

ABERFOYLE TIN DEVELOPMENT PARTNERSHIP
CLEVELAND DEVELOPMENT PROJECT

REPORT ON SAMPLE DATA ANALYSIS
FOR HALL'S LODE, LENS "A"
UPON COMPLETION OF 1300'R. L. "Qa" ADIT LEVEL
EXPLORATION PROGRAMME,
CLEVELAND MINE, TASMANIA

MICROFILMED

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1. INTRODUCTION

Sample data obtained from Hall's Lode, Lens "A" on the 1300'R. L. "Qa" adit level at Cleveland Mine, Tasmania, on the eight cross-sections K, L, N, P, Qa, R, T and V is analysed in this report.

The reader is assumed to be acquainted with the geology of the deposit and the purpose and method of the sampling programme undertaken during 1964-5. The following references cover this ground:-

- (a) "Outline of Proposed Exploratory Development and Ore Testing Programme", A. A. C. Mason, November 1963.
- (b) "Report of the Resident Geologist upon Completion of Exploratory Underground Development, R. L. 1300 ft. Level", R. Cox, January 1965.
- (c) "Report on the Bulk Sample Operation, Exploratory Underground Development, R. L. 1300 ft. Level, " N. A. Gilberthorpe, July 1965.
- (d) "Progress Report on Sample Data Analyses, 1300 ft. R. L. "Qa" Adit, Cross-sections, Hall's Lode", R. Cox, 21-1-65.
- (e) "Report upon Completion of the 1300 ft. R. L. "Qa" Adit Level Exploration Programme", R. Cox, 30-11-65.

A brief summary of the sampling programme on Hall's Lode, Lens "A" is appropriate here. The full width of the ore body on eight cross-sections, (K, L, N, P, Qa, R, T and V) at approximately 120 ft. centres along strike, was sampled using groove, channel, DDH_g split core and bulk samples. Lode and interbanded chert horizons were sampled separately with the groove, channel and DDH s/c samples. The object of this sampling programme was to determine:-

1. the reliability of the various sized samples with respect to tin and copper grade, and
 2. the distribution of tin and copper values with respect to the lode (aggregate sulphide) and chert bands.
- The results are shown in the following Tables, nos. 1-4.

TABLE I

SAMPLE DATA ANALYSIS - HALLS LODE, LENS "A"
1300'R. L. "Qa" ADIT LEVEL, OVERALL LODE

| Cross- Section | Groove Samples | | Channel Samples | | D.D.H. S/C Samples | | Bulk Samples | |
|----------------------|----------------------------|----------|----------------------------|----------|----------------------------|----------|----------------------------|----------|
| | Product (width x grade) | | Product (width x grade) | | Product (width x grade) | | Product (width x grade) | |
| | Sn. | Cu. | Sn. | Cu. | Sn. | Cu. | Sn. | Cu. |
| V | 141.50 | 88.99 | 199.94 | 101.84 | 382.55 | 139.80 | 285.60 | 128.52 |
| T | 383.73 | 115.79 | 342.85 | 112.93 | 301.84 | 153.86 | 363.54 | 109.56 |
| R | 435.54 | 131.58 | 490.34 | 146.28 | 453.91 | 140.83 | 461.70 | 159.60 |
| Qa | 293.00 | 144.65 | 285.94 | 179.70 | 249.35 | 129.19 | 286.20 | 178.08 |
| P | 420.68 | 206.15 | 413.35 | 179.43 | 396.00 | 180.70 | 503.04 | 212.22 |
| N | 511.53 | 140.94 | 522.35 | 147.18 | 506.01 | 158.76 | 512.46 | 135.78 |
| L | 59.94 | 31.09 | 85.52 | 50.95 | 137.42 | 47.06 | 109.44 | 41.76 |
| K | 426.42 | 138.43 | 439.04 | 153.25 | 382.84 | 129.76 | 349.32 | 115.02 |
| Totals | 2672.34 | 997.62 | 2779.33 | 1071.56 | 2809.92 | 1079.96 | 2871.30 | 1080.54 |
| Mean | 334.08 | 124.70 | 347.42 | 133.95 | 351.24 | 135.00 | 358.91 | 135.07 |
| "S" | 147.56 | 46.97 | 140.50 | 40.66 | 110.12 | 36.84 | 126.46 | 47.70 |
| "V" | 44.17% | 37.67% | 40.44% | 30.35% | 31.35% | 27.29% | 35.23% | 35.31% |
| Total width | 3349½" | | 3358½" | | 3276 " | | 3501" | |
| Av. width | 418½" | | 420 " | | 409½" | | 438" | |
| Wt. Mean Assay | 0.80%Sn. | 0.30%Cu. | 0.83%Sn. | 0.32%Cu. | 0.86%Sn. | 0.33%Cu. | 0.81%Sn. | 0.30%Cu. |

