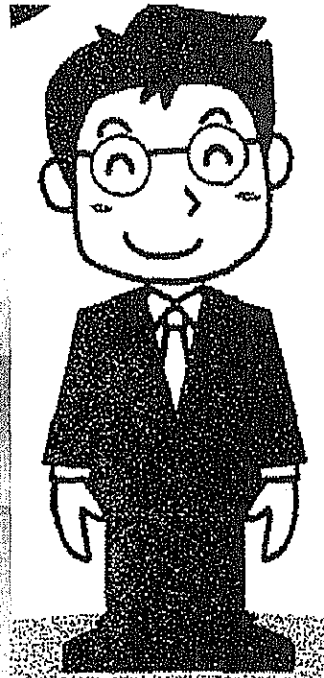


Gracias por Su Atención!



The Mineral Resources and Mining Potential in the Waste and Tailings

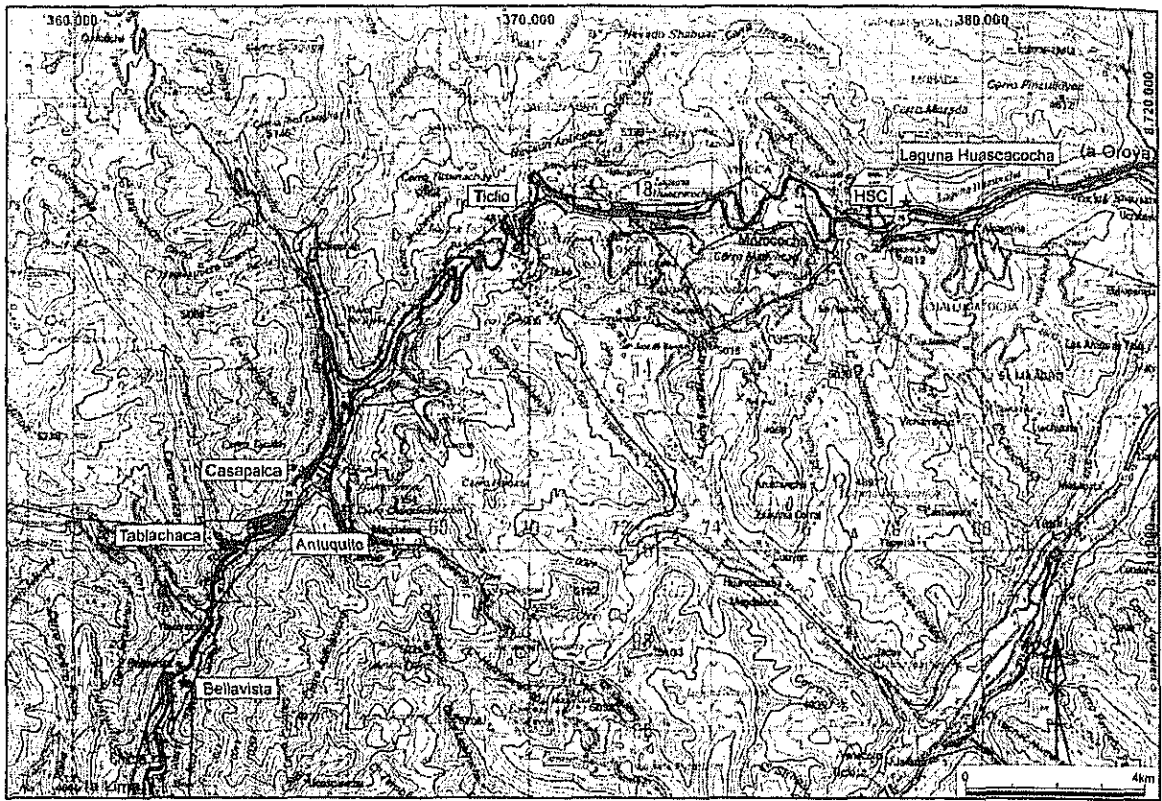
August 2008

Tsuyoshi YAMADA

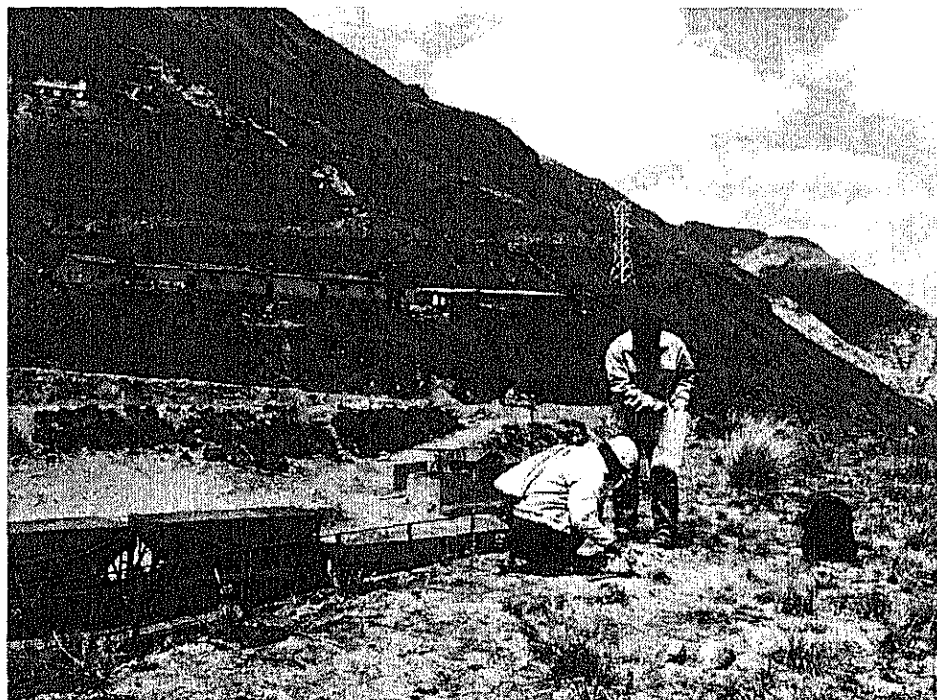
JBIC Study Team



Casapalca Mine



Location map of the Tailing Dams



Sampling at Casapalca Tailing Dam

Volumen of Tailings

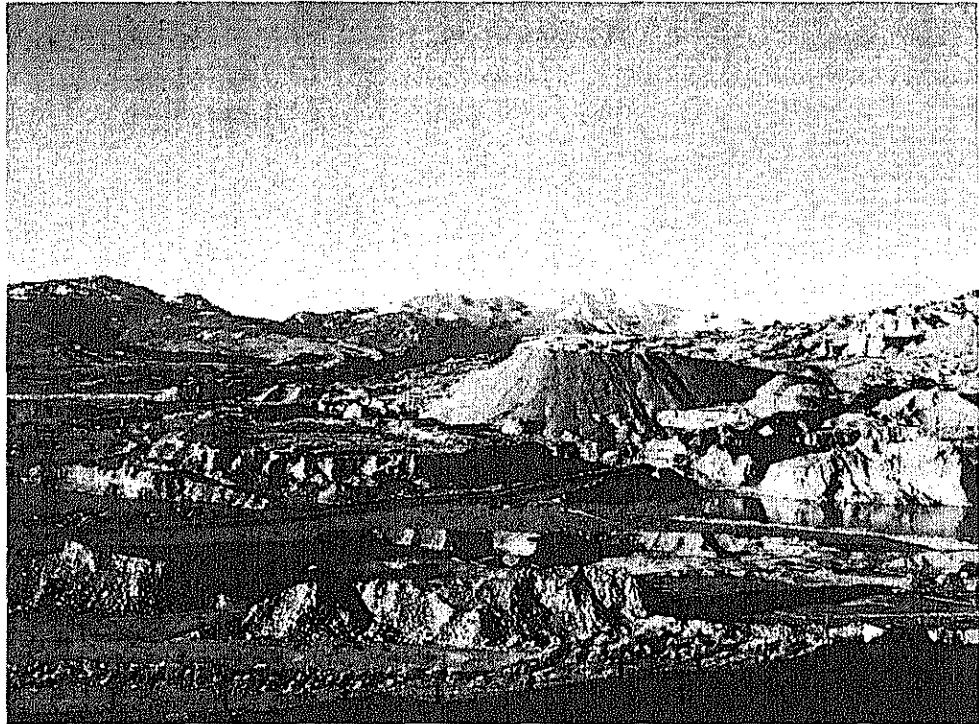
Casapalca	1,000,000 t
Antuquito	600,000 t
Tablachaca	3,000,000 t
Bellavista	1,220,000 t

