

**Mineral Observation Results of Four Loam/Alluvial Samples From SEL 26939,  
Northern Territory**

by

Anthony L. Ahmat

**Distribution list:**

John Evans  
David Jones  
Ron Roberts  
Sandfire Office

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## Executive Summary

Four loam and alluvial samples collected from tenement SEL26939 in the Northern Territory were processed for their heavy mineral content and observed under a binocular stereoscopic microscope to test their diamond and/or kimberlite prospectivity. No diamonds or minerals suggestive of kimberlite were recorded.

The four samples are dominated by limonite and Fe-Ti oxide phases (mainly ilmenite and Ti-bearing magnetite), with minor amounts of minerals such as leucoxene, haematite, monazite, carbonate, tourmaline, rutile and zircon. There is a progressive decrease in the proportion of the Fe-Ti oxides from samples BUT 1 through BUT 2 to NR 1 and NR 3.

The morphology and surface textures of the Fe-Ti oxides indicate they are "ordinary" crustal phases, probably derived from nearby basalt or dolerite.

## Introduction and Processing

Four loam and alluvial samples were collected along a prominent linear magnetic feature by David Jones and Ron Roberts in order to test if it could be kimberlite, or related rock. The rationale was to examine the heavy mineral fractions of the samples for diamond and kimberlitic indicator minerals (KIMs).

The samples were submitted to Diamond Recovery Services in Welshpool in November 2009 for processing, involving Wet Tabling and Heavy Liquid Separation (TBE). The details of the original sample sizes and heavy mineral concentration weights are shown in the following Table.

Sample Number	Weight (kg)			Weight (g)	
	Initial	Table Concentrate		TBE Sinks	
		+1mm	-1mm	+0.3mm	-0.3mm
BUT 1	26.9	0.924	1.146	42.2	35.8
BUT 2	24.3	1.179	2.179	17.5	17.5
NR 1	11.0	0.212	0.276	6.8	36.2
NR 3	22.9	1.031	0.771	10.6	2.4

An examination of the 0.3-1.0 mm heavy mineral concentrates (HMC) indicated significant amounts of highly magnetic minerals and particles and the decision was made to remove ("scalp") these materials. The weights of the scalped fractions, which were discarded, are:

BUT 1	10.7 g
BUT 2	0.96 g
NR 1	3.95 g
NR 3	1.12 g

By percentage, the biggest reductions were for samples NR 1 (58 %) and BUT 1 (25 %). It is assumed that the scalped material is largely magnetite, much of it variably coated by iron oxides/hydroxides (i.e. "limonite").

## Mineral Observation

Mineral observation was limited to the 0.3-1.0 mm fraction. Normally, the +1 mm fraction rarely contains discrete mineral particles and the -0.3 mm fraction is very time-consuming to observe (this fraction is usually fused in sodium peroxide in order to reduce the number of grains to observe).

To facilitate better observing results, the 0.3-1.0 mm fraction was further sieved at 0.8 mm, 0.5 mm, 0.4 mm and 0.3 mm, producing splits of +0.8 mm, +0.5 mm, +0.4 mm and +0.3 mm. The various splits were observed under a binocular stereoscopic microscope.

### **Observation Results**

Observation results are presented in the attached "observation sheets" (see end of this report; note that observation sheets have data on their back page as well). Mineral proportion codes used in the sheets are:

P	Prevalent	>=50 %
A	Abundant	20-50 %
C	Common	10-20 %
S	Some	1-10 %
O	Often	0.1-1 %
F	Few	>5 grains
R	Rare	2-5 grains
T	Trace	1 grain

No diamond or kimberlitic indicator minerals were recovered.

Each sample is dominated by "limonite" (various Fe-oxides/hydroxides) and Fe-Ti oxides (mainly ilmenite, but also Ti-magnetite and magnetite in various stages of "martitisation"), with a very strong inverse proportional relationship between the two with grain size. For example, the +0.8 mm splits may or may not contain Fe-Ti oxides (e.g. ilmenite) whereas the +0.3 mm splits may contain up to 50 % ilmenite.

Minor phases in the HMCs include leucoxene (ex-ilmenite and Ti-magnetite), haematite, monazite, carbonate, tourmaline, rutile, zircon, epidote ( $\pm$ clinozoisite), ?kyanite, garnet (one almandine grain in NR 1) and amphibole. Quartz and rust flakes (up to 10 % in some +0.8 mm splits) are present in all samples as contaminants.

Ilmenite and the other Fe-Ti oxide minerals are mostly euhedral in form and display surface textures and structures consistent with growth directly from magma.

### **Discussion and Conclusions**

As mentioned above, no diamond or kimberlitic indicator minerals (KIMs) were recovered in the 0.3-1.0 mm size-range. This fact greatly reduces the likelihood of kimberlite or lamproites being present in the area. However, it is still possible that such minerals are present in the -0.3 mm fraction, but kimberlites and lamproites typically contain large KIMs that are well-represented in the +0.3 mm fraction.

The ilmenite and other Fe-Ti oxide minerals show features consistent with high-level, upper crustal crystallisation, probably in a basic magma. There are no textural features to suggest that any of the ilmenite was derived from the upper mantle.

The exceptional "freshness" of the Fe-Ti oxide minerals indicates that the source of these minerals is very close by.

Anthony L. Ahmat  
B.Sc.(Hons), PhD, FGAA

SANDFIRE RESOURCES NL  
HEAVY MINERALS & DIAMOND INDICATOR MINERAL DATA SHEET

Page 5 (v1)

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TOR MINERALS DATA SHEET		NAME: BENTONITE	
COMMENTS (these print out)		NAME: BENTONITE	
NEGATIVE FOR DIAMOND & INDICATOR		SUSCEPTIBILITY:	
1) IRREGULARS.		SUSCEPTIBILITY:	
The "FE" series" were sampled, measured to be Fe-rich magnetic materials (e.g., magnetite). The relationship of these materials to the indicated material is unclear. Largely to indicate various iron-rich Fe-oxides/hydroxides, magnetite yellow to orange in red-brown and brownish colors, irregular, fine-grained, tabular to rounded and fractured - fractured.			
1. ALMANDINE	2.	ANATASITE	3.
2. ALMANDINE	3.	ANATASITE	4.
3. ANTHRAZITE	4.	ANTIMONY	5.
4. ANTHRAZITE	5.	BORONITE	6.
5. ANTHRAZITE	6.	BRONZITE	7.
6. ANTHRAZITE	7.	CALCIUM	8.
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### Expt 1 (continued)

② Weights observed:

$$\begin{aligned} +0.8 \text{ mm} &= 1.621.3 \\ +0.5 \text{ mm} &= 5.519.9 \\ +0.4 \text{ mm} &= 4.306.9 \\ +0.3 \text{ mm} &= 12.147.2 \end{aligned}$$

$$24.483.9$$

- ③ Shows the 'scaled' +0.3 mm fraction was retained, & so the expected  $\frac{1}{3}$  mm fraction.
- This fraction was not observed.

