D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 Lithologic **Hole no.** 108-1 **Dip** -45° **Started** 8/25/81 **Elev.** _____

Job no. 264 **Township** T10-R8 **Coord.** See Sketch 264-38 SW 1/4 **Direction** 156° Mag **Completed** 8/31/81

Lithotype

0'

11' Overburden

Basalt - coarse grained, grey-green, with a red-brown hematitic stained mineral. Plagioclase has commonly altered to calcite. 11'-32' - the basalt is leached to a grey-tan color, locally it is limonite stained. Plag. in this area has not altered to calcite. A piece of agglomerate is included at 25'.

50'

71' fine to medium grained, grey-green color, locally contains calcite and chlorite amygdules, minor inclusions of shale and agglomerate are present. The agglomerate has silicified basalt and siliceous fragments in a siliceous matrix

100'

112' same at 11'-71'

140' fine grained, grey-green to tan-grey with some shale inclusions, brecciated locally with shaley material filling between chilled basalt fragments. 181'-184' basalt dike, coarse grained w/narrow chill zones, in contest with the shale

150'

163' Shale - black, layers are not easily visible, those that can be measured run at 10° to 45° to core axis, the basalt contacts run at 15°-25° to core axis; 181'-184' basalt dike, coarse grained, w/narrow chill zones; in contact with the shale

188'

196' Basalt - same as 11'-71' and 112'-140'

200'

211' Shale - same as above - 206.5'-209' agglomerate w/tan-grey basalt, grey basalt, hard grey siliceous and minor black shale frags, several massive sulphide clasts (pyrite are present.

Bottom of Hole

250'

11'-163' - These are oddball calcareous andesites (?), locally magnetic, locally with qtz, biotite, hard orange qtz or feldspars, soft (altered) plagioclase; 1st sample shows a tan rock with soft plag, calcite spotted with a lt. green mineral and a few small and one large qtz crystal. - TCW

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 Lithologic Hole no. 108-1 Dip -45° Started 8/25/81 Elev.

Job no. 264 Township T10-R8 Coord. 264-38 See Sketch SW 1/4 Direction 156° Mag Completed 8/31/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
11	211	200'	<1%	Pyrite, fine grained, blebs and clasts in agglomerate	
Bottom of Hole					
				196'-203' - trace As	
				203'-204.5' - <1% As	
				Trace Cu at 201'	

J. S. Cummings, Inc.

DDH 108-1 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy
203' - 204.5'	1.5'	None	None		None	None	None	0.98

Bottom of Hole: 211'

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 Lithologic Hole no. 108-2 Dip -45° Started 8/31/81 Elev. ____

Job no. 264 Township T10-R8 Coord. See Sketch 264-38 SW 1/4 Direction 156° Mag. Completed 9/1/81

Lithotype

0'

Overburden

18'

Shale - black with some grey layers, layers are at angles of 10°-40° to the core axis, light grey fragments of silicified siltstone are found along with quartz and calcite (vein?) fragments. Most fragments have their long axis parallel to the layers. Some basalt fragments are seen between 96.5' and 99'. Heavy graphite is seen on some fracture surfaces.

50'

100'

Brecciated shale? - TCW

143'

150'

Gritty to Lapilli Agglomerate - fragments change rapidly from grit size to lapilli size. The matrix varies from fine grit to shale. Matrix is locally absent. The rock is also locally silicified, especially in gritty areas

166'

Shale - same as above, layers are at angles of 0°-45° to the core axis

187'

200'

Gritty to Lapilli Agglomerate - same as above, agglom. silicification of the gritty sections is more common here. Shale layers up to 1.5' are present.