Source: Ex-CENTROMIN

5

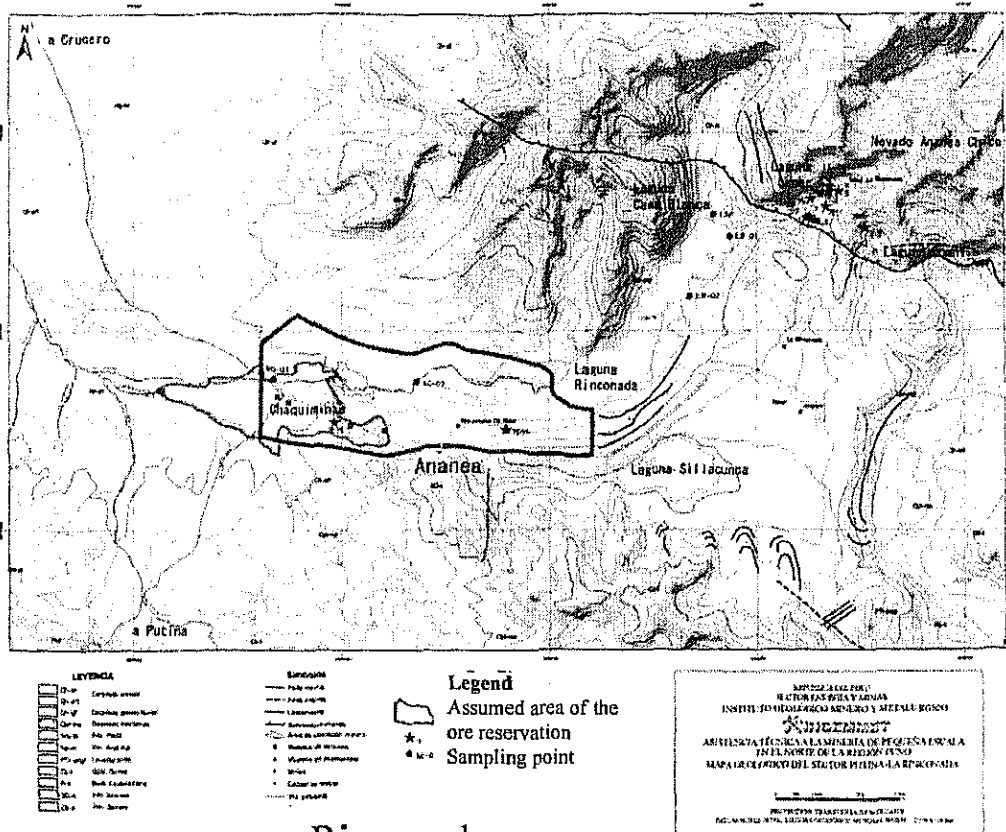
Volume of Remained Metals

	Casapalca 1,000,000t				Antuquito 600,000t				Tablachaca 3,000,000t				Bellavista 1,220,000t			
	Content		Metal		Content		Metal		Content		Metal		Content		Metal	
Au	0.089	ppm	89	kg	0.054	ppm	32	kg	0.058	ppm	174	kg	0.041	ppm	50	kg
Ag	40.2	ppm	40	t	28.7	ppm	16	t	25.8	ppm	77	t	17.8	ppm	21	t
As	316	ppm	316	t	414	ppm	248	t	411	ppm	1,233	t	219	ppm	267	t
Cd	9.88	ppm	10	t	8.39	ppm	5	t	18.15	ppm	54	t	5.74	ppm	7	t
Ce	22.5	ppm	23	t	36.1	ppm	22	t	41.2	ppm	124	t	38.2	ppm	47	t
Co	9.6	ppm	10	t	12.7	ppm	8	t	31.1	ppm	93	t	9.2	ppm	11	t
Cu	925	ppm	925	t	402	ppm	241	t	687	ppm	2,061	t	372	ppm	454	t
Ga	8.84	ppm	10	t	12.2	ppm	7	t	12.45	ppm	37	t	18.85	ppm	17	t
In	0.054	ppm	54	kg	0.035	ppm	21	kg	0.031	ppm	93	kg	0.043	ppm	52	kg
Li	18.9	ppm	19	t	21.9	ppm	13	t	22.9	ppm	89	t	38.7	ppm	47	t
Mo	18.35	ppm	18	t	15.15	ppm	9	t	12.25	ppm	37	t	10.35	ppm	13	t
Nb	7.1	ppm	7	t	9.4	ppm	6	t	9.8	ppm	29	t	9.1	ppm	11	t
Ni	7.8	ppm	8	t	10.4	ppm	6	t	20.8	ppm	62	t	8.2	ppm	10	t
Pb	3430	ppm	3,430	t	2,380	ppm	1,428	t	1,330	ppm	3,990	t	1,660	ppm	2,025	t
Sn	1.8	ppm	2	t	1.7	ppm	1	t	1.4	ppm	4	t	1.8	ppm	2	t
Ta	0.53	ppm	530	kg	0.86	ppm	398	kg	0.69	ppm	2,070	kg	0.78	ppm	927	kg
Tl	0.254	%	2,540	t	0.321	%	1,926	t	0.308	%	9,240	t	0.328	%	4,002	t
W	14.3	ppm	14	t	12.8	ppm	8	t	11.1	ppm	33	t	10.1	ppm	12	t
Zn	2960	ppm	2,960	t	2240	ppm	1,344	t	5130	ppm	15,390	t	1790	ppm	2,184	t
Zr	33.2	ppm	33	t	47.7	ppm	29	t	40.3	ppm	121	t	72.2	ppm	68	t



Panorama view of the Rinconada area

7



Rinconada area

Estimation of gold deposits in the Rinconada area (1)

- Manto type

Area (Assumed on map) $500 \text{ m} \times 100 \text{ m} = 50,000 \text{ m}^2$

Average thickness of waste rock

(Visual assumption) 5 m

Specific gravity (general waste rock) 1.6

Estimate total waste rock $400,000 \text{ t}$

9

Estimation of gold deposits in the Rinconada area (2)

- Estimate Volume of moraine and placer

Area (Ananea-Chaquiminas) 20 km^2 ($8 \text{ km} \times 2.5 \text{ km}$)

Average thickness 10 m (Chaquiminas)

Specific gravity 2.25 (INGEMMET 2003)

Estimate total volume of moraine & placer

$200,000,000 \text{ m}^3$

10

Content of Gold in the Rinconada Area

Deposit type		Content	Estimated ore grade
Manto	Gangue (155c m)	0 g/t	$(155 \text{ cm} \times 0 \text{ g/t} + 10 \text{ cm} \times 5 \text{ g/t} + 15 \text{ cm} \times 100 \text{ g/t}) \div (155 \text{ cm} + 10 \text{ cm} + 15 \text{ cm}) = 8.6 \text{ g/t}$
	Gangue (10 cm)	0~10 g/t (average 5 g/t)	
	Ore (15 cm)	~4,000 g/t (average 100 g/t)	
Moraine & Placer	part of fine grained deposit	0.55 g/m ³	0.55 g/m ³
	part of coarse grained deposit	0.08 g/m ³	0.08 g/m ³
	average	0.13 g/m ³ ~0.48 g/m ³	0.305 g/m ³ (INGEMMET 2003)
	waste material	0.07 g/m ³ ~0.08 g/m ³	0.075 g/m ³

11

Estimation of gold at Rinconada Area

Manto type	Moraine & Placer type	
	Volume of Gold in remained moraine & placer	Volume of Gold in remained waste rock
Volume of waste rock 400,000 t	Deposits 200,000,000 m ³ (grain size -3.75 cm 64%	Volume of Gold in the excavated deposit
Gold content of waste rock 8.6 g/t	128,000,000 m ³ average content of gold 0.305 g/m ³ / 0.64 = 0.48 g/m ³)	30.5 t
Percentage of remained gold in waste rock 50%	Excavated percentage 50%	Gold recovery of the excavated deposit 50%
gold 1.72 t	gold 30.5 t	gold 15.25 t
Total Gold 47.47 t		

