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R. 392

CONCENTRATION TESTS ON DIAMOND DRILL CORE FROM HOLE D.P. 2, ARDLETHAN, N.S.W.

Introduction

This is the second of a series of investigations to obtain data relating to the recovery of tin by gravity concentration from diamond drill core samples from Ardlethan, N.S.W. Methods of sample preparation, &c., were given in some detail in the report of investigation R.390, and to save repetition, you are referred to that report (this volume, p.).

Sample

Composite samples R.392A-F were made up in the manner outlined in investigation R. 390.

The various composite samples were:—

Reg. No.	Description	Percent Sn	Sample Number	Percent Tin Composite Sample
905	D.P. 2— 1	0.14		
906	D.P. 2— 2	0.28		
907	D.P. 2— 3	0.39	R.392A	0.21
908	D.P. 2— 4	0.22		
909	D.P. 2— 5	Trace		
910	D.P. 2— 6	0.29		
911	D.P. 2— 7	0.30		
912	D.P. 2— 8	0.63	R.392B	0.36
913	D.P. 2— 9	0.21		
914	D.P. 2—10	0.38		
915	D.P. 2—11	0.32		
916	D.P. 2—12	0.25		
917	D.P. 2—13	Trace	R.392C	0.24
918	D.P. 2—14	0.36		
919	D.P. 2—15	0.14		
920	D.P. 2—16	0.35		
921	D.P. 2—17	Trace		
922	D.P. 2—18	0.77		
923	D.P. 2—19	0.37	R.392D	0.37
924	D.P. 2—20	0.42		
925	D.P. 2—21	0.77		
926	D.P. 2—22	0.54		
927	D.P. 2—23	0.28	R.392E	0.48
928	D.P. 2—24	0.33		
929	D.P. 2—25	0.52		

Note: Where the tin content of the ore was less than 0.10%, the result was reported as "Trace."

Sample R.392F was made up from equal weights of samples R.392A-E.

Investigation

As investigation R.390.

Summary

Table concentration tests gave:—

Sample No.	Composite Head % Sn	Combined Concentrates % Sn	Combined Tailings % Sn	Percent Recovery of Tin in Concentrates
R.392A	0.21	5.1	0.08	64.0
R.392B	0.34	9.7	0.12	66.8
R.392C	0.27	7.9	0.09	67.5
R.392D	0.41	12.0	0.16	63.4
R.392E	0.48	14.9	0.18	62.9
Arithmetical Average	0.34	9.9	0.13	64.9

Proceedure was varied from that of investigation R.390, in that middlings from the 3 coarse sizes were ground and returned to the bulk sample for reconcentration. The lower tailings obtained in the present investigation are primarily due to this regrinding of middlings.

Heavy liquid separations on the plus 30 mesh material confirms earlier data indicating that preconcentration by heavy media methods would not be warranted due to high tailing losses.

This series of tests confirms the earlier opinion that a recovery of some 60% of the tin in a concentrate assaying about 10% tin is practicable from ores similar to those tested.

Research

Sample reduction: as investigation R.390.
Flotation of sulphides: as investigation R.390.
No sulphides floated from samples R.392A and R.392B.

Table Concentration

The desulphidized minus 44 mesh material was wet screened into plus and minus 60 mesh fractions.

The plus 60 mesh fraction was then treated on the Deister laboratory table to give—

(*a*) a comparatively low grade tin concentrate;
(*b*) a middling fraction;
(*c*) a clean tailing.

The middling fraction was stage ground to minus 60 mesh in the ball mill using short time intervals to minimize production of slimes. The ground middling was then added to the minus 60 mesh fraction of the original sample, and the whole wet screened into plus and minus 100 mesh fractions.

The plus 100 mesh fractions were then treated similarly with the exception that the middlings were ground through a 100 mesh screen.

The plus 200 mesh fractions were similarly treated, the middlings being ground minus 200 mesh.

When concentrating the minus 200 mesh material, a middling product was not taken off separately. This proceedure differs from that used in investigation R.390 in the regrinding of the middlings. Due to this regrinding, it is difficult to compare directly the tailings from the various sized fractions, as the coarse middlings have been reground and eventually appear in the finer sizes.

The quantity of middlings ground for each stage is shown as a weight percentage of the original total sample taken in the table below.

Fraction	Middlings: Percent Weight R.392A	R.392B	R.392C	R.392D	R.392E
+ 60 mesh	3.6	2.8	2.6	1.7	2.1
+ 100 mesh	0.9	1.0	0.8	0.7	0.9
+ 200 mesh	1.5	0.6	1.2	0.7	0.5