217'

Bottom of Hole

250'

Agglomerates show fine grained siliceous fragments (probably rhyolite, chert, cherty siltstone) and qtz grains - TCW

300'

350'

400'

J.S. Cummings Inc. D. Coles

SULPHIDE LOG

Project T10-R8 Lithologic Hole no. 108-2 Dip -45° Started 8/3/81 Elev. _____

Job no. 264 Township T10-R8 Coord. See Sketch 264-38 SW 1/4 Direction 156° Mag Completed 9/1/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
18	217	199'	<1%	Pyrite blebs and fine grained - 6" of 5% pyrite at 138.5'	
Bottom of Hole					

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 Lithologic **Hole no.** 108-3 **Dip** -45° **Started** 9/2/81 **Elev.** ____

Job no. 264 **Township** T10-R8 **Coord.** See Sketch 264-38 SW 1/4 **Direction** 336° Mag. **Completed** 9/8/81

Lithotype

0'–5': Overburden

5'–68.5': Hematitic Siltstone - maroon color, locally with maroon chert layers, layers are at 0°-50° to core axis, calcite and quartz veins are present.
48'-56' - gritty tuff with some lapilli sized frags, layers are seen locally and are at angles of ±35° to core axis, grit is in a matrix of maroon hematitic siltstone, similar to the rock just above the massive sulphide in CL-47

68.5'–110': Gritty to Lapilli Felsic Agglomerate - overall green-grey color with creme color to grey frags, fragment types include creme colored chert, rhyolite with plag. phenocrysts, siltstone and bright red chert in a chlorite matrix, the gritty sections tend to be altered *

110'–146': Hematitic Chert and Siltstone - orange pink to maroon in color, the rock is brecciated, fragments are found in a black-green chloritic matrix, layers are seen locally at angles of 10°-80° to core axis

146'–172.5': Hematitic Siltstone - with some chert layers, same as 5'-68.5', with layers at ±60° to core axis

172.5'–212': Gritty to Lapilli Felsic Agglomerate - same as 68.5'-110' *

212' Bottom of Hole

* Samples (exception at 100') show abundant lt. green sericite and quite a few qtz crystals. I would consider these as largely pyroclastics. Cracking and chlorite filling of pink cherts is probably related to pyroclastic activity and alteration; i.e., units 68.5'-110' and 172.5'-212'. - TCW

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 Lithologic Hole no. 108-3 Dip -45° Started 9/2/81 Elev.

Job no. 264 Township T10-R8 Coord. See Sketch 264-38 SW 1/4 Direction 336° Mag Completed 9/8/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
5	212	207'	<1%	(Trace Cu @ 83') Pyrite(Trace Cu @ 113')	68.5'-81' Chl-Ser
Bottom of Hole					173.5'-193' Chl-Ser

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 Lithologic **Hole no.** 108-4 **Dip** -45° **Started** 9/9/81 **Elev.**

Job no. 264 **Township** T10-R8 **Coord.** 264-38 See Sketch SW 1/4 of T10-R8 **Direction** 336° Mag. **Completed** 9/10/81

Lithotype

0'
5' Overburden

Felsic Exhalite with Minor Altered Felsic Tuff and Chert - fine grained, green to green-grey to grey-white color, locally layered with layers at 5°-55° to the core axis, and .05" to 6" in thickness *

50'

100'

Altered Felsic Tuff - dark green, fine grained with some quartz and chlorite veins the contact with the upper felsic exhalite is at 60°, the lower contact is at 10°-20° to the core axis *

150'
158'

172'

Felsic Exhalite with Chert and Minor Felsic Tuff - grey to grey-green to maroon color, locally layered with most layers at 35°-50° to the core axis, most layers are convoluted and/or broken up *

200'

212'

Bottom of Hole

250'

* I would suggest that this is a sequence of welded felsic tuffs - TCW

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 Lithologic Hole no. 108-4 Dip -45° Started 9/9/81 Elev.