- ④ "Dustite" = Fe-Ti oxides, consisting mainly of magnetite, and titaniferous magnetite.
- ⑤ Magnetite is largely hexagonal, and has a significant component of the "staple" type.
- ⑥ The Fe-Ti oxides (i.e. dustite) are mostly tabular and very thick-looking, apparently with delicate intergrowth features.
- ⑦ Fe-Ti oxides are more abundant in the finer grained fractions. For example, Fe-Ti oxide makes up ~5% of the +0.3 mm fraction, but ~55% of the +0.3 mm fraction.
- ⑧ The boundaries of the sample and the fractions of the Fe-Ti oxides suggest a matrix source (e.g. dolomite, basal) that is very close by (i.e. proximal).

SANDFIRE RESOURCES NL.  
HEAVY MINERALS & DIAM.

STATE	TYPE		
DATA	PROJECT		
TOTAL WEIGHT	24.2 kg	WEIGHT AFTER TIME	17.5 g
DATA	DATA	DATA - EXCLUDED	
OBSERVATION	17600	TIME TAKEN MISSING	3.58
OBSERVATION	0.00	TIME TAKEN MISSING	
MATERIALS USED	0.00	TIME TAKEN MISSING	

MURKIN

SANDFIRE RESOURCES NL.  
HEAVY MINEDAILS & DIAMOND INDICATOR MINEDAILS DATA SHEET.