Product	Percent Weight	Percent Sn	Percent Distribution Sn
Sample R.392A			
Concentrate:			
+ 60 mesh	0.77	5.9	21.2
+ 100 mesh	0.65	4.96	15.1
+ 200 mesh	0.28	8.65	11.3
— 200 mesh	1.02	3.45	16.4
Total Concentrate	2.72	5.1	64.0
Tailings:			
+ 60 mesh	37.12	0.06	10.4
+ 100 mesh	21.58	0.05	5.0
+ 200 mesh	14.12	0.07	4.6
— 200 mesh	24.46	0.14	16.0
Total Tailings	97.28	0.08	36.0
Composite Head	100.00	0.21	100.0
Head (Assay)	....	0.21	....
Concentration Results—Individual Fractions			
+ 60 mesh fraction:			
Concentrate	2.02	5.9	67.0
Tailings	97.98	0.06	33.0
Composite	100.00	0.18	100.0
+ 100 mesh fraction:			
Concentrate	2.95	4.96	75.1
Tailings	97.05	0.05	24.9
Composite	100.00	0.19	100.0
+ 200 mesh fraction:			
Concentrate	1.93	8.65	70.9
Tailings	98.07	0.07	29.1
Composite	100.00	0.24	100.0
— 200 mesh fraction:			
Concentrate	4.01	3.45	50.7
Tailings	95.99	0.14	49.3
Composite	100.00	0.27	100.0

Product	Percent Weight	Percent Sn	Percent Distribution Sn
Sample R.392B			
Concentrate:			
+ 60 mesh	0.88	9.3	24.1
+ 100 mesh	0.54	9.0	14.3
+ 200 mesh	0.31	12.6	11.5
— 200 mesh	0.61	9.4	16.9
Total Concentrate	2.34	9.7	66.8
Tailings:			
+ 60 mesh	35.42	0.08	8.3
+ 100 mesh	25.33	0.10	7.5
+ 200 mesh	13.89	0.16	6.5
— 200 mesh	23.02	0.16	10.9
Total Tailings	97.66	0.12	33.2
Composite Head	100.00	0.34	100.0
Head (Assay)	...	0.36	....
Concentration Results—Individual Fractions			
+ 60 mesh fraction:			
Concentrate	2.42	9.3	74.2
Tailings	97.58	0.08	25.8
Composite	100.00	0.30	100.0
+ 100 mesh fraction:			
Concentrate	2.07	9.0	65.5
Tailings	97.93	0.10	34.5
Composite	100.00	0.28	100.0
+ 200 mesh fraction:			
Concentrate	2.20	12.6	63.9
Tailings	97.80	0.16	36.1
Composite	100.00	0.43	100.0
— 200 mesh fraction:			
Concentrate	2.59	9.4	61.0
Tailings	97.41	0.16	39.0
Composite	100.0O0	0.40	100.0
Sample R.392C			
Concentrate:			
+ 60 mesh	0.97	4.98	17.6
+ 100 mesh	0.53	6.9	13.4
+ 200 mesh	0.31	13.1	14.8
— 200 mesh	0.54	11.0	21.7
Total Concentrate	2.35	7.9	67.5
Tailings:			
+ 60 mesh	38.34	0.07	9.8
+ 100 mesh	22.16	0.06	4.9
+ 200 mesh	15.40	0.12	6.7
— 200 mesh	21.36	0.14	10.9
Sulphides	0.39	0.17	0.2
Total Tailings	97.65	0.09	32.5
Composite Head	100.00	0.27	100.0
Head (Assay)	....	0.24	....

Product	Percent Weight	Percent Sn	Percent Distribution Sn
Concentration Results—Individual Fractions			
+ 60 mesh fraction:			
Concentrate	2.48	4.98	64.4
Tailings	97.52	0.07	35.6
Composite	100.00	0.19	100.0
+ 100 mesh fraction:			
Concentrate	2.32	6.9	73.2
Tailings	97.68	0.06	26.8
Composite	100.00	0.22	100.0
+ 200 mesh fraction:			
Concentrate	1.97	13.1	68.7
Tailings	98.03	0.12	31.3
Composite	100.00	0.38	100.0
— 200 mesh fraction:			
Concentrate	2.47	11.0	66.6
Tailings	97.53	0.14	33.4
Composite	100.00	0.41	100.0
Sample R.392D			
Concentrate:			
+ 60 mesh	1.04	7.1	17.8
+ 100 mesh	0.55	10.9	14.5
+ 200 mesh	0.24	24.8	14.3
— 200 mesh	0.39	17.9	16.8
Total Concentrate	2.22	12.0	63.4
Tailings:			
+ 60 mesh	40.86	0.15	14.8
+ 100 mesh	21.23	0.13	6.6
+ 200 mesh	13.62	0.18	5.9
— 200 mesh	20.13	0.18	8.7
Sulphides	1.94	0.12	0.6
Total Tailings	97.78	0.16	36.6
Composite Head	100.00	0.41	100.0
Head (Assay)	....	0.37	....
Concentration Results—Individual Fractions			
+ 60 mesh fraction:			
Concentrate	2.49	7.1	54.7
Tailings	97.51	0.15	45.3
Composite	100.00	0.32	100.0
+ 100 mesh fraction:			
Concentrate	2.50	10.9	68.3
Tailings	97.50	0.13	31.7
Composite	100.00	0.40	100.0