See Sketch

Job no. 264 Township T10-R8 Coord. 264-38 Direction 336° Mag Completed 9/10/81

SW 1/4 of T10-R8

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
5	212	207'	Trace	Pyrite	
Bottom of Hole					

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC **Hole no.** 108-5 **Dip** -45° **Started** 9/10/81 **Elev.** ____

See Sketch

Job no. 264 **Township** T10-R8 **Coord.** 264-38 **Direction** 156°mag **Completed** 9/14/81

S.W. 1/4 of T10-R8

Lithotype

0'

Overburden

5'

Altered Felsic tuff, green to dark green in color, altered and unaltered, medium to coarse felsic grit is found in a chlorite matrix

18'

Felsic Exhalite, Hematitic Chert, Chert and Altered Felsic Tuff - color varies from dark green to green to cream to maroon, the rock is commonly layered with layers at 45° to 80° to the core axis, thickness ranges from .05" to 1', some sections of the altered felsic tuff are calcareous

50'

64'

Bottom

100'

Felsic tuffs are weakly altered. No sample at office of felsic exhalite. TCW

200'

250'

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 LITHOLOGIC Hole no. 108-5 Dip -45° Started 9/10/81 Elev.

See Sketch

Job no. 264 Township T10-R8 Coord. 264-38 Direction 156°mag Completed 9/14/81

SW 1/4 of T10-R8

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
5'	64'	59'	<1%	Pyrite	

J.S. Cummings Inc.

D. Coles

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC **Hole no.** 108-6 **Dip** -45° **Started** 9/14/81 **Elev.** _____

See Sketch

Job no. 264 **Township** T10-R8 **Coord.** 264-38 **Direction** 156°mag **Completed** 9/14/81

S.W. 1/4 of T10-R8

	Lithotype
0'–3'	Overburden
3'–8'	Rhyolite or Chert, grey-green color, very fine grained and hard
8'	Bottom

0'
50'
100'
200'
250'
300'
350'
400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 LITHOLOGIC Hole no. 108-6 Dip -45° Started 9/14/81 Elev. _____

Job no. 264 Township T10-R8 Coord. See Sketch 264-38 S.W. 1/4 of T10-R8 Direction 156°mag Completed 9/14/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
3'	8'	5'	Trace		

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

ct T10-R8 LITHOLLGIC **Hole no.** 108-7 **Dip** -45° **Started** 9/16/81 **Elev.** ____

See Sketch

no. 264 **Township** T10-R8 **Coord.** 264-38 **Direction** 156°mag **Completed** 9/17/81

SW 1/4 of T10-R8

Lithotype

0'

5' Overburden

Gritty Tuff, black-grey color, medium to coarse grit, which includes shale, black and cream chert, silisified siltstone and siltstone and plagioclase in a shale matri some lapilli fragments up to .5" are present

48'
50'

Shale, black, layered with layers at 10° - 50° to the core axis, and .05" to 4" thic layers commonly seem disturbed by soft sediment deformation. The change from the above gritty tuff to the shale is transitional starting at 38° with gritty tuff then grading to tuffaceous shale to shale, with some grit and lapilli fragments

100'

85.0' - 92.5' - gritty tuff, coarse grit and some small lapilli fragments in a shale matrix, quartz and some thick calcite veins are present

200'

220' Bottom

250'

300'

350'

400'

J.S. Cummings Inc.

SULPHIDE LOG

D. Coles

Project T10-R8 LITHOLOGIC Hole no. 108-7 Dip -45° Started 9/16/81 Elev. _____

See Sketch

Job no. 264 Township T10-R8 Coord. 264-38 Direction 156°mag Completed 9/17/81

SW 1/4 of T10-R8

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
15'	220'	205'	<1%	Pyrite	
				@ 45' are several vein fragments up to 1" x .5" with 60% pyrite	
				@ 70' is a vein fragment "V" shaped 15" thick x 3" long which contains ± 60% pyrite	

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC **Hole no.** 108-8 **Dip** -45° **Started** 9/18/81 **Elev.** ____

Job no. 264 **Township** T10-R8 **Coord.** See Sketch 264-38 **Direction** 156°mag **Completed** 9/19/81

S.W. 1/4 T10-R8

Lithotype

0'

Overburden

20'

