ore deposits coincide with the zone of silicification. Ore minerals comprise chalcopyrite, malachite, azurite, chrysocolla, chalcocite, pyrrhotite, and pyrite. Gangue minerals consist of quartz and anhydrite. Gold grades 14.9 g/t Au with less than 6% of copper. Dimensions are unknown. The site is accompanied with high magnetic anomalies in a depth. Veins being of about 1 m wide are roughly radiated between Arroyo del Agua Dulce and Arroyo del Agua Amarga. Main mines are Virgen de Guadalupe, Amelia, Rubia, Angela, Beatriz, Hilda, La Sanjuanina, and Santa Teresa, etc. The present field survey recorded narrow veins of NW-SE direction in the periphery of the ore deposits, comprising galena, sphalerite, pyrite and quartz.

Mining Right: Many mine lots get complicated. A main title holder is Cominco. The joint venture of Cominco and Sollarino conducted the surface geology with a scale of 10,000. Assay results being of the order of 4 g/t were obtained at several places, and the prospecting was suspended.

References: Groundtruth, Nov.11, 1997. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report, pp.211 (in Japanese). Moguilner, M.R. (1985).

Satellite Images: San Jose, A84. The alteration zone AB7003 coincides with the zone of Guachi, being of less than 2 km in the major axis and seems to be accompanied with limonite impregnation. The structure of NW-SE direction is hard to be identified.

Maps: N.A.

No. 36
Province: SJ
Topography: Pre-Cordillera

Name: Al oeste de las minas de oro de Guachi
Minerals: Cu
Latitude: .
Longitude: .

Location: Fifty-four km north of Rodeo, situated at the west of Guachi gold mine.

Geology: Tonalite and dacite of Cretaceous intruded into tuff and andesitic breccia of Aspero formation, being of Triassic.

Mineralization: Ore minerals comprise chalcopyrite, pyrite, malachite, and azurite with a few galena or gold. Gangue mineral is quartz. The vein strikes N70-80°E and dips steeply. General tenors are 6% Cu and 15 g/t Au. Tonalite and dacite are being considered to be related with mineralization. Main mines are Santa Filomena, and Dolores, etc.

Mining Right: Unknown.

References: Moguilner, M.R. (1985).

Satellite Images: San Jose, A84. Three small alteration zones of argillization are scattered in the periphery of the ore deposits. Alteration zone, AB7003 at 2.5 km to the southwest, is of a little less than 2 km in the major axis and accompanied with limonite impregnation.

Maps: N.A.

No. 37
Province: SJ
Topography: Pre-Cordillera

Name: Las Tólas, 5 km al oeste de Guachi
Minerals: Pb,Zn,Ag
Latitude: 29° 55' S
Longitude: 68° 51' W

Location: Situated at 5 km west of Guachi.

Geology:

Mineralization: A vein-type ore deposit. Ore minerals are of galena and pyrite. This mineral appearance is considered to belong to the fringe of Guachi mineralization zone.

Mining Right: Unknown.

References: Moguilner, M.R.(1985).

Satellite Images: San Jose. Equivalent to the alteration zone AB70031, being of a little less than 2 km in the major axis and accompanied with limonite impregnation.

Maps: N.A.

No. 38
Province: SJ
Topography: Pre-Cordillera

Name: Quebrada de Varela
Minerals: Fe,Cu
Latitude: -
Longitude: -

Location: Located on the upstream of Rio Gualcamayo, 65 km north of San Jose de Jachal.

Geology: Stocks of dacite and tonalitic porphyry of Cretaceous intruded into limestone of San Juan formation and conglomerate of Ordovician.

Mineralization: The skarn deposits formed at the contact of Ordovician limestone and granodiorite. Ore minerals comprise pyrrhotite, chalcopyrite, pyrite, copper oxide, and gold. Gangue minerals consist of quartz, garnet, and epidote, etc. The main ore body is 15 to 35 m wide with a grade of 56 % Fe. The sum of 495,000 t of iron ore is estimated with an average grade of 20 % Fe. Principal mines include Gualcamayo and Patrimonio.

Mining Right: Unknown.

References: Moguilner, M.R.(1985).

Satellite Images: -

Maps: N.A.

No. 39
Province: SJ
Topography: Pre-Cordillera

Name: Quebrada del Rodeo
Minerals: Mo
Latitude: .
Longitude: .
Location: Rio Gualcamayo, 60 km north of San Jose de Jacoba.
Geology: .
Mineralization: A porphyry-type. Ore minerals comprise molybdenite and pyrite, which are accompanied by quartz veins occupying fissures or joints in rocks. Dissemination of molybdenite in dacite and tonalitic porphyry exists, too. Four samples of altered porphyry average 1,040 ppm Mo. Principal mines include Patrimonio and Patrimonio IV.
Mining Right: Unknown.
References: Moguiner, M.R. (1985).
Satellite Images: .
Maps: .

No. 40
Province: SJ
Topography: Pre-Cordillera

Name: La Punilla (Despreciada)
Minerals: Au(Cu,Fe,As)
Latitude: 29° 42'S
Longitude: 69° 01'W
Location: Located at Sierra del Volcan and Sierra del Punilla. Thirty kilometers northwest of San Jose de Jacoba. The distance is similar from Rodeo.
Geology: Granodiorite and stocks of intermediate plutonic rocks of unknown age intruded into the sandstone of Devonian Punilla formation.
Mineralization: A vein-type gold deposit in schists. Ore minerals comprise chalcocopyrite, galena, malachite, azurite, tetrahedrite and pyrite. Gangue minerals consist of quartz, limonite and anhydrite. Ore grades 1 to 50 g/t Au, 25 to 206 g/t Ag. Dimensions are unknown. Veins strike N35 - 90°E with variable dips. A lens-type mineralization of less than 1 m thick exists. Principal mines include Chigua A - G, San Agustin and La Despreciada, etc.
Mining Right: unknown
References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report, pp.211 (in Japanese), Moguiner, M.R. (1985).
Satellite Images: San Jose, ASS. Marginal alteration is not recognized. Lineaments of 8 km long with a trend of NE - SE are observed in the south.

Maps: N.A.

No. 43
Province: SJ
Topography: Pre-Cordillera

Name: El Fierro Alto (El Fierro)
Minerals: Pb, Zn, Ag (Cu, As)
Latitude: 29° 26'S
Longitude: 69° 28'W

Location: The upper stream of Arroyo de Fierro, a tributary of Rio del Paica. The elevation is 4,400 m a.s.l.

Geology: The shale of Cerro Agua Negra formation is overlain by volcanic rocks of Permian-Triassic Choiyoi group. These were intruded by dioritic to monzonitic porphyry and its dikes, probably of Tertiary. These intrusive rocks are considered to have relation with mineralization. N-S trending thrusts of Andes orogenic movement is in the vicinity.

Mineralization: The vein-type lead and zinc deposits developed in Tertiary volcanic rocks. Ore minerals comprise silver-bearing galena, sphalerite, cerussite, anglesite, chalcopyrite and malachite. Gangue minerals consist of quartz, barite, siderite and limonite. Veins trend north to northwesterly, extending about 500 m in these directions being of 1 m wide. Narrow veins of very pure galena with 75 to 75 %Pb, and 1.2 to 1.5 %Ag are distributed. Major mines include Santa Rosa, La Verde, and Languantas. El Fierro Alto had been mined to a depth of 40 m. Two shafts of 50 m deep were sunk at El Fierro. Recorded grades are 10.0 %Pb, 4.0 %Zn 500 g/t Ag in the former, and 23.8 %Pb, 1.1 %Zn, 500 g/t Ag in the latter. Annual amount of past production is not known.

Mining Right: Unknown.

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMA/JMEC Internal Report, pp.211 (in Japanese). Moguilner, M.R. (1985).

Satellite Images: Puntilla, A74 (El Fierro Alto), A75 (El Fierro). An area of Mesozoic sedimentary rocks. Noticeable alteration is not observed at the locations of ore deposits. A height about 3 km in the south was argillized, probably coinciding with an area of intrusive rocks.

Maps: N.A.

No. 41
Province: SJ
Topography: Pre-Cordillera

Name: San Juan Formation
Minerals: Au
Latitude: .
Longitude: .

Location: Mineral showings are reported at four places. Los Berros is situated between Quebrada de la Flecha and Rio del Agua. The location of Quebrada de Las Lajas is not known. Sierra de la Batea is located at Rio Huasco. Cieneguilla is situated between Rio Acquiñon and Rio Potrillo.

Geology: Limestone of San Juan formation of Ordovician.

Mineralization: The geological institute of U.N.S.J. investigated the potential of gold deposit in the limestone of San Juan formation. Geochemical anomalies in gold were detected at Los Berros in samples at the vicinity of boundary between San Juan formation and Carboniferous arenite of Jejenes formation. A value of 0.5 g/t Au was obtained partially. At Las Lajas, one of geochemical samples taken at an interval of 0.3 m yielded 5.2 g/t Au. At La Batea, noticed are a zone of gold mineralization ranging 0.48 to 0.98 g/t in limestone, and an overlying zone of silicification being of 0.4 g/t Au and 21 - 6 g/t Ag. The assay result of 5 g/t Au was obtained from a blackish bed at Cieneguilla. These data indicate an existence of so-called curling-type gold deposit.

Mining Right: Unknown.

References: Moguilner, M.R. (1985).

Satellite Images: Limestone is resistive against erosion, forming rather large massive heights. It is easily identified in Color ratio image (CRC), being of white to grayish white. Attention is given to the fact that a similar tone of color is displayed by a portion of argillization.

Maps: N.A.

No. 44
Province: SJ
Topography: Pre-Cordillera

Name: El Fierro Bajo
Minerals: Pb, Zn, Cu, Ag
Latitude: 29° 26'S
Longitude: 69° 23'W

Location: Situated at Arroyo del Fierro, 10 km north-northwest of Rodco. Around four hours riding in a four-wheel driven vehicle from Pismanta. The elevation is 3,800 m a.s.l.

Geology: Weakly metamorphosed rocks of Carboniferous. Permo-Triassic granite and granodiorite were intruded by Tertiary andesite dikes.

Mineralization: A vein-type ore deposit. Ore minerals comprise galena, sphalerite, tetrahedrite, chalcocite, pyrite, and pyrrhotite. Gangue minerals consist of quartz, barite, and siderite. Three veins of N45° to 75°W directions extend 1,000 m, 600 m, and 380 m. High grade is recorded at the brecciated zone of 7.5 m wide, which dips 50° to southwest. Major mines are Rara Fortuna, and Animas, etc.

Mining Right: Unknown.

References: Groundtruth, Nov.8, 1997. Moguilner, M.R. (1985).

Satellite Images: Punilla. The area of Mesozoic sedimentary rocks. Remarkable alteration is not observed at the mine sites. A mountain, about 3 km in the south, presents obvious alteration, named as El Fierro Alteration.

Maps: N.A.

No. 45
Province: SJ
Topography: Pre-Cordillera

Name: El Fierro Alteration
Minerals: (Cu)
Latitude: 29° 28'S
Longitude: 69° 28'W

Location: Five kilometers south of El Fierro Bajo and El Fierro Alto. Around two hours are required on horseback from El Fierro Bajo. The elevation is more than 4,400 m a.s.l.

Geology: Permo-Triassic Granite experienced from an intensive hydrothermal alteration.

Mineralization: An alteration zone mainly of silicification. Narrow veins of tourmaline and quartz occur in granite. Sericitization is noticed partly. Sulphides are scarce. Groundtruth was conducted in anticipation of porphyry system, and revealed very low values in assays of Au, Cu, and Mo.

Mining Right: Data are almost unavailable in this alteration zone. KZ and Solitario are reported to have conducted samplings, but results are unknown.

References: Groundtruth, Nov.9, 1997. Hearing from Mr. Raul Cardo, SECEMAR.

Satellite Images: Punilla. An remarkable alteration zone. The central part seems rich in limonite.

Maps: N.A.

No. 46
Province: SJ
Topography: Cordillera Frontal

Name: Cerro Amarillo (Filo Amarillo)
Minerals: Cu, Au
Latitude: 28° 41'S
Longitude: 69° 35'W
Location: Located at the intersection of Rio Macho Muerto and Rio del Inca. Access is available from the side of Rio del Inca with a road for prospecting of Minera Macho Muerto. The elevation is 4,300 to 4,500 m a.s.l.
Geology: The Carboniferous sandstones are overlain with slightly angular unconformity by andesite lavas and pyroclastic rocks. Dikes and stocks of an extensive scale intruded into these rocks.
Mineralization: Distributed are an alunite-bearing silicified zone and a mineralization zone of copper. Acidic intrusive rock is situated in the middle of alteration zone, causing potassic alteration. Quartz, rutile and jarosite are formed in the most front at the periphery of argillic alteration. Alunite-bearing brecciated ledges of silicification occur in the periphery of porphyry. A zone of propylite alteration is distributed in the outer block.
Mining Right: Minera Macho Muerto S.A. The company carried out probably three drilling holes in the zone of sericitization.
References: Groundtruth, Mar. 11, 1998. Compendio de la Minería Argentina (1997). Osvaldo Cravero (1995): Carta Mineralo-Metalogénica Pastillos Provincia de La Rioja. Hearing from Mt. Osvaldo V. Cravero, SEGEMAR.
Satellite Images: La Puntilla, AA6056. Remarkable alteration zone of argillization and limonitization, with the major axis of 2.5 km. Faults of N-S direction are developed in the east.

Maps: N.A.

No. 47
Province: SJ
Topography: Cordillera Frontal

Name: El Soberado
Minerals: Au, Ag
Latitude: 29° 09'S
Longitude: 69° 53'W
Location: Location in Valle del Cura, province of San Juan, at the upstream of A. de los Tanbillos a tributary of Rio de Las Tiguas. The elevation is 4,200 m a.s.l.
Geology: Acidic pyroclastic rocks of Donna Ana formation of lower Miocene were intruded by dacite.
Mineralization: A vein-type gold deposit with high contents of sulfides. The vein comprises quartz, alunite, barite and enargite.
Mining Right: Minera Aguilar. The site is being investigated at present. Details are unknown.
References: Moguilner, M.R. (1985). Hearing at the site.
Satellite Images: La Puntilla. Volcanic rocks of Oligocene-Miocene. An alteration zone of argillization is not identified in the periphery, which is highly resistive against erosion.
Maps: Moguilner, M.R. (1985).

No. 48
Province: SJ
Topography: Cordillera Fronal

Name: Manifestacion N.N.
Minerals: Au.
Latitude: 29° 12'S
Longitude: 69° 53'W
Location: Situated at Valle del Cura, 6 km east of Po. de Cholliay with an elevation of 4,000 m a.s.l.
Geology: -
Mineralization: -
Mining Right: Unknown.
References: Secretaria de Minera de la Nacion (1994); Mapa Metagenico de la frontera Argentino-Chile.
Satellite Images: La Puntilla. The alteration zone of argillization and limonitization, being of about 2 km in diameter. The area corresponds to the north of AA6036 of NNY-SSE system.
Maps: N.A.

No. 49
Province: SJ
Topography: Cordillera Fronal

Name: Los Amarillos
Minerals: Au-Ag.
Latitude: 29° 15'S
Longitude: 69° 55'W
Location: Situated at Valle del Cura, 3 km east of Po de Los Amarillos. The elevation is 4,600 m a.s.l.
Geology: -
Mineralization: -
Mining Right: Penores
References: Secretaria de Minera (1995); Mapa geologico de la provincia de San Juan, 1:500,000.
Satellite Images: La Puntilla. The alteration zone of argillization and limonitization being of 1 km by 2 km in size, coincides with AA6035.
Maps: N.A.

No. 50
Province: SJ
Topography: Cordillera Frontal

Name: Arroyo Batedero
Minerals: Au, Ag
Latitude: 28° 28' S
Longitude: 69° 31' W
Location: Four kilometers south of Rio Blanco, near the province border of La Rioja and San Juan.
Geology: Laccoliths of rhyolite and rhyolitic dacite intruded along the fracture of N10°-15°W direction.
Mineralization: The hydrothermal alteration of silicification and argillization is noticed along the same fracture of laccolith intrusion. A number of quartz veins, as stringers and massive bands of quartz were developed. Openings are occupied by quartz of comb structure. The silicified zone underwent quartz-sericitic alteration of later stage. Argillization is chiefly of kaolinite. Ore minerals observed are hematite, jarosite, and magnetite. Gold grades from 20 to 40 ppm. Panning had revealed an existence of gold grain of 50 microns in diameter. Brecciated rhyolite with native sulfur is distributed in the area of geochemical anomalies.
Mining Right: Unknown.
References: Osvaldo Cravero (1995): Carta Micro-Metalogenetica, "Pastillos", Provincia de La Rioja, (No.16).
Satellite Images: La Puntilla, AA6065. Rather weak alteration extends over the mountain. The eastern slope seems rich in limonite.
Maps: N.A.

No. 51
Province: SJ
Topography: Cordillera Frontal

Name: La Oruga
Minerals: Au, Ag
Latitude: 29° 15' S
Longitude: 69° 48' W
Location: Located in Valle del Cura, the province of San Juan. Situated at Cordón de la Oruga, at an elevation of 5,000 m a.s.l..
Geology: Choyoi group of Permo-Triassic and overlying Dona Ana formation of lower Miocene.
Mineralization: Epithermal gold deposit of vein-type. A narrow zone of acidic alteration mainly consisting of alunite and a zone of intermediate alteration consisting of quartz and sericite are distributed. The ore vein occur in the latter. Remarkable are brecciation and silicification.
Mining Right: Barrick Exploraciones de Argentina S.A. Details of exploration are unknown. A same name project had been carried out in Solitario Ag., which was regional geochemical investigation only and costed a sum of \$40,000 in 1996-97.
References: Compendio de la Minería Argentina (1997). Departamento de Minería de San Juan (1997); Empresa Mineras con Proyectos de Exploración en San Juan - Mayo 1997.
Satellite Images: La Puntilla. The area occupied at a part of the alteration zone AA6052, being of 20 km in NS direction and 5 to 2 km in EW direction.
Maps: N.A.

No. 53
Province: SJ
Topography: Cordillera Frontal

Name: Los Despoblados
Minerals: Au,Ag
Latitude: 29° 27'S
Longitude: 69° 52'W

Location: Located at Valle del Cura, the province of San Juan. On the branch of Ao. de los Despoblados, a tributary of Rio de las Taguas, and at an elevation of 4,000 m a.s.l.

Geology: Rhyolite and dacitic to andesitic pyroclastic rocks of Dona Ana formation of Tertiary.

Mineralization: Polymetallic vein-type deposit. Alteration of quartz and sericite is observed, and quartz veins occur at the surface. Alteration of kaolinite probably of supergene is remarkable. A quartz vein with the maximum width of 8 cm is found to exist in the zone of sericitic alteration in the area of field survey. The vein trends E-W and dips vertically or steeply to the south. A small amount of associated pyrite is identified. Wall rocks are of tuff-breccia.