- Notes:
- units of "Product (width x grade)" are in "inches percent"
i. e. (width in inches) x (grade in %)
 - "S" = standard deviation = $\sqrt{\frac{\sum (x - \bar{x})^2}{n}}$, where \bar{x} = mean
 - "V" = coefficient of variation = $\frac{100 \cdot S}{\bar{x}}$

TABLE II

SAMPLE DATA ANALYSIS1300'R. L. "Qa" ADIT LEVEL, HALLS LODE, LENS "A"AGGREGATE SULPHIDE BANDS

| Cross- Section | Groove Samples Product (width x grade) | | Channel Samples Product (width x grade) | | D.D.H. S/C Samples + Groove Samples Product (width x grade) | |
|-------------------|--|--------|---|---------|---|---------|
| | Sn. | Cu. | Sn. | Cu. | Sn. | Cu. |
| V | 141.50 | 84.53 | 197.02 | 98.13 | 382.55 | 138.27 |
| T | 383.73 | 115.79 | 342.85 | 112.93 | 301.84 | 153.86 |
| R | 430.69 | 131.58 | 489.46 | 146.28 | 444.16 | 140.83 |
| Qa | 289.10 | 144.35 | 281.50 | 179.70 | 249.35 | 129.19 |
| P | 417.44 | 200.61 | 408.31 | 175.78 | 385.92 | 169.57 |
| N | 509.20 | 140.24 | 518.58 | 146.16 | 504.91 | 158.76 |
| L | 58.14 | 26.05 | 81.31 | 48.22 | 137.42 | 47.06 |
| K | 426.42 | 138.43 | 437.83 | 153.25 | 298.17 | 129.76 |
| Totals | 2656.22 | 981.58 | 2756.86 | 1060.45 | 2704.32 | 1067.30 |
| Wt. Mean | 1.09%Sn. 0.40%Cu. | | 1.12%Sn. 0.43%Cu. | | 1.20%Sn. 0.47%Cu. | |
| Total width | 2443½" | | 2451½" | | 2247" | |
| Av. width | 305½" | | 306½" | | 281" | |

TABLE IIISAMPLE DATA ANALYSIS1300'R. L. "Qa" ADIT LEVEL, HALLS LODE, LENS "A"AGGREGATE CHERT BANDS

| Cross- Section | Groove Samples Product (width x grade) | | Channel Samples Product (width x grade) | | D.D.H. S/C Samples \pm Groove Samples Product (width x grade) | |
|-------------------|--|-------|---|-------|---|-------|
| | Sn. | Cu. | Sn. | Cu. | Sn. | Cu. |
| V | Nil | 4.46 | 2.92 | 3.71 | Zero | 1.53 |
| T | Nil | Nil | Nil | Nil | Zero | Zero |
| R | 4.85 | Nil | 0.88 | Nil | 9.75 | Zero |
| Qa | 3.90 | 0.30 | 4.44 | Nil | - | - |
| P | 3.25 | 5.54 | 5.05 | 3.65 | 10.08 | 11.13 |
| N | 2.34 | 0.70 | 3.78 | 1.02 | 1.10 | Zero |
| L | 1.80 | 5.04 | 4.21 | 2.73 | - | - |
| K | Nil | Nil | 1.21 | Nil | 84.67 | Zero |
| Totals | 16.14 | 16.04 | 22.49 | 11.11 | 105.60 | 12.66 |
| Wt. Mean | 0.02%Sn. 0.02%Cu. | | 0.02%Sn. 0.01%Cu. | | 0.10%Sn. 0.01%Cu. | |
| Total width | 906" | | 907" | | 1029 " | |
| Av. width | 113" | | 113" | | 128 $\frac{1}{2}$ " | |

TABLE IVSAMPLE DATA ANALYSIS, HALLS LODE, LENS "A"O/ALL LODE, 1300'R. L. "Qa" ADIT LEVEL

For cross-sections K, L, N, P, Qa, R, T and V

Data taken from Table I.

| Type of Sample | O/all lode Width | Product | |
|----------------|------------------|---------------------|---------------------|
| | | (width x grade Sn.) | (width x grade Cu.) |
| Groove | 418.5" | 334.08 | 124.70 |
| Channel | 420.0 | 347.42 | 133.95 |
| DDH S/C | 409.5 | 351.24 | 135.00 |
| Bulk | 438.0 | 358.91 | 135.07 |
| Total | 1686.0 | 1391.65 | 528.72 |
| Mean | 421.5 | 347.91 | 132.18 |

