

TR18-212-213

R.671. Mine and mill effluent, Electrolytic Zinc Company, Rosebery.

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Two samples of effluent were obtained by the Chief Chemist and Metallurgist from the company's works for the determination of dissolved and suspended solids and the testing of treatment methods to reduce them.

SAMPLES

Reg. No. 735694. No. 2 dam overflow: Clear liquid from tailing dam being discharged into watershed.

Reg. No. 735695. Excess tailings from mill and mine water: Slurry being discharged into Stitt River.

TEST WORK

The tests involved determinations of dissolved and suspended solids on the samples as received, precipitation of dissolved metals with lime and with lime followed by aeration.

Settling tests were performed on the slurry sample before and after lime addition. A sizing analysis was made of suspended solids, which were also assayed for a number of metals and acid insoluble material.

TEST RESULTS

Analyses of 'as received' material

Reg. No. 735694. No. 2 dam O/F

Determination	mg/l	Determination	mg/l
pH	3.7	TDS	800
Cu	<0.02	Turbidity	<5.0
Zn	17.0	SO ₄	420
Pb	3.5	Cl	21
Fe	60.0	Ca	60
Mn	37.0	Na	55
Cd	<0.01	Mg	20
As	<0.03		

Reg. No. 725695. Excess mill tailings and mine water

Suspended solids content: 40 g/l

Solids		Liquid	
Determination	%	Determination	mg/l
Cu	0.24	pH	4.4
Zn	2.5	Cu	<0.05
Pb	1.3	Zn	35.0
Fe	12.5	Pb	<0.2
Mn	1.6	Fe	0.2
Insol	51.5	Mn	39.0
		Cd	<0.1
		As	<0.03
		TDS	836
		SO ₄	510

TK18-010-8197
 Settling Tests (Reg. No. 735695)

Condition	Initial settling rate over first 5 minutes (mm/min)	Suspended solids after one hour g/l
As received	9	0.15
2 g/l Limil (pH 11.8)	26	0.15

Precipitation of Metals

- (1) With 2 g/l Limil.
- (2) With 2 g/l Limil and 10 minutes aeration in a flotation cell.

The precipitated and suspended solids were removed by filtration and the filtrate analysed with the following results.

Determination	Reg. No. 735694		Reg. No. 735695	
	1 mg/l	2 mg/l	1 mg/l	2 mg/l
Cu	<0.05	<0.05	0.05	0.05
Zn	<0.05	<0.05	0.2	0.1
Pb	<0.2	<0.2	<0.2	<0.2
Fe	<0.1	<0.1	<0.1	<0.1
Mn	<0.5	9.0	<0.5	5.0
Cd	<0.1	<0.1	<0.1	<0.1
As	<0.03	<0.03	<0.03	<0.03
TDS	656	956	960	890
SO ₄	420	420	480	490
Cl	28	18	21	28
pH	11.0	8.2	11.8	8.1

CONCLUSION

The results obtained indicate that solution of iron and lead is taking place in the No. 2 dam, the overflow of which contains 60 and 3.5 mg/l of these elements respectively. The slurry which bypasses the dam does not contain significant amounts of these elements in solution.

The levels of other elements determined are comparable in both samples.

The use of Limil to pH 11 appears to be effective in significantly reducing the levels of metals in solution as well as inducing a rapid settling rate of suspended solids in the slurry sample.

Aeration of the alkaline pulp or solution has the effect of causing manganese to re-dissolve, without further reducing the levels of other metals.

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