Mining Right: Owned by Provincial Mining Exploration Institute of San Juan (IPEEM). Penores implemented investigation in the past and relinquished the mining right. The prospect was reverted to IPEEM.

References: Groundtruth, Nov.30, 1998. Secretaria de Minería (1995): Mapa geológico de la provincia de San Juan, 1:500,000. Hearing at the site.

Satellite Images: La Puntilla, AA6026. An alteration zone of 3 km by 3 km.

Maps: N.A.

No. 52
Province: SJ
Topography: Cordillera Frontal

Name: Lama
Minerals: Au,Ag,Cu.
Latitude: 29° 19'S
Longitude: 69° 60'W

Location: Around Pasqua de San Juan, and near the Chile border, on the upstream of Ao. Turbao a tributary of Rio de las Taguas. The elevation is more than 4,300 m a.s.l.

Geology: According to the geological map of 1:500,000 compiled by SEGEMAR, distributed are granitic rocks of Permo-Triassic and Tortolas formation of upper Miocene.

Mineralization: An epithermal gold deposit of acidic sulfate-type on the extension of Pasqua. A vertical section of hydrothermal system crops out exceeding 1,500 m in height. A transition is observed from the bottom being rich in pyrrhotite and pyrite to the middle part comprising quartz, kaolin and pyrite, and then the upper part of silinite and native sulfur.

Mining Right: Under investigation by Barrick Argentina.

References: Compendio de la Minería Argentina (1997). SEG Newsletter (1996). Mining Jour.(1996). Moguilner, M.R.(1985).

Satellite Images: La Puntilla. Alteration zone of 5 km in EW direction and 2.5 km in NS direction, corresponding to the eastern half of A-6033.

Maps: N.A.

No. 55
Province: SJ
Topography: Cordillera Frontal

Name: Veladero Norte
Minerals: Au,Ag
Latitude: 29° 25'S
Longitude: 69° 57'W

Location: Situated at Valle del Cura, at the junction of Rio de las Taguas and Arroyo de los Despedrados. The elevation is 4,000 to 5,000 m a.s.l.

Geology: Dacite or rhyolitic dacite of Dona Ana formation of lower Miocene. Crust rich in sulfate minerals was formed on the surface.

Mineralization: An epithermal gold deposit associated with breccia of hydrothermal alteration. The fracture zone and matrices of intensely brecciated dacite are occupied with fine-grained pyrite, pyrrhotite and quartz. Major brecciation zones associated with mineralization include Filo Federico (350 m X 1,100 m, with estimated metal contents of 2 million oz Au and 70 million oz Ag), Cerro Pelado (1,000 m in diameter), Amable (500 m X 200 m, and under investigation at present), Breccia Agostina (200 m in diameter with metal contents of 0.1 million oz Au and 2 million oz Ag), and Northwest (metal contents of 0.4 million oz Au and 5 million oz Ag). Grades increase with depth. Alunite occurs in places of the breccia of hydrothermal alteration. Vuggy quartz also occurs in places. The bonanza intersected by drilling is with the mineralization ages of 13 Ma and 7 Ma on alunite. The alteration zone in the south is named as Veladero Centro and is owned by Argentina Gold. The prospecting of the zone stands still at present.

Mining Right: The public corporation of mining in the province of San Juan, IPEEM, invited tenderers in 1992, and the mining right of the area is reserved by Argentina Gold in 1994. Prospecting expenditures over five years are requested to be of \$7.3 million. Prospecting is being implemented with the partner of Barric Gold Co., on trenching, geochemical, and geophysical methods comprising IR, RES, and MAG, and on drilling of more than 4,300 m. At the Veladero Norte, the grid sampling, geophysical survey and drilling are being conducted actively. Interests are shared 60 % by Argentina Gold and 40 % by Barric.

References: Groundtruth, Nov.27, 1998. Secretaria de Minera de la Nacion (1994): Mapa Metalogenico de la frontera Argentino-Chile. Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo 1997. Argentina Gold Co.' bulletins for public relations.

Satellite Images: La Puntilla. The rock mass of breccia with hydrothermal alteration forms annular hills of 2 km in diameter and being highly resistive against erosion. The alteration zone is not identified on the ratio image due to a lack of argillization alteration.

Maps: N.A.

No. 54
Province: SJ
Topography: Cordillera Frontal

Name: Guanaco (Guanaco Zonzo)
Minerals: Au,Ag
Latitude: 29° 25'S
Longitude: 69° 55'W

Location: Situated at Valle del Cura, on the upstream of Rio de las Taguas at an elevation of 4,000 m a. s. l.

Geology: Tertiary dacitic welded tuff of Dona Ana formation.

Mineralization: Welded tufts were intensively silicified. The matrix of tuff is almost composed of silica, while welded glass was leached. Pyrite is scarce. Grades of gold obtained with drilling by Argentina Gold reach to several tens ppb.

Mining Right: Argentina Gold. The company implemented geochemical prospecting, trenching, and drilling of five holes totalling about 400 m from 1996 to February, 1998 and suspended the investigation.

References: Groundtruth, Nov.27, 1998. Secretaria de Minera de Minera (1995). Mapa geologico de la provincia de San Juan, 1 : 500,000.

Satellite Images: La Puntilla. The south and southeast of AA6030. On the TM image, only silicification is identified, but it is difficult to say there is an alteration zone due to almost no clay.

Maps: N.A.

No. 56
Province: SJ
Topography: Cordillera Frontal

Name: Veindero Sur
Minerals: Au,Ag
Latitude: 29° 31' S
Longitude: 69° 54' W

Location: Valle del Cura. Located five kilometers south of the camp (29°24' 40", 69°53'44") owned by Argentina Gold at the junction of Arroyo de Despoblados and Rio del Las Taguas. The site is accessible with around 30 minutes by four-wheel driven vehicle over a distance of 5 km. The elevation is 4,200 m a.s.l.

Geology: Andesite and its pyroclastic rock of Tertiary. Quartz veins in the south occur in dacite.

Mineralization: Alteration zone of silicification with intensive pyrite dissemination. SEGEMAR investigated the area in 1987 to 1988 and reported the maximum grade of 3 g/t Au. Norwest Mine Services, Inc. (1993) reported the maximum grade of 0.52 g/t Au from four samples, all of which geochemical anomalies in Se and Bi(2 to 5 ppm), three of which are with 140 to 370 ppm Pb. A 70 cm wide quartz vein with low grade crops out at Mula Twelta in the south of the area.

Mining Right: Argentina Gold and Barrick Gold share the interests at the ratio of 60 % and 40 % , respectively. Argentina Gold carried out geochemical, geophysical investigations and drilled several holes from 1996 to early 1998. Prospecting stands still at present.

References: Groundtruth, Nov.28, 1998. Compendio de la Minería Argentina (1997). Norwest Mine Services, Inc. (1993). Mognliner, M.R. (1985).

Satellite Images: Vicuna, AA 6025 and its southern extension.

Maps: N.A.

No. 57
Province: SJ
Topography: Cordillera Frontal

Name: Rio Frio
Minerals: Au,Ag
Latitude: 29° 49' S
Longitude: 69° 53' W

Location: Valle del Cura, in the border area with Chile. Ten kilometers southeast of El Indio deposits of Chile. The elevation is 4,500 m a.s.l.

Geology: Andesites of intensive hydrothermal alteration in Torolias formation of Tertiary were intruded by andesitic porphyry. Eminent structures are thrust faults of an N-S direction and normal faults in a WNW direction.

Mineralization: A large scale alteration zone where acidic sulfate-type gold deposits are expected to exist. Mineralization is associated with the Tertiary breccia of hydrothermal alteration, many of which are situated at the intersections of tectonically weak lines such as faults. In the situated area, pyroclastic rocks appear as a NW ledges due to its intensive silicification accompanied with limonite. Mineral showings are known at four places in the north and the south of Rio Frio mineralization as follows.

Torolias, 5 sq.km, with less than 14.28 g/t Au, Vacas Heladas, 8 sq.km, being of less than 8.42 g/t Au, Barrios, 4 sq.km, with less than 2.58 g/t Au and 400 to 1,000 g/t Ag, and Zancaron, being of 2 million tons at 4 g/t Au.

Mining Right: Empresa Rio Frio of a Chilean capital prospected the area in 1990 to 1991. Later, Argentina Gold obtained the mining area, and investigation was conducted until 1993 in joint venture with Western Mining Argentina, who pulled out from the eastern Aodes region by 1997.

References: Groundtruth, Nov.28, 1998. Compendio de la Minería Argentina (1997). SEG Newsletter (1996). Mining Jour. (1996). National Mining Secretariat (1994): Directory of Opportunities 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report, (in Japanese).

Satellite Images: Vicuna, AS2. Due to the fact that the image of Vicuna was obtained in winter time and saturation in image, some problems are with the accuracy of discrimination. Yet the developments of broad argillization alteration in the periphery are noticed. A concentration of alteration zones in oval region with the major axis of around 30 km and the minor axis of about 18 km extends along the national border in north-south direction, covering the areas of El Indio, and Rio Frio. Alteration zoning by JERS-1 recorded the broad distribution of kaolinite.

Maps: N.A.

No. 59
Province: SJ
Topography: Pre-Cordillera

Name: Sierra del Tontal
Minerals: Pb,Ag,Zn
Latitude:
Longitude:

Location: Located at the upstream of Quebrada del Carmen, in Sierra del Tontal, at 25 km east of Barreal.

Geology: Dikes of hornblende dacite intruded into graywacke and phyllite of Don Polo formation of lower Paleozoic.

Mineralization: Vein-type lead and zinc deposits. Veins strike in an N-S direction and dip 70° to 80° to the east. An extension toward strike is of 100 m with a width of 0.2 to 2.0 m. Ore minerals comprise cerussite, cerargyrite, rosicleres, argentite, galena, sphalerite, tetrahedrite, pyrite and chalcocopyrite. Oxides of lead are common. Gangue minerals consist of quartz and siderite. According to Rickard (1966), the size of ore deposit is of 1,290 t, being of 2.07 g/t Ag. A sample of 200 kg collected at the 46.5 m level of Carmen Alto mine returned 3.0 % Pb, and 2.4 % Zn with 640 g/t Ag. Principal mines include Carmen Alto, Colon, and Manto Mercedes, etc.

Mining Right: Unknown.

References: Moguilner, M.R. (1985).

Satellite Images: -

Maps: N.A.

No. 58
Province: SJ
Topography: Cordillera Frontal

Name: Zancarron (Chezanoo)
Minerals: Au,Ag,Cu,S,Ba.
Latitude: 29° 37'S
Longitude: 69° 56'W

Location: In Valle de Cura, situated at the uppermost of Rio de las Taguas, at an elevation of more than 4,200 m a.s.l.

Geology: Distributed are acidic tuff and ignimbrite on ridges and andesitic volcanic rocks in valleys.

Mineralization: Gold deposit of acidic sulfate. Moguilner (1985) reported alteration zones of alunite, gypsum, quartz and native sulfur on ridges and enargite and native copper in valleys. The principal mines are Meco, once known as Zancarron, and Zancarron which is of 2 million tons with 4 g/t Au. Mining was conducted in 1984 to 1985 and ores were dressed in Chile. The survey by SM in 1986 to 1988 reported the mineralization with the highest value of 15 g/t Au and the tendency in which mineralized zones were sporadically distributed in broad areas. The field investigation recognized a broad zone of mineralization and the existence of enargite.

Mining Right: Argentina Gold. A dressing test was implemented in the joint venture with Western Mining Argentina in 90's to collect data on recovery by wet-method. Western Mining pulled out afterwards.

References: Groundtruh, Nov.28, 1998. Moguilner, M.R. (1985).

Satellite Images: Vicuna. Details are not available due to snow cover.

Maps: N.A.

No. 61
Province: SJ
Topography: Cordillera Frontal

Name: Jaguelito
Minerals: Au/Ag/S.
Latitude: 29° 48'S
Longitude: 69° 38'W

Location: Situated at Valle del Cura in the province of San Juan. On the western slope of Cordón de la Colanguil which extends from Co. Alumbre to Jaguerito. About five hours are required from Pismanta to the camp. The elevation is 4,400 m a.s.l.

Geology: The basement of weakly metamorphosed rocks of Carboniferous are overlain by Tertiary andesitic porphyry, breccia and tuff, which are the wall rocks of alteration zone.

Mineralization: Gold deposit of acidic sulfate-type. Native sulfur was mined in the past. Veins strike NW-SE and N-S. The mine was named as El Jaguerito.

Mining Right: Penoles. Prospecting is running on.

References: Compendio de la Minería Argentina (1997). Moguiner, M.R. (1985).

Satellite Images: Vicuna. Argillization alterations of 1.5 km and 2 km in diameter are distributed on the western slopes of Co Alumbre and Jaguerito, respectively.

Maps: N.A.

No. 60
Province: SJ
Topography: Cordillera Frontal

Name: Río Totorá de Calingasta
Minerals: Ba/Au.
Latitude: -
Longitude: -

Location: At Vega Redonda and bajada de Cabeza of Río Torata de Calingasta.

Geology: Detailed information is not available.

Mineralization: Detailed information is not available.

Mining Right: Unknown.

References: Moguiner, M.R. (1985).

Satellite Images: -

Maps: N.A.

No. 62
Province: SJ
Topography: Cordillera Frontal

Name: Los Puentes
Minerals: Ag,Pb,Zn,
Latitude: 29° 51' S
Longitude: 69° 31' W

Location: In the periphery of Port del Salado, Cordon de Colangui in the province of San Juan. The elevation is more than 4,500 m a.s.l.

Geology: Unknown.

Mineralization: A vein-type deposit.

Mining Right: Unknown.

References: Secretaria de Minería de la Nación (1994): Mapa Metalogénico de la frontera Argentino-Chilena. Hearing from Mr. Raul Cardo, SEGEMAR.

Satellite Images: Vicuna. Remarkable alteration is not noticed.

Maps: N/A

No. 63
Province: SJ
Topography: Pre-Cordillera

Name: El Salado
Minerals: Pb,Zn,Ag,Cu,Ba,
Latitude: 29° 49' S
Longitude: 69° 24' W

Location: Village Maliman is located 160 km north of Calingasta, which is accessible on route 430 along Rio Blanco. The site is around three hours' distance from Maliman on 25 km of unpaved road. There remain ruins of the mine office (29°49'22", 69°23'53") which can be used as base camp. The elevation is 3,000 to 3,200 m a.s.l.

Geology: Granitic rocks of Permo-Triassic intruded into sedimentary rocks of Permo-Carboniferous. Propylitized andesitic porphyry also occurs. Dikes of intensively altered aplite are distributed in the vicinity of ore deposit.

Mineralization: A vein-type ore deposit. The sum of 25,000 to 30,000 tons ore with 1,500 to 1,900 g/t Ag has been estimated. Ore minerals comprise silver-bearing galena, sphalerite, chalcopyrite, tetrahedrite, pyrrhotite, strophanite, native silver, bornite, covellite, native gold and pyrite. Gangue minerals consist of quartz, barite and oxide minerals of copper. Alterations in the periphery are of propylitization and kaolinization. There are three veins of 1 m wide, dipping vertically. The strikes are N20°E, N50°E and N60°E, with extensions of 520 m, 100 m, and 100 m long respectively. The grade ranges 740 to 1,500 g/t Ag with low values of lead and zinc. Principal mines are Desengano, Anima, No me Enganes, and Ciclito del Rosario, etc.

Mining Right: Puma Minerals S.A.(Bema Gold Corp.). Ores were treated at the rate of 100 t a day with the cyanidation method from 1910 to 1917. A shaft of 90 m deep remains at the site.

References: Groundtruth, Oct31, 1998. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMA/JMEC Internal Report, (in Japanese), Moguilner,M.R. (1985).

Satellite Images: Vicuna, A81. An alteration zone of 14 km long in N-S direction by 2.5 km in E-W direction. Details are unknown due to saturation of data. Granitic rocks being of wall rocks are estimated to have suffered from intensive weathering.

Maps: N/A

No. 64
Province: SJ
Topography: Cordillera Frontal

Name: Las Openas
Minerals: Au.
Latitude: 29° 47'S
Longitude: 69° 21'W

Location: Twenty-five kilometers northwest of Maliman de Abajo, the province of San Juan. Accessible with four hours riding on horseback from the camp of El Salado. The elevation is 3,200 m a.s.l.

Geology: Permo-Triassic Granite.

Mineralization: A vein-type gold deposit. Veins comprise limonite and quartz. Due to secondary enrichment by oxidation, assays return high gold values. One vein strikes in N-S direction and three veins run in E-W direction, being of less than 0.6 m in widths. 1 to 6 cm wide stringers are common. Limonitized veins reported results of 5 to 25 g/t Au at the prospecting by Secretaria de Minera in 1990. Two samples obtained by the present investigation reported assay results of 38 g/t and 25 g/t Au. Sericitization of granite is remarkable within an area of 50 m outside from the veins. Old workings of San Pedro and others are situated in the west of the area, and some veins are perpetual.

Mining Right: Unknown. Old workings were taken around the period from 1930 to 1932, being of a small scale by human power.

References: Groundtruth, Nov.1, 1998. Mogulner, M.R. (1985). Secretaria de Minera (1995): Mapa geologico de la provincia de San Juan, 1 : 500,000.

Satellite Images: Vicuna.

Maps: N/A.

No. 65
Province: SJ
Topography: Pre-Cordillera

Name: Chinguillos
Minerals: Sb/As/Pb.
Latitude: 29° 41'S
Longitude: 69° 08'W

Location: Thirty kilometers north of Maliman, the province of San Juan.

Geology: Sedimentary rocks of Devonian (?).

Mineralization: A vein-type ore deposit.

Mining Right: Unknown.

References: -

Satellite Images: Vicuna. Lack of marginal alteration. Faults of N-S trend are inferred at the east and the west.

Maps: N/A.

No. 66
Province: SJ
Topography: Pre-Cordillera

Name: Andacollo
Minerals: Ba,Pb.
Latitude: -
Longitude: -
Location: Situated at Quebrada de los Loros, Sierra de Yanso, in the vicinity of San Jose de Jaichal, the province of San Juan.
Geology: Ordovician limestone of San Juan formation.
Mineralization: Silicified rocks and a vein accompanied by a 15 m druse. Known as Cortadera Mine.
Mining Right: Unknown.
References: Moguilner, M.R. (1985).
Satellite Images: -
Maps: -

No. 67
Province: SJ
Topography: Cordillera Frontal

Name: Cordon del Limite
Minerals: S,Au?
Latitude: -
Longitude: -
Location: Valle del Cura. Distributed in an area from the south of Tornolas to the north of Rio las Taguas.
Geology: Wall rocks are tuff and tuff breccia of volcanic rocks of lower Pleistocene.
Mineralization: Mineralizations are of joint-filling or nodules in the alteration zone. Patina Grande is the major mine.
Mining Right: Unknown.
References: Moguilner, M.R. (1985).
Satellite Images: -
Maps: -

No. 69
Province: SJ
Topography: Cordillera Frontal

Name: El Carrizal
Minerals: Au,Ag(U)
Latitude: 30° 01'S
Longitude: 69° 04'W

Location: Accessible with 30 minutes' riding in a four-wheel driven vehicle from Argualisto, 15 km north of Rodoce, the province of San Juan. The elevation is 2,000 m a.s.l.