TUTOR MINERALS DATA SHEET					
COMMENTS (Please print clearly)		SAMPLE DATA			
Negative Test Characters & Indicators	Positive Test Characters & Indicators	Solubility	Reactions	Test No.	Date
Properties					
Magnetic "Spoon" response to a magnet (5-10% iron in the sample).					
The IRPC is very shiny & is soft, it is not hard because it is plastic like					
Fe-Titanite (brown, fibrous magnetic) or less magnetic than pyroxene and less dense than olivine.					
1. MASHINE	AMPHIBOLE	5. ANHYDITE	4. ANDALUSITE	4.	APATITE
2. MASHITE	RASITE	8. BOSITITE	9. BRONZITE	10.	CASSITERITE
3. BASPHORE	12. CASSITERITE	11. CIRSPHAL	13. CRYSTOBALITE	15.	DIAPORE
4. CASSITE	16. CRYSTOBALITE	10. CRYSTOBALITE	14. DIOPHILITE	20.	FLUORITE
5. CASSITERITE	17. DIAPORE	19. FLUORITE	21. GARNET	25.	KYANITE
6. CIRSPHAL	18. DIOPHILITE	24. GARNET	26. KYANITE	29.	MUGEARITE
7. CRYSTOBALITE	19. FLUORITE	23. KYANITE	27. KYANITE	30.	MUScovite
8. DIAPHRAGMITE	20. KYANITE	13. KYANITE	14. KYANITE	35.	PERIDOTITE
9. DIOPHILITE	21. KYANITE	15. KYANITE	16. KYANITE	36.	PEROVSKITE
10. EPORITE	22. KYANITE	17. KYANITE	18. KYANITE	37.	PERWHYLITE
11. KYANITE	23. KYANITE	16. KYANITE	19. KYANITE	38.	QUARTZITE
12. KYANITE	24. KYANITE	18. KYANITE	20. KYANITE	39.	ROCKS
13. KYANITE	25. KYANITE	19. KYANITE	21. KYANITE	40.	SCANDIUM
14. KYANITE	26. KYANITE	20. KYANITE	22. KYANITE	41.	SELENITE
15. KYANITE	27. KYANITE	21. KYANITE	23. KYANITE	42.	SILOMANITE
16. KYANITE	28. KYANITE	22. KYANITE	24. KYANITE	43.	SILVER
17. KYANITE	29. KYANITE	23. KYANITE	25. KYANITE	44.	SILVERITE
18. KYANITE	30. KYANITE	24. KYANITE	26. KYANITE	45.	SILVERWELLITE
19. KYANITE	31. KYANITE	25. KYANITE	27. KYANITE	46.	SILVERWELLITE
20. KYANITE	32. KYANITE	26. KYANITE	28. KYANITE	47.	SILVERWELLITE
21. KYANITE	33. KYANITE	27. KYANITE	29. KYANITE	48.	SILVERWELLITE
22. KYANITE	34. KYANITE	28. KYANITE	30. KYANITE	49.	SILVERWELLITE
23. KYANITE	35. KYANITE	29. KYANITE	31. KYANITE	50.	SILVERWELLITE
24. KYANITE	36. KYANITE	30. KYANITE	32. KYANITE	51.	SILVERWELLITE
25. KYANITE	37. KYANITE	31. KYANITE	33. KYANITE	52.	SILVERWELLITE
26. KYANITE	38. KYANITE	32. KYANITE	34. KYANITE	53.	SILVERWELLITE
27. KYANITE	39. KYANITE	33. KYANITE	35. KYANITE	54.	SILVERWELLITE
28. KYANITE	40. KYANITE	34. KYANITE	36. KYANITE	55.	SILVERWELLITE
29. KYANITE	41. KYANITE	35. KYANITE	37. KYANITE	56.	SILVERWELLITE
30. KYANITE	42. KYANITE	36. KYANITE	38. KYANITE	57.	SILVERWELLITE
31. KYANITE	43. KYANITE	37. KYANITE	39. KYANITE	58.	SILVERWELLITE
32. KYANITE	44. KYANITE	38. KYANITE	40. KYANITE	59.	SILVERWELLITE
33. KYANITE	45. KYANITE	39. KYANITE	41. KYANITE	60.	SILVERWELLITE
34. KYANITE	46. KYANITE	40. KYANITE	42. KYANITE	61.	SILVERWELLITE
35. KYANITE	47. KYANITE	41. KYANITE	43. KYANITE	62.	SILVERWELLITE
36. KYANITE	48. KYANITE	42. KYANITE	44. KYANITE	63.	SILVERWELLITE
37. KYANITE	49. KYANITE	43. KYANITE	45. KYANITE	64.	SILVERWELLITE
38. KYANITE	50. KYANITE	44. KYANITE	46. KYANITE	65.	SILVERWELLITE
39. KYANITE	51. KYANITE	45. KYANITE	47. KYANITE	66.	SILVERWELLITE
40. KYANITE	52. KYANITE	46. KYANITE	48. KYANITE	67.	SILVERWELLITE
41. KYANITE	53. KYANITE	47. KYANITE	49. KYANITE	68.	SILVERWELLITE
42. KYANITE	54. KYANITE	48. KYANITE	50. KYANITE	69.	SILVERWELLITE
43. KYANITE	55. KYANITE	49. KYANITE	51. KYANITE	70.	SILVERWELLITE
44. KYANITE	56. KYANITE	50. KYANITE	52. KYANITE	71.	SILVERWELLITE
45. KYANITE	57. KYANITE	51. KYANITE	53. KYANITE	72.	SILVERWELLITE
46. KYANITE	58. KYANITE	52. KYANITE	54. KYANITE	73.	SILVERWELLITE
47. KYANITE	59. KYANITE	53. KYANITE	55. KYANITE	74.	SILVERWELLITE
48. KYANITE	60. KYANITE	54. KYANITE	56. KYANITE	75.	SILVERWELLITE
49. KYANITE	61. KYANITE	55. KYANITE	57. KYANITE	76.	SILVERWELLITE
50. KYANITE	62. KYANITE	56. KYANITE	58. KYANITE	77.	SILVERWELLITE
51. KYANITE	63. KYANITE	57. KYANITE	59. KYANITE	78.	SILVERWELLITE
52. KYANITE	64. KYANITE	58. KYANITE	60. KYANITE	79.	SILVERWELLITE
53. KYANITE	65. KYANITE	59. KYANITE	61. KYANITE	80.	SILVERWELLITE
54. KYANITE	66. KYANITE	60. KYANITE	62. KYANITE	81.	SILVERWELLITE
55. KYANITE	67. KYANITE	61. KYANITE	63. KYANITE	82.	SILVERWELLITE