Product	Percent Weight	Percent Sn	Percent Distribution Sn
+ 200 mesh fraction:			
Concentrate	1.75	24.8	71.0
Tailings	98.25	0.18	29.0
Composite	100.00	0.61	100.0
— 200 mesh fraction:			
Concentrate	1.92	17.9	66.0
Tailings	98.08	0.18	34.0
Composite	100.00	0.52	100.0

Sample R.392E

Concentrate:			
+ 60 mesh	0.91	10.8	20.5
+ 100 mesh	0.49	15.6	16.0
+ 200 mesh	0.20	28.7	12.0
— 200 mesh	0.42	16.4	14.4
Total Concentrate	2.02	14.9	62.9
Tailings:			
+ 60 mesh	36.28	0.13	9.9
+ 100 mesh	24.55	0.17	8.7
+ 200 mesh	13.88	0.08	2.3
— 200 mesh	17.83	0.34	12.7
Sulphides	5.44	0.31	3.5
Total Tailings	97.98	0.18	37.1
Composite Head	100.00	0.48	100.0
Head (Assay)	....	0.48	....

Concentration Results—Individual Fractions

+ 60 mesh fraction:			
Concentrate	2.44	10.8	67.5
Tailings	97.56	0.13	32.5
Composite	100.00	0.39	100.0
+ 100 mesh fraction:			
Concentrate	1.94	15.6	64.5
Tailings	98.06	0.17	35.5
Composite	100.00	0.47	100.0
+ 200 mesh fraction:			
Concentrate	1.44	28.7	84.0
Tailings	98.56	0.08	16.0
Composite	100.00	0.49	100.0
— 200 mesh fraction:			
Concentrate	2.31	16.4	53.3
Tailings	97.69	0.34	46.7
Composite	100.00	0.71	100.0

Concentration by "Vanning"

Recovery of tin, by vanning, from the various samples is shown below—

Sample No.	Percent Recovery of Tin in Concentrate
R.392A	64.9
R.392B	54.0
R.392C	64.4
R.392D	64.0
R.392E	58.2

Heavy Liquid Separation

Sample R.392F was divided into three sized fractions as described in Investigation R.390. Specific gravity of the acetylene tetrabromide was 2.94.

Product	Percent Weight	Percent Sn	Percent Distribution Sn
Minus 5 mesh plus 10 mesh: sink	2.9	1.49	13.1
Minus 5 mesh plus 10 mesh: float	22.1	0.21	14.0
Minus 5 mesh plus 10 mesh: Composite	25.0	0.36	27.1
Minus 10 mesh plus 30 mesh: sink	8.8	1.23	32.8
Minus 10 mesh plus 30 mesh: float	39.7	0.10	12.0
Minus 10 mesh plus 30 mesh: Composite	48.5	0.30	44.8
Minus 30 mesh	26.5	0.35	28.1
Composite sample	100.0	0.33	100.0
Concentration Results—Individual Fractions			
Sink: minus 5 mesh plus 10 mesh	2.9	1.49	13.1
Sink: minus 10 mesh plus 30 mesh	8.8	1.23	32.8
Composite sink	11.7	1.29	45.9
Float: minus 5 mesh plus 10 mesh	22.1	0.21	14.0
Float: minus 10 mesh plus 30 mesh	39.7	0.10	12.0
Composite float	61.8	0.14	26.0
Minus 30 mesh	26.5	0.35	28.1
Composite sample	100.0	0.33	100.0

Float products and sink products are very similar to the equivalent products from Investigation R.390 as regards macroscopic examination.

Tin contents of both float fractions are lower than equivalent fractions from Investigation R.390.

Discussion

The five tabling tests can be summarized as:—

Sample No.	Composite Head % Sn	Combined Concentrates % Sn	Combined Tailings % Sn	Percent Recovery of Tin in Concentrates
R.392A	0.21	5.1	0.08	64.0
R.392B	0.34	9.7	0.12	66.8
R.392C	0.27	7.9	0.09	67.5
R.392D	0.41	12.0	0.16	63.4
R.392E	0.48	14.9	0.18	62.9
Arithmetical Average	0.34	9.9	0.13	64.9

Average concentrate grade at 9.9% tin is very close to that obtained in Investigation R.390.

Average tin content of the tailings is 0.13%, compared with 0.18% for Investigation R.390, and the decrease is almost certainly due to regrinding of middlings.

In concentration test R.392A, the concentrate grade at 5.1% tin is low, and the tailing at 0.08% tin is correspondingly low, both probably due to the low head value of the sample.

Concentration tests R.392B and R.392C have no abnormal characteristics.

In concentration test R.392D, tailings are consistently a little higher than average, for no apparent reason.

In concentration test R.392E, tailings are a little higher than average, except for the minus 200 mesh tailing which, at 0.34% tin, is markedly higher than other corresponding tailings, for no apparent reason.

Tin content of the sulphides from R.392E, at 0.31% tin, is the highest to date. Other sulphides have assayed between 0.11 and 0.17% tin.

Overall results of concentration tests in the R.392 series are a little better than tests in the series R.390. This is due primarily to the regrinding of middlings.