

TR7-144-150 R. 396

**CONCENTRATION TESTS ON DIAMOND DRILL CORE FROM
HOLE DP4, Ardlethan, N.S.W.**

Introduction

This is the fifth of a series of investigations to obtain data relating to the recovery of tin by gravity concentration from diamond drill core samples from Ardlethan.

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 this report. (Tech. Rep. Dep. Min. Tas., 6, p. 229).

Sample

Composite samples R.396A-D were made up in the manner outlined in Investigation R.390.

Sample R.396F was made up from six parts of sample R.396A to five parts each of samples R.396B-D.

Results from concentration tests on sample R.396A and R.396D gave discrepancies between the actual and calculated heads, and concentration tests were repeated on samples R.396A/2 and R.396D/2. Due to shortage of some core reject samples, sample R.396A/2 consisted of equal parts of samples DP4/6-9 inclusive, but only 25 per cent of equivalent part of sample DP4/5, and only 62 per cent of equivalent part of sample DP4/10.

Sample R.396D/2 consisted of equal parts of samples DP4/21-24 inclusive, but only 23 per cent of equivalent part of sample DP4/25.

The various composite samples were:—

Reg. No.	Description	Per cent tin	Sample number	Per cent tin in composite sample
1742	DP4-2	Trace		
1743	3	Trace		
1744	4	Trace		
1745	5	0.15		
1746	6	0.23		
1747	7	0.33	R.396A/2	0.38
1748	8	0.42		
1749	9	0.43		
1750	10	0.19		
1751	11	0.43		
1752	12	1.07		
1753	13	0.99	R.396B	0.81
1754	14	0.63		
1755	15	0.78		
1756	16	0.89		
1757	17	0.53		
1758	18	1.03	R.396C	0.79
1759	19	1.03		
1760	20	0.46		
1761	21	0.19		
1762	22	0.31		
1763	23	0.28	R.396D/2	0.25
1764	24	0.19		
1765	25	0.11		

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

Sample DP4/1 was not received.

Investigation

As Investigation R.390.

Summary

Table concentration gave—

Sample No.	Composite Head Percent Sn	Combined Concentrate Percent Sn	Combined Tailings Percent Sn	Percent Recovery of Sn in Concentrate
R.396A/2	0.38	22.3	0.16	58.4
R.396B	0.81	44.1	0.30	64.1
R.396C	0.81	38.3	0.29	64.2
R.396D/2	0.24	30.2	0.12	53.3
Arithmetical Average	0.56	33.7	0.22	60.0

Average concentrate grade is higher than in previous investigations.

Tailings from samples R.396A/2 and R.396D/2 are normal, but tin content of tailings from samples R.396B and R.396C are much higher than usual, due principally to abnormally high tin content of the minus 200 mesh tailings fractions.

Research

Sample reduction: as Investigation R.390.

Flotation of Sulphides: as Investigation R.390.

Table concentration: as Investigation R.392. (Tech. Rep. 6, p. 240). The quantity of middlings ground for each stage of concentration is shown below as a weight percentage of the original total sample taken.

Fraction	Middlings Percent Weight			
	R.396A/2	R.396B	R.396C	R.396D/2
Plus 60 mesh	1.2	3.0	3.3	3.6
Plus 100 mesh	4.8	5.6	4.6	3.5
Plus 200 mesh	2.1	0.8	0.7	1.2

Negligible quantities of concentrates were produced from samples R.396A/2 and R.396D/2 from the two fractions coarser than 100 mesh and from samples R.396B and A.396C from the plus 60 mesh fractions. In this, the present test differs markedly from the previous four investigations.

Sample R.396A/2

Product	Weight	Percent	
		Sn	Distribution Sn
Concentrate:			
+ 200 mesh	0.37	24.1	23.6
- 200 mesh	0.65	20.2	34.8
Total concentrate	1.02	22.3	58.4
Tailings:			
+ 60 mesh	3.48	0.13	1.2
+ 100 mesh	32.07	0.09	7.6
+ 200 mesh	21.89	0.07	4.1
- 200 mesh	37.89	0.25	25.1
Sulphides	3.65	0.38	3.6
Total tailings	98.98	0.16	41.6
Composite head	100.00	0.38	100.0
Head (assay) .....	.....	0.38	.....

Concentration Results—Individual Fractions.

+ 200 mesh fraction:			
Concentrate	0.64	24.1	64.5
+ 60 mesh tailings	6.02	0.13	3.3
+ 100 mesh tailings	55.47	0.09	21.0
+ 200 mesh tailings	37.87	0.07	11.2
Composite	100.00	0.24	100.0
- 200 mesh fraction:			
Concentrate	1.69	20.2	58.1
Tailings	98.31	0.25	41.9
Composite	100.00	0.59	100.0

Sample R.396B

Product	Weight	Percent	
		Sn	Distribution Sn
Concentrate:			
+ 100 mesh	0.32	36.0	14.2
+ 200 mesh	0.30	47.7	17.6
- 200 mesh	0.56	46.8	32.3
Total concentrate	1.18	44.1	64.1
Tailings:			
+ 60 mesh	25.41	0.25	7.8
+ 100 mesh	27.65	0.12	4.1
+ 200 mesh	14.77	0.22	4.0
- 200 mesh	29.91	0.54	19.8
Sulphides	1.08	0.12	0.2
Total tailings	98.82	0.30	35.9
Composite head	100.00	0.81	100.0
Head (assay) .....	.....	0.81	.....