56. KYANITE	68. KYANITE	62. KYANITE	64. KYANITE	83.	SILVERWELLITE
57. KYANITE	69. KYANITE	63. KYANITE	65. KYANITE	84.	SILVERWELLITE
58. KYANITE	70. KYANITE	64. KYANITE	66. KYANITE	85.	SILVERWELLITE
59. KYANITE	71. KYANITE	65. KYANITE	67. KYANITE	86.	SILVERWELLITE
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61. KYANITE	73. KYANITE	67. KYANITE	69. KYANITE	88.	SILVERWELLITE
62. KYANITE	74. KYANITE	68. KYANITE	70. KYANITE	89.	SILVERWELLITE
63. KYANITE	75. KYANITE	69. KYANITE	71. KYANITE	90.	SILVERWELLITE
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66. KYANITE	78. KYANITE	72. KYANITE	74. KYANITE	93.	SILVERWELLITE
67. KYANITE	79. KYANITE	73. KYANITE	75. KYANITE	94.	SILVERWELLITE
68. KYANITE	80. KYANITE	74. KYANITE	76. KYANITE	95.	SILVERWELLITE
69. KYANITE	81. KYANITE	75. KYANITE	77. KYANITE	96.	SILVERWELLITE
70. KYANITE	82. KYANITE	76. KYANITE	78. KYANITE	97.	SILVERWELLITE
71. KYANITE	83. KYANITE	77. KYANITE	79. KYANITE	98.	SILVERWELLITE
72. KYANITE	84. KYANITE	78. KYANITE	80. KYANITE	99.	SILVERWELLITE
73. KYANITE	85. KYANITE	79. KYANITE	81. KYANITE	100.	SILVERWELLITE
74. KYANITE	86. KYANITE	80. KYANITE	82. KYANITE	101.	SILVERWELLITE
75. KYANITE	87. KYANITE	81. KYANITE	83. KYANITE	102.	SILVERWELLITE
76. KYANITE	88. KYANITE	82. KYANITE	84. KYANITE	103.	SILVERWELLITE
77. KYANITE	89. KYANITE	83. KYANITE	85. KYANITE	104.	SILVERWELLITE
78. KYANITE	90. KYANITE	84. KYANITE	86. KYANITE	105.	SILVERWELLITE
79. KYANITE	91. KYANITE	85. KYANITE	87. KYANITE	106.	SILVERWELLITE
80. KYANITE	92. KYANITE	86. KYANITE	88. KYANITE	107.	SILVERWELLITE
81. KYANITE	93. KYANITE	87. KYANITE	89. KYANITE	108.	SILVERWELLITE
82. KYANITE	94. KYANITE	88. KYANITE	90. KYANITE	109.	SILVERWELLITE
83. KYANITE	95. KYANITE	89. KYANITE	91. KYANITE	110.	SILVERWELLITE
84. KYANITE	96. KYANITE	90. KYANITE	92. KYANITE	111.	SILVERWELLITE
85. KYANITE	97. KYANITE	91. KYANITE	93. KYANITE	112.	SILVERWELLITE
86. KYANITE	98. KYANITE	92. KYANITE	94. KYANITE	113.	SILVERWELLITE
87. KYANITE	99. KYANITE	93. KYANITE	95. KYANITE	114.	SILVERWELLITE
88. KYANITE	100. KYANITE	94. KYANITE	96. KYANITE	115.	SILVERWELLITE
89. KYANITE	101. KYANITE	95. KYANITE	97. KYANITE	116.	SILVERWELLITE
90. KYANITE	102. KYANITE	96. KYANITE	98. KYANITE	117.	SILVERWELLITE
91. KYANITE	103. KYANITE	97. KYANITE	99. KYANITE	118.	SILVERWELLITE
92. KYANITE	104. KYANITE	98. KYANITE	100. KYANITE	119.	SILVERWELLITE
93. KYANITE	105. KYANITE	99. KYANITE	101. KYANITE	120.	SILVERWELLITE
94. KYANITE	106. KYANITE	100. KYANITE	102. KYANITE	121.	SILVERWELLITE
95. KYANITE	107. KYANITE	101. KYANITE	103. KYANITE	122.	SILVERWELLITE
96. KYANITE	108. KYANITE	102. KYANITE	104. KYANITE	123.	SILVERWELLITE
97. KYANITE	109. KYANITE	103. KYANITE	105. KYANITE	124.	SILVERWELLITE
98. KYANITE	110. KYANITE	104. KYANITE	106. KYANITE	125.	SILVERWELLITE
99. KYANITE	111. KYANITE	105. KYANITE	107. KYANITE	126.	SILVERWELLITE
100. KYANITE	112. KYANITE	106. KYANITE	108. KYANITE	127.	SILVERWELLITE
101. KYANITE	113. KYANITE	107. KYANITE	109. KYANITE	128.	SILVERWELLITE
102. KYANITE	114. KYANITE	108. KYANITE	110. KYANITE	129.	SILVERWELLITE
103. KYANITE	115. KYANITE	109. KYANITE	111. KYANITE	130.	SILVERWELLITE
104. KYANITE	116. KYANITE	110. KYANITE	112. KYANITE	131.	SILVERWELLITE
105. KYANITE	117. KYANITE	111. KYANITE	113. KYANITE	132.	SILVERWELLITE
106. KYANITE	118. KYANITE	112. KYANITE	114. KYANITE	133.	SILVERWELLITE
107. KYANITE	119. KYANITE	113. KYANITE	115. KYANITE	134.	SILVERWELLITE
108. KYANITE	120. KYANITE	114. KYANITE	116. KYANITE	135.	SILVERWELLITE
109. KYANITE	121. KYANITE	115. KYANITE	117. KYANITE	136.	SILVERWELLITE
110. KYANITE	122. KYANITE	116. KYANITE	118. KYANITE	137.	SILVERWELLITE
111. KYANITE	123. KYANITE	117. KYANITE	119. KYANITE	138.	SILVERWELLITE
112. KYANITE	124. KYANITE	118. KYANITE	120. KYANITE	139.	SILVERWELLITE
113. KYANITE	125. KYANITE	119. KYANITE	121. KYANITE	140.	SILVERWELLITE
114. KYANITE	126. KYANITE	120. KYANITE	122. KYANITE	141.	SILVERWELLITE
115. KYANITE	127. KYANITE	121. KYANITE	123. KYANITE	142.	SILVERWELLITE
116. KYANITE	128. KYANITE	122. KYANITE	124. KYANITE	143.	SILVERWELLITE