Graywacke with tuffaceous greywacke and gritty tuff. The greywacke and tuffaceous greywacke are grey in color and contain fine grit layers with some black shale layers. Layers are at 0° to 30° to the core axis, and are .05" to 2" thick. Gritty tuff sections are grey in color and 4' - 7' thick, fragment types include green, grey and black siliceous fragments, grey and black shale and plagioclase. The matrix is shale where present, small lapilli fragments are in the majority locally

50'

100'

137'

Agglomeratic shale with minor agglomerate, black with grey to black lapilli (.2" to 1.5") fragments. Fragment types include grey-green, grey and black siliceous ones, grey and black shale and minor pyritic massive sulphide clasts. Some shale fragment have a thin pyrite ring around them. The few layers that are seen are at 10 to 30° to the core axis.

173.5'

Gritty tuff with some lapilli agglomerate and tuffaceous greywacke. The same fragment types are present as in the above agglomeratic shale, very few massive sulphide clasts are seen. Layers in the graywacke are at 0° to 30° to the core axis

200'

221'

Bottom of hole

250'

65' - Spec. min agglomerate

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 LITHOLOGIC Hole no. 108-8 Dip -45° Started 9/18/81 Elev.

Job no. 264 Township T10-R8 Coord. See Sketch 264-38 S.W. 1/4 of T10-R8 Direction 156°mag Completed 9/19/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
20.0'	137.0'	117.0'	<1%	Pyrite	
137.0'	173.5'	36.5'	1 - 3%	Pyrite in veins, blebs, disseminated and	
				massive sulphide clasts	
173.5'	221.0'	47.5'	<1%	Pyrite in veins, blebs, disseminated and	
				massive sulphide clasts	

J.S. Cummings Inc.

D. Coles

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC **Hole no.** 108-9 **Dip** -45° **Started** 9/20/81 **Elev.** ____

Job no. 264 **Township** T10-R8 **Coord.** See Sketch 264-38 S.W. 1/4 of T10-R8 **Direction** 156°mag **Completed** 9/21/81

Lithotype

0'

Overburden

15'

50'

Shale with minor greywacke, black with light grey greywacke, layers are at 0° to 50° to the core axis and range in thickness from .05" to 3"+

33.5' - 34' - Calcareous shale, calcite and quartz veins are present

100'

200'

217'

Bottom of hole

250'

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 LITHOLOGIC Hole no. 108-9 Dip -45° Started 9/20/81 Elev.

See Sketch

Job no. 264 Township T10-R8 Coord. 264-38 Direction 156°mag Completed 9/21/81

S.W. 1/4 T10-R8

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
15'	217'	202'	<1%	Pyrite	

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC **Hole no.** 108-10 **Dip** -45° **Started** 9/22/81 **Elev.** _____

Job no. 270 **Township** T10-R8 **Coord.** See Sketch 264-38 S.W. 1/4 of T10-R8 **Direction** 156°mag **Completed** 9/29/81

Lithotype

0'

Overburden

22'

50'

Shale - black with some grey layers. Layers are at 25° to 60° to the core axis and .05" to 3"+ in thickness. Commonly layers are convoluted. Siltstone and silicified siltstone fragments, and layers are elongate with the long axis parallel to the layers. Heavy graphite is seen on some fracture surfaces

100'

200'

218'

Bottom

250'

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 LITHOLOGIC Hole no. 108-10 Dip -45° Started 9/22/81 Elev.

See Sketch

Job no. 264 Township T10-R8 Coord. 264-38 Direction 156°mag Completed 9/29/81

S.W. 1/4 T10-R8

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
22'	218'	196'	<1%	Pyrite	

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC DRILLING **Hole no.** 108-11 **Dip** -45° **Started** 9/29/81 **Elev.** _____

Job no. 264 **Township** T10-R8 **Coord.** See Sketch 264-38 S.W. 1/4 of T10-R8 **Direction** 156°mag **Completed** 9/30/81

Lithotype

0'

5' Overburden

Hematitic Siltstone and Chert with minor cream colored chert. Color varies from maroon to black. Locally layered with layers at 0° to 60° to the core axis and <.05" to 3"+ in thickness. Felsic grit is present in some scattered layers Locally short sections up to 3" long are brecciated with quartz filling the space between breccia fragments.