Concentration Results—Individual Fractions.

+ 100 mesh fraction:			
Concentrate	0.60	36.0	54.4
+ 60 mesh tailings	47.60	0.25	30.0
+ 100 mesh tailings	51.80	0.12	15.6
Composite	100.00	0.40	100.0
+ 200 mesh fraction:			
Concentrate	1.98	47.7	81.4
Tailings	98.02	0.22	18.6
Composite	100.00	1.16	100.0
- 200 mesh fraction:			
Concentrate	1.82	46.8	61.6
Tailings	98.18	0.54	38.4
Composite	100.00	1.38	100.0

Sample R. 396C

Concentrate:			
+ 100 mesh	0.33	31.5	12.9
+ 200 mesh	0.27	50.0	16.8
- 200 mesh	0.75	37.0	34.5
Total concentrate	1.35	38.3	64.2
Tailings:			
+ 60 mesh	23.29	0.18	5.2
+ 100 mesh	26.25	0.13	4.2
+ 200 mesh	10.87	0.26	3.5
- 200 mesh	35.28	0.51	22.3
Sulphides	2.96	0.16	0.6
Total tailings	98.65	0.29	35.8
Composite head	100.00	0.81	100.0
Head (assay) .....	.....	0.79	.....

Concentration Results—Individual Fractions.

Product	Weight	Percent	
		Sn	Distribution Sn
+ 100 mesh fraction:			
Concentrate	0.65	31.5	57.3
+ 60 mesh tailings	46.71	0.18	23.5
+ 100 mesh tailings	52.64	0.13	19.2
Composite	100.00	0.36	100.0
+ 200 mesh fraction:			
Concentrate	2.44	50.0	82.8
Tailings	97.56	0.26	17.2
Composite	100.00	1.47	100.0
— 200 mesh fraction:			
Concentrate	2.09	37.0	60.8
Tailings	97.91	0.51	39.2
Composite	100.00	1.27	100.0
Sample R.396D/2			
Concentrate:			
+ 200 mesh	0.13	27.8	14.8
— 200 mesh	0.30	31.2	38.5
Total concentrate	0.43	30.2	53.3
Tailings:			
+ 60 mesh	11.57	0.04	1.9
+ 100 mesh	28.25	0.06	7.0
+ 200 mesh	8.40	0.03	1.0
— 200 mesh	46.59	0.18	34.5
Sulphides	4.76	0.12	2.3
Total tailings	99.57	0.11	46.7
Composite head	100.00	0.24	100.0
Head (assay) .....	.....	0.25	.....

Concentration Results—Individual Fractions.

+ 200 mesh fraction:			
Concentrate	0.26	27.8	59.2
+ 60 mesh tailings	23.93	0.04	7.9
+ 100 mesh tailings	58.43	0.06	28.7
+ 200 mesh tailings	17.38	0.03	4.2
Composite	100.00	0.12	100.0
— 200 mesh fraction:			
Concentrate	0.64	31.2	52.8
Tailings	99.36	0.18	47.2
Composite	100.00	0.38	100.0

Concentration by "Vanning"

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

Sample	Percent Recovery of Tin in Concentrate
R.396A	64.5
R.396B	72.5
R.396C	71.2
R.396D	61.3

Heavy Liquid Separation

Sample R.396F was separated in acetylene tetra-bromide (Sp.G. 2.89) as in Investigation R.390.

Product	Weight	Percent Sn	Distribution Sn
— 5 mesh + 10 mesh:			
Sink	12.5	1.19	29.2
Float	32.9	0.20	12.9
Composite	45.4	0.47	42.1
— 10 mesh + 30 mesh:			
Sink	9.3	1.42	25.9
Float	24.5	0.14	6.7
Composite	33.8	0.50	32.6
— 30 mesh	20.8	0.62	25.3
Composite sample	100.0	0.51	100.0
Sink:			
— 5 mesh + 10 mesh	12.5	1.19	29.2
— 10 mesh + 30 mesh	9.3	1.42	25.9
Composite sink	21.8	1.29	55.1
Float:			
— 5 mesh + 10 mesh	32.9	0.20	12.9
— 10 mesh + 30 mesh	24.5	0.14	6.7
Composite float	57.4	0.17	19.6
— 30 mesh	20.8	0.62	25.3
Composite sample	100.0	0.51	100.0

On visual examination, float and sink products appeared similar to equivalent fractions from Investigation R.390, with the exception that no cassiterite larger than about pin head size was noted.

Discussion

The table of tests can be summarized as:—

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In many respects, results obtained in this investigation are markedly different from results of previous investigations. Of particular significance is the fact that there was little or no production of concentrates from the plus 100 mesh material.

Concentrate grade has been increased significantly to average 33.7 per cent tin.

Tin contents of the tailings from samples R.396A/2 and R.396D/2 are satisfactory at 0.16 and 0.12 per cent respectively. Tin contents of most fractions of the tailings of samples R.396B and R.396C are higher than usual. However, the tin content of the two minus 200 mesh fractions of these samples are 0.51 per cent, and 0.54 per cent respectively.

The ore dressing procedure was similar to previous investigations, and it is difficult to explain these abnormal results, unless the cassiterite in these samples occurs in a much finer state than in previous samples tested.

Tin contents of the sulphides were all comparatively low, varying between 0.12 and 0.16 per cent.