117. KYANITE	129. KYANITE	123. KYANITE	125. KYANITE	144.	SILVERWELLITE
118. KYANITE	130. KYANITE	124. KYANITE	126. KYANITE	145.	SILVERWELLITE
119. KYANITE	131. KYANITE	125. KYANITE	127. KYANITE	146.	SILVERWELLITE
120. KYANITE	132. KYANITE	126. KYANITE	128. KYANITE	147.	SILVERWELLITE
121. KYANITE	133. KYANITE	127. KYANITE	129. KYANITE	148.	SILVERWELLITE
122. KYANITE	134. KYANITE	128. KYANITE	130. KYANITE	149.	SILVERWELLITE
123. KYANITE	135. KYANITE	129. KYANITE	131. KYANITE	150.	SILVERWELLITE
124. KYANITE	136. KYANITE	130. KYANITE	132. KYANITE	151.	SILVERWELLITE
125. KYANITE	137. KYANITE	131. KYANITE	133. KYANITE	152.	SILVERWELLITE
126. KYANITE	138. KYANITE	132. KYANITE	134. KYANITE	153.	SILVERWELLITE
127. KYANITE	139. KYANITE	133. KYANITE	135. KYANITE	154.	SILVERWELLITE
128. KYANITE	140. KYANITE	134. KYANITE	136. KYANITE	155.	SILVERWELLITE
129. KYANITE	141. KYANITE	135. KYANITE	137. KYANITE	156.	SILVERWELLITE
130. KYANITE	142. KYANITE	136. KYANITE	138. KYANITE	157.	SILVERWELLITE
131. KYANITE	143. KYANITE	137. KYANITE	139. KYANITE	158.	SILVERWELLITE
132. KYANITE	144. KYANITE	138. KYANITE	140. KYANITE	159.	SILVERWELLITE
133. KYANITE	145. KYANITE	139. KYANITE	141. KYANITE	160.	SILVERWELLITE
134. KYANITE	146. KYANITE	140. KYANITE	142. KYANITE	161.	SILVERWELLITE
135. KYANITE	147. KYANITE	141. KYANITE	143. KYANITE	162.	SILVERWELLITE
136. KYANITE	148. KYANITE	142. KYANITE	144. KYANITE	163.	SILVERWELLITE
137. KYANITE	149. KYANITE	143. KYANITE	145. KYANITE	164.	SILVERWELLITE
138. KYANITE	150. KYANITE	144. KYANITE	146. KYANITE	165.	SILVERWELLITE
139. KYANITE	151. KYANITE	145. KYANITE	147. KYANITE	166.	SILVERWELLITE
140. KYANITE	152. KYANITE	146. KYANITE	148. KYANITE	167.	SILVERWELLITE
141. KYANITE	153. KYANITE	147. KYANITE	149. KYANITE	168.	SILVERWELLITE
142. KYANITE	154. KYANITE	148. KYANITE	150. KYANITE	169.	SILVERWELLITE
143. KYANITE	155. KYANITE	149. KYANITE	151. KYANITE	170.	SILVERWELLITE
144. KYANITE	156. KYANITE	150. KYANITE	152. KYANITE	171.	SILVERWELLITE
145. KYANITE	157. KYANITE	151. KYANITE	153. KYANITE	172.	SILVERWELLITE
146. KYANITE	158. KYANITE	152. KYANITE	154. KYANITE	173.	SILVERWELLITE
147. KYANITE	159. KYANITE	153. KYANITE	155. KYANITE	174.	SILVERWELLITE
148. KYANITE	160. KYANITE	154. KYANITE	156. KYANITE	175.	SILVERWELLITE
149. KYANITE	161. KYANITE	155. KYANITE	157. KYANITE	176.	SILVERWELLITE
150. KYANITE	162. KYANITE	156. KYANITE	158. KYANITE	177.	SILVERWELLITE
151. KYANITE	163. KYANITE	157. KYANITE	159. KYANITE	178.	SILVERWELLITE
152. KYANITE	164. KYANITE	158. KYANITE	160. KYANITE	179.	SILVERWELLITE
153. KYANITE	165. KYANITE	159. KYANITE	161. KYANITE	180.	SILVERWELLITE
154. KYANITE	166. KYANITE	160. KYANITE	162. KYANITE	181.	SILVERWELLITE
155. KYANITE	167. KYANITE	161. KYANITE	163. KYANITE	182.	SILVERWELLITE
156. KYANITE	168. KYANITE	162. KYANITE	164. KYANITE	183.	SILVERWELLITE
157. KYANITE	169. KYANITE	163. KYANITE	165. KYANITE	184.	SILVERWELLITE
158. KYANITE	170. KYANITE	164. KYANITE	166. KYANITE	185.	SILVERWELLITE
159. KYANITE	171. KYANITE	165. KYANITE	167. KYANITE	186.	SILVERWELLITE
160. KYANITE	172. KYANITE	166. KYANITE	168. KYANITE	187.	SILVERWELLITE
161. KYANITE	173. KYANITE	167. KYANITE	169. KYANITE	188.	SILVERWELLITE
162. KYANITE	174. KYANITE	168. KYANITE	170. KYANITE	189.	SILVERWELLITE
163. KYANITE	175. KYANITE	169. KYANITE	171. KYANITE	190.	SILVERWELLITE
164. KYANITE	176. KYANITE	170. KYANITE	172. KYANITE	191.	SILVERWELLITE
165. KYANITE	177. KYANITE	171. KYANITE	173. KYANITE	192.	SILVERWELLITE
166. KYANITE	178. KYANITE	172. KYANITE	174. KYANITE	193.	SILVERWELLITE
167. KYANITE	179. KYANITE	173. KYANITE	175. KYANITE	194.	SILVERWELLITE
168. KYANITE	180. KYANITE	174. KYANITE	176. KYANITE	195.	SILVERWELLITE
169. KYANITE	181. KYANITE	175. KYANITE	177. KYANITE	196.	SILVERWELLITE
170. KYANITE	182. KYANITE	176. KYANITE	178. KYANITE	197.	SILVERWELLITE
171. KYANITE	183. KYANITE	177. KYANITE	179. KYANITE	198.	SILVERWELLITE
172. KYANITE	184. KYANITE	178. KYANITE	180. KYANITE	199.	SILVERWELLITE
173. KYANITE	185. KYANITE	179. KYANITE	181. KYANITE	200.	SILVERWELLITE