12

Mitigación de Contaminación Minera y Protección Ambiental

Choshin Haneji

Medio Ambiente, Prevención de Contaminación Minera

Misión de Estudio JBIC

Agosto, 2008

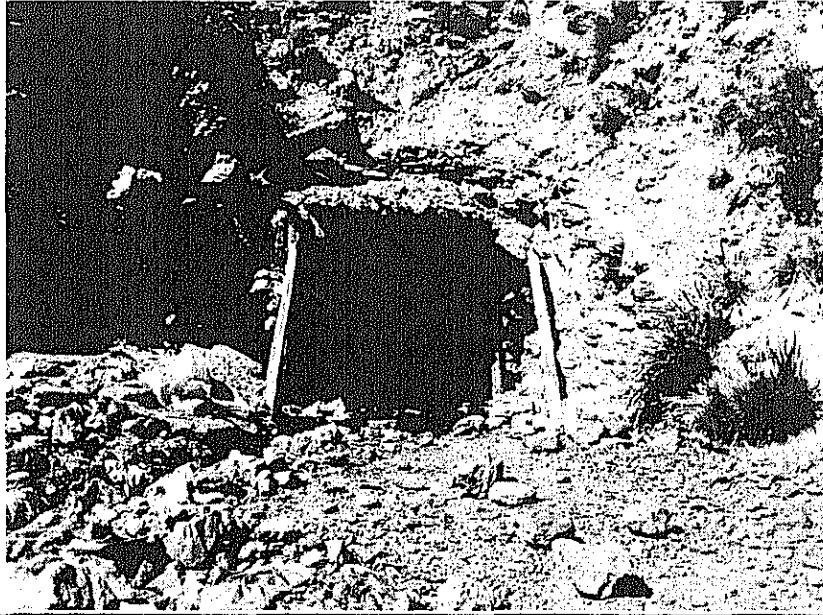
1

Impacto de la actividad minera de la zona La Rinconada

- Metodología del diagnóstico
 - Análisis de información existente
 - DIGESA, INRENA, INGEMMET, PELT, etc.
 - Entrevistas
 - Oficina Regional de Minería, Puno
 - Universidad del Altiplano
 - Mediciones in-situ y análisis de muestras
 - Mediciones simples (pack tests)
 - Análisis en laboratorio de muestras de agua, sedimentos y rocas