Mean grade, based on 4 sample sizes, is

0.83%Sn. and 0.31%Cu. over a
horizontal width of 421½" (35'1½")

2. RESULTS

In order to examine the reliability of the four sample sizes (groove, channel, "AXT" split core and bulk), the sample and assay data was analysed as follows:-

Tin and Copper Grades, Lens "A", o/all width,
4 sample sizes

- (a) Step One consisted of calculating the overall weighted average assays, and the overall lode width, for each of the 8 cross-sections.
- (b) Step Two consisted of calculating the weighted average assays, and the average overall lode width, for the 8 cross-sections combined.
- (c) Step Three consisted of calculating the product of the overall lode width (inches) and grade (in %Sn. and %Cu.) for each of the 8 cross-sections.
- (d) Step Four consisted of calculating the mean, standard deviation and coefficient of variation for the product (width x grade) for the 8 cross-sections combined.

These results are shown in Table I. For any distribution which is reasonably symmetrical about its mean, and which is unimodal, the standard deviation is the most important measure of dispersion, and the coefficient of variation of relative variability.

For tin values, groove and split core samples give highest and lowest values respectively for both standard deviation and coefficient of variation, for product (width x grade). Thus we conclude that groove samples are the most variable both in the absolute sense, and as expressed as a percentage of the mean value, Split core samples are the least variable in both these senses.

For copper values, bulk and split core samples give highest and lowest values respectively for standard deviation, while groove and split core samples give highest and lowest values respectively for coefficient of variation.

In order to examine the distribution of tin and copper values within the lode and chert bands comprising the overall lode, the sample and assay data were analysed as follows:-

Tin and Copper Grades, Lens "A", Aggregate Sulphide
and Chert Bands, 3 sample sizes (groove, channel,
AXT split core)

- (a) Step One consisted of calculating the overall weighted average assays, and the respective overall sulphide band and chert widths, for each of the 8 cross-sections.
- (b) Step Two consisted of calculating the weighted average assays, and the overall widths of sulphide band and chert, for the 8 cross-sections combined.

The results for sulphide and chert bands are shown in Tables II and III respectively.

Tin and copper values are located almost exclusively in the sulphide lode bands. The interbanded chert horizons contain negligible values.

3. CONCLUSIONS

The data presented in this report show that, for Halls Lode, Lens "A" on the 1300'R. L. horizon between cross-sections "K" and "V" (a strike length of 950 ft.), :-

- (a) the overall lode width is extremely variable. In the case of groove samples taken on the 8 cross-sections, the width varied between $142\frac{1}{2}$ " and 656", with an average of $418\frac{1}{2}$ "*.
- (b) the tin and copper values (grade x width) over the overall lode width are extremely variable from one section to the next.
- (c) the variability of the values referred to above under (b) is partly due to the variability in the bulk % chert content of the overall lode.*
- (d) the mean grade for the ground tested by this sampling programme is 0.83%Sn. and 0.31%Cu. over a horizontal width of $421\frac{1}{2}$ ". These values are the means of those obtained from the 4 sample sizes.
- (e) small groove or AXT split core samples provide as reliable an estimate of the tin and copper grade as the larger channel and bulk samples. Ore reserve calculations based largely upon AXT split core samples would therefore provide a reliable estimate, within reasonable limits, of the tin and copper grade.

* See Table 6 of "Report upon Completion of the 1300'R. L. "Qa" Adit Level Exploration Programme", R. Cox, 30-11-65.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH C86 + GROOVE SAMPLES

HALLS LODE, LENS "A", "K" CROSS-SECTION

1. Overall lode width = 339" = 28'3"
2. Chert bands = 97"
3. Bulk % chert = 29%
4. \sum Products (l)x(v) = 84.67 chert bands Sn. ; Grade = 0.87 %Sn.
5. " = Nil chert bands Cu. ; " = Nil %Cu.
6. " = 298.17 sulphide bands Sn. ; " = 1.23 %Sn.
7. " = 129.76 sulphide bands Cu. ; " = 0.54 %Cu.
8. Overall lode, including chert bands:-
Grade = 1.13%Sn. and 0.38%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH C82 + GROOVE SAMPLES