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78.

## GUITT $\eta$ (loss, V<sub>solid</sub>)

### Plates

$$\begin{aligned} \textcircled{1} \quad & \text{Welds observed:} \\ & + \text{O.} 8 \text{ mm} : 1.625 \text{ g} \\ & + \text{O.} 5 \text{ mm} : 5.053 \text{ g} \\ & + \text{O.} 4 \text{ mm} : 1.918 \text{ g} \\ & + \text{O.} 3 \text{ mm} : \frac{5.154 \text{ g}}{12.754 \text{ g}} \end{aligned}$$

- ② When the "seal pad" + 0.3 mm thickness was used, a 765% reported in  $\eta_{\text{loss}}$  - O. 3 mm thickness.
- This thickness was not observed.
- ③ Fe-Ti nodes are, on average, less stressed than those in PdT.
- ④ Fe-Ti nodes were found in the lower strained fractions (similar to PdT).
- ⑤ Like PdT, the Fe-Ti nodes are mostly oriented, very fresh-looking and commonly have distinct impingement features.
- ⑥ Like GUITT 1, the morphology and morphologies suggest a previous fatigue.

HgCl<sub>2</sub> (1.0 mmole)

SANDFIRE RESOURCES NL  
THE AVS MINEDAIR & DIAMONIN INDICATED MINED AIRS DATA SHEET

TOM MINERALS DATA SHEET				
COMMENTS (for reference only)				
NAME & NUMBER & FEDERAL #	DATE: 1-5-1-10 SIGNATURE: [Signature] POSITIVE: ✓			
POLYMERASIS:	Negative: ✓			
Hematite "Zig-Zag" oriented $\sigma_{\text{parallel}}$ ( $S_2 \cap S_3$ ) from the $[B_2 \cap S_3]$ surface. The elongating system is oriented $\perp$ to the $[B_2 \cap S_3]$ surface, therefore the real elongation direction is $S_3$ parallel, corresponding with a normal rock tension. The elongating system is $S_2$ parallel elongated elongate.				
$\sigma_{\text{parallel}}$ ( $S_2 \cap S_3$ ) elongates $\sim S_2$ in the $HRC$ .				
L.	Z.	3.	4.	5.
1. ALMANTHONITE	AMPHIBOLE	ASPARTATE	ANHYDRITE	APATITE
2. BORAX	CORUNDUM	C	C	C
3. AXFADITE	DARWINITE	DOLITHON	DROMOLITE	DASSIERITE
4. C. CLINOPHOENIC TOPAZOIDITE	E	F	G	H
5. DIAPODITE	ESTAVITITE	EPIDOTE	FLUORURITE	HAUCORITE
6. E. GARNET	H	I	J	K
7. F. GARNET	IGNEOUS	IMMAGITE	KYANITE	L
8. G. HEMIMELITE	J	K	L	M
9. H. HEMIMELITE	KAGANGAITE	KALIUMITE	MANGANESE	MANGANESE
10. I. HEMIMELITE	L	M	N	O
11. J. HEMIMELITE	M	N	O	P
12. K. HEMIMELITE	N	O	P	Q
13. L. HEMIMELITE	O	P	Q	R
14. M. HEMIMELITE	P	Q	R	S
15. N. HEMIMELITE	Q	R	S	T
16. O. HEMIMELITE	R	S	T	U
17. P. HEMIMELITE	S	T	U	V
18. Q. HEMIMELITE	T	U	V	W
19. R. HEMIMELITE	U	V	W	X
20. S. HEMIMELITE	V	W	X	Y
21. T. HEMIMELITE	W	X	Y	Z
22. U. HEMIMELITE	X	Y	Z	A
23. V. HEMIMELITE	Y	Z	A	B
24. W. HEMIMELITE	Z	A	B	C
25. X. HEMIMELITE	A	B	C	D
26. Y. HEMIMELITE	B	C	D	E
27. Z. HEMIMELITE	C	D	E	F
28. A. HEMIMELITE	D	E	F	G
29. B. HEMIMELITE	E	F	G	H
30. C. HEMIMELITE	F	G	H	I
31. D. HEMIMELITE	G	H	I	J
32. E. HEMIMELITE	H	I	J	K
33. F. HEMIMELITE	I	J	K	L
34. G. HEMIMELITE	J	K	L	M
35. H. HEMIMELITE	K	L	M	N
36. I. HEMIMELITE	L	M	N	O
37. J. HEMIMELITE	M	N	O	P
38. K. HEMIMELITE	N	O	P	Q
39. L. HEMIMELITE	O	P	Q	R
40. M. HEMIMELITE	P	Q	R	S
41. N. HEMIMELITE	Q	R	S	T
42. O. HEMIMELITE	R	S	T	U
43. P. HEMIMELITE	S	T	U	V
44. Q. HEMIMELITE	T	U	V	W
45. R. HEMIMELITE	U	V	W	X
46. S. HEMIMELITE	V	W	X	Y
47. T. HEMIMELITE	W	X	Y	Z
48. U. HEMIMELITE	X	Y	Z	A
49. V. HEMIMELITE	Y	Z	A	B
50. W. HEMIMELITE	Z	A	B	C
51. X. HEMIMELITE	A	B	C	D
52. Y. HEMIMELITE	B	C	D	E
53. Z. HEMIMELITE	C	D	E	F
54. A. HEMIMELITE	D	E	F	G
55. B. HEMIMELITE	E	F	G	H
56. C. HEMIMELITE	F	G	H	I
57. D. HEMIMELITE	G	H	I	J
58. E. HEMIMELITE	H	I	J	K
59. F. HEMIMELITE	I	J	K	L
60. G. HEMIMELITE	J	K	L	M
61. H. HEMIMELITE	K	L	M	N
62. I. HEMIMELITE	L	M	N	O
63. J. HEMIMELITE	M	N	O	P
64. K. HEMIMELITE	N	O	P	Q
65. L. HEMIMELITE	O	P	Q	R
66. M. HEMIMELITE	P	Q	R	S
67. N. HEMIMELITE	Q	R	S	T
68. O. HEMIMELITE	R	S	T	U
69. P. HEMIMELITE	S	T	U	V
70. Q. HEMIMELITE	T	U	V	W
71. R. HEMIMELITE	U	V	W	X
72. S. HEMIMELITE	V	W	X	Y
73. T. HEMIMELITE	W	X	Y	Z
74. U. HEMIMELITE	X	Y	Z	A
75. V. HEMIMELITE	Y	Z	A	B
76. W. HEMIMELITE	Z	A	B	C
77. X. HEMIMELITE	A	B	C	D
78. Y. HEMIMELITE	B	C	D	E
79. Z. HEMIMELITE	C	D	E	F
80. A. HEMIMELITE	D	E	F	G
81. B. HEMIMELITE	E	F	G	H
82. C. HEMIMELITE	F	G	H	I
83. D. HEMIMELITE	G	H	I	J
84. E. HEMIMELITE	H	I	J	K
85. F. HEMIMELITE	I	J	K	L
86. G. HEMIMELITE	J	K	L	M
87. H. HEMIMELITE	K	L	M	N
88. I. HEMIMELITE	L	M	N	O
89. J. HEMIMELITE	M	N	O	P
90. K. HEMIMELITE	N	O	P	Q
91. L. HEMIMELITE	O	P	Q	R
92. M. HEMIMELITE	P	Q	R	S
93. N. HEMIMELITE	Q	R	S	T
94. O. HEMIMELITE	R	S	T	U
95. P. HEMIMELITE	S	T	U	V
96. Q. HEMIMELITE	T	U	V	W
97. R. HEMIMELITE	U	V	W	X
98. S. HEMIMELITE	V	W	X	Y
99. T. HEMIMELITE	W	X	Y	Z
100. U. HEMIMELITE	X	Y	Z	A
101. V. HEMIMELITE	Y	Z	A	B
102. W. HEMIMELITE	Z	A	B	C
103. X. HEMIMELITE	A	B	C	D
104. Y. HEMIMELITE	B	C	D	E
105. Z. HEMIMELITE	C	D	E	F
106. A. HEMIMELITE	D	E	F	G
107. B. HEMIMELITE	E	F	G	H
108. C. HEMIMELITE	F	G	H	I
109. D. HEMIMELITE	G	H	I	J
110. E. HEMIMELITE	H	I	J	K
111. F. HEMIMELITE	I	J	K	L
112. G. HEMIMELITE	J	K	L	M
113. H. HEMIMELITE	K	L	M	N
114. I. HEMIMELITE	L	M	N	O
115. J. HEMIMELITE	M	N	O	P