2

DAM: Bocamina Balcón III



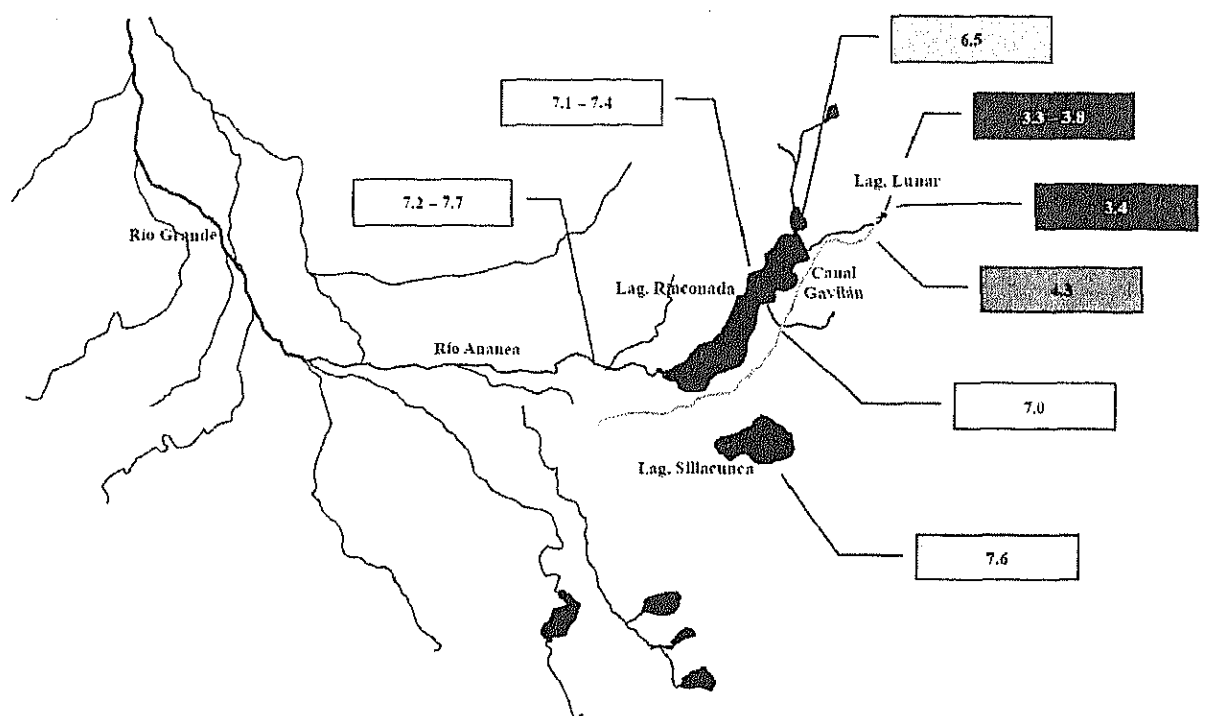
3

pH 3.7, caudal 69 L/s, As 1.13 mg/L



4

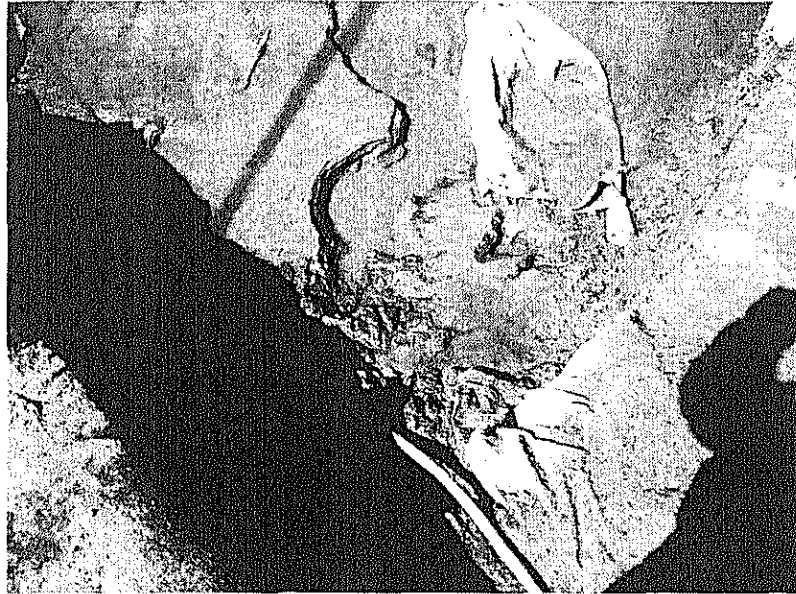
Zona La Rinconada: Valores de pH



Quimbaleteo/Amalgamación

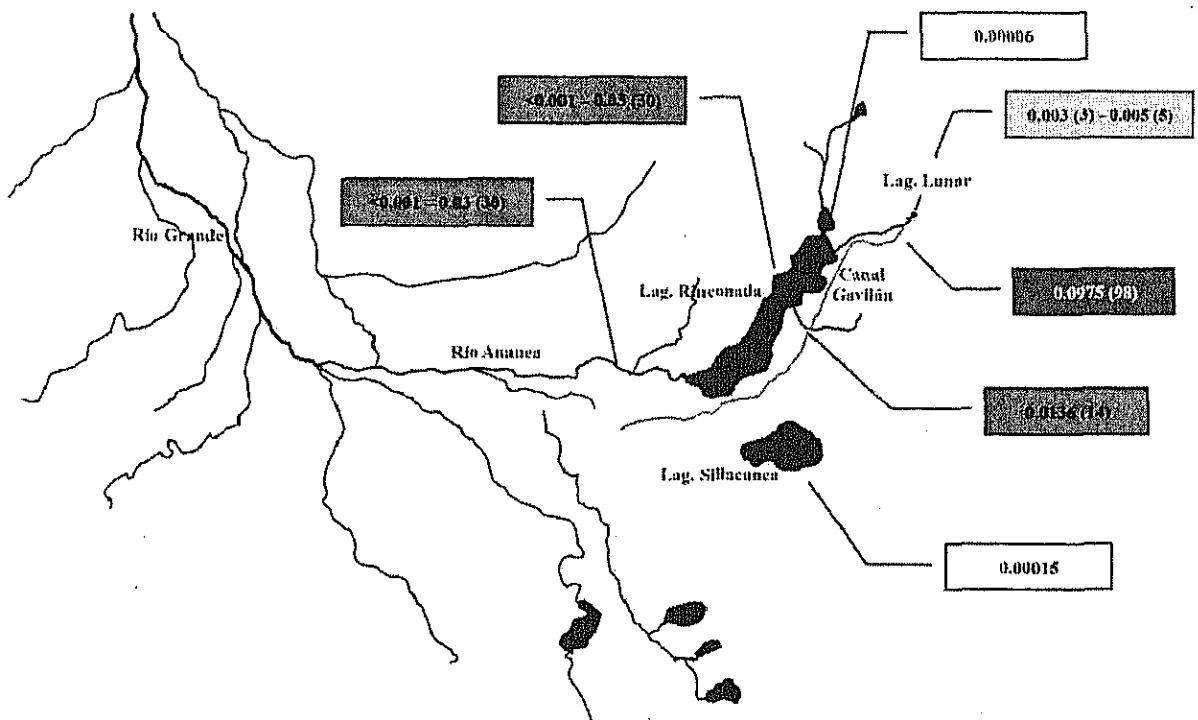


Hg > 100 mg/L



7

Zona La Rinconada: Hg (mg/L)

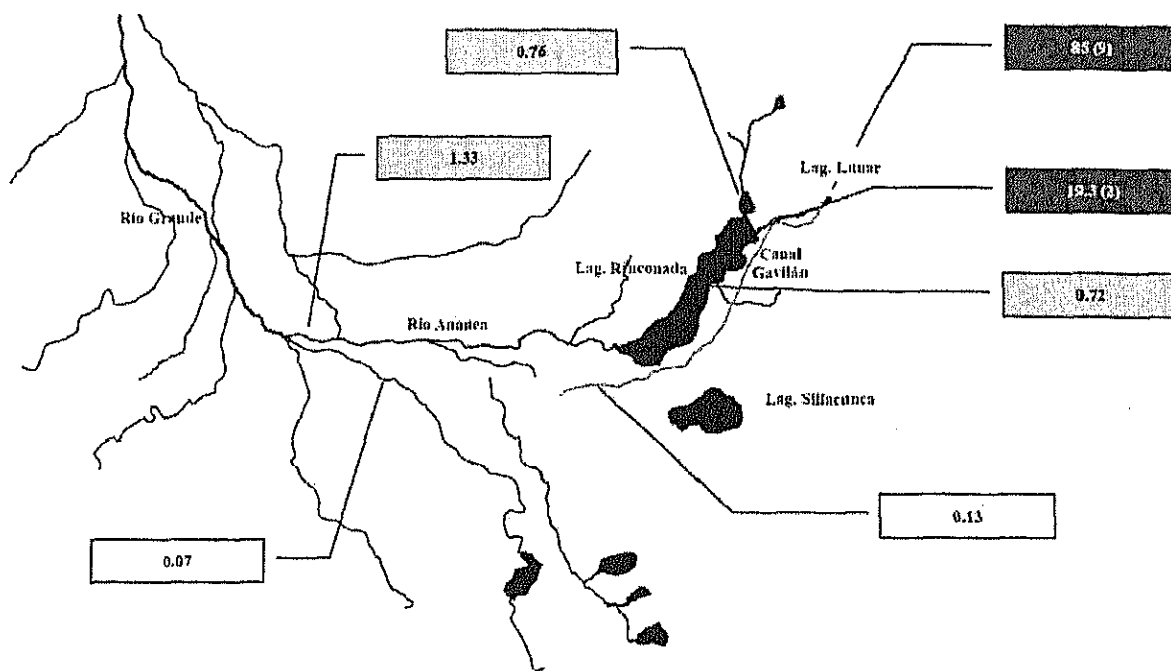


Chuteo de material morrénico

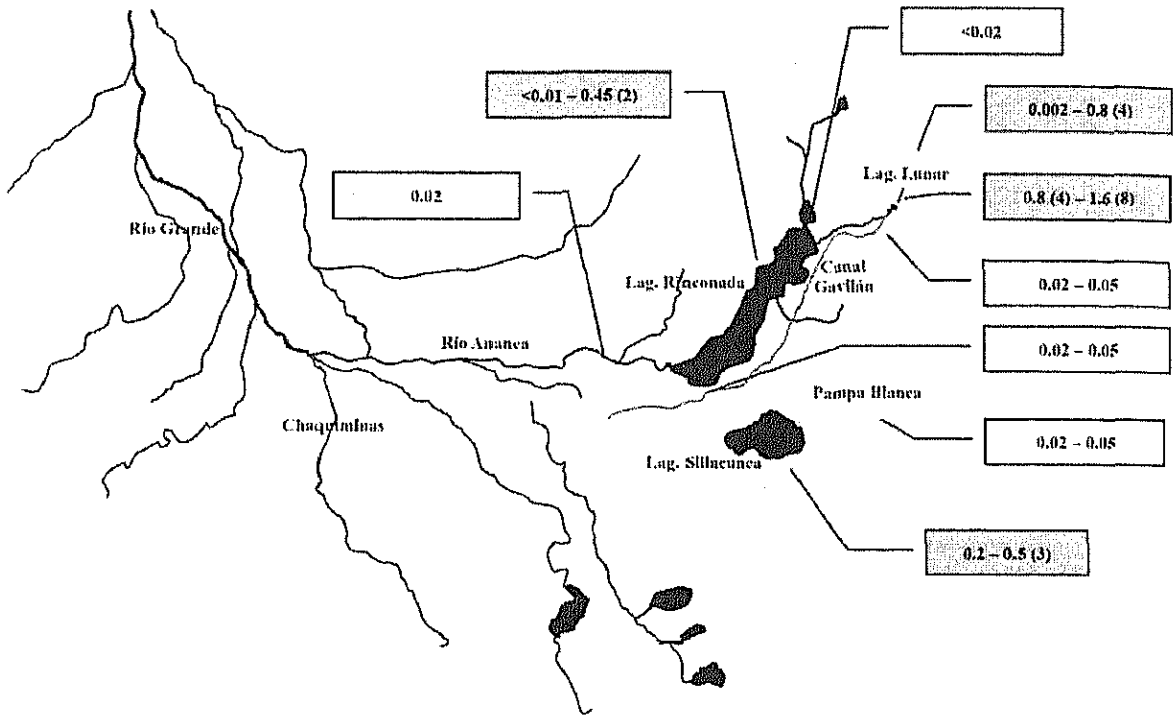


9

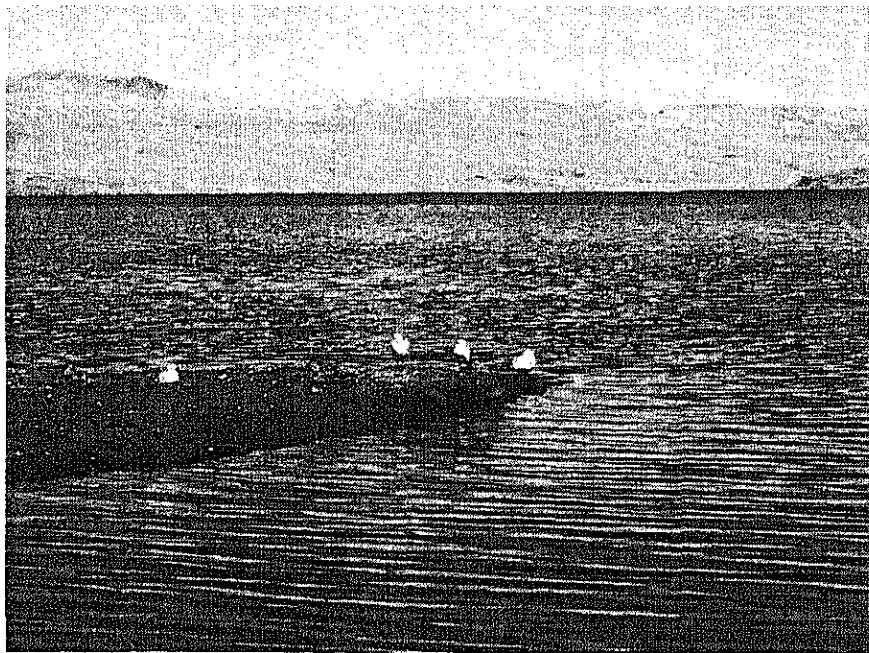
Zona La Rinconada: Hg (mg/Kg)