Geology: Devonian shale of Punilla formation.

Mineralization: The field survey confirmed the existence of network of quartz stringers accompanied with pyrite and chalcopyrite. Distinguished are veins of N35°W trend and of 10 cm in width. Impregnations of uranium minerals are often noticed in the periphery of veins. A small-scale mining of arsenic was recorded before the World War II. Grades of gold are said to be less than 10 g/t.

Mining Right: Argentina Gold. The geological, geochemical and geophysical surveys and trenching were conducted, spending \$1,000,000 from 1994 to 95 and \$300,000 in 1997. Uranium was investigated in the past by CNEA, an organization of federal government with the main office at Mendoza, and more than two holes were drilled.

References: Groundtruth, Nov.7, 1997. Compendio de la Minería Argentina (1997). SEG Newsletter (1996). Moguilner, M.R.(1985). Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo 1997.

Satellite Images: Vicuña. Many lineaments (faults) of NNE-SSW direction are distributed. The site of ore deposit corresponds to the reddish part on CRC image, being of about 2 km in diameter.

Maps: N.A.

No. 68
Province: SJ
Topography: Pre-Cordillera

Name: María María Circe, and others
Minerals: Pb,Zn,Ag
Latitude: 31° 06'S
Longitude: 69° 37'W

Location: The site is accessible by a four-wheel driven vehicle over a distance of 28 km from Villa Nueva, which is situated 68 km away from Calingasta, the province of San Juan.

Geology: Granodiorite of Permo-Triassic was intruded by silicified porphyry. The structure is distinguished with thrusts of high angles in N-S direction.

Mineralization: Vein-type ore deposits. Veins occur in faults developed in dikes of silicified porphyry. Ore minerals are silver-bearing galena, sphalerite and pyrite. Quartz occurs as a gangue mineral. An expected size stands at 1,000,000 t with 12% Pb, 1% Zn and 305 g/t Ag.

Mining Right: Replo Extractiva S.R.L.

References: National Mining Secretariat (1994): Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAU/JMEC Internal Report, (in Japanese).

Satellite Images: Vicuña, A95. An area slightly apart to the east from remarkable alteration of argillization in the periphery of Río Casiano Viejo. It is with high possibility that ore deposits are accompanied with a small and weak alteration zone.

Maps: N.A.

No. 70
Province: SJ
Topography: Cordillera Frontal

Name: Banados del Carmen
Minerals: Au, Ag
Latitude: 30° 04'S
Longitude: 69° 55'W
Location: Located at the south end of Valle del Cura, the province of San Juan. Being fifteen kilometers southwest of Carmen Camp of Barrick S.A. The elevation is 4,500 m a.s.l.
Geology: Tertiary volcanic rocks.
Mineralization: Epithermal gold deposit, being rich in sulfide. One of eight holes drilled by Cerro Amarillo in 1998 returned assay results of 1.12 g/t Au and 33.4 g/t Ag from the intersection of 35 m long.
Mining Right: Barrick Gold (?) or Argentina Gold (?).
References: Secretaria de Minería (1995): Mapa geológico de la provincia de San Juan, 1 : 500,000. Bulletins by Argentina Gold.
Satellite Images: Vicuna. Details are unknown due to snow cover.
Maps: N.A.

No. 71
Province: SJ
Topography: Cordillera Frontal

Name: Agua Blanca
Minerals: Au, Cu
Latitude: 30° 07'S
Longitude: 69° 49'W
Location: Valle del Cura, the province of San Juan.
Geology: Tertiary volcanic rocks.
Mineralization: A vein-type deposit of gold, silver and copper. A grade of 2.4 g/t has been reported.
Mining Right: Joint venture of Newcrest and Minera Andes Inc., at the ratio of 51% and 49%, respectively. Newcrest will spend an obligation expenditure of \$12,000,000 for exploration in six years from 1996 and intends to implement a bankable feasibility study.
References: Compendio de la Minería Argentina (1997). National Mining Secretariat (1994): Directory of opportunities, 1994. Minera Andes's bulletin for public relations.
Satellite Images: Vicuna. Ore deposit seems to correspond the spot in the northeast of caldera, which is 3 km in diameter, although the identification is hard due to snow cover and a glacial topography.
Maps: N.A.

No. 72
Province: SJ
Topography: Cordillera Frontal

Name: San Lorenzo
Minerals: Au,Ag
Latitude: 30° 12'S
Longitude: 69° 49'W
Location: Situated at the upper stream of Arroyo del Agua Negra, in the border zone of Chile.
Geology: Tertiary volcanic rocks.
Mineralization: Mineral prospects were carried out in the periphery of old workings for kaolin.
Mining Right: Minas Argentina.
References: Secretaria de Minería (1995); Mapa geológico de la provincia de San Juan, 1 : 500,000.
Satellite Images: Vicuña. Ore deposits are located in the central part of caldera of 2.5 km in diameter, though identification is obscured by snow cover.

Maps: N.A.

No. 73
Province: SJ
Topography: Cordillera Frontal

Name: La Poposa
Minerals: Au,Ag,Cu
Latitude: 30° 31'S
Longitude: 69° 40'W
Location: Located at the upper stream of Arroyo de Chita at the west of Iglesia, the province of San Juan. The site is accessible on the back of donkey. The elevation is more than 4,000 m a.s.l.
Geology: Distributed are sedimentary rocks of Carboniferous and andesitic porphyry of Tertiary in topographical depressions and volcanic rocks of Tertiary in heights. All rock facies underwent epithermal alterations.
Mineralization: Epithermal gold deposits occur in a caldera and in the upper parts of lava domes. A number of mineralized zones exist and are composed of vein zones. The trenching investigation in 1993 revealed an existence of a number of mineralized zones ranging from 20 to 50 m in width, with an average grade of 2 to 3 g/t Au.
Mining Right: Argentina Gold commenced the prospecting in 1993, and trenching, geochemical survey and drilling of 5,000 m in total were carried out by 1994. A joint venture with Western Mining Argentina is reported to have drilled more than 2,000 m, and Western Mining pulled out from the venture in 1997, then investigations were suspended.

References: Compendio de la Minería Argentina (1997). Argentina Gold's bulletin.

Satellite Images: Vicuña. Equivalent to alteration zone of AA7055. The intensity of argillization alteration is estimated to be of medium degree. The zone is situated in the northern margin of composite ring structure being of 12 km in diameter. An existence of fractures, which are related with formation of Poposa-Chita, trending NW-SE in depths is presumed. Alteration zoning by JERS-1 described it as mainly kaolinite.

Maps: N.A.

No. 74
Province: SJ
Topography: Cordillera Frontal

Name: Quebrada de Chita (Porphyry Copper)

Minerals: Au, Ag, Cu.

Latitude: 30° 33' S

Longitude: 69° 31' W

Location: The site is thirty-five kilometers southwest of Iglesia, the province of San Juan. About an hour's riding is needed from Pismanta by four-wheel driven vehicle. The elevation is 3,200 m a.s.l.

Geology: Distributed are Carboniferous sedimentary rocks and Permo-Triassic granitic intrusive rocks, boundary of which is a N-S trending fault. Unaltered Tertiary porphyry also exists in the surrounding area. Porphyry related with mineralization is also possible to be of Tertiary.

Mineralization: A porphyry-type ore deposit of copper and molybdenum. Ore minerals comprise chalcocite, molybdenite, and covellite. The military arsenal (FM) estimated the ore of 30,000,000 t, with 0.27% Cu, and 0.19% Mo. Fluorite-bearing veins trend east to northeast with 1 to 5 m in width and are traced to a length of 100 meters. The field investigation confirmed that the area of geochemical anomaly by SF corresponds to the mineralized zone of oxide copper. There is a great expectation for further prospecting because only very limited areas have been in the past in the large range of mineralization. Old workings on pyrrhotite-quartz veins in Carboniferous sedimentary rocks are situated about 2 km east of the porphyry deposits.

Mining Right: In 1997, Battle Mountain Gold and BHP decided to have a joint investigation. And, the military arsenal (FM) carried out an investigation of having analyzed several hundred geochemical samples and drilled four holes. Then, Los Amarillos and Solitario carried out a joint prospecting. Solitario drilled at least two holes.

References: Groundtruth, Nov.6, 1997 on porphyry deposits and Oct.28, 1998 on gold veins. Direccion General de Fabricaciones Militares y Provincia de San Juan (1968); Informes Finales, Plan Cordillerano Centro, San Juan. Compendio de la Minería Argentina (1997). Moguilner, M.R. (1985).

Satellite Images: Vicuna. Discrimination is illegible because of mountain shadows. Alteration zoning by JERS-1 categorized it to be common sericite and minor kaolinite.

Maps: Direccion General de Fabricaciones Militares y Provincia de San Juan (1968); Maps of geology and geochemistry with records of logging of drilled holes. Mapa metalogenetico y areas favorables, 1: 200,000.

No. 75
Province: SJ
Topography: Cordillera Frontal

Name: Quebrada de Chila (Pegmatite)

Minerals: Cu, Mo, W.

Latitude: 30° 32' S

Longitude: 69° 32' W

Location: Located at Cordillera de Olivares, 55 km southwest of Iglesia.

Geology: Permo-Triassic granitic intrusive rocks.

Mineralization: Probably of pegmatite deposits. Ore minerals comprise molybdenite and wolframite. Gangue minerals consist of quartz, feldspar and beryl. Veins of pegmatite strike N45° to 90° E, and are traced over a distance of 100 to 300 m with the maximum thickness of 4 m. A bonanza is lenticular and 40 cm long with the average of 0.65% Mo, though assay values vary widely. Main mines include San Jose and San Pedro. The similar types of mineralization are located somewhat north and northwest of the area at Quebrada de Bauchacoen and Oabrada de Agua Negra where Carboniferous sedimentary rocks are distributed.

Mining Right: Minas Argentinas (or a joint venture of Minera Sanmartine and a person-Sandue Dolche?).

References: Moguilner, M.R. (1985).

Satellite Images: Vicuna. Remarkable alteration is not recognized, because the reading is illegible in mountain shadows.

Maps: Mapa metalogenetico y areas favorables, 1: 200,000.

No. 76
Province: SJ
Topography: Cordillera Frontal

Name: Quebrada de Chita (Gold vein)

Minerals: Au.

Latitude: -

Longitude: -

Location: The site is forty-five kilometers southwest of Iglesia. Details of location are not known.

Geology: Distributed are Carboniferous quartzite and shale of Cerro Agua Negra formation, and quartz diorite, dacite and andesite.

Mineralization: Vein-type ore deposits. Ore minerals comprise chalcopyrite, pyrite, malachite, azurite and limonite. The vein intersects sedimentary and volcanic rocks with a E - NE strike. Widths stand at 0.6 to 1.5 m in an adit opened at the beginning of this century. The main mines include Pterina II and Pterina III. Arsenic deposits in this area are said to contain gold.

Mining Right: Minas Argentinas (or a joint venture of Minera San martino with Sanduc Dolbe - a private person ?). Minas Argentinas implemented the geochemical analysis of 1600 samples on a grid system, magnetic and IP investigations of 15 km, RC drilling of 1,800 m and diamond drilling of eleven holes with depths 70 to 200 m.

References: Moguilner, M.R. (1985). Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo 1997.

Satellite Images: -

Maps: -

No. 77
Province: SJ
Topography: Pre-Cordillera

Name: Rodolphis, & others (Guardia Viejo, Pata de Indio)

Minerals: Cu,Bi.

Latitude: 30° 42'S

Longitude: 69° 32'W

Location: The site is along Route 150, about 30 km west of village Las Flores which is 25 km southwest of Rodeo, the province of San Juan. Access roads are all paved. The elevation is around 2,800 m a.s.l.

Geology: Sedimentary rocks of Carboniferous to Permian were intruded by Permian dioritic rocks.

Mineralization: Vein-type copper deposits. Ore minerals consist of chalcopyrite, marcasite, and chrysocolla. Gangue minerals comprise limonite, quartz, tourmaline, kaolinite, fluoreite and barite. Ore grades 3.0 to 10.0 % of Cu. Ore deposits of Guardia Viejo and Pata de India are situated in the periphery.

Mining Right: Unknown. Mixed in 1914 to 1918.

References: IMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAU/IMEC Internal Report, (in Japanese). Instituto Geografico Militar (1969): Rodeo, Carta topografica, 1:250,000.

Satellite Images: Vicuna. No alteration is noticed in the periphery of ore deposits.

Maps: N.A.

No. 81
Province: SJ
Topography: Cordillera Frontal

Name: Guanaqueros
Minerals: Au,Ag,Cu
Latitude: 30° 49'S
Longitude: 69° 40'W

Location: The site is 8 km west of Quebrada de San Francisco, a tributary of Río Castano in the province of San Juan. It is accessible on 10 km horse road from El Retamal which can be reached with four-wheel driven vehicle. The elevation is 2,500 to 3,000 m a.s.l.

Geology: Limestone and sandstone of Agua Negra formation of Carboniferous and andesitic rocks of Choiyoi formation of Permo-Triassic were intruded by granite to granodiorite and andesitic porphyry.

Mineralization: A porphyry-type mineralization. Pyrite, chalcopyrite and arsenopyrite were disseminated in Carboniferous and Permo-Triassic rocks. Andesitic porphyry is in the zone of intensive alteration, being associated with many veins comprising quartz, sericite and chlorite. Mineralized andesite crops out at the mouth of valley and is accompanied by pyrite, magnetite and some chalcopyrite. Pyrite is limonitized in part. Analyses of geochemical assays of rocks gave threshold values of 70 ppm Cu and 34 ppm Mo, but no samples exceeded this value in Cu. On the other side, anomalous values of molybdenite were obtained to be of 52, 40 and 36 ppm, etc.

Mining Right: Solitario Argentina. Only regional geochemical investigation was carried out. Exploration expenditure of \$40,000 is estimated in 1996-97.

References: Direccion General de Fabricaciones Militares y Provincia de San Juan (1968); Informes Finales, Plan Cordillerano Centro, San Juan, Secretaria de Minería (1995); Mapa geológico de la provincia de San Juan, 1:500,000, Departamento de Minería de San Juan (1997); Empresas Mineras con Proyectos de Exploración en San Juan - Mayo, 1997.

Satellite Images: Vicuña. A remarkable alteration zone of about 1 km in diameter is identified, at the mouth of Arroyo de Guanaquero, a tributary of Río Castano. Alteration zoning by JERS-1 describes it as sericite and kaolinite.

Maps: Direccion General de Fabricaciones Militares y Provincia de San Juan (1968); Geological map, and map of geochemical anomalies, 1:50,000, and map of geochemical anomalies on river sand, 1:25,000. Mapa metalogenético y areas favorables, 1:200,000.

No. 80
Province: SJ
Topography: Cordillera Frontal

Name: San Francisco de los Andes (Cerro Negro)
Minerals: Au,Ag,(Cu,Bi)
Latitude: 30° 50'S
Longitude: 69° 36'W

Location: The site is eighty kilometers from Calingasta of San Juan, which is accessible on unpaved road with about two hours' riding in four-wheel driven vehicle from Villa Nuevo. The elevation is 2,700 m a.s.l.

Geology: Sedimentary rocks and schists of Carboniferous were intruded by granite and granodiorite.

Mineralization: At San Francisco, tourmaline occupies the matrix of breccia pipe being elliptic to columnar (70 m by 15 to 30 m in size). Ore deposits cover the whole breccia and extend to the surrounding brecciated zones. The previous investigation reported that estimated reserves to the depth of 80 m stood at 150,000 t, of which, an average of 5% Cu, 1.2% Bi and 200 ppm Ag were given for oxidized ore, and an average of 0.8% Cu, 0.6% Bi, 80 ppm Ag and 4 g/t Au were given for sulfide ore. Cerro Negro is the project name given by Solitario. The company drilled a 150 m deep hole in breccia pipe and revealed a 45 m wide copper mineralization of porphyry-type with a grade of 0.22% Cu.

Mining Right: Owned privately. Minera Aguilar investigated the area in the past. Solitario obtained a mining area of 3,500 ha. in the periphery, and implemented geochemical prospecting, and geophysical investigation of induced polarization method. The mineralized zone of 0.22% Cu over the maximum length of 45 m was found from the drilling of 95 holes. Solitario abandon the area in 1998.

References: Groundruth, Nov.5, 1997; National Mining Secretariat (1994); Directory of opportunities, 1994. Crown Resources Web Site (1997). JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMA/JMEC Internal Report, (in Japanese).

Satellite Images: Vicuña, A90, which coincides with the alteration zone AA7060, 7 km northwest of El Retamal. A ring structure of 2 km in diameter exists in the east.

Maps: N.A.

No. 83
Province: SJ
Topography: Cordillera Frontal

Name: Vizcachas
Minerals: Au,Ag,Cu
Latitude: 30° 57'S
Longitude: 69° 45'W

Location: The site is eight kilometers upstream of Arroyo de Vizcachas, a tributary of Río Castano Viejo. It is accessible from the camp of Castano Viejo on horseback. The elevation is 3,200 m a.s.l.

Geology: On the contact between rhyolite of Permo-Triassic and granitic rocks. Alteration is located near rhyolite.

Mineralization: Silicified alteration with minor pyrite. Pyrite was intensively limonitized. From the existence of magnetite stringers in rhyolite, overlapping of potassic alteration and phyllic alteration could be possible. The site of present field survey is situated in the west of anomalous area in Cu, Zn and Mo, which is identified from the geochemical survey conducted by Fabricaciones Militares.

Mining Right: Unknown.

References: Groundtruth, Oct.20, 1998. Direccion General de Fabricaciones Militares y Provincia de San Juan (1988); Direccion General de Fabricaciones Militares y Provincia de San Juan (1968); Informes Finales, Plan Cordillerano Centro, San Juan.

Satellite Images: Vicuna. A number of small scale alteration zones of less than 100 m in diameter are distributed in the weak alteration zone of argillization. Lineaments of ENTE-WSW trend are distributed in the central part of the area.

Maps: Direccion General de Fabricaciones Militares y Provincia de San Juan (1968); Informes Finales.

No. 82
Province: SJ
Topography: Cordillera Frontal

Name: El Retamal
Minerals: Au,Ag,Cu (Cu,Mo)
Latitude: 30° 52'S
Longitude: 69° 35'W

Location: Located along Rio Castano, 55 km north-northwest of Calingasta, the province of San Juan. Accessible, with two hours thirty minutes' riding in four-wheel driven vehicle from Villa Nuevo. The elevation is 1,900 m a.s.l.