116. K. HEMIMELITE	N	O	P	Q
117. L. HEMIMELITE	O	P	Q	R
118. M. HEMIMELITE	P	Q	R	S
119. N. HEMIMELITE	Q	R	S	T
120. O. HEMIMELITE	R	S	T	U
121. P. HEMIMELITE	S	T	U	V
122. Q. HEMIMELITE	T	U	V	W
123. R. HEMIMELITE	U	V	W	X
124. S. HEMIMELITE	V	W	X	Y
125. T. HEMIMELITE	W	X	Y	Z
126. U. HEMIMELITE	X	Y	Z	A
127. V. HEMIMELITE	Y	Z	A	B
128. W. HEMIMELITE	Z	A	B	C
129. X. HEMIMELITE	A	B	C	D
130. Y. HEMIMELITE	B	C	D	E
131. Z. HEMIMELITE	C	D	E	F
132. A. HEMIMELITE	D	E	F	G
133. B. HEMIMELITE	E	F	G	H
134. C. HEMIMELITE	F	G	H	I
135. D. HEMIMELITE	G	H	I	J
136. E. HEMIMELITE	H	I	J	K
137. F. HEMIMELITE	I	J	K	L
138. G. HEMIMELITE	J	K	L	M
139. H. HEMIMELITE	K	L	M	N
140. I. HEMIMELITE	L	M	N	O
141. J. HEMIMELITE	M	N	O	P
142. K. HEMIMELITE	N	O	P	Q
143. L. HEMIMELITE	O	P	Q	R
144. M. HEMIMELITE	P	Q	R	S
145. N. HEMIMELITE	Q	R	S	T
146. O. HEMIMELITE	R	S	T	U
147. P. HEMIMELITE	S	T	U	V
148. Q. HEMIMELITE	T	U	V	W
149. R. HEMIMELITE	U	V	W	X
150. S. HEMIMELITE	V	W	X	Y
151. T. HEMIMELITE	W	X	Y	Z
152. U. HEMIMELITE	X	Y	Z	A
153. V. HEMIMELITE	Y	Z	A	B
154. W. HEMIMELITE	Z	A	B	C
155. X. HEMIMELITE	A	B	C	D
156. Y. HEMIMELITE	B	C	D	E
157. Z. HEMIMELITE	C	D	E	F
158. A. HEMIMELITE	D	E	F	G
159. B. HEMIMELITE	E	F	G	H
160. C. HEMIMELITE	F	G	H	I
161. D. HEMIMELITE	G	H	I	J
162. E. HEMIMELITE	H	I	J	K
163. F. HEMIMELITE	I	J	K	L
164. G. HEMIMELITE	J	K	L	M
165. H. HEMIMELITE	K	L	M	N
166. I. HEMIMELITE	L	M	N	O
167. J. HEMIMELITE	M	N	O	P
168. K. HEMIMELITE	N	O	P	Q
169. L. HEMIMELITE	O	P	Q	R
170. M. HEMIMELITE	P	Q	R	S
171. N. HEMIMELITE	Q	R	S	T
172. O. HEMIMELITE	R	S	T	U
173. P. HEMIMELITE	S	T	U	V
174. Q. HEMIMELITE	T	U	V	W
175. R. HEMIMELITE	U	V	W	X
176. S. HEMIMELITE	V	W	X	Y
177. T. HEMIMELITE	W	X	Y	Z
178. U. HEMIMELITE	X	Y	Z	A
179. V. HEMIMELITE	Y	Z	A	B
180. W. HEMIMELITE	Z	A	B	C
181. X. HEMIMELITE	A	B	C	D
182. Y. HEMIMELITE	B	C	D	E
183. Z. HEMIMELITE	C	D	E	F
184. A. HEMIMELITE	D	E	F	G
185. B. HEMIMELITE	E	F	G	H
186. C. HEMIMELITE	F	G	H	I
187. D. HEMIMELITE	G	H	I	J
188. E. HEMIMELITE	H	I	J	K
189. F. HEMIMELITE	I	J	K	L
190. G. HEMIMELITE	J	K	L	M
191. H. HEMIMELITE	K	L	M	N
192. I. HEMIMELITE	L	M	N	O
193. J. HEMIMELITE	M	N	O	P
194. K. HEMIMELITE	N	O	P	Q
195. L. HEMIMELITE	O	P	Q	R
196. M. HEMIMELITE	P	Q	R	S
197. N. HEMIMELITE	Q	R	S	T
198. O. HEMIMELITE	R	S	T	U
199. P. HEMIMELITE	S	T	U	V
200. Q. HEMIMELITE	T	U	V	W
201. R. HEMIMELITE	U	V	W	X
202. S. HEMIMELITE	V	W	X	Y
203. T. HEMIMELITE	W	X	Y	Z
204. U. HEMIMELITE	X	Y	Z	A
205. V. HEMIMELITE	Y	Z	A	B
206. W. HEMIMELITE	Z	A	B	C
207. X. HEMIMELITE	A	B	C	D
208. Y. HEMIMELITE	B	C	D	E
209. Z. HEMIMELITE	C	D	E	F
210. A. HEMIMELITE	D	E	F	G
211. B. HEMIMELITE	E	F	G	H
212. C. HEMIMELITE	F	G	H	I
213. D. HEMIMELITE	G	H	I	J
214. E. HEMIMELITE	H	I	J	K
215. F. HEMIMELITE	I	J	K	L
216. G. HEMIMELITE	J	K	L	M
217. H. HEMIMELITE	K	L	M	N
218. I. HEMIMELITE	L	M	N	O
219. J. HEMIMELITE	M	N	O	P
220. K. HEMIMELITE	N	O	P	Q
221. L. HEMIMELITE	O	P	Q	R
222. M. HEMIMELITE	P	Q	R	S
223. N. HEMIMELITE	Q	R	S	T
224. O. HEMIMELITE	R	S	T	U
225. P. HEMIMELITE	S	T	U	V
226. Q. HEMIMELITE	T	U	V	W
227. R. HEMIMELITE	U	V	W	X
228. S. HEMIMELITE	V	W	X	Y
229. T. HEMIMELITE	W	X	Y	Z
230. U. HEMIMELITE	X	Y	Z	A
231. V. HEMIMELITE	Y	Z	A	B
232. W. HEMIMELITE	Z	A	B	C
233. X. HEMIMELITE	A	B	C	D
234. Y. HEMIMELITE	B	C	D	E
235. Z. HEMIMELITE	C	D	E	F
236. A. HEMIMELITE	D	E	F	G
237. B. HEMIMELITE	E	F	G	H
238. C. HEMIMELITE	F	G	H	I
239. D. HEMIMELITE	G	H	I	J
240. E. HEMIMELITE	H	I	J	K
241. F. HEMIMELITE	I	J	K	L
242. G. HEMIMELITE	J	K	L	M
243. H. HEMIMELITE	K	L	M	N
244. I. HEMIMELITE	L	M	N	O
245. J. HEMIMELITE	M	N	O	P
246. K. HEMIMELITE	N	O	P	Q
247. L. HEMIMELITE	O	P	Q	R
248. M. HEMIMELITE	P	Q	R	S
249. N. HEMIMELITE	Q	R	S	T
250. O. HEMIMELITE	R	S	T	U
251. P. HEMIMELITE	S	T	U	V
252. Q. HEMIMELITE	T	U	V	W
253. R. HEMIMELITE	U	V	W	X
254. S. HEMIMELITE	V	W	X	Y
255. T. HEMIMELITE	W	X	Y	Z
256. U. HEMIMELITE	X	Y	Z	A
257. V. HEMIMELITE	Y	Z	A	B
258. W. HEMIMELITE	Z	A	B	C
259. X. HEMIMELITE	A	B	C	D
260. Y. HEMIMELITE	B	C	D	E
261. Z. HEMIMELITE	C	D	E	F
262. A. HEMIMELITE	D	E	F	G
263. B. HEMIMELITE	E	F	G	H
264. C. HEMIMELITE	F	G	H	I
265. D. HEMIMELITE	G	H	I	J
266. E. HEMIMELITE	H	I	J	K
267. F. HEMIMELITE	I	J	K	L
268. G. HEMIMELITE	J	K	L	M
269. H. HEMIMELITE	K	L	M	N
270. I. HEMIMELITE	L	M	N	O
271. J. HEMIMELITE	M	N	O	P
272. K. HEMIMELITE	N	O	P	Q
273. L. HEMIMELITE	O	P	Q	R
274. M. HEMIMELITE	P	Q	R	S
275. N. HEMIMELITE	Q	R	S	T
276. O. HEMIMELITE	R	S	T	U
277. P. HEMIMELITE	S	T	U	V
278. Q. HEMIMELITE	T	U	V	W
279. R. HEMIMELITE	U	V	W	X
280. S. HEMIMELITE	V	W	X	Y
281. T. HEMIMELITE	W	X	Y	Z
282. U. HEMIMELITE	X	Y	Z	A
283. V. HEMIMELITE	Y	Z	A	B
284. W. HEMIMELITE	Z	A	B	C
285. X. HEMIMELITE	A	B	C	D
286. Y. HEMIMELITE	B	C	D	E
287. Z. HEMIMELITE	C	D	E	F
288. A. HEMIMELITE	D	E	F	G
289. B. HEMIMELITE	E	F	G	H
290. C. HEMIMELITE	F	G	H	I
291. D. HEMIMELITE	G	H</		