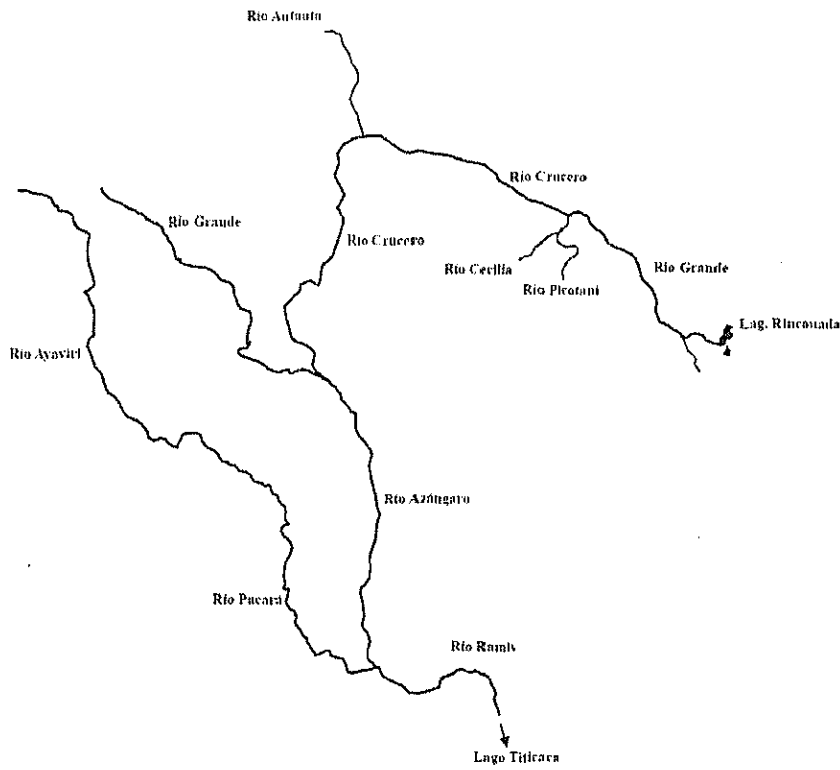
Zona La Rinconada: As (mg/L)