Geology: Sedimentary rocks of Devonian to Carboniferous were intruded by Tertiary granodiorite, granite and andesite dike. Granitic rocks partly underwent hydrothermal alteration. Distribution of intrusive rocks is controlled by ring fractures. Moguilner (1985) recorded the distribution of arenaceous metasediments of Carboniferous and intrusive rocks of Permo-Triassic and the alteration in extent of 7 sq. km.

Mineralization: A porphyry-type gold and copper deposit. Intensive dissemination of pyrite is noticed over the area. Ore consists of mainly pyrite and quartz, with minor chalcopyrite, molybdenite, galena and sphalerite. Gold is associated with pyrite. The zone of mineralization is in accordance with the area of intensive silicification. Granodiorite and sedimentary rocks underwent silicification and argillization alteration. Weak potassic alteration is also seen. Elements of Cu, Mo and Au are effectively indicative of mineralization in geochemical survey. A zone of gold mineralization has been delineated by geochemical investigation and drilling, being of 1 to 3 g/t Au in general with frequent values of 15 to 20 g/t. The maximum value of 96 g/t Au is said to be dubious. Tourmaline-quartz breccia similar to one of San Francisco also occurs.

Mining Right: SONOMA Resources (a joint venture of H.Batias and L.Basida Agent). Geophysical survey and drilling of two holes were carried out. From 1981 to 84, SEGEMAR San Juan implemented geochemical survey and geophysical investigation with the induced polarization method, and drilling of six holes. The drilling delineated many mineralization zones of more than 10 g/t Au and attracted public attention. The assay values from the investigation by SONOMA did not exceed 0.1 g/t Au.

References: Groundtruth, Nov.5, 1997. National Mining Secretariat (1994); Directory of opportunities, 1994. INMEC (1997): A Report for Project Funding in Argentina, and Satellite Data Analysis. MMAJ/INMEC Internal Report. (in Japanese). Moguilner, M.R.(1985). Hearing from Mr. Raul Cardo, SEGEMAR.

Satellite Images: Vicuna, A91. The alteration zone coincides with the circular zone of 2.5 km in diameter which includes AA7064, at the north bank of Rio Castano. Mr. Cardo pointed out that gold values are higher in the west of ring structure which is of caldera. A series of ring structures is noticed in the region between San Francisco and the site.

Maps: Secretaria de Minera (1995): Mapa geologico de la provincia de San Juan, 1:500,000.

No. 84
Province: SJ
Topography: Cordillera Frontal

Name: Castano Viejo District
Minerals: Pb,Zn,Ag (Cu,Au)
Latitude: 30° 56'S
Longitude: 69° 38'W

Location: The site is about 70 km northwest of Calingasta in the province of San Juan, and also seven kilometers south of El Retamal ore deposit, or twenty-five kilometers northwest of Villa Nueva. It is accessible with four-wheel driven vehicle. The elevation is around 2,400 m a.s.l. The coordinates above are of the camp at the north of Compana.

Geology: Distributed are Silurian to Devonian San Ignacio formation (calcareous shale and shale), Carboniferous Agua Negra formation (mudstone and sandstone), and the unconformably overlying Permo-Triassic Choiyoi formation (andesitic pyroclastic rocks and dacite), all of which were intruded by a suite of N-S and NW-SE dikes of rhyolite dacite of Triassic.

Mineralization: Many polymetallic deposits of vein-type are distributed. Ore minerals comprise galena, sphalerite, chalcopyrite, chalcocite, anglesite, covellite and pyrite. Gangue minerals consist of quartz, chlorite, calcite and fluorite. Veins repeatedly filled fractures which strike E-W and dip vertically. The largest deposit of Compana produced 630,000 t with 6.5% Pb, 8.5% Zn, 0.4% Cu and 80 g/t Ag. The deposit is 350 m long and 3 m in width. The width became narrow at 0.1 to 0.2 m in width to a depth of 450 m. The second largest deposit of Cuatro Amigos produced 200,000 to 300,000 t with an average of 15% Pb, 24.3% Zn and 270 g/t Ag. Flor de Castano vein produced 50,000 t, extending 300 m with 3 m in width. In addition to the three deposits, there are many vein-type deposits with small scale. Secretaria de Minera estimates the remained ones of 800,000 t in all, of 3 to 9% Pb, 1-7.4% Zn, 1.4 to 507 g/t Ag with less than 1% Cu and 2 g/t Ag.

Mining Right: Most fields(?) are occupied by OPAUICA. Fields became complicated(?) with old and small lots.

References: Groundtruth, Oct.17 & 18, 1998. Cardo, R.(1998): Distrito polimetálico Castano Viejo, presentado para el libro de Recursos Minerales de la Republica Argentina. Secretaria de Minería de la Nación (1994): Mapa Metalogenico de la frontera Argentino-Chilena. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMA/JMEC Internal Report, (in Japanese). Moguliner, M.R. (1985).

Satellite Images: Vicuna, A93. At the southeast margin of the image, an alteration zone extends about 12 km from the southern bank of Rio Castano in NNE-SSW being of more and less than about 2 km in width. AA7067 and 7068 are included. N-S striking lineaments are more than 2 km long. A ring structure of 2 km in diameter is noticed. The area of alteration zone with the strongest reflection coincides with the area of Venezuela ore deposit. Alteration zoning of JERS-1 describes it as alteration of sericite and kaolinite

in the main.

Maps:

Secretaria de Minería (1993) : Mapa geológico de la provincia de San Juan, 1:500,000.
Cardo (1998) : Distrito polimetálico Castano Viejo.
Texto Explicativo de la Carta Geología a escala de 1:100,000 (Castano Viejo).

No. 87
Province: SJ
Topography: Pre-Cordillera

Name: Cerro Negro de la Coradara

Minerals: Pb,Ag,Zn

Latitude:

Longitude:

Location: At the northwest of Castano Viejo, or 75 km north of Calingasta.

Geology: Distributed are sandstone of Agua Negra formation of Carboniferous and granodiorite porphyry Permo-Triassic.

Mineralization: Vein-type ore deposits. Ore minerals comprise galena, argentite, sphalerite, chalcopyrite and pyrite. Gangue minerals consist of quartz, tourmaline and calcite. The vein of 25 de Mayo has an extension of 600 m with a strike of N70° to 75° E, being of 0.3 to 2.2 m in width and dipping 50° to 80° to the north. An intrusive dike trending N20°W exists in the vicinity, and underwent an intensive alteration. A zone of brecciation is noticed which is with 12% Pb, 305 g/t Ag and 1% Zn over a width of 20 m. Major mines are 25 de Mayo, Bomita and Azurita, etc.

Mining Right: Solitario Argentina S.A. Regional geochemical and geophysical prospecting and drilling of 632 m were implemented. Investigation expenditure stands at \$250,000.

References: Moguilner, M.A. (1985). Departamento de Minería de San Juan (1997): Empresas Mineras con Proyectos de Exploración en San Juan - Mayo 1997.

Satellite Images:

Maps: N.A.

No. 88
Province: SJ
Topography: Pre-Cordillera

Name: Cuatro Amigos

Minerals: Pb,Zn,Au,Ag

Latitude: 30° 56'S

Longitude: 69° 37'W

Location: At the Castano Viejo area in the province of San Juan. Accessible to the site by horseback from the camp of Castano Viejo. The elevation is 2,200 m a.s.l.

Geology: Distributed are sedimentary rocks of Silurian to Carboniferous and volcanic rocks of Choiyoí formation of Permo-Triassic. These were intruded by granodiorite and dikes of rhyolite.

Mineralization: A polymetallic vein-type ore deposit. The vein occurs in the silicified volcanic breccia and has a strike of N80°E with a width of 2 to 3 m in the surface. Ore minerals comprise galena, sphalerite and pyrite. Gangue minerals consist of quartz and calcite. A dike of rhyolitic dacite runs in the vicinity with a trend of N-S.

Mining Right: Unknown. Aguilar y Borcesque S.R.C. conducted an energetic exploration in 1946 and the installation was increased in 1956. The average grade is 15.0% Pb, 24.3% Zn and 270 g/t. The mine produced 2 to 300,000 tons of ore.

References: Groundtruth, Oct.18, 1998. National Mining Secretariat (1994): Distrito polimetálico Castano Viejo. Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina and Satellite Data Analysis. MMAJ/IMEC Internal Report, pp211 (in Japanese).

Satellite Images: Vicuna, A92. Situated 3 km north of Venezuela alteration zone. Argillization alteration is indistinct on the image of IERS-1 OPS.

Maps: Distrito polimetálico Castano Viejo.

No. 89
Province: SJ
Topography: Cordillera Frontal

Name: Avezruces
Minerals: Au,Ag,Cu
Latitude: 30° 58'S
Longitude: 69° 47'W

Location: About 15 km west of Castano Viejo area in the province of San Juan. Two days are required on horseback from the camp of Castano Viejo. The elevation is 3,100 to 3,500 m a.s.l.

Geology: Distributed are andesite, andesitic pyroclastic rocks and dacite of Choiyoí formation of Permo-Triassic. Arroyo de Avezruces is inferred to be a fault trending N-S (Fabricaciones Militares, 1968).

Mineralization: Silicified ledge and zone of argillization alteration in the periphery. Alteration is of mixed layers of sericite and smectite. The silicified ledge has a strike of E-W with variable width and rather limited continuation. Generally oxidation and leaching are remarkable in the silicified ledge and limonite stains were formed, though remained pyrite is noticed in places. Kaolinite alteration is also remarkable, which seems to have been formed in the stage of oxidation and leaching. Fabricaciones Militares (1968) confirmed an existence of geochemical anomalies of 66 ppm Mo and 60 ppm Cu in a sample of breccia.

Mining Right: Unknown. Preliminary research was conducted in 1987 by Argentina Gold.

References: Groundtruth, Oct.21, 1998. Dirección General de Fabricaciones Militares y Provincia de San Juan (1968) : Informe Finales Plan Cordillerano Centro. Secretaría de Minería (1995) : Mapa geológico de la provincia de San Juan, 1:500,000.

Satellite Images: Vicuna, AA7066. A zone of argillization alteration being of 4 km by 2 km wide. Alteration zoning by JERS-1 recorded a wide range of kaolinite. Sericite is predominant in the north of alteration zone.

Maps: Dirección General de Fabricaciones Militares y Provincia de San Juan (1968) : Maps of geological and of geochemical anomalies, 1:50,000 and geochemical map of stream sediments, 1:25,000.

No. 90
Province: SJ
Topography: Cordillera Frontal

Name: Manrique
Minerals: Au,Ag
Latitude: 31° 04'S
Longitude: 69° 46'W

Location: Twenty-five kilometers west of Villa Nueva in the province of San Juan. The site is accessible in about six hours on horseback from Villa Nueva.

Geology: Distributed are sandstone and limestone of Agua Negra formation of Carboniferous, andesite and pyroclastic rocks of Choiyoí formation of Permo-Triassic and intrusive rocks. The Agua Negra formation occurs in topographical heights only, and was intensively folded around the axis of NW-SE direction.

Mineralization: An epithermal alteration zone with geochemical anomalies. Observed alterations are of remarkable silicification, of quartz-sericite and of propylitization. The maximum values among 92 samples collected in 1995 by Secretaría de Minería are 126 ppm Cu, 155 ppm Zn, 92 ppm Ag and 1.0 ppm Au.

Mining Right: Owned privately (Bastidas). On Manrique alteration zone, attention is riveted in 1968 through the geological analysis of photos by Minería TEA and Dirección Provincial de Minería de San Juan. The field investigation reported geochemical anomalies in Cu, Pb, Zn, Mo and U. Later, geochemical survey was conducted by Fabricaciones Militares. SONOMA S.A. is reported to have implemented a preliminary investigation in 1997.

References: Groundtruth, Oct.23, 1998. Cardo, R. and Perez, L.(1995): Area de Alteration Manrique, Perfil economico minero. Secretaria de Minería (1995): Mapa geológico de la provincia de San Juan, 1:500,000.

Satellite Images: Vicuna, Alteration zone AA7069 which extends 6 km towards NEE-SSW.

Maps: Cardo, R. and Perez, L.(1995): Geological map, 1:16,000 and Location map of samples and assay values, 1:6,000.

No. 92
Province: SJ
Topography: Pre-Cordillera

Name: Castano Nuevo
Minerals: Au, Cu
Latitude: 31° 01'S
Longitude: 69° 33'W

Location: The site is eight kilometers north of Villa Nueva which is at the right bank of Rio Castano, the province of San Juan. Villa Nueva is accessible with an ordinary vehicle, then about twenty minutes are required in four-wheel driven vehicle from Villa Nueva to the site. The elevation is 1,750 m a.s.l.

Geology: A stock of intensively altered porphyry probably of Miocene intruded into andesite of Choyoi group of Permo-Triassic.

Mineralization: A mesothermal (epithermal?) vein-type gold deposit. Ore deposit occurs in the northwest of intrusive rock, closely associated with breccia. The area of altered breccia is of oval, being 1,500 m long in N-S and 1,000 m long in E-W direction on the surface. Alteration comprises argillization chiefly of alunite and silicification, with a scale of 5 km by 5 km. Assay of ore stands at 5 g/t Au. Ore minerals are made up with electrum, galena, chalcocopyrite and pyrite. Gangue minerals are composed of quartz, calcite and anhydrite. Gold seems to be associated chiefly with pyrite. Veins are 250 to 900 m long and 0.5 to 1.5 m wide with the maximum width of 4 m, and trend N-S, N10°E and N45°W dipping at 45° to 75° to south or southwest. Gold grade ranges from 8 to 15 g/t.

Mining Right: The Castano Nuevo alteration zone, Las Gemelas, is owned by SONOMA Resources Corporation (Canada). Since November 1995, geochemical survey, geophysical investigation using IP method in the grids of 50 m by 50 m, and drilling of eight holes have been implemented. SONOMA conducts exploration of the area in winter time only. Castano Nuevo mine was opened in 1930s and closed in 1949 due to exhaustion of ore. A cyanidation plant seems to have been in operation in 1970s.

References: Groundtruth, Nov.6, 1997. JMEC (1997) : A Report for Project finding in Argentina. 1997. JMEC (1997) : A Report for Project finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report. (in Japanese). Moguliner, M.R. (1985). Hearing from Mr. Raul Cardo, SEGENMAR.

Satellite Images: Vicuna, A94. The mineralized zone coincides with the alteration zone of 1.7 km in diameter at the south bank of Rio Castano at the southeastern edge of the image. The central portion of alteration zone is rich in limonite. Alteration zoning by JERS-1 describes it as sericite alteration of several hundred meters in diameter, being of somewhat indistinct.

Maps: N/A

No. 91
Province: SJ
Topography: Cordillera Frontal

Name: Portezuelo de Las Burras
Minerals: Au, Ag
Latitude: 31° 04'S
Longitude: 69° 50'W

Location: Thirty kilometers west of Villa Nueva in the province of San Juan. A ridge line, 2 km north of Port de Las Burras. Two days are required on horseback from Nueva.

Geology: Volcanic rocks of Tertiary.

Mineralization: Unknown.

Mining Right: Unknown.

References: Secretaria de Minería (1995): Mapa geológico de la provincia de San Juan, 1:500,000.

Satellite Images: Vicuna, Ilapel. The argillization zone, AA7070. The alteration zone extends 4 km in a N-S direction. JERS-1 records kaolinite alteration in the north and sericite alteration in the south.

Maps: N/A

No. 94
Province: SJ
Topography: Cordillera

Principal Name: Calderon
Minerals: Au,Ag,Cu
Latitude: 31° 13' S
Longitude: 70° 29' W

Location: Near the Chilean border. At the upper stream of Rio del Lagnas o Salinas. The elevation is 3,200 to 4,000 m a.s.l.

Geology: Sedimentary rocks of Cretaceous and volcanic rocks of Tertiary.

Mineralization: Unknown.

Mining Right: Unknown. In March, 1998, IPEEM, Instituto Provincial de Exploraciones y Exploraciones Mineras of the provincial government of San Juan, invited tenders over the adjoining area to the south, being of 15 km by 2 km along the Chilean border.

References: Secretaria de Minería (1995); Mapa geológico de la provincia de San Juan 1:500,000. IPEEM (1997); Concurso Publico Internacional de Ofertas por Dos Areas Minas.

Satellite Images: Ilapel. The somma of the ring structure with a diameter of 7.5 km is defined by a river flowing in a N-S direction. The ring structure is considered to be of caldera. Hydrothermal alteration is not recognized in images of TM and LERS-1.

Maps: N.A.

No. 93
Province: SJ
Topography: Cordillera

Principal Name: Rincones de Araya
Minerals: Au,Ag,Cu
Latitude: 31° 13' S
Longitude: 70° 17' W

Location: Situated at the west side of Cordillera de la Tolora, 80 km west of Calingasta. The elevation is 3,200 to 4,000 m a.s.l.

Geology: Detailed information is not available.

Mineralization: Similar to that of Rio Cenizero. Details are unknown.

Mining Right: In accordance with a prospecting agreement, RTZ Mining and Exploration (RTZ-C.R.A. Exploraciones ?) investigated the mining area of 3,400 ha., with an exploration expenditure of \$670,000.

References: Moguiner, M.R. (1985). Departamento de Minería de San Juan (1997); Empresas Mineras con Proyectos de Exploracion en San Juan - Mayo 1997.

Satellite Images: Ilapel. The site corresponds to the alteration zone AA8012, with an NE elongation being of 2.0 km by 1.5 km in size. Alteration zoning by JERS-1 describes it as kaolinite alteration in the middle and sericitic alteration in the periphery.

Maps: N.A.

No. 95
Province: SJ
Topography: Cordillera

Principal Name: Arroyo de Alier - Rincon de Conicoro
Minerals: Au, Ag, Zn
Latitude: 31° 29' S
Longitude: 70° 29' W

Location: Near the Chilean border. At the upstream of Rio de la Pantanosa, a tributary of Rio Santa Cruz at 100 km west of Calingasta. Twenty-five kilometers to the mineralized zone is accessible on horseback. The elevation is 3,400 to 4,000 m a.s.l.

Geology: Distributed are a stock of granodiorite and its effusive rocks of Permo-Triassic and sedimentary rocks of Jurassic and Cretaceous. These were intruded in places by volcanic rocks of late Cretaceous to Tertiary.

Mineralization: Epithermal gold deposits. In El Alier, the mineralized zone is of 1,000 m by 1,500 m, and of intensive silicification due to the concentration of metalliferous veins. The veins comprise sulfur, gypsum, pyrite, alunite, enargite and tourmaline, etc. The zone of silicification is surrounded by alteration zones of argillitic and propylitic. In Rincon de la Mina, a similar silicified zone is of 600 m by 300 m and is accompanied by pyrite, magnetite, specularite and stringers of oxide copper minerals. Assay values in geochemical prospecting stand at 3 g/t Au as a maximum. Silver ranges from 4 to 40 g/t in the silicified zone.

Mining Right: Barrick Exploration de Argentina.

References: National Mining Secretariat (1996): Directory of opportunities, 1996. Moguilner, M.R. (1985).