No. 1 (continued)NOTES:

$$\begin{aligned} \textcircled{1} & \text{ Weights observed:} \\ & + 0.8 \text{ mm. } 0.958 \text{ g.} \\ & + 0.5 \text{ mm. } 0.785 \text{ g.} \\ & + 0.1 \text{ mm. } 0.245 \text{ g.} \\ & + 0.3 \text{ mm. } 0.912 \text{ g.} \end{aligned}$$

$\textcircled{2}$  When the "soluble" + 0.3 mm. fraction was ignited, 0.651 g. referred to  $\text{H}_2\text{O}$ , + 0.2 mm. fraction,

This fraction was not observed.

$\textcircled{3}$  The Fe + Ti oxides are similar to those in "BUT 1" and "BUT 2," but much smaller in size.

$\textcircled{4}$  A significant proportion of the "titanite" grains have visible faces (planar) after magnetite and pyrite (pyrrhotite) were removed.

**SANDFIRE RESOURCES NL**  
**HEAVY MINERALS & DIAMOND INDICATOR MINERALS DATA SHEET**

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COMMENTS (Please print clearly)	SIGNATURE of the author	PRINTED NAME
NEGATIVE FOR INACCURACIES & TRUTHFULNESS	PROMISE:	
REVIEWED BY: <u>John P. S.</u>	Negative	✓
Minerals "seen" removed from (D.S.) from the "Sands" of the "Caves" 2% of the W.C. F.T. decide opposite to that of the W.C. Very first-trusted information procedures should be used.		
1. Few grains of specular hematite are present.		
1. MARKET	✓ AMPHIBOLITE ✓	1. ASBESTOSITE ✓
6. ANHYDITE	7. BARYTE	8. BARYTE
11. CLINOPYROXENE CORONOPOLIS	12. CASSITERITE	13. CASSITERITE
16. DOLPHITE	17. EPIDOTITE	18. EPIDOTITE
31. GAGGERT	32. HEMATITE ✓	33. HEMATITE
34. LAMPROPHYLLITE ✓	35. LAMPROPHYLLITE	36. LAMPROPHYLLITE ✓
31. LIMONITE ✓	32. MAGNETITE	33. MAGNETITE
34. OIL RUST	35. OIL RUST	36. OIL RUST
36. PYRITI	37. PYROLORE	38. PYROLORE
41. SILICAITE	42. SPHALERITE	43. SPHALERITE
51. ZIRCON	52. ANDALUSITE	53. COLUMBIA
59. ZIRCON	54. ANDALUSITE	55. COLUMBIA
61. ZIRCONIUM	56. ANDALUSITE	56. COLUMBIA
61. ZIRCONIUM	57. ANDALUSITE	57. COLUMBIA
	58. ANDALUSITE	58. COLUMBIA
	59. ANDALUSITE	59. COLUMBIA
	60. ANDALUSITE	60. COLUMBIA
	61. ANDALUSITE	61. COLUMBIA
	62. ANDALUSITE	62. COLUMBIA

$$\mu \Omega \equiv (c_{\alpha}, b_{\alpha \beta})$$

Notes:

① Weighted

$$\begin{aligned} & + 0.8_{\text{new}} + 1.2_{\text{old}} \\ & + 0.5_{\text{new}} + 1.2_{\text{old}} \\ & + 0.4_{\text{new}} + 1.1_{\text{old}} \\ & + 0.3_{\text{new}} + 0.1_{\text{old}} \end{aligned}$$

$$= 0.8048$$

② When the "old" and "new" fractions were equal, quantity reported to  $\mu \Omega$  = 0.5 was fraction

This fraction was not observed

- ③ Very limited (various, nonporous), steel-blue, because there is a significant component of the zinc
- ④ Zincate/ $\text{Fe}-\text{Ti}$  oxide are a somewhat minor component of this sample, however the former was typically oxidized and very brittle, its breakdown just like those in  $\text{Fe}-\text{Ti}$ ,  $\text{Cu}-2$  and  $\text{Mn}-1$ .