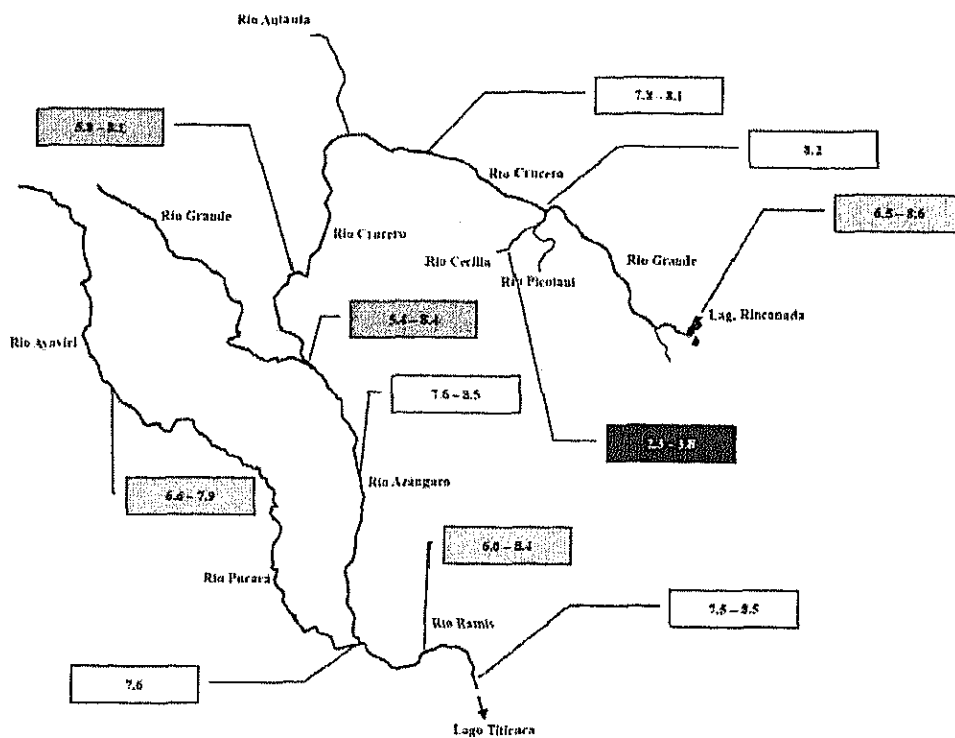
Vista de la laguna Rinconada



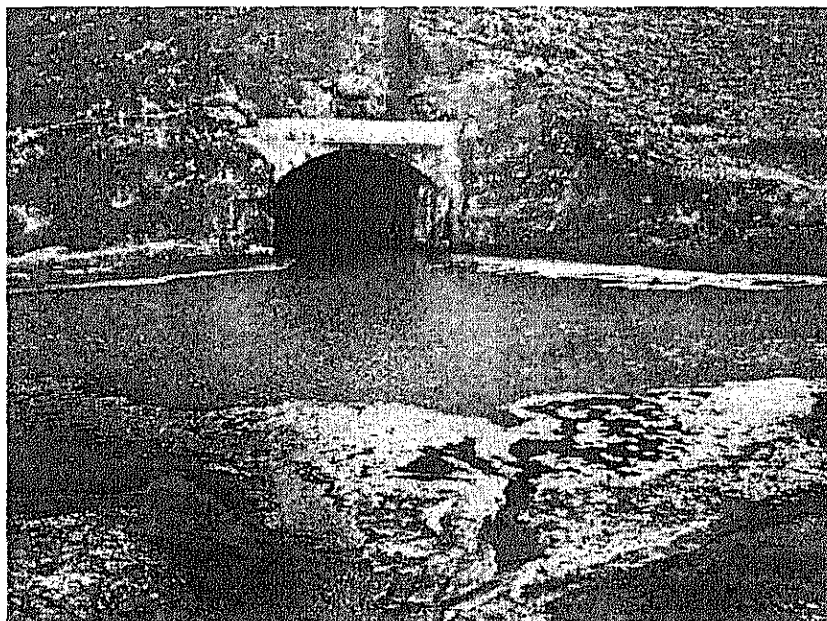
Cuenca Ramis



Cuenca Ramis: Valor de pH

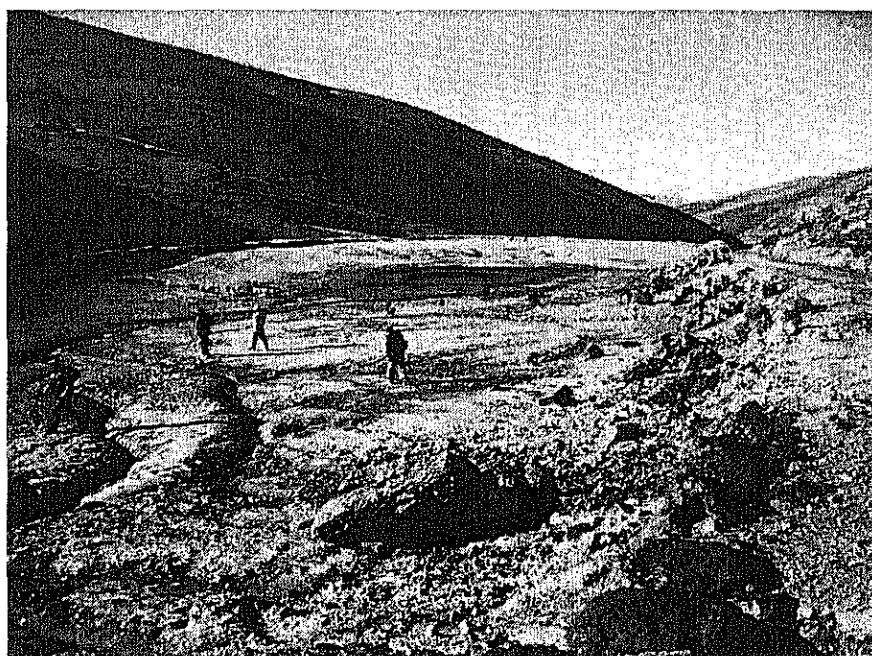


Cuenca río Cecilia: mina abandonada



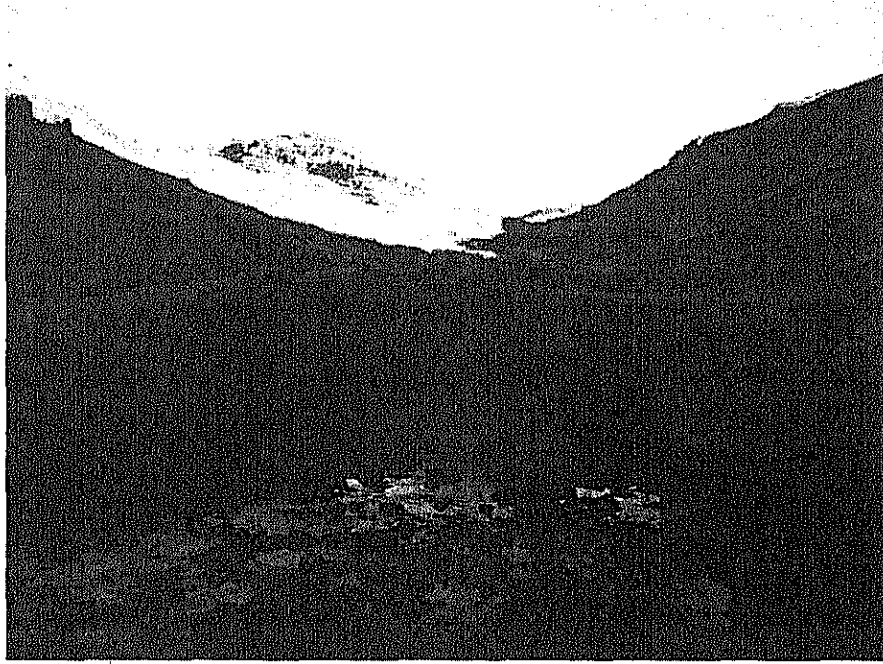
15

Cuenca río Cecilia: relavera abandonada



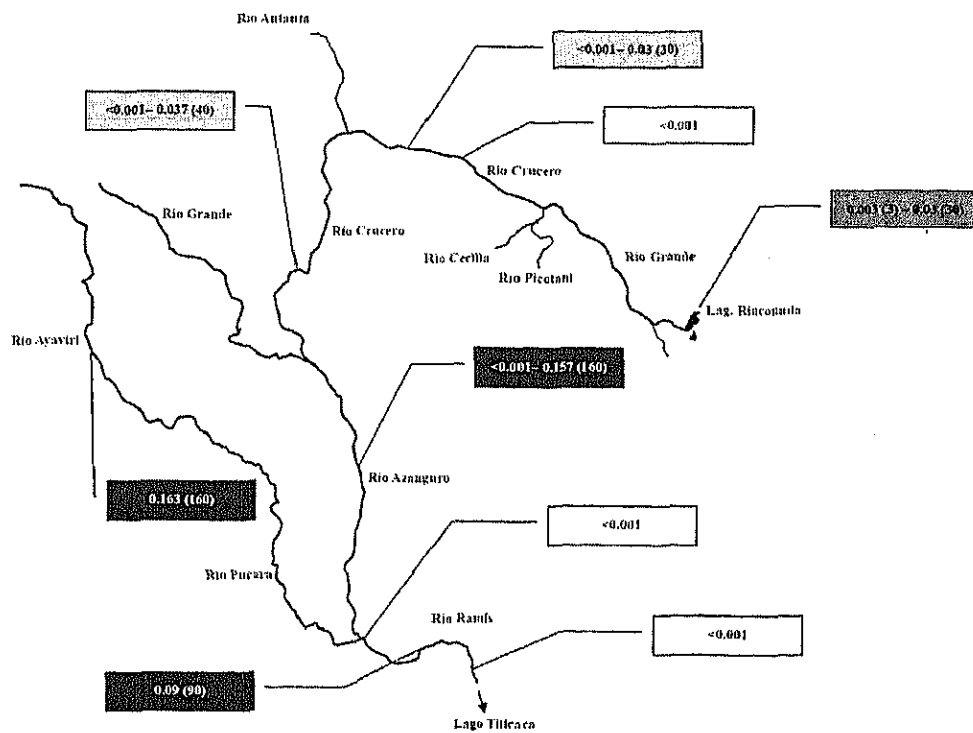
16

Río Cecilia



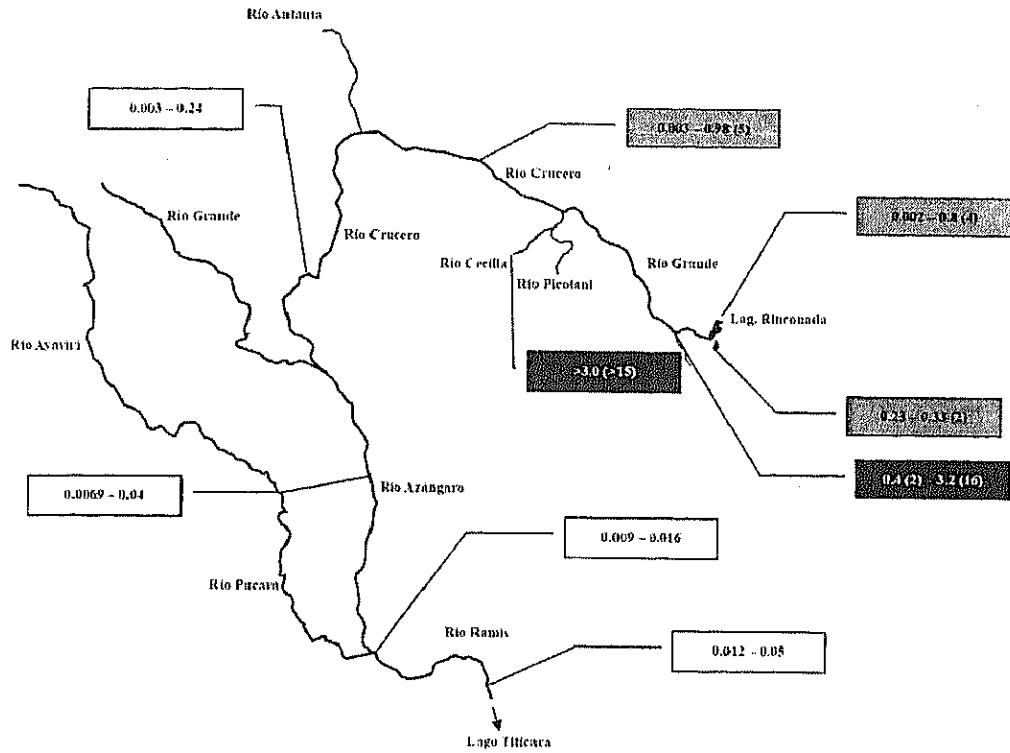
17

Cuenca Ramis: Hg (mg/L)