Satellite Images: JIlapel. The mineralized zone corresponds to the alteration zone AA8020 of 4 km by 2 km in diameter. Alteration zoning by JERS-1 describes it as broad kaolinite alteration with some sericitic alteration in the periphery.

Maps: N.A.

No. 96
Province: SJ
Topography: Cordillera Frontal

Name: La Alumbra de Arriba (La Alumbra)
Minerals: Cu, Mo.
Latitude: 31° 25' S
Longitude: 69° 51' W

Location: Situated at the upper stream of Arroyo de Fierro, a tributary of Rio Calingasta, being at 30 km west of Calingasta. The elevation is 3,500 m a.s.l.

Geology: Wall rocks are rhyolitic volcanic rocks of Permo-Carboniferous, which abut against dikes of andesitic hypabyssal rocks and diabase.

Mineralization: A small-scale mineralized zone of pyritic and limonite with impregnation of chalcopyrite. Veins trend west-northwest. Major vein zones include Panul and Peludos.

Mining Right: Unknown.

References: Moguilner, M.R. (1985).

Satellite Images: A weak alteration zone is centered at A. Fierro and a valley of its south, extending in E-W direction with 5 km in the major axis by 3 km in the minor axis. The alteration is locally intensive, with the preponderance of sericitic alteration.

Maps: N.A.

No. 97
 Province: SJ
 Topography: Cordillera Frontal

No. 98
 Province: SJ
 Topography: Cordillera

Name: El Pachon
Minerals: Cu, Mo.
Latitude: 31° 55'S
Longitude: 69° 51'W
Location: Near the Chilean border, a mountainous zone situated at 90 km west of Barreal, the province of San Juan. At the upper stream of Rio Pachon, a tributary of Rio Santa Cruz. The elevation is 3,600 to 3,900 m a.s.l.

Principal Name: Yunque
Minerals: Cu, Au.
Latitude: 31° 52'S
Longitude: 70° 17'W
Location: The site is twenty kilometers southwest of El Pachon. The headwater of Rio de las Churrulas is accessible on horseback over a distance of about 15 km. The elevation is 4,200 to 4,400 m a.s.l. with an extremely steep topography.

Geology: The area consists of sedimentary rocks of Jurassic and unconformably overlying volcanic rocks. These were intruded by diorite to granodioritic rocks. Intrusive rocks have a concomitant dacitic to tonalitic facies which is regarded to be related with mineralization. Wall rocks are volcanic rocks of late Jurassic and were intruded by diorite and granodiorite of Miocene.

Geology: Sandstone and conglomerate of Tordillo formation of Jurassic are overlain unconformably by andesitic volcanic rocks of Cretaceous to Tertiary. These were intruded by dioritic intrusive rock. The geological setting of the area is similar to that of El Pachon.

Mineralization: A porphyry-type copper deposit of Miocene, being of 9 to 10 Ma. The deposit seems to be the largest in Argentina at 890,000,000 t with 0.61% Cu, 0.016% Mo, 4 g/t Ag and 0.017 g/t Au. Among this, the oxide ore of 186,000,000 t with more than 1% Cu on the top and sulfide ore of less than 1.5 % Cu in breccia pipe are promising to be of mining target. A mineralized surface area is 2.3 sq. km. Ore minerals comprise chalcopyrite and pyrite with minor molybdenite and bornite which are accompanied by pyrite, Tetrahedrite, chalcocite and digenite also occur. Native sulfur is associated with quartz stringers. The zone of secondary enrichment is developed to be of 170 m thick. The breccia zone is particularly rich in magnetite and shows remarkable magnetic anomalies.

Mineralization: Gold-bearing porphyry copper deposits. A zonal alteration of potassic-phyllitic-propylitic is noticed. Ore deposits are accompanied with zones of potassic alteration in two cores of the north and the south. The area of potassic alteration is of about 1 sq.km. Oxidation and leaching are observed in places.

Mining Right: Cambior Inc. holds 50% being of an operator and a venturer, Minera San Jose holds 50% being of a venturer and Pachon S.A. Minera being the venture. Feasibility study was completed in 1997 by drilling of 202 holes totalling 37,000 m in length. Production is scheduled to start in 2002. The initial expenses stand at \$ 9 million. Minera San Jose intends to sell its interests.

Mining Right: Minera Aguilar. RTZ possesses the periphery.
References: Hearing at the site.

References: Compendio de la Minería Argentina (1997). National Mining Secretariat (1994): Directory of opportunities. 1994. IMEC (1997): A Report for Project Finding to Argentina, and Satellite Data Analysis. MAMU/IMEC Internal Report, (in Japanese). Moguilner, M.R. (1985). *Bulletin of Cambior Inc.*

Satellite Images: Ilapel, AAS028. A zone of remarkable hydrothermal alteration, with an elongation of 3 by 1.5 km in NE-SW direction. Alteration zoning by JERS-1 describes it as zones of a sericitic alteration and a combination of sericite and oxide alteration minerals.

Satellite Images: Ilapel, A102. Distributed in the vicinity are many cauldrons, zones of hydrothermal alteration, both of which are associated with Miocene volcanic activities, and pre-existing ore deposits. El Pachon and adjoining Los Perambres in Chile are accompanied with zones of particularly intensive alteration. Noticed is an arch of 8.5 km in diameter, delineated with two zones of alteration. Alteration zoning of JERS-1 describes it as alterations of kaolinite and sericitic.

Maps: XII Congreso Geológico Argentino y Congreso de Exploración de Hidrocarburos Actas, Fig.1-3.

Maps: N/A

No. 99
Province: SJ
Topography: Cordillera

Principal Name: Valle de los Patos Norte
Minerals: Au, Ag
Latitude: -
Longitude: -

Location: The site is one hundred and ten kilometers northwest of Calingasta.

Geology: Details are unknown.

Mineralization: Similar to the geological setting of Rio Cenicero. Detailed information is not available.

Mining Right: -

References: Moguiner, M.R. (1985).

Satellite Images: -

Maps: -

No. 100
Province: SJ
Topography: Cordillera

Principal Name: Cerro Mercedario
Minerals: Cu, Mo
Latitude: 31° 57'S
Longitude: 70° 03'W

Location: At Cordón de la Ramada, 65 km west of Barreal. Access is possible by horse only, and four days are required from Barreal, or two days from Peusto del Andarivel. At an elevation of 5,000 m a.s.l. being covered with perpetual snow.

Geology: Wall rocks are tonalite to granodiorite of middle Miocene being of 13±0.3 Ma, which intruded into volcanic rocks of Choiyoi group of Permo-Triassic.

Mineralization: A porphyry-type copper and molybdenum ore deposit. Judging from moraines, ores are of disseminated chalcopyrite and of molybdenite with pyrite and magnetite accompanied by quartz stringers. Pyrite is unevenly distributed to be of dissemination or of stringers. Line sampling of 12 holes by United Nations returned 20 to 6,600 ppm Cu, 12 to 4000 ppm Mo with the maximum value of 25,000 ppm. Oxidation and leaching are rare. Noticed alterations are of silicification, sericitization, argillization, chloritization and epidotization. Moguiner (1985) evaluated the mineralization to be of a low grade, and widespread.

Mining Right: Unknown. An area adjoining to the northeast being of 4.1 km by 5.7 km was scheduled to be put out to tender in March, 1998 by IPESM, Institute Provincial de Exploraciones y Explotaciones Miberas, of the provincial government of San Juan.

References: United Nations (1970). Moguiner, M.R. (1985). IPESM (1997): Concurso Publico Internacional de Operates por Dos Areas Minas.

Satellite Images: Illapel. Altered rocks seem to be sporadic along the ridge line of NNNE-SSW, though obscured by snow cover.

Maps: United Nations (1970): Fig.88.

No. 101
Province: SJ
Topography: Cordillera Frontal

Name: Leoncito
Minerals: Cu, Mo.
Latitude: 32° 00'S
Longitude: 69° 34'W
Location: Being thirty-five kilometers south to southwest of Barreal. Accessible with unpaved road from somewhere on the route No.39. The elevation is 3,000 m a.s.l. The topography is not so steep, but is not accessible in wintertime.

Geology: Argillaceous schist of Permo-Triassic and intruding amphibole andesitic porphyry. Small-scale intrusions of trachyte and rhyolite also occur.

Mineralization: A porphyry-type copper deposit. Ore deposit was created in a portion of intensive alteration in the intrusive rocks. Alterations are of kaolinization, sericitization and silicification, being of 1 sq. km in scale. The ore deposit underwent oxidation and leaching with the appearance of turquoise and malachite in addition to the widespread distributed limonite. By geochemical survey, clear anomalies of Cu and Mo are obtained being of 200 to 4,300 ppm Cu and 16 to 130 ppm Mo. The induced polarization method suggested an existence of polarizing medium in some 200 m in depth. Three holes drilled to 278 ft, 120 ft and 585 ft in depth by United Nations did not reveal remarkable mineralization.

Mining Right: An individual (Jorge Bastias).
References: United Nations (1970), Moguilner, M.A. (1985).
Satellite Images: San Juan. In accordance with alteration zone AB80061. Dimensions are of 2 km by 1 km.

Maps: United Nations (1970), Fig. 85,86 & 87.

No. 102
Province: SJ
Topography: Cordillera

Principal Name: Quebrada de la Honda
Minerals: Cu, Au, Ag.
Latitude: 32° 13'S
Longitude: 70° 09'W

Location: Being ninety kilometers southwest of Barreal. Fifty-five kilom ciers from Alvarez Candarco, three days necessary by horse.

Geology: Limestone of Tordillo formation of Jurassic and unconformably overlying volcanic rocks of upper Cretaceous to Tertiary. These were intensively folded around the axes of N-S trend.

Mineralization: There exist disseminated pyrite and breccia pipe, probably being of extremely weak mineralization. Moguilner (1985) reports that gold is accompanied by bornite and chalcopyrite. Ore deposits occur in the form of veins on the limb of plunging fold.

Mining Right: Unknown.
References: United Nations (1970), Moguilner, M.A. (1985).

Satellite Images: Details were obscured by snow cover.
Maps: N.A.

No. 103

Province:

Topography: Cordillera Frontal

Name: Manuel

Minerals: Pb, Zn

Latitude: -

Longitude: -

Location: -

Geology: -

Mineralization: Unknown.

Mining Right: Unknown.

References: -

Satellite Images: -

Maps: N.A.

No. 104

Province: SJ

Topography: Cordillera Frontal

Name: San Santiago

Minerals: Pb, Zn, (Ni, U)

Latitude: -

Longitude: -

Location: Being thirty kilometers east of Dept. Gral Sarmiento Jague. The elevation is 2,500 to 4,000 m a.s.l.

Geology: Schist, amphibolite, quartzite and limestone of Proterozoic.

Mineralization: Ore deposits are of veins trending N65°E to E-W, dipping at 55° to the south, with extensions of 450 m long and 0.5 to 1.2 m wide. Gangue minerals are calcite, nickel minerals and pitchblende of 10% U. Ore minerals are chalcopyrite, sphalerite and galena. Previously, ores were mined as of La Solitaria, and four old workings remain.

Mining Right: Unknown.

References: SECEMAR (1995): A Proposal of Technical Cooperation to the Government of Japan. MMAJ's internal documents.

Satellite Images: -

Maps: N.A.

No. 106
Province: SJ
Topography: Pre-Cordillera

Name: Santa Elena (Quebrada de la Alcaparrosa)
Minerals: Pb, Zn, Ag, Au.
Latitude: 31° 17'S
Longitude: 69° 21'W

Location: The site is located three kilometers east of Caimagasta, the province of San Juan. It will take two hours and forty minutes on route No.12 from San Juan. The elevation is 1,400 m a.s.l.

Geology: Rhyolitic dacite intruded into black shale and pillow basalt of Ordovician, being the upper part of ophiolitic horizon in the stratigraphic profile.

Mineralization: East-west trending veins in pillow basalt. Ores are of gold-bearing pyrite, marcasite, sphalerite, galena, arsenopyrite, sulfate minerals and bismutinitic. It may be appropriate to take it as Cyprus-type ore deposits. There are two veins. The southern vein is of 1 to 8 m wide, dipping at 75° to the south and extends intermittently over a distance of 1 km. Shafts were sunk to the levels of 30 m and 60 m in depth, respectively, and drifts were developed. The northern vein is parallel to the southern vein over a distance of around 700 m long. Remaining ore reserves stood at 370,000 t, being of 2.1% Pb, 3.3% Zn, 4.2 g/t Au and 87 g/t Ag. According to Moguilner, M.R. (1985), ore reserves are of 60,000 t with 2% Pb, 3% Zn, 82 g/t Ag and 4.5 g/t Ag. Estimated reserves are 220,000 t with 2% Pb, 3% Zn, 80 g/t Ag and 5 g/t Au in the western area, 180,000 t with 2% Pb, 3% Zn, 80 g/t Ag and 4.5 g/t Au in the central area and 80,000 t with 1.3 g/t Au and 60 g/t Ag in the eastern area. Major mines are Santa Elena and Santaeresa.

Mining Right: Tomba-Belletti S.R.A. (Argentina)

References: JICAMMAJ (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1997. National Mining Secretariat (1994): Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MNMAJ/JMEC Internal Report, (in Japanese). Moguilner, M.R. (1985).

Satellite Images: Iliapel, San Juan, A99. On the bank of Rio de los Patos, 3 km west of Alcaparrosa porphyry copper deposit. Small-scale alteration zones are sporadically scattered in an area of 7 km to 8 km in diameter in the periphery of ore deposits.

Maps: N/A

No. 105
Province: SJ
Topography: Pre-Cordillera

Name: Hualilan, Gualilan
Minerals: Au, Ag.
Latitude: 30° 44'S at Hualilan and 30° 49'S at Gualilan.
Longitude: 68° 57'W at Hualilan and 68° 49'W at Gualilan.

Location: Being one hundred and eighteen kilometers northwest of San Juan city. The area can be reached by two hours riding in common vehicle from San Juan. The elevation is 1,750 m a.s.l.

Geology: Dikes and stocks of dacite intruded into the San Juan formation of Ordovician.

Mineralization: Ore deposits are tabular or vein like, occurring conformably in limestone with a strike of N-S and a dip of about 60° to the west. Veins comprise ore minerals of pyrite, silver-bearing sphalerite, chalcocopyrite and pyrrhotite, etc. And gangue minerals are quartz and carbonates. Vein width reaches to 4 m, and grade ranges from 5 to 30 g/t Au. Impregnation of fine-grained gold has been reported in brecciated dacite in the periphery. Deposits are separated to Gualilan in the south and Hualilan in the north, extending over a distance of about 3 km. Geological reserves are estimated to be 660,000 t, being of 14 g/t Au, 49 g/t Ag, 2.0% Zn, 0.2% Cu and 0.59% Pb. A number of old workings and shafts remain.

Mining Right: Gold deposits with a long history which have been mined since the latter half of 16th century. Hualilan is owned by Plata Mining (Canada), over an area of 90 ha, including 15 sites of old workings and mineral showings. The company conducted prospecting from 1995 and reported the proved ore reserves in addition, being of 289,000 t, with 12.7 g/t Au, 47.5 g/t Ag, 0.2% Cu, 0.7% Pb and 2.2% Zn. Gualilan is owned by Solitario Resources Corp. A joint venture with an optionee Monarch Resources Ltd. investigated the area and was dissolved in Oct. 1996, without realizing the anticipated result.

References: JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. Geological Survey, Mines Department of Argentina (1995): A Proposal for Technical Cooperation to the Government of Japan. National Mining Secretariat (1994): Directory of opportunities, 1994. JICAMMAJ (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. Moguilner, M.R. (1985).

Satellite Images: San Jose, A88, A89. Mineral occurrences without alteration zone in strongly folded sedimentary rocks of Ordovician. Distributions of intrusive rocks are unknown. The periphery is broadly overlain by Quaternary systems.

Maps: JICAMMAJ/JMEC (1997): A Report of Project Finding in Argentina, Fig.5-2-1.

No. 108
Province: SJ
Topography: Pre-Cordillera

Name: La Toya (San Jorge)
Minerals: Pb, Zn, Cu.
Latitude: 31° 09' S
Longitude: 69° 27' W

Location: Being twenty-five kilometers north of Calingasta, on the western slope of Sierra del Tigre at the east of Puchuzum. The elevation is 1,500 m a.s.l.

Geology: Distributed are the Ordovician sedimentary rocks of Don Pío formation and andesitic porphyry of Triassic.

Mineralization: Vein-type ore deposits which are related with Triassic quartz porphyry. Ore minerals comprise chalcopyrite, galena, sphalerite, pyrite, enargite and chalcocite. Veins crop out over a distance of 90 m along faults trending in N-S direction. Bonanzas are located at intersections of faults trending N30°E and NW. San Jorge and La Toya are of major mines. Angelilli (1984) recorded mining of 22 m long and 0.5 to 1.0 m wide in lode at -10m and -16m levels, with an average of 6.5% Cu.

Mining Right: Unknown.

References: Moguilner, M.R. (1985). Yacimientos metalíferos de la Republica Argentina, Vol.1.

Satellite Images: San Juan. Hydrothermal alteration is not noticed.

Maps: N.A.

No. 107
Province: SJ
Topography: Pre-Cordillera

Name: Alcaparrosa
Minerals: Cu, Mo.
Latitude: 31° 18' S
Longitude: 69° 23' W

Location: Situated at the south bank of Rio San Juan, being 12 km northwest of Calingasta, the province of San Juan.

Geology: Sedimentary rocks, pillow lava and dolerite of Ordovician to Devonian were intruded by acidic rock of Permian. Hydrothermal biotite of the intrusive rock returned a K-Ar age of 267±4 Ma (Sillitoe, 1977).

Mineralization: A porphyry copper deposit. Pillow lava and mudstone of the upper part of ophiolite horizon in the stratigraphic profile are intruded by dacite porphyry. Ore mineral comprise chalcopyrite, molybdenite, chalcocite, pyrite, pyrrhotite, arsenopyrite, marcasite and chrysocolla. Existing survey data showed low values, among which the highest stood at 0.3% Cu and 0.04% Mo. A field investigation noticed abundant dissemination of pyrite and rare chalcopyrite. Secondary enrichment is not developed. The area of porphyry occurrence in the surface is restricted to be of 200 m by 300 m. Argillization alteration becomes more intensive with away from porphyry. At the northwest of the alteration zone, many magnesium- and aluminum- sulfate deposits occur with a small-scale and are mined sporadically and minutely.

Mining Right: Grupo Minera Aconcagua S.A., a subsidiary fully owned by Northern Orion Exploration. Geochemical survey in early 1970s delineated anomalies in Cu and Mo, and more than two holes were drilled. Recursos Americanos Avg. also conducted exploration in the vicinity.

References: Groundtruth, Nov.4, 1997. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report, (in Japanese), Moguilner, M.R. (1985). Sillitoe (1977).

Satellite Images: Illapel, San Juan A98. Small alteration zones (A38003) are sporadic in the vicinity of ore deposit.

Maps: N.A.

