

TR15-193-195

R.620. The occurrence of zinc and cadmium in ore from the Aberfoyle and Storeys Creek mines

The Senate Select Committee on Water Pollution's report (1970) refers to the occurrence of Itai Itai disease in Japan due to the presence of cadmium in the water supply.

As the South Esk River receives waters containing cadmium, concern was expressed regarding the safety of water for communities downstream from the mines.

As the actual cadmium content is low relative to zinc and as both metals behave similarly the zinc concentration could be a guide to the cadmium content.

SAMPLES

Following a request from this Department the following ore specimens were received:

Reg. No.	Sample No.	Description
702809	1	Aberfoyle mine, 38 ft above 2L, 4,650 ft N - 1,225 ft E
702810	2	Aberfoyle mine, 49 ft above 6L, 5,813 ft N - 1,230 ft E
702811	3	Storeys Creek mine, 7 Level, 3,300 ft N
702812	4	Storeys Creek mine, 9 Level, 3,450 ft N - 2,180 ft E

ANALYSES

Aberfoyle Ltd requested the following assays be done on the 'as received' specimens.

The assay results are shown in Table 1.

CONCENTRATION TESTS

The pulverised specimens were subjected to flotation to concentrate the zinc mineral, marmatite. The concentrates from the tests assayed as follows:

Reg. No.	Zinc Concentrates Assay Per Cent					
	Zn	Cd	Fe	Cu	S	Insol.
702809	30.0	0.95	18.4	7.6	31.3	4.9
702810	38.0	1.13	17.4	1.9	30.6	1.5
702811	44.0	2.05	15.8	0.4	30.2	3.5
702812	46.0	2.00	11.6	1.0	29.1	4.6

These concentrates are not high grade because all of the small original samples were pulverised for assay. The small size and the fact that the samples had been pulverised for some time before precluded good flotation.

Zinc:Cadmium Ratio

The zinc:cadmium ratio has been calculated for the foregoing specimens and concentrates and, in addition, the ratio has been calculated for a number of mine water samples.

Table 2. ZINC:CADMIUM RATIOS

Reg. No.	Unit	Assay		Ratio Zn:Cd	Remarks
		Zn	Cd		
702809	%	10.2	0.32	31.8	Aberfoyle 2 Level
702810	%	15.0	0.45	33.3	Aberfoyle 6 Level
702811	%	27.0	1.10	24.5	Storeys Ck 7 Level
702812	%	20.5	0.75	27.3	Storeys Ck 9 Level
702809C	%	30.0	0.95	31.6	Conc. Aberfoyle
702810C	%	38.0	1.13	33.6	Conc. Aberfoyle
702811C	%	44.0	2.05	21.5	Conc. Storeys Ck
702812C	%	46.0	2.00	23.0	Conc. Storeys Ck
703039	mg/l	0.08	-	-	Aberfoyle Dam O/F
703035	mg/l	0.8	Trace	-	Storeys Ck Dam O/F
703036	mg/l	106	4	26.5	Storeys Ck Mine Water
703037	mg/l	68	3	22.7	Storeys Ck Mine ex. dam
703262	mg/l	0.2	-	-	Aberfoyle Dam O/F
703261	mg/l	0.9	Trace	-	Aberfoyle Mine Water
703264	mg/l	76	3.3	23.0	Storeys Ck Mine Water
703265	mg/l	90	3.8	23.7	Storeys Ck Mine Water + Mill Discharge

The Zn:Cd ratio for the Aberfoyle Mine lies between 31 and 34 and for Storeys Creek 21 and 28. The metals appear to dissolve more readily at Storeys Creek where the ratio found in the solids also holds for the various waters from that area. Thus one could predict for 703035 that the 'trace' reported would be 0.03 mg/l or close to the limit of detection for cadmium by the method used.

While there are no direct results to confirm that the ratio found in the solids holds for the Aberfoyle solutions by applying the ratio for Aberfoyle to sample 703261 the 'trace' reported also works out to 0.03 mg/l.

REFERENCE

SENATE SELECT COMMITTEE ON WATER POLLUTION 1970. Report. *Commonw. Parl. Pap.* 1970(98):64.

Table 1. ASSAY RESULTS

Reg. No.	Sample No.									Per Cent							
		SiO ₂	Mo	Bi	Ca	As	Sb	Pb	Cd	Cu	Zn	WO ₃	Sn	S	P	Nb	Ta
702809	1	23.7	Trace	0.03	1.42	0.51	Trace	0.05	0.32	2.9	10.2	Trace	1.63	25.5	0.32	Nil	Nil
702810	2	17.9	Trace	0.10	0.65	0.51	Trace	0.84	0.45	0.87	15.0	Trace	1.18	23.4	0.09	Nil	Nil
702811	3	20.9	Trace	0.18	0.08	Trace	Trace	0.05	1.10	0.19	27.0	5.6	0.02	17.0	0.01	0.02	Nil
702812	4	35.8	Trace	0.10	0.42	Trace	Trace	0.09	0.75	0.54	20.5	1.3	0.18	14.3	0.21	0.01	Nil

CONCENTRATIONS

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702809	23.7	Trace	0.03	1.42	0.51	Trace	0.05	0.32	2.9	10.2	Trace	1.63	25.5	0.32	Nil	Nil
702810	17.9	Trace	0.10	0.65	0.51	Trace	0.84	0.45	0.87	15.0	Trace	1.18	23.4	0.09	Nil	Nil
702811	20.9	Trace	0.18	0.08	Trace	Trace	0.05	1.10	0.19	27.0	5.6	0.02	17.0	0.01	0.02	Nil
702812	35.8	Trace	0.10	0.42	Trace	Trace	0.09	0.75	0.54	20.5	1.3	0.18	14.3	0.21	0.01	Nil

ANALYSIS

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