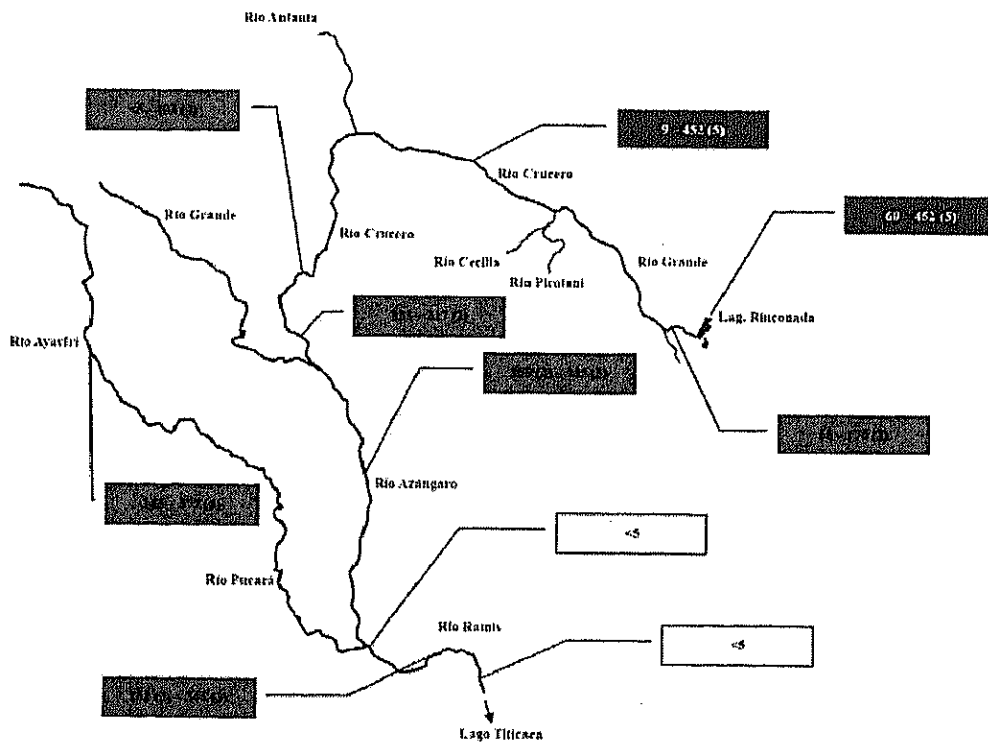


18

Cuenca Ramis: As (mg/L)



Cuenca Ramis: STS (mg/L)



Síntesis

- pH:
 - Características ácidas durante época de lluvias
 - SS:
 - Fluctuante en toda la extensión del Ramis
 - Arsénico:
 - Tendencia a aumentar en época de estiaje
 - Fluctuante en toda la extensión del Ramis
 - Mercurio:
 - Fluctuante en toda la extensión del Ramis
-

Financial Analysis for

- a) Environment Restoration for Rinconada Area
- b) Environment Restoration for Cecilia River Basin

August 15, 2008

Hiromichi KATO

JBIC Study Team

1

THE PILOT STUDY FOR PROJECT FORMATION FOR ENVIRONMENTAL IMPROVEMENT OF ABANDONED MINES

a) Financial Analysis for Rinconada Area P.P

Rinconada Area P.P.

	Case-1	Case-2	Case-3	Case-4	Case-5
Investment	19mil.US\$	19mil.US\$	19mil.US\$	19mil.US\$	19mil.US\$
Prod.Capacity.	270,000t/Y	270,000t/Y	270,000t/Y	216,000t/Y	270,000t/Y
Prod.Capacity Au.	970Kg/Y	970Kg/Y	970Kg/Y	776Kg/Y	970Kg/Y
Processig Commission.	23US\$/t	25US\$/t	29US\$/t	29US\$/t	25US\$/t
Num.of Employee	48	48	48	48	48→36

2

a) Financial Analysis for Rinconada Area P.P.

Cumulative Net Profit 000US\$

	Case-1	case-2	Case-3	case-4	Case-5
5th.year	-8,245	-5,742	-1,024	-5,788	-5,742
10th.year	-5,207	-903	7,294	-1,300	2,946
15th.year	-1,982	13,660	15,194	1,844	11,698
20th.year	1,193	28,292	23,198	6,163	20,523

Processing Commission

Case-1: 23US\$/t, Case-2: 25US\$/t, Case-3: 29US\$/t, Case-4: 29US\$/t, Case-5: 25US\$/t

Case-4: The operation ratio falls 80% of Case-1.

Case-5: 5 years later, finish Hg elimination. Production cost falls 3/4 of case-1., 3

a) Financial Analysis for Rinconada Area P.P

Cumulative Cash-Flow 000US\$

	Case-1	case-2	Case-3	Case-4	Case5
5th.year	4,889	7,454	12,074	7,408	7,752
10th.year	8,133	12,361	20,538	12,038	16,581
15th.year	9,539	15,311	27,162	13,422	25,050
20th.year	11,018	18,363	33,859	15,979	33,592

Processing Commission

Case-1: 23US\$/t, Case-2: 25US\$/t, Case-3: 29US\$/t, Case-4: 29US\$/t, Case-5: 25US\$/t

Case-4: The operation ratio falls 80% of Case-1.

Case-5: 5 years later, finish Hg elimination. Production cost falls 3/4 of case-1., 4

a) Financial Analysis for Rinconada Area P.P.

Cumulative Cash-Flow/Investment %

	Case-1	Case-2	Case-3	Case-4	Case-5
5th.year	31.7	39.2	63.5	39.0	40.8
10th.year	42.8	65.1	108.1	63.4	87.3
15th.year	50.2	80.6	143.0	70.6	131.8
20th.year	58.0	96.6	178.2	84.1	176.8
FIRR					
10th.year			3.333		
15th.year			7.077		4.928
20th year			8.728		7.176

5

Financial Analysis for (a) Rinconada Area P.P.

Proposal :

- If the cost in which the the environmental protection cost is added to a current gold retrieving treatment cost is stored in the consigned processing expenditure, it is necessary to execute this project.
- The environmental restoration measures like this project is executable only according to super-low interest and the long-term fund.
If the interest cost becomes a high cost, and it doesn't make amends for it in the policy, it is a project in the general interest rate application capital that cannot be continued.
- It is necessary to establish a strong management public agency / corporation to execute this project.

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b) Financial Analysis for Cecilia River Basin P.P.

Cecilia River Basin P.P.

	Case-1	Case-2	Case-3	Case-4
Investment	25mil US\$	25mil US\$	19mil US\$	22mil YS\$
Treatment Capacity	270,000t/Y	270,000t/Y	270,000t/Y	135,000t/Y
Produced Metals	Cu, Pb, Zn, In	Cu, Pb, Zn, In	Cu, Pb, Zn, In	Cu, Pb, Zn, In
LME Price	90% of today	67.5% of today	67.5% of today	67.5% of today
Num of Employee	48	48	37	37

Case-1: Original Plan

Case-2: LME Prices fall 1/4 from Case-1.

Case-3: LME Prices fall 1/4 from Case-1,

Investment, and Operation cost fall 3/4 of Case-1

Case-4: LME Prices fall 1/4 from Case-1,

Investment reduces to 90%,

Operation cost reduces to 50%, and Labor cost reduces to 3/4 from Case-1.

Treatment capacity : 500t/Y.

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b) Financial Analysis for Cecilia River Basin P.P.

Cumulative Net Profit 000US\$

	Case-1	Case-2	case-3	Case-4
5th.year	-1047	-16973	-795	-6437
10th.year	2884	-2952	2146	-6444
15th.year	6899		5149	-6318
20th.year	11008		8227	-6120

Case-1: Original Plan

Case-2: LME Prices fall 1/4 from Case-1.

Case-3: LME Prices fall 1/4 from Case-1,

Investment, and Operation cost fall 3/4 of Case-1

Case-4: LME Prices fall 1/4 from Case-1,

Investment reduces to 90%,

Operation cost reduces to 50%, and Labor cost reduces to 3/4 from Case-1.

Treatment capacity : 500t/Y

8

b) Financial Analysis for Cecilia River P.P.

Cumulative Cash-Flow 000US\$

	Case-1	Case-2	Case-3	Case-4
5th.year	7,262	28	8,448	2,280
10th.year	13,840	651	13,981	2,644
15th.year	17,553		1,679	3,060
20th.year	21,315		19,469	3,549

Case-1: Original Plan

Case-2: LME Prices fall 1/4 from Case-1.