No. 109
Province: Pre-Cordillera
Topography: Pre-Cordillera

Name: Agua Blanca & Mondaca Auca
Minerals: Au, Ag, Cu.
Latitude: 29° 28'S
Longitude: 69° 59'W

Location: Located 170 km north of Calingasta, Province San Juan. Heading north on Route No.430 along Rio Blanco, the site is at the west of Chinguillos village. The elevation is 3,000 m a.s.l.

Geology: The upper Devonian sedimentary rocks. Presence of intrusive rocks is not confirmed. The west of ore deposits is broadly overlain with the Quaternary system.

Mineralization: A vein-type gold and copper deposit. A grade of 2.4 g/t Au has been reported.

Mining Right: Unknown.

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report. (in Japanese).

Satellite Images: Vicuna, A78. Situated in the vicinity of boundary between the Devonian and the Quaternary systems at the northeast of the image. Alteration zones of argillization and limonitization are accompanied.

Maps: N.A.

No. 110
Province: MZ
Topography: Pre-Cordillera

Name: San Jorge
Minerals: Cu, Au.
Latitude: 32° 15'S
Longitude: 69° 26'W

Location: Being forty kilometers north of Uspallata village on Route No.39, about 100 km northwest of Mendoza city.

Geology: Distributed are Carboniferous sedimentary rocks, Triassic volcanic rocks and stocks of porphyry of late Triassic. These were overlain by sand and gravel beds related with upheaval of Andean movement in the Tertiary time. Sillitoe (1977) reported a K-Ar age of 270±4 Ma from biotite of magma type in rhyolitic to dacitic porphyry.

Mineralization: A gold-bearing porphyry copper deposit. The deposit occurs in stocks of Permian-Triassic porphyry and tourmaline conglomerate. Principle tectonic line runs in a direction of N-S to NNE with secondary tectonic lines of NW and ENE directions. The zone of secondary enrichment is formed 100 m below the surface. Drilling of 146 holes totalling 21,000 m delineated the ore deposit of 146,000,000 t, with 0.5% Cu, 0.2 g/t Au and 3.5 g/t Ag. Continuation of the zone of more than 5% Cu to a depth of 495 m has been confirmed. The high correlation between copper and silver has been recognized in geochemical survey, but these two elements do not correlate with gold.

Mining Right: Grupo Minera Aconcagua S.A., a subsidiary fully owned by Northern Orion of Canada. In 1968, an individual person commenced prospecting with pitting, trenching, geophysical prospecting using IP-method, and drilling of 32 holes. In 1973, Falconbridge conducted survey and relinquished the prospect. In 1992, RAA Resources Americanos Argentinos S.A., obtained the prospect and drilled 45 holes with RC, and implemented the dressing test of oxide ores. In 1995, Northern Orion acquired RAA, and a pre-feasibility study is in progress. There remains a shaft of 60 m deep at the site.

References: Groundtruth, Nov25, 1997. JICAMMAJ (1997): A Report for Project Finding in Argentina for the fiscal year 1996. Argentina Mining 96 Field Excursion Guidebook, 1996. SEG Newsletter, (1996). Mining Jour., (1996). JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report. (in Japanese). Hearing from Mr. Eddy Lavandao, SECEMAR. Sillitoe (1977).

Satellite Images: Itapel, San Juan, A97. The site of ore deposit corresponds with an alteration zone of 2 km by 1 km.

Maps: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. Fig.5-2-4. Argentina Mining 96 Field Excursion Guidebook, 1996. 9 pieces.

No. 112
Province: MZ
Topography: Pre-Cordillera

Name: Paramillos Sur
Minerals: Cu, Au.
Latitude: 32° 29'S
Longitude: 69° 06'W

Location: Being seventy-five kilometers northwest of Mendoza. Trips of two hours in ordinary vehicle on Route No.7 to Uspallata and about another one hour in four-wheel driven vehicle are necessary for going to the center of mineralized zone. Gentle hills at an elevation of 3,000 m a.s.l. Being accessible throughout the year.

Geology: Tertiary sedimentary rocks of Triassic were intruded by stocks of andesitic porphyry of Miocene. Around 90% of these area are overlain by the Quaternary system.

Mineralization: A porphyry copper deposit. Due to intensive silicification, the central part of mineralized zone remains to be a hill and its periphery is covered by Quaternary detrital sediments, which are 50 m thick. A portion of 50 to 100 m in depth is the zone of oxidation and leaching and the zone of secondary enrichment occurs more than 100 m deep from the surface. Ore reserves in situ were reported from 25 DDH, to be of 186,000,000 t, being of 0.58% Cu, and 0.06 to 0.42 g/t Ag. Molybdenum contents are unknown. Among them, a sum of 33,000,000 t of ore is from rich zones of more than 0.95% Cu. An area of mineralization is of 4 sq. km. Major ore minerals are chalcocite and chalcopyrite, with minor gold and molybdenite. According to the analysis made by UN (FM), the area was divided into blocks with many faults, and each block fluctuated upward or downward differentially. The shape of ore deposit was defined by fractures of NW and NE to NNE trends being of passages for hydrothermal solutions. The age of this tectonic movement is assumed to be of around Tertiary.

Mining Right: A dispute of mining right has been settled. Mining right is owned by an individual person, Mr. Pedro Norberto Capredoni and prospecting agreement was fixed up with Grupo Minero Aconcagua. Committed exploration expenditure stands at \$ 7 million for two years, inclusive of expenditure for Paramillos Norte and other prospects.

References: Groundtruth, Doc.1, 1997. JICA/MMAJ/JMEC (1997): A Report for Project Finding in Argentina, Internal Report, (in Japanese). National Mining Secretariat (1994): Directory of opportunities, 1994. UN (1970). Hearing from Mr. Eddy Lavandaino, SEGEMAR.

Satellite Images: Mendoza, A107. A rock mass of intensive alteration with the preponderance of clay minerals is confirmed in Quaternary system. The tones of color of altered rocks are similar to those of Paramillos Norte and Centro. An existence of caldera is being discussed, which corresponds to the ring structure of about 5 km in diameter extending from Grupo Oro del Sur to Paramillos Centro.

Maps: JICA/MMAJ/JMEC (1997): A Report for Project Finding in Argentina, Fig.5-2-4.

No. 111
Province: MZ
Topography: Pre-Cordillera

Name: Yalguaraz
Minerals: Cu, Mo, (Zn, Au, W).
Latitude: 32° 08'S
Longitude: 69° 26'W

Location: Being forty kilometers north of Uspallata. A journey of about two hours in four-wheel driven vehicle is necessary from Uspallata. The elevation is 2,500 m a.s.l.

Geology: The Carboniferous sedimentary rocks are intruded by granodiorite and diorite probably of Permian. The most area is overlain by the Quaternary system up to 200 m thick. The site is situated at an anticlinal axis.

Mineralization: A porphyry copper or skarn-type ore deposit. Zonal alteration of potassic, phyllic and propylitic is centered around Permian diorite. Ore deposit is associated with the zone of potassic alteration and made up almost of primary minerals being of 0.2% Cu. Ore minerals comprise electrum, chalcopyrite, sphalerite, bornite, pyrite, arsenopyrite, azurite, cuprite, chalcocite and malachite. Tourmaline-bearing breccia pipe and veins of N-S direction occur in outer edge of the porphyry system. Drilling of breccia pipe in the north intersected the mineralization of 0.4% Cu at a depth of about 60 m. Zones of veining are equivalent to the old Yalguaraz ore deposit. United Nations (FS) implemented a regional survey on the Quaternary system in Uspallata Graben at the southeast of Yalguaraz. From geophysical prospecting, three sites of Yalguaraz Central, Yalguaraz S.W. and Tambillos were selected to be promising. 18 holes (16, 1 and 1) respectively, totalling 3,000 m were drilled and got values of low grade. Geochemical survey using caliche in the Quaternary system was tried and found not to be effective.

Mining Right: Grupo Minero Aconcagua S.A. The periphery is occupied by A.M.D, American Mining Development.

References: Groundtruth, Nov.25, 1997. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report, (in Japanese). Moguilner, M.R. (1985). UN (1970). Hearing from Mr. Eddy Lavandaino, SEGEMAR.

Satellite Images: San Juan, A104. Remarkable argillization alteration is noticed.

Maps: UN (1970): Figures 23 to 25.

No. 113
 Province: MZ
 Topography: Pre-Cordillera

Name: Paramillos Norte
 Minerals: Au, Ag, Cu, Pb, Zn.
 Latitude: 32° 26'S
 Longitude: 69° 06'W

Location: Being five kilometers north of Paramillos Sur at an elevation of 3,100 m a.s.l. Accessible through the year with four-wheel driven vehicle.

Geology: Complex of igneous rocks, mainly of monzonite of Neogene Tertiary intruded into volcanic breccia of Triassic. The complex crops out over an area of 6 sq.km.

Mineralization: Ore deposits are made up of porphyry copper deposit centering around intrusive rocks, and polymetallic veins and zones of dissemination in volcanic breccia in the periphery. Veins take the form of stringers of iron, copper and gold, as approaching to the porphyry system in the center. Estimated ore reserves are 50 million tons of porphyry type and 2 million tons of vein type, both being of low grade. United Nations (UN) reported the sequence of intrusions in the central part of mineralization as (1) regional Budinera breccia, (2) Cerro Aspero porphyry, andesitic to andesitic in composition, and (3) small-scale breccia pipes being rich in magnetite cement. Mineralization of copper and molybdenum is accompanied with breccia bodies of the last stage. The geochemical survey by UN (FM) delineated many anomalies in the northeast of Aspero porphyry. Geophysical survey showed a concurrence between the area of high induced polarization and the distribution of disseminated sulfides, and the distribution of apparent resistivity defined that the mineralization was controlled by fault systems of N-S and of NE-SW. Among 17 DDH, one hole intersected a 48 cm wide oxide mineralization of 1.7% Cu and 0.07% Mo.

Mining Right: A dispute of mining right has been settled. Mining right is owned by an individual person, Mr. Pedro Norberto Capredoni and prospecting agreement was fixed up with Grupo Minero Aconagua.

References: Groundtruth, Nov. 30, 1997. JICANMAJ/MEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. National Mining Secretariat (1994): Directory of opportunities, 1994. UN (1970). Hearing from Mr. Eddy Lavandao, SEGEMAR.

Satellite Images: Mendoza, A109. Remarkable alteration zone has been formed, being of 1.5 km by 0.5 km, extending in E-W direction. Contrast of unaltered Aspero porphyry against altered breccia in the periphery is apparent. The alteration zone of Paramillos Norte is situated in the west of alteration zone of ring-shape, being of 4.5 km in diameter. With the ring structure of Paramillos Sur in the south, these can be deemed to be of composite calderas. The east of alteration zone seems to remain not having been prospected.

Maps: JICANMAJ/MEC (1997): A Report of Project Finding, Fig. 5-2-4. UN (1970): Figures 26 to 30, and Table 19.

No. 114
Province: MZ
Topography: Pre-Cordillera

Name: Paramillos Centro
Minerals: Cu, Au
Latitude: 32° 28'S
Longitude: 69° 07'W

Location: Being two kilometers north of Paramillos Sur. Accessible with four-wheel driven vehicle. The elevation is about 3,000 m a.s.l.

Geology: The Triassic terrigenous sedimentary rocks were intruded by a stock of andesitic porphyry of Miocene. Similar with that of Paramillos Sur, but window-like intrusive rock is of a small-scale. Alluvium is not noticed to have developed.

Mineralization: Andesitic porphyry was brecciated in part and cemented with limonite. Geochemical survey by SEGEMAR delineated an anomaly of gold.

Mining Right: Mining right is in dispute between Provincia de Mendoza and an individual person.

References: Groundtruth, Dec.1, 1997. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report (in Japanese). Hearing from Mr.Eddy Lavandaio, SEGEMAR.

Satellite Images: Mendoza, A107. Alteration zones spotted in a circle of 300 m in diameter. The tone of color in TM ratio image is similar to that of Paramillos Norte.

Maps: JICAMMAJ (1997): A Report of Project Finding. Fig.5-2-4.

No. 115
Province: MZ
Topography: Pre-Cordillera

Name: Paramillos de Uspallata
Minerals: Ag, Pb, Zn
Latitude: 32° 29'S
Longitude: 69° 09'W

Location: Being three kilometers west of Paramillos Sur. Accessible with four-wheel driven vehicle. The elevation is about 3,000 m a.s.l.

Geology: Triassic sandstone and the transgressive doleritic sheet of the same age.

Mineralization: More than 40 veins of silver-bearing galena and sphalerite are developed in sandstone and dolerite, within a zone of 2 km in width. The veins have an E-W strike and a vertical dip, extending 200 m to 1 km with a width of 30 to 200 cm. More remarkable growths of veins are observed in dolerite. Estimated ore reserves are of 1.2 million tons with 250 g/t Ag, 2% Pb and 3% Zn. An area of mineralization is 4 km by 4.5 km. Ore minerals comprise pyrite, chalcopyrite, galena, sphalerite, and tetrahedrite. Gangue minerals are siderite, rhodochrosite and quartz.

Mining Right: After the dispute with Nuclear Mendoza S.E., the mining right is owned by a private person, Mr. P. N. Capredoni. Uspallata mine was opened in 1638 and exhausted in 1980. During the period, about 400,000 tons of crude ore were produced from thirty veins. A shaft of 80 m deep and many adits remain in the site.

References: Groundtruth, Dec.1, 1997. JICAMMAJ/JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. SEG Newsletter (1996). Geological Survey, Mines Department Argentina (1995): A Proposal to the Government of Japan for Technical Cooperation. Hearing from Mr.Eddy Lavandaio, SEGEMAR.

Satellite Images: Mendoza, A108. Alteration in the periphery is indistinct because of weakness.

Maps: JICAMMAJ (1997): A Report of Project Finding. Fig.5-2-4.

No. 117
Province: MZ
Topography: Pre-Cordillera

Name: Rio de las Penas
Minerals: Cu, Pb, Zn
Latitude: -
Longitude: -
Location: Being fifty kilometers north of Mendoza city and fifteen kilometers northeast of Paramillos Norte, at an elevation of 1,400 m a.s.l.
Geology: Devonian sandstone and mudstone and Triassic calcareous sedimentary rocks are distributed in the west of normal faults trending N-S and dipping at a high angle, and Cambrian to Ordovician limestones are in the east of the faults. Mineralization is along the faults.
Mineralization: A few copper carbonate minerals are noticed and geochemical anomalies of Cu, Pb and Zn are delineated along the faults.
Mining Right: Unknown.
References: UN (1979).
Satellite Images: -
Maps: UN (1970), Fig.35.

No. 116
Province: MZ
Topography: Pre-Cordillera

Name: Grupo Oro del Sur
Minerals: Au, Ag
Latitude: 32° 31' S
Longitude: 69° 06' W
Location: Being one and half kilometers southeast of Paramillos, at an elevation of 3,100 m a.s.l.
Geology: The Triassic terrigenous sedimentary rocks were intruded by igneous rocks being mainly of diorite. Faults trending northwest are remarkably developed.
Mineralization: Epithermal gold and copper deposits of fissure-filling veins, being of marginal veins in the periphery of porphyry system at Paramillos Sur. Fifty-six veins have been discovered, and ore reserves of major four veins in total of proved and estimated are reported to be of 460,000 tons with 8 g/t Au. A total of all veins are said to be of one million tons of ore. Ore minerals comprise gold-bearing pyrite and chalcopyrite. Major gangue mineral is quartz. A remarkable silicification zone is developed in the north of veins group. Two holes were drilled in 1989 by SEGEMAR and found mineralized zone of 0.3 g/t between 60 m and 170 m in depth.
Mining Right: After a dispute with Nuclear Mendoza S.E. of the province of Mendoza, a private person, Mr.P.N. Capredoni holds the right. Previously, an international tender was scheduled but abandoned because of the dispute.
References: Groundruth, Dec.1, 1997. JICAMMAJ/JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. National Mining Secretariat (1994): Directory of opportunities, 1994. Hearing from Mr.Eddy Lavandato, SEGEMAR.
Satellite Images: Mendoza, A110. The marginal alteration is feeble. Pinpointing the site of ore deposits is confronted with a difficulty.
Maps: JICAMMAJ/JMEC (1997): A Report of Project Finding, Fig. 5-2-4.

No. 118
Province: MZ
Topography: Pre-Cordillera

Name: La Negra
Minerals: Au, Ag
Latitude: 32° 19'S
Longitude: 69° 09'W

Location: Being forty kilometers northeast of Uspallata village, the province of Mendoza. Accessible with ordinary vehicle. At a country of gentle hills being of 2,500 m a.s.l.

Geology: Phyllites associated with ophiolite of Precambrian to lower Paleozoic were intruded by diorites of Neogene Tertiary.

Mineralization: Epithermal gold and silver deposits in sheared zones which were developed in the periphery of diorite mass. Veins are of massive sulfides which were intensively limonitized, extending over a distance of 4 to 500 m with maximum widths of about 1 m. Magnitude of ore deposits is estimated to be of 1 million tons with 3.5 g/t Au and 700 g/t Ag.

Mining Right: Minera Cordillerana S.A.

References: Groundtruth, Nov-24, 1997. National Mining Secretariat (1994): Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MINAJ/MEC Internal Report (in Japanese).

Satellite Images: San Juan, A106. Ore deposits are situated in the alteration zone of 2 km by 1 km. The site can be deemed to be at the northern end of narrow mineralized zone of Tertiary, extending N-S to Paramillos.

Maps: N.A.

No. 119
Province: MZ
Topography: Pre-Cordillera

Name: Coraderna - San Benicio
Minerals: Cu
Latitude: 32° 20'S
Longitude: 69° 08'W

Location: Situated at northeast of Uspallata, the province of Mendoza. A journey of seventy minutes in four-wheel driven vehicle is necessary over a distance of 47 km.

Geology: An accumulation of pyroclastic rocks is underlain by sedimentary rocks of lower Paleozoic. These were intruded by dikes of biotite-hornblende granitic porphyry and andesite. The porphyry is magnetite-bearing hypabyssal rock of I-type, which caused contact metamorphism against Paleozoic formation.

Mineralization: The zone of alteration extends about 2 km in N-S and about 600 km in E-W direction. Alterations of potassic, quartz-sericite and propylite are observed in the surface. Supergene alteration is also remarkable, forming jarosite and goethite stains. Geochemical anomaly of gold stands at more than 10 ppb in silicified zone, with the maximum value of 310 ppb. Copper contents have a tendency being higher in a zone of quartz stockworks with the maximum value of 612 ppm. Greenish oxide copper and pitchblende are observed in the zone of quartz stockworks. Molybdenum is with the maximum value of 101 ppm.

Mining Right: In dispute with Provincia de Mendoza. Pegasus Golds plans drilling.

References: Groundtruth, Nov-24 & 29, 1997. Hearing from Ms. Eddy Lavandaino, SECEMAR.