50'

35' - 72' - Very magnetic with abundant magnetite

100'

105' Bottom

Entire section magnetic, massive (locally layered), maroon-black iron formation (chert, siltstone, hematite, magnetite) TCW

200'

250'

300'

350'

400'

J.S. Cummings Inc.

SULPHIDE LOG

D. Coles

Project T10-R8 LITHOLOGIC Hole no. 108-11 Dip -45° Started 9/29/81 Elev.

Job no. 264 Township T10-R8 Coord. See Sketch 264-38 S.W. 1/4 of T10-R8 Direction 156°mag Completed

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
5'	105'	100'	<1%	Pyrite	

D. Coles

J.S. Cummings Inc.

LITHOLOGIC LOG

Project T10-R8 LITHOLOGIC **Hole no.** 108-12 **Dip** -45° **Started** 9/30/81 **Elev.** _____

Job no. 264 **Township** T10-R8 **Coord.** See Sketch 264-38 **Direction** 156°mag **Completed** 10/2/81

S.W. 1/4 T10-R8 (near townline on deadend haul road)

Lithotype

0'

Overburden

10'

Felsic Exhalite with some green chert. Grey-green color; layered with layers at 0° to 45° to the core axis and .05" to 3" in thickness. Locally layers have been broken up. Quartz and calcite veins are present

50'

* Probably a welded felsic tuff.

TCW

86'

100'

Hematitic Siltstone with minor gritty tuff, well layered with layers at 0° to 45° to the core axis. Thickness ranges from <.05" to 4-1/4". Gritty tuff sections may be up to 4" thick and contain some lapilli sized fragments. Grit includes cream to orange colored chert, siltstone, plagioclase, and quartz crystals in a soft yellow-green matrix or a hematitic siltstone matrix

*Sample suggests some hematitic chert interlayered with hematitic siltstone - TCW

151'

Bottom

200'

250'

300'

350'

400'

J.S. Cummings Inc.

D. Coles

SULPHIDE LOG

Project T10-R8 LITHOLOGIC Hole no. 108-12 Dip -45° Started 9/30/81 Elev.

Job no. 264 Township T10-R8 Coord. 264-38 See Sketch Direction 156°mag Completed 10/2/81

S.W. 1/4 of T10-R8

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
10'	151'	141'	Trace		

HOLE #	COORDINATES	DATE COLLARED	DATE COMPLETED	DIP	MAGNETIC BEARING	DEPTH	DRILLED BY
108- 1	See Sketch 264-38	8/25/81	8/31/81	-45°	156°	211'	County
108- 2	See Sketch 264-38	8/31/81	9/01/81	-45°	156°	217'	County
108- 3	See Sketch 264-38	9/02/81	9/08/81	-45°	336°	212'	County
108-4	See Sketch 264-38	9/09/81	9/10/81	-45°	336°	212'	County
108-5	See Sketch 264-38	9/10/81	9/14/81	-45°	156°	64'	County
108-6	See Sketch 264-38	9/14/81	9/14/81	-45°	156°	8'	County
108-7A	See Sketch 264-38	9/15/81	9/16/81	-45°	156°	64'	County
108-7	See Sketch 264-38	9/16/81	9/17/81	-45°	156°	220'	County
108-8	See Sketch 264-38	9/18/81	9/19/81	-45°	156°	221'	County
108-9	See Sketch 264-38	9/20/81	9/21/81	-45°	156°	217'	County
108-10	See Sketch 264-38	9/22/81	9/29/81	-45°	156°	218'	County
108-11	See Sketch 264-38	9/29/81	9/30/81	-45°	156°	105'	County
108-12	See Sketch 264-38	9/30/81	10/02/81	-45°	156°	151'	County

108 LITHOLOGIC DRILLING (T10-R8)

J. S. CUMMINGS, INC.