HALLS LODGE, LENS "A", "L" CROSS-SECTION

1. Overall lode width = 133" = 11'1"
2. Chert bands = Zero"
3. Bulk % chert = Zero%
4. \sum Products (l)x(v) = - chert bands Sn. ; Grade = - %Sn.
5. " = - chert bands Cu. ; " = - %Cu.
6. " = 137.42 sulphide bands Sn. ; " = 1.03 %Sn.
7. " = 47.06 sulphide bands Cu. ; " = 0.35 %Cu.
8. Overall lode, including chert bands:-
Grade = 1.03%Sn. and 0.35%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH, C83

HALLS LODGE, LENS "A", "N" CROSS-SECTION

1. Overall lode width = 421" = 35'1"
2. Chert bands = 86"
3. Bulk % chert = 20%
4. \sum Products (l)x(v) = 1.10 chert bands Sn. ; Grade = 0.01 %Sn.
5. " = Zero chert bands Cu. ; " = Nil %Cu.
6. " = 504.91 sulphide bands Sn. ; " = 1.51 %Sn.
7. " = 158.76 sulphide bands Cu. ; " = 0.47 %Cu.
8. Overall lode, including chert bands:-
Grade = 1.20%Sn. and 0.38%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH C84 + GROOVE SAMPLES

HALLS LODGE, LENS "A", "P" CROSS-SECTION

1. Overall lode width = 406" = 33'10"
2. Chert bands = 70"
3. Bulk % chert = 17%
4. \sum Products (l)x(v) = 10.08 chert bands Sn. ; Grade = 0.14 %Sn.
5. " = 11.13 chert bands Cu. ; " = 0.16 %Cu.
6. " = 385.92 sulphide bands Sn. ; " = 1.15 %Sn.
7. " = 169.57 sulphide bands Cu. ; " = 0.50 %Cu.
8. Overall lode, including chert bands:-
Grade = 0.98%Sn. and 0.45%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH C95 + GROOVE SAMPLES

HALLS LODGE, LENS "A", "Qa" CROSS-SECTION

1. Overall lode width = 180" = 15'0"
2. Chert bands = Zero"
3. Bulk % chert = Zero%
4. \sum Products (l)x(v) = - chert bands Sn. ; Grade = - %Sn.
5. " = - chert bands Cu. ; " = - %Cu.
6. " = 249.35 sulphide bands Sn. ; " = 1.39 %Sn.
7. " = 129.19 sulphide bands Cu. ; " = 0.72 %Cu.
8. Overall lode, including chert bands:-
Grade = 1.39%Sn. and 0.72%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH, C80

HALLS LODE, LENS "A", "R" CROSS-SECTION

1. Overall lode width = 584" = 48'8"
2. Chert bands = 232"
3. Bulk % chert = 40%
4. \sum Products (l)x(v) = 9.75 chert bands Sn. ; Grade = 0.04 %Sn.
5. " = Zero chert bands Cu. ; " = Nil %Cu.
6. " = 444.16 sulphide bands Sn. ; " = 1.26 %Sn.
7. " = 140.83 sulphide bands Cu. ; " = 0.40 %Cu.
8. Overall lode, including chert bands:-
Grade = 0.78%Sn. and 0.24%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH C81 + GROOVE SAMPLES
HALLS LODGE, LENS "A", "T" CROSS-SECTION

1. Overall lode width = 511" = 42'7"
2. Chert bands = 214"
3. Bulk % chert = 42%
4. \sum Products (l)x(v) = Zero chert bands Sn. ; Grade = Nil %Sn.
5. " = Zero chert bands Cu. ; " = Nil %Cu.
6. " = 301.84 sulphide bands Sn. ; " = 1.02 %Sn.
7. " = 153.86 sulphide bands Cu. ; " = 0.52 %Cu.
8. Overall lode, including chert bands:-
Grade = 0.59%Sn. and 0.30%Cu.

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SAMPLE DATA ANALYSIS

1300'R. L. "Qa" ADIT, DDH C94 + GROOVE SAMPLES

HALLS LODE, LENSES "A"+"B", V CROSS-SECTION

1. Overall width = 702" = 58'6"
2. Chert bands = 330"
3. Bulk % chert = 21%
4. \sum Products (l)x(v) = Nil chert bands Sn. ; Grade = Nil %Sn.
5. " = 1.53 chert bands Cu. ; " = Trace %Cu.
6. " = 382.55 sulphide bands Sn. ; " = 1.03 %Sn.
7. " = 138.27 sulphide bands Cu. ; " = 0.37 %Cu.
8. Overall lode, including chert bands:-
Grade = 0.54%Sn. and 0.20%Cu.