Satellite Images: San Juan. Corresponding to the alteration zone AB8008. Magnitude of 2.5 km by 1 km with an elongation to the northeast. La Negra is situated in the north of alteration zone.

Maps: Under the present investigation.

No. 120
Province: MZ
Topography: Pre-Cordillera

Name: Pampa Fria
Minerals: Cu, Au
Latitude: 32° 22' S
Longitude: 69° 09' W

Location: At the middle point between Paramillos Norte and La Negra. A journey of about forty minutes in four-wheel drive vehicle is necessary from Uspallata. The elevation is 2,700 m a.s.l. The topography is subdued with a small relief of 45 m.

Geology: Blocks of limestone, sandstone and mudstone of Cambrian to Ordovician. Faults of N20°W were developed within blocks and in surroundings. A slice of narrow serpentine is situated along the faults. These rocks underwent mineralization caused by concealed intrusive rocks. Dimensions of outcrop are 200 m by 300 m. The Quaternary system broadly overlies in the periphery.

Mineralization: A porphyry-type gold and copper deposit. Outcropping sedimentary rocks are intensively disseminated with sulfide minerals and gossans of limonite and copper oxides were formed almost through the area. Three veins of maximum width of 2 m trending N20°W occur along the faults and stockwork stringers of quartz and calcite are widespread. Gemus et al.(1996) regards the intrusive rocks to be of Tertiary. Gold in limonitized zones was mined with many pits of small-scale in the past. Mining remained within the oxidation zones near the surface. Present investigation collected 47 samples and noticed low geochemical anomalies in Cu and Zn.

Mining Right: Many holders exist. Pegasus Gold conducted the induced polarization method. The area of intensive IP anomaly seems to have related with an area of serpentine. Under the prospecting agreement, Argentina Mining Development (AMD), drilled 6 holes in 1996.

References: Groundtruth, Nov.24 & 29, 1997. Gemus et al. (1996). Hearing from Mc.Eddy Lavandao, SEGEMAR.

Satellite Images: San Juan. Two altered hills of small-scale are on a line of NE trend.

Maps: Under the present investigation.

No. 120
Province: MZ
Topography: Pre-Cordillera

Name: Pampa Fria
Minerals: Cu, Au
Latitude: 32° 22' S
Longitude: 69° 09' W

Location: At the middle point between Paramillos Norte and La Negra. A journey of some forty minutes in four-wheel drive vehicle from Uspallata. An elevation of 2,700 m a.s.l. The topography is subdued with a small relief of 45 m.

Geology: Blocks of limestone, sandstone and mudstone of Cambrian to Ordovician in age. Faults of N20°W are developed within blocks and in surroundings. A slice of narrow serpentine is situated along the faults. These rocks undergo mineralization caused by concealed intrusive rocks. Dimensions of outcrop are 200 m by 300 m long. The Quaternary system broadly overlies in the periphery.

Mineralization: A porphyry-type gold and copper deposit. Outcropping sedimentary rocks are intensively disseminated with sulfide minerals and gossans of limonite and copper oxides are formed almost through the area. Three veins of maximum width of 2 m trending N20°W occur along the faults and stockwork stringers of quartz and calcite are widespread. Gemus et al.(1996) regards the intrusive rocks to be of Tertiary. Gold in limonitized zones was mined with many pits of small-scale in the past. Mining remained within the oxidation zones near the surface. The party of present investigation collected 47 samples and noticed slight geochemical anomalies in Cu and Zn.

Mining Right: Many holders exist. Pegasus Gold conducted the induced polarization method. The area of intensive IP anomaly seems to have related with an area of serpentine. Under the prospecting agreement, AMD, Argentina Mining Development, drilled 6 holes in 1996.

References: Groundtruth, Nov.24 & 29, 1997. Gemus et al. (1996). Hearing from Mc.Eddy Lavandao, SEGEMAR.

Satellite Images: San Juan. Two altered hills of small-scale are on a line of NE trend.

Maps: Under the present investigation.

No. 122
Province: MZ
Topography: Cordillera

Principal Name: Rio de las Vacas
Minerals: Cu, Mo.
Latitude: 32° 34'S
Longitude: 69° 58'W

Location: Being about 60 km northwest of the village of Puna de Vacas. The site is situated at a distance of two days journey from the village along Rio de Vacas on the back of donkey. Topography is extremely steep. The elevation is 3,500 to 5,000 m a.s.l.

Geology: Distributed are Cretaceous volcanic and sedimentary rocks and granodioritic porphyry of Cretaceous to Tertiary. The site is broadly covered with glaciatic and moraine sediments.

Mineralization: A porphyry copper type deposit. Copper ore is of a moraine sediment. Three types of ore are of dissemination, vein-like and of secondary enrichment. Copper ores of dissemination-type are distributed chiefly in the central part of moraine sediments. Ores are quartz dioritic with distinct porphyritic texture, and are characterized with disseminated chalcopyrite and molybdenite in quartz stringers. Remarkable potassic and phyllic alterations are noticed. As for vein-type ore, pyrite, chalcopyrite, covellite and malachite are associated with in veins of 2 to 10 cm wide. Under the microscope, galena and tetrahedrite are noticed and dense distribution of Bi, Cd, Sn and Ag, etc. are observed. From these, veins are identified as marginal zone of porphyry system. Besides these, tourmaline breccia with copper mineralization occur. No outcrop of deposit has been discovered.

Mining Right: Unknown.

References: JMEC (1977): A Report for Project Finding in Argentina, and Satellite Data Analysis, MMAJ/JMEC Internal Report (in Japanese). UN (1970).

Satellite Images: Illapel, Mendoza, A105. Location of ore deposits is illegible because of mountain shadow. The remarkable zone of argillization alteration, AA8067, is situated 8 km to the south. Owing to snow cover, no details are available in Image of Mendoza.

Maps: UN (1970), Figures 39 & 40.

No. 121
Province: MZ
Topography: Pre-Cordillera

Name: Puesto la Pena
Minerals: Cu.
Latitude: 32° 45'S
Longitude: 68° 57'W

Location: Being about 30 km northwest of Mendoza. Accessible with ordinary vehicle. The elevation is 1,500 m a.s.l.

Geology: The Devonian volcanic, metamorphic and sedimentary rocks were intruded by Tertiary composite plutonic rocks, being basic to intermediate in composition. Radiated dikes were developed in the periphery, and brecciated quartz plugs were identified in the plutonic rocks.

Mineralization: An area of geochemical anomaly of copper accompanied with intrusive rocks. The anomalous area being more than 1 km in the major axis, is of more than 300 ppm, with local high value of 7% Cu. The intrusive rocks were formed in sequence of pyroxenite, gabbro to diorite and aplite. Mineralization derived from acidic rocks in the last stage. Ore minerals comprise magnetite, limonite and copper minerals. Magnetite and limonite occur chiefly in matrix of brecciated pyroxenite. Chalcopyrite and bornite are disseminated with pyrite in basic intrusive rocks and dikes of acidic rocks. Outcrops of copper oxide are not rare. An anomalous area of magnetic survey delineated an area where magnetite was distributed. The induced polarization method did not delineate the distribution of sulfides. One hole was drilled, and core determined with an average value of 500 ppm Cu, in which a section from the surface to a depth of 27 m was of 1,000 ppm Cu in average.

Mining Right: Unknown.

References: UN (1970).

Satellite Images: Mendoza. No hydrothermal alteration is noticed.

Maps: UN (1970), Figures 36 to 38.

No. 124
Province: MZ
Topography: Cordillera

Principal Name: Cerro de los Dedos
Minerals: Cu, Mo (Pb, Zn)
Latitude: 32° 42'S
Longitude: 70° 04'W

Location: Along the Chilean border, 25 km east of Las Cuevas village. Access to the site is possible by ascending Quebrada Matienzo for 6 hours on the back of donkey. At an extremely steep topography.

Geology: Jurassic arenitic sandstone and andesite and Cretaceous sandstone were intruded along faults trending NW-SE by dikes of diorite and andesite of Tertiary. The area is situated on the eastern flank of anticline which is a N-S trending folding system.

Mineralization: Sporadic anomalies of more than 150 ppm Cu, 30 ppm Mo, 100 ppm Pb, or 100 ppm Zn were delineated by the geochemical survey of stream sediments. Sticking of copper oxide is observed very rarely on intrusive rocks. Alteration is also rare.

Mining Right: Unknown.

References: UN (1970).

Satellite Images: -

Maps: UN (1970), Fig.42.

No. 123
Province: MZ
Topography: Cordillera

Principal Name: Cajon del Rubio
Minerals: Cu
Latitude: 32° 36'S
Longitude: 70° 08'W

Location: Being about 10 km west of Mt. Aconcagua, or twenty-five kilometers north of Las Cuevas village. The site is accessible by one day trip on the back of donkey from the village. The elevation is 4,000 to 5,000 m a.s.l.

Geology: Distributed are upper Jurassic sandstone, Cretaceous andesite and Tertiary rhyolite. These were intruded by dikes of diorite and andesite being of Cretaceous to Tertiary. The area is situated at the western flank of anticline which is of N-S trending folding system.

Mineralization: Sporadic weak anomalies in copper were delineated by geochemical survey with 241 samples, conducted by UN. Twelve samples exceeded the value of 200 ppm Cu. Rhyolite is intensively disseminated with pyrite, while mineralization or alteration is not noticed with the intrusive rocks. A zone of mineralization or of anomaly seems to be restricted around the border between sandstone and diorite.

Mining Right: Unknown.

References: UN (1970).

Satellite Images: Santiago. Details are unclear because of snow cover.

Maps: UN (1970), Fig.41 & Table 23.

No. 125
Province: MZ
Topography: Cordillera

Principal Name: Las Cuevas (Mina San Jose)
Minerals: Cu, Pb, Zn.
Latitude: 32° 49' S
Longitude: 70° 01' W
Location: Being fifteen kilometers south Mt. Aconcagua, accessible en route to Chile along Rio de los Cuevas. The elevation is 3,200 to 4,500 m a.s.l.
Geology: Andesite sill intruded into sedimentary rocks of Jurassic to Cretaceous.
Mineralization: A manto-type ore deposit. A zone of copper mineralization of 9 m wide was formed in the brecciated zone at the hanging side of andesitic sill. This sort of mineralization is observed in five horizons within the thickness of 120 m. Ore minerals comprise bornite, chalcocite, malachite and azurite. The chief gangue mineral is calcite. A sum of 242,000 t of ore with 1% Cu is estimated. An old mine in this area, San Jose, produced 2,000 tons of copper metal in the past.
Mining Right: Unknown.
References: JMBC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMBC Internal Report (in Japanese).
Satellite Images: Santiago, Mendoza, A112. Details are unknown because of heavy snow cover.
Maps: UN (1970), Fig.43.

No. 126
Province: MZ
Topography: Cordillera Frontal

Name: Punta de Vacas
Minerals: Cu, Pb, Zn, Mo.
Latitude: 32° 52' S
Longitude: 69° 49' W
Location: Being four kilometers southwest of Punta de Vacas village, the province of Mendoza. At an extremely steep topography with an elevation of 2,500 to 4,500 m a.s.l. The alteration zone can be seen from Route No.7.
Geology: Perno-Triassic andesite and pyroclastic rocks were intruded by granite of Cretaceous to Tertiary.
Mineralization: An existence of porphyry copper type ore deposit can be expected. The UN (FM) report concludes that the prospect is promising because of 1) anomalous tone of color on granite probably being of imonite, 2) geochemical anomalies in Cu, Mo, Pb and Zn, and 3) structural control of large-scale lineaments. However, only two samples exceeded 100 ppm Cu or 30 ppm Mo in the geochemical survey.
Mining Right: Three private enterprises created mining areas. No details are available.
References: National Mining Secretariat (1996): Directory of opportunities, 1996. UN (1970).
Satellite Images: Mendoza. An alteration zone of 3 km in diameter is developed.
Maps: UN (1970), Fig. 44.

No. 127
Province: MZ
Topography: Cordillera

Principal Name: Mina Mantos Preciosos
Minerals: Cu.
Latitude: 32° 52' S
Longitude: 69° 12' W
Location: Being thirty-five kilometers west of Mendoza. Accessible with ordinary vehicles.
Geology: Distributed are limestone of Cambrian to Ordovician, gray wacke, limestone and shale of Devonian and Permian-Carboniferous porphyry. Many block faults are developed.
Mineralization: A vein-type copper deposit. A vein of 0.5 to 0.7 m wide runs intermittently over a distance of about 500 m in NNE direction dipping vertical to 50° eastward. Brecciation is observed in part. Mineralization seems to have developed in the contact zone between Cambrian to Ordovician and Devonian rocks. Observed ore minerals include malachite, azurite and a trace of vanadium mineral being of volborthite.
Mining Right: Unknown. An adit of 30 m was expanded. There remain an open pit of a small scale.
References: UN (1970).
Satellite Images: Mendoza. Remarkable alteration is not noticed. Even a weak alteration is unclear. Many lineaments run in NNE-SSW directions.
Maps: UN (1970), Fig. 45.

No. 128
Province: MZ
Topography: Pre-Cordillera

Name: Polvaredos
Minerals: Cu.
Latitude: 32° 50' S
Longitude: 69° 40' W
Location: Being seventy-five kilometers west of Mendoza.
Geology: The Carboniferous sedimentary rocks and Triassic granitic rocks.
Mineralization: A porphyry copper type ore deposit? Ore minerals comprise chalcocopyrite and pyrite. Gangue mineral is tourmaline.
Mining Right: Unknown.
References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report (in Japanese).
Satellite Images: Mendoza, A111. Remarkable alteration is not noticed.
Maps: N.A.

No. 129
Province: LR
Topography: Cordillera Frontal

Name: Santa Rita & Poncho
Minerals: Pb, Zn
Latitude: 28° 20' S
Longitude: 68° 05' W

Location: Being forty-five kilometers west-north-west of Compañas.

Geology: Proterozoic metasediments and sedimentary rocks of upper Miocene.

Mineralization: Mesothermal vein-type ore deposits. Ore minerals comprise galena, sphalerite, cerussite, smithsonite, azurite, malachite and pyrite. Gangue minerals consist of limonite, quartz, barite and calcite. A total of proved and estimated ores stands at 1,057 t, and inferred reserves are of 1,536 t, being of 5.2 to 9.0% Pb, 2.4 to 4.4% Zn and 22 to 53 g/t Ag.

Mining Right: Unknown. An extension of adits is 418 m.

References: JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report (in Japanese).

Satellite Images: Chilecito, AS9. No alteration is observed in the margin. Situated in the vicinity of N-S trending faults which border upper Miocene sediments and Precambrian system.

Maps: N.A.

No. 130
Province: LR
Topography: Sistema de Famatina

Name: Famatina (Mejicana, Ofir, La Estrechura, Los Bayos, Las Encrucijada)
Minerals: Cu, Au, Mo.
Latitude: 28° 56' S
Longitude: 67° 45' W

Location: Being two hundred and forty kilometers west of Chilecito, the province of La Rioja. Accessible with four-wheel driven vehicle.

Geology: Phyllite and shale of Precambrian to lower Paleozoic were intruded by the dacite stock of Miocene to Pliocene.

Mineralization: The ore deposits consist of polymetallic veins of Mejicana and the porphyry copper type of La Estrechura. Veins are of fissure filling sulfides and comprise pyrite, arsenopyrite, tetrahedrite, chalcopyrite and native gold. Gangue minerals are quartz, alunite and barite, etc. Ores of porphyry type are of dissemination of molybdenite and chalcopyrite with a little amounts of alunite, galena and sphalerite. Strictly speaking, these are accompanied with quartz stringers and situated in the zone of phyllic to potassic alteration. Ore reserves are estimated to be 250,000 tons with 8.4 g/t Au of vein type and 300,000,000 tons with 0.13 to 0.17% Mo and 0.5% Cu of porphyry type.

Mining Right: The joint venture of YAMIRI and CRA is at a standstill. In 1993, CRA Exploration Argentina entered into the option agreement of exploration expenditure at US \$4,000,000, and in the next year commenced geochemical and geophysical surveys, trenching, drilling by DDH and RC methods and road construction with relation to implementation of those. Exploration expenditure so far accumulated at US \$10,000,000 with 180,000 samples of geochemical survey, 300 km of geophysical survey lines and drilling of 13,350 meters. CRA Exploration Argentina is the local subsidiary of RITZ and CRA.

References: JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. SEG Newsletter (1996). National Mining Secretariat (1994): Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMAJ/JMEC Internal Report (in Japanese). YAMIRI S.A. Boletín Informativo Septiembre de 1997.

Satellite Images: Chilecito, A66-A70. Remarkable alteration zones are arranged sporadically in an oval of 8 km in the major axis and 6 km in the minor axis. Titled six deposits and Grupo Minero de Oro are situated in the oval. Alteration zones have a tendency to be rich in limonite at the northeast.

Maps: N.A.

No. 131
Province: LR
Topography: Sistema de Famatina

Name: Famatina Oeste
Minerals: Cu, Au, Co, U.
Latitude: .
Longitude: .
Location: In the vicinity of border with the province of Catamarca . A journey of 350 km is necessary for accessing from La Rioja with a steep topography.
Geology: Sandstone and conglomerate of upper Carboniferous were intruded by acidic igneous rocks.
Mineralization: Dissemination of gold and copper can be expected in the alteration zone. Accompanied are stringers mineralized with U-Cu-Au and Co.
Mining Right: YAMIRI holds possession of mining right. For implementation of basic survey, the working environment is under preparation.

References: JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996.

Satellite Images: .

Maps: .

No. 132
Province: LR
Topography: Sistema de Famatina

Name: Sierra de las Minas
Minerals: Au, Ag.
Latitude: .
Longitude: .
Location: At the southeastern edge of the province of La Rioja. Chepes can be accessed by a journey of 250 km on paved road from La Rioja. A major mineral showings , La Callanas is about 40 km from Chepes and accessible with four-wheel driven vehicle. The site is a plateau of an elevation ranging from 400 to 910 m with a steep slope in the east.

Geology: The area is underlain by metamorphic rocks and granitic rocks of Proterocambrian to lower Paleozoic.

Mineralization: Thirty gold-bearing quartz veins, probably being epithermal in origin, are noticed in an area of 10 by 40 km. Many of them are controlled by lineaments of NW-SE system. La Callanas is a vein of 20 m in length with an average of 0.8 m in width, and the grades are of 46 g/t Au and 63 g/t Ag. Grade of 2% Cu is reported with analytical result.

Mining Right: YAMIRI holds the mining right. The area was the subject of cooperative fundamental study in 1992 to 94 by JICA and MMAJ for development of mineral resources. Drilling was conducted at La Callanas and La Pirca and delineated a decline of mineralization in depth. The international open tender seems to have been conducted in 1996 but the result is unknown.

References: JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. SEC Newsletter (1996). National Mining Secretariat (1994): Directory of opportunities, 1994.

Satellite Images: .

Maps: National Mining Secretariat (1994): Directory of opportunities, 1994, Fig.11 (p.176).