Case-3: LME Prices fall 1/4 from Case-1,
Investment, and Operation cost fall 3/4 of Case-1

Case-4: LME Prices fall 1/4 from Case-1,
Investment reduces to 90%,
Operation cost reduces to 50%, and Labor cost reduces to 3/4 from Case-1.
Treatment capacity : 500t/Y

b) Financial Analysis for Cecilia River Basin P.P.

Cumulative Cash-Flow/Investment

	Case-1	Case-2	Case-3	Case-4
5th.year	29.0	0.1	44.5	10.4
10th.year	55.4	2.6	73.4	12.0
15th.year	70.2		87.8	13.9
20t.year	85.3		102.5	16.1

Case-1: Original Plan

Case-2: LME Prices fall 1/4 from Case-1.

Case-3: LME Prices fall 1/4 from Case-1,
Investment, and Operation cost fall 3/4 of Case-1

Case-4: LME Prices fall 1/4 from Case-1,
Investment reduces to 90%,
Operation cost reduces to 50%, and Labor cost reduces to 3/4 from Case-1.
Treatment capacity : 500t/Y

Financial Analysis for (b) Cecilia River Basin P.P.

Proposal :

- It is a significant proposal to cover with the product to which the equivalent part of this cost is collected from the processing line to improve a current environmental degradation.
- The environmental restoration measures like this project is executable only according to super-low interest and the long-term fund.
If the interest cost becomes a high cost, and it doesn't make amends for it in the policy, it is a project in the general interest rate application capital that cannot be sustained..
- It is necessary to establish a strong management public agency / corporation to execute this project.

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Financial Analysis for (a) Rinconada Area P.P.

Case-1: Cost Table	270,000 t/Y		000US\$
Year	1~5	6~	Remarks
Raw materials and Energy Cost.	1,886	1,886	
Labor cost	1,822	1,822	
Depreciation	2,604	281	
Maintenance cost	922	922	
Tax,Duties	8	8	
Others	195	195	
Total Fixed Cost	5,551	3,229	
Total Cost	7,437	5,115	
Total unit cost	27.54US\$/t	18.94US\$/t	

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Financial Analysis for (a) Rinconada Area P.P.

Case-1: Cost

Investment : US\$17,241 thousand US\$

000US\$

1.Raw materials and Energy cost.

	Amount	Remarks
Energy Electricity	906	$270,000t \times 3.8236Kwh/t \times 0.8776US\$/Kv$
Water	122	$270,000t \times 3.8236m^3/t \times 0.118US\$/m^3$
Consumes	858	Regents, Balls, Liners, Auxiliaries
Total Direct cost	1,886	

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Financial Analysis for (a) Rinconada P.P.

Case-1: Cost

Investment : US\$17,241 thousand US\$

2.Investment and Depreciation

000US\$

	Main system	Auxiliary sys.	Construction	Total	Depreciation
Mach.& Equip.	5,411	1,104	5,098	11,613	2,322
Build & Struc.		2,701	2,927	5,628	281
Total	5,411	3,805	8,025	17,241	2,604

The life: Mach.& Equip.5years, Build & Structure 20years

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Financial Analysis for (a) Rinconada Area P.P.

Case-1: Cost

3. Labor Cost

000US\$

	Num.	Salary/M (Sol)	Salary/Y (000Sol)	Incidental Expense(000S)	TTL. Labor Cost/Y(Sol)	TTL Labor Cost (000US\$)
Gen. Manager	1	23,000	322	55	377	128
Plant Manager	1	16,000	224	38	262	89
Stuff	7	14,800	1,450	247	1,698	577
Sub-stuff	8	7,500	840	143	983	334
Operator	21	1,690	497	85	582	198
Maintenance	6	1,690	142	24	166	57
Office clerk	4	7,200	403	69	472	160
Others	(8)	1,029	115	20	135	46
Total	48		3,994	681	4,675	1,589

1) Bonus:2M/Y, 2)Incidental Exp.Salary/Y × 17.5%,

3)Retirement reserve:Salary/Y /5year 233thousand US\$/Y

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Financial Analysis for (b) Cecilia River Basin P.P.

Case-1:

Cost Table

270,000 t/Y

000US\$

Year	1~5	6~	Remarks
Raw materials and Energy Cost.	5,272	5,272	
Labor cost	1,822	1,822	
Depreciation	2,209	768	
Maintenance cost	1,453	1,453	
Tax,Duties	13	13	
Others	345	345	
Total Fixed Cost	5,842	4,401	
Total Cost	11,114	9,673	
Total unit cost	27.54US\$/t	18.94US\$/t	

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b) Financial Analysis for Cecilia River Basin P.P

Case-1: Cost

Investment : 25million US\$

1. sales

000US\$

Products	Amount	Remarks
Cu concentrate	3,203	$1,944\text{t/Y} \times @6,938\text{US\$} \times 25\% \times 0.95$
Pb concentrate	315	$405\text{t/Y} \times @1,364\text{US\$} \times 60\% \times 0.95$
Zn concentrate	6,810	$9,720\text{t/Y} \times @1,475\text{US\$} \times 50\% \times 0.95$
In Inort.	739	$972\text{t/Y} \times @800\text{US\$} \times 0.95$
Total	11,067	

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b) Financial Analysis for Cecilia River Basin P.P

Case-1: Cost

Investment : 25million US\$

2. Variable cost

000US\$

	Amount	Remarks
Exploitation	2,700	$270,000\text{t} \times 10\text{US\$}$
Electricity	906	$270,000\text{t} \times 3.823\text{Kw} \times 0.8776\text{US\$}$
Water	702	$270,000 \times 3.8236\text{m}^3/\text{t} \times 0.680\text{US\$/m}^3$
Consumable	964	Regents, Balls, Liners, Auxiliaries
Tital	5,272	

18

b) Financial Analysis for Cecilia River Basin P.P

Case-1: Cost

Investment : 25million US\$

3. Investment and Depreciation

000US\$

	Main system	Auxiliary sys.	Construction	Total	Depreciation
Mach.& Equip.	7,207			7,207	1,441
Build & Struc.	3,249	4,078	8,026	15,353	768
Total	10,456	4,078	8,026	22,560	2,209

The life: Mach.& Equip.5years, Build & Structure 20years

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b) Financial Analysis for Cecilia River Basin P.P

Case-1: Cost

4. Labor cost

000US\$

	Num.	Salary/M (Sol)	Salary/Y (000Sol)	Incidental Expense(000S)	TTL. Labor Cost/Y(Sol)	TTL Labor Cost (000US\$)
Gen.Manager	1	23,000	322	55	377	128
Plant Manager	1	16,000	224	38	262	89
Stuff	7	14,800	1,450	247	1,698	577
Sub-stuff	8	7,500	840	143	983	334
Operator	21	1,690	497	85	582	198
Maintenance	6	1,690	142	24	166	57
Office clerk	4	7,200	403	69	472	160
Others	(8)	1,029	115	20	135	46
Total	48		3,994	681	4,675	1,589

1) Bonus:2M/Y, 2)Incidental Exp.Salary/Y × 17.5%,

3)Retirement reserve:Salary/Y /5year 233thousand US\$/Y

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b) Financial Analysis for Cecilia River Basin P.P

Case-1: Cost

Investment : 25million US\$

5. Maintenance cost :US\$1,453thousand.

6. Other fixed cost : US\$345thousand.

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a) Financial Analysis for Rinconada Area P.P

b) Financial Analysis for Cecilia River Basin P.P

Common:

1. Tax & Duties :

a) I.T.F: (Sales + Materials + Energy + Maintenance + Others) \times 0.07%

b) Participacion Laboral : (Operation profit) \times 8%

2. Income tax :

Net profit \times 30%

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- a) Financial Analysis for Rinconada Area P.P.
- b) Financial Analysis for Cecilia River Basin P.P

Common

3. Finance condition : (Borrowing Money)

- US\$25,000,000.
- Terms: 40years,
- Grace period:10years
- interest rate : 0.65%

4. Exchange rate :

- 2.941Soles / US\$ (3/7/2008)