No. 133
Province: LR
Topography: Sistema de Famatina

Name: Mina el Oro, Los Bayitos, (El Oro).
Minerals: Au, Cu.
Latitude: 29° 10'S
Longitude: 67° 45'W
Location: Being thirty kilometers northwest of Chilecito, the province of La Rioja. A journey of 10 km in four-wheel driven vehicle is necessary for accessing from Guanchin village, and about 9 km of a mountain path is necessary. The elevation is 2,900 m a.s.l. with a steep topography.
Geology: Sedimentary rocks of Ordovician and intruding granitic rocks of Silurian to Devonian were intruded by dacite of the Tertiary.
Mineralization: Hydrothermal vein-type deposits related with the Tertiary dacite. Pyrite, chalcopyrite and native gold are accompanied by siderite-quartz veins. Possible reserves from three veins stand at 170,000 tons of 8 g/ Au.
Mining Right: YAMIRI holds the mining right. During the period from 1939 and 1942, ore deposits were mined by Arminas Co. yielding crude ores of 100,000 tons and adits were extended about 400 meters. A synthetic economic evaluation was conducted in 1987.
References: JMEC (1997): A Report of Project Finding in Argentina for the Fiscal Year of 1996. National Mining Secretariat (1994): Directory of opportunities, 1994. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMA/JMEC Internal Report (in Japanese).
Satellite Images: Chilecito, A73. Situated 4 km to the south of remarkable alteration zone being of oval at 8 km by 6 km in the axes. Quantitative ratio of clay minerals are rather smaller than that of mineralized zone of copper.

Maps: N.A.

No. 134
Province: LR
Topography: Sistema de Famatina

Name: La Veguete, La Aragonesa
Minerals: Pb, Zn.
Latitude: -
Longitude: -
Location: -
Geology: -
Mineralization: -
Mining Right: -
References: -
Satellite Images: -
Maps: -

No. 136
Province: LR
Topography: Pre-Cordillera

Name: Corral
Minerals: Au, Ag, Cu.
Latitude: 29° 37'S
Longitude: 68° 39'W

Location: Being ten kilometers south of Cuandacol, the province of La Rioja. Accessible with four-wheel driven vehicle. The elevation is 1,400 m a.s.l.

Geology: A stock of monzonite of unknown age, probably being of the Tertiary, intruded into the thrust fault between Ordovician limestone and Carboniferous sandstone and mudstone.

Mineralization: The limestone underwent remarkable cataclasis and silicification. Quartz veins and calcite veins occur along the fault. Within the region of present observation, quartz veins are 5 to 10 cm wide and are accompanied by potash feldspar, dolomite and smithsonite with sickling of copper oxide. Assay yields 2.1 g/t Au, 0.3% Cu and 5.4% Zn. Calcite veins return the highest value of 0.78 g/t Au.

Mining Rights: Minas Argentinas. The company has investigated the prospect since 1995, and under the name of Salamanca Project, geochemical survey and drilling of 15 holes were implemented.

References: Groundtruth, Oct 25, 1997. JICA/MMA/JMEC (1997): A Report of Regional Survey in Argentina.

Satellite Images: A zone of alteration is not noticed.

Maps: N.A.

No. 135
Province: LR
Topography: Sistema de Famatina

Name: Cerro Negro
Minerals: Au, Pb, Zn.
Latitude: 29° 04'S
Longitude: 67° 43'W

Location: Being twenty-five kilometers west of Chilecito, the province of La Rioja. At a mountainous district with an elevation of 4,000 m a.s.l. Accessible en route for El Oro ore deposits, which is under construction at present.

Geology: Distributed are sedimentary and granitic rocks of the lower Paleozoic and dacite of the Tertiary.

Mineralization: The deposit is divided into Western part and Eastern part based on ore types. Western deposits, Plata I, II and III, are well known for long. The total reserves of three deposits in situ are 145,000 tons of ore being of 800 g/t Ag, 7% Zn and 2% Pb. Eastern deposits are composed of many veins of several hundred meters long. Ore minerals comprise galena, native silver, sphalerite, argentite, chalcocopyrite and pyrite. Gangue minerals consist of siderite, quartz, rhodochrosite and limonite.

Mining Rights: A private enterprise holds the mining right. No details are available. Ores have been mined intermittently since 1970 to a depth of 300 m and picked.

References: National Mining Secretariat (1994): Directory of opportunities, 1996. JMEC (1997): A Report for Project Finding in Argentina, and Satellite Data Analysis. MMA/JMEC Internal Report (in Japanese).

Satellite Images: Chilecito, A72. Situated at 2 km southeast of remarkable alteration zone at Famatina being of an oval which is 8 by 6 km in axes.

Maps: N.A.

No. 138
Province: MZ
Topography: Pre-Cordillera

Name: Cerro Blanco
Alt.
Minerals:
Latitude: 32° 06'S
Longitude: 69° 29'W

Location: Being seventy kilometers north-northeast of Uspallata, the province of Mendoza. One hour riding in four-wheel driven vehicle is necessary from Uspallata to Yaiguazaz mineral showings. From Yaiguazaz, about three hours are needed on horseback to the site 1 (12 km) and to the site 2 (15 km).

Geology: Alterations of sandstone and mudstone of Carboniferous are overlain by Permian volcanic and pyroclastic rocks. Porphyry of the Tertiary intruded into the above. These are covered by volcanic rocks of Tertiary.

Mineralization: Zones of sericite alteration and quartz veins. At the site 1, a silicified ledge, characterized by remarkable silicification and dissemination of pyrite, was developed in dacite porphyry. The ledge is of 1 to 2 m wide and brecciated. At the site 2, stringers of opaline silica were developed in the Permian volcanic rocks which were slightly silicified. Kaolinization of plagioclase phenocrysts and limonite staining are remarkable.

Mining Right: Unknown.

References: Groundtruth, Nov.26, 1997.

Satellite Images: In accordance with alteration zone AB8007, being of a small-scale of 1 km by 1 km.

Maps: N.A.

No. 137
Province: MZ
Topography: Pre-Cordillera

Name: Creston Amarillo
Alt.
Minerals:
Latitude: 32° 27'S
Longitude: 69° 05'W

Location: Located at the northwest of Uspallata village, the province of Mendoza. Situated at the southeastern edge of alteration zone of Paramillos Norte. Accessible with one and half hours riding in four-wheel driven vehicle from Uspallata over a distance of 46 km.

Geology: Andesite and its hypabyssal rock porphyry.

Mineralization: An area of geochemical anomalies, characterized with silicification and alteration of quartz and sericite. Remarkable alterations are located in ridges. The grain size of sericite reaches to a scale of recognition with the naked eye. Pyrophyllite is accompanied in places. Dissemination of pyrite is remarkable on the lower reach of the ridge and propylite alteration takes its place downwards, where quartz veins become scarce and stringers are noticed in the vicinity of intensively silicified hydrothermal breccia. Once, SEGEMAR Mendoza conducted geochemical survey then obtained values of 0.1 to 1.0 g/t Au, and the exploration was suspended.

Mining Right: Unknown.

References: Groundtruth, Nov.30, 1997. Hearing from Mr. Lavandato, SEGEMAR.

Satellite Images: Mendoza. In accordance with alteration zone AB8010, which extends 1 km in E-W direction with 0.5 km in width.

Maps: N.A.

No. 139
Province: SJ
Topography: Pre-Cordillera

Name: Venezuela
Minerals: Au, Ag.
Latitude: 30° 54'S
Longitude: 69° 39'W

Location: Located fifteen kilometers northwest of Villa Nueva, the province of San Juan. It takes about three hours in four-wheel driven vehicle from Villa Nueva to Castano Viejo camp, then another one and half hours horseback are necessary to reach the site. Castano Viejo camp can be accessed only via Rio Castano and is not accessible in flooded season. The elevation is 2,300 to 2,900 m a.s.l.

Geology: Distributed are andesite and its pyroclastic rocks of Choiyoi group of the Permo-Carboniferous. Acidic pyroclastic rocks are located in the vicinity of mountaintop.

Mineralization: Alteration zone of epithermal in origin. Intensive hydrothermal alterations were developed in the conical mountain of 3 km in diameter. Alterations are chiefly of silicification and argillization. In general, silicified portions form a small-scale ledge extending in a direction of N40°W to N60°W. Extremely fine particles of tourmaline, being of impalpable powder, are disseminated in the silicified zone. Quartz stringers sometimes occur as stockwork zone of 1 m in width. Argillization alteration is made up of mixed layers of sericite and smectite. A zone of acidic alteration with alunite occurs in heights of topography.

Mining Right: A private individual, Mr. Basitidas.

References: Groundtruth, Oct.17, 1998. Hearing from Mr. Raul Caldo, SECEMAR.

Satellite Images: In accordance with alteration zone AA7068, one of prominent alteration zones. Alteration zoning by JERS-1 described the zone to be of alterations of sericite and kaolinite, with preponderance of kaolinite in topographical heights.

Maps: N.A.

No. 140
Province: SJ
Topography: Pre-Cordillera

Name: Potezuero de Amanillo
Minerals: Pb, Zn.
Latitude: 30° 57'S
Longitude: 69° 40'W

Location: Being three kilometers west of Venezuela alteration zone. A journey of about two hours on horseback is necessary for accessing from the Castano camp.

Geology: Andesitic rocks and pyroclastic rocks of Choiyoi group of Permo-Triassic.

Mineralization: Silicified breccia occurs in the alteration zone of argillization, characterized with mixed layers of sericite and smectite. Silicified rocks appear as ledges and are rich in tourmaline. Within the area of field investigation, the maximum geochemical anomalies stand at 418 ppm Pb and 3.2 ppm Ag. Argillization extends specially to pyroclastic rocks. Adjoining andesite is rarely altered. Besides mixed layers, chlorite and calcite occur in the zone of argillization alteration. Limonite stains are ubiquitous.

Mining Right: Unknown.

References: Groundtruth, Oct.19, 1998.

Satellite Images: Vicuna. In accordance with alteration zone AA7067, which extends in N-S direction with magnitude of 3.5 km by 1.5 km. The present field survey was conducted at the northern edge of alteration zone. Alteration zoning by JERS-1 describes it as sericitic alteration.

Maps: N.A.

No. 142
Province: SJ
Topography: Pre-Cordillera

Name: Samoso
Minerals: Au, Ag
Latitude: 30° 57'S
Longitude: 69° 43'W

Location: Situated about 10 km southwest of Castano Viejo District. Accessible by horse riding from the Castano camp. The elevation is 3,000 m a.s.l.

Geology: Sedimentary rocks of Agua Negra formation of The Carboniferous were intruded by rhyolite dome of unknown age.

Mineralization: Small old workings are located at the topographical heights rhyolite dome. Details of the past production are not known. A small number of floats of quartz stringers are noticed, and copper oxide stains are recognized in places. An adit extends toward N70°W.

Mining Right: Unknown.

References: Groundtruth, Oct20, 1998.

Satellite Images: Vicuna. Distinctive features are ambiguous.

Maps: N.A.

No. 141
Province: SJ
Topography: Pre-Cordillera

Name: Potrenillos
Minerals: Zn
Latitude: 31° 01'S
Longitude: 69° 44'W

Location: Located twenty-five kilometers west of Villa Nueva, the province of San Juan. Accessible by about four hours horse riding from the Castano Viejo camp. The elevation is 3,000 to 3,500 m a.s.l.

Geology: Carboniferous sedimentary rocks were intruded by dacite dome of unknown age.

Mineralization: Zones of argillization alteration accompanied with dacite. The alteration zone is characterized with mixed layers of sericite and smectite. Two samples collected at the present field investigation were determined the highest values 19 ppm Cu, 20 ppm Pb and 6 ppm Zn, and with less than detection limits of Au, and Ag.

Mining Right: Unknown.

References: Groundtruth, Oct.19, 1998.

Satellite Images: Vicuna. The alteration zone is discernible on the image of JERS-1 with a scale of 1:150,000. Nine alteration zones of a small-scale being less than 800 m in diameter are found in a line trending N-S. The field investigation was conducted at the north edge of the lowest altitude. Zoning of alteration by JERS-1 describes it as kaolinitic and sericitic alteration in places but is obscured by omissions in record.

Maps: N.A.

No. 143
Province: SJ
Topography: Pre-Cordillera

Name: Vicuña (El Salado)
Minerals: Cu, Mo.
Latitude: 29° 49'S
Longitude: 69° 25'W

Location: The El Salado camp is situated in a place accessible by about three hours riding in four-wheel driven vehicle from Pismania, the province of San Juan. The prospect site is accessible by thirty minutes on horseback from the camp. A road to the prospect site needs some repairs for vehicle access.

Geology: Dacite porphyry of unknown age.

Mineralization: Mineral showings of porphyry type. Zonal alterations of potassic and phyllic are evident toward outside. Stains of copper oxide are ubiquitous in the zone of potassic alteration. Quartz veins of stockwork are also widespread. Zone of oxidation in the surface is of 1 sq. km wide. BEMA reported geochemical assays of rock tips in 1994, being of 2.16 % Cu and 0.24 g/t Au over a 40 m interval and of 0.85 % Cu and 0.37 g/t Au over a 62 m interval. Twenty samples collected at the present field investigation were determined with the maximum values of 1.5 g/t Au in stockwork quartz veins and of 0.78 % Cu in hydrothermal breccia. A very small amount of molybdenite is noticed in drill cores left on the ground. A depth is unknown.

Mining Right: AMD, Argentina Mineral Development S.A., obtained mining rights, and made an agreement with BEMA Gold, Puma Minerals, the subsidiary of BEMA, conducted an exploration of the El Salado area as a part of Uspallata project which was under the same agreement of joint venture. Trenches and about thirty drill holes were put down at El Salado in 1995 to 1996. The results are unknown but Puma Minerals withdrew from the exploration of El Salado in 1997. A regional airborne magnetic survey seems to have been conducted over an area of Uspallata project which covered this prospect.

References: Groundtruth, Oct.31, 1998, BEMA Gold bulletin.

Satellite Images: Vicuña. A zone of alteration can be recognized on the Landsat image. The alteration zone is similar to weathered granitic rocks of Permo-Triassic and attention is necessary in discrimination.

Maps: N.A.

No. 144
Province: SJ
Topography: Pre-Cordillera

Name: Pastran
Minerals: W.
Latitude: 29° 46'S
Longitude: 69° 19'W

Location: Located twenty-five kilometers north-northwest of Maliman villogs, the province of San Juan. After going north from Maliman in four-wheel driven vehicle on unpaved road along Quebrada del Molle, the site is accessible with around thirty minutes on horseback. The elevation is 3,500 m a.s.l.

Geology: Situated on the border between Carboniferous Agua Negra formation and Permo-Triassic granite, as same as Las Opcasas.

Mineralization: Stringer veins of several millimeters wide in mudstone of Agua Negra formation. A zone of veins of about 1 m in width extends toward N30°E. Veins are formed of scheelite.

Mining Right: Unknown. Some forty years ago, the prospect site was mined in a small-scale by hands.

References: Groundtruth, Nov.2, 1998. Hearing from Mr. Raul SEGEVAR.

Satellite Images: No alteration zone is noticed.

Maps: N.A.

No. 145
Province: SJ
Topography: Pre-Cordillera

Name: Compañia
Minerals: Pb, Zn, Ga.
Latitude: 30° 56' S
Longitude: 69° 38' W

Location: Situated one kilometer south of the Castano Viejo camp, with an elevation of 2,500 m a.s.l. The camp site is in a distance of 18 km from Villa Nueva. It takes three hours riding in four-wheel driven vehicle from Villa Nueva.
Geology: Andesitic pyroclastic rocks of Permo-Triassic and dikes of rhyolite rocks.

Mineralization: The largest vein-type deposit in the Castano Viejo district. The production stood at 700,000 t, being of 7.4% Pb, 7.5% Zn, 0.15% Cu and 72 g/t Ag in average. Veins strike N70° to 85° E and dip 60° to 85° N. Widths range from 2 to 10 m. The deposit was mined at 200 t a day from this vein over a strike length of 350 m and to a depth of 300 m level. The mineralized zone converges into bonanza of 6 m thick and 50 m long at a depth. Ore minerals comprise sphalerite, galena, pyrite and chalcocopyrite with a gangue mineral of quartz. The sericitic alteration zone is widespread in the periphery.

Mining Right: Exploration was commenced in 1945 as "Minas de Oro y Plata del Castano". Holes were drilled to a depth of 160 m level. National Lead Company S.A. mined the deposit in 1950s to 1960s.

References: Raul (1998): Distrito polimetálico Castano Viejo, presentado para el libro de Recursos Minerales de la Republica Argentina.

Satellite Images: A broad alteration of argillization being of 5 km by 5 km, which corresponds to Castano Viejo district, is noticed in pyroclastic rocks of Permo-Triassic. Alteration zoning by JERS-1 describes the site as sericite and kaolinite, but these are ambiguous.

Maps: Raul (1998): Distrito polimetálico Castano Viejo, presentado para el libro de Recursos Minerales de la Republica Argentina.

No. 246
Province: SJ
Topography: Pre-Cordillera

Name: Del Carmen
Minerals: Au, Ag.
Latitude: 30° 01' S
Longitude: 69° 55' W

Location: In the border zone with Chile at the south end of Valle del Cura. The camp site, 30° 03'04" S, and 69° 47'44" W, is in a distance of about six hours riding from Pismanta in four-wheel driven vehicle. The prospect site requires more than one hour in addition to access. The elevation is 4,600 to 5,100 m a.s.l.

Geology: Volcanic rocks and pyroclastic rocks of Tertiary formation of the Tertiary.
Mineralization: An alteration zone of epithermal acidic sulfate type. The very large alteration zone is characterized with silicification and acidic alteration. Silicified rocks are often brecciated and appear as ledges extending in various directions of NE-SW, NW-SE, etc. A ledge of vuggy silica is also observed. Silica of opaline to chalcedony predominates at topographical heights. Alunite is ubiquitous in silicified zones and native sulfur is often associated. Among thirty-four samples collected by the present investigation, four samples are with more than 1 g/t Au, with the maximum values of 2.2 g/t Au and 9.6 g/t Ag from silicified rock. Cerro Amartillo silicified rocks were the main target of drilling by Barrick, and Hole 27 gave the most promising values of 1.2 g/t Au and 33.4 g/t Ag from an intersection of 35 m in length.

Mining Right: The joint venture of Barrick Gold, the holder of 60% interest and the operator, with Argentina Gold, the holder of 40% interest. The committed expenditure stands at US\$10.7 million (PEEM). The exploration is in progress and eight holes totalling 3,500 m are scheduled to be drilled in 1997/98.

References: Groundtruth, Nov.26, 1998 at Carmen Norte.

Satellite Images: Vicuna. Equivalent to the large alteration zone AA7043, being of 5 km in diameter. Alteration zoning by JERS-1 describes the site as a broad kaolinic alteration. Alunite is recorded in places at the eastern edge of the alteration zone. Portions of alteration zone at the western edge and northern edge were understood to be of sericitic alteration.

Maps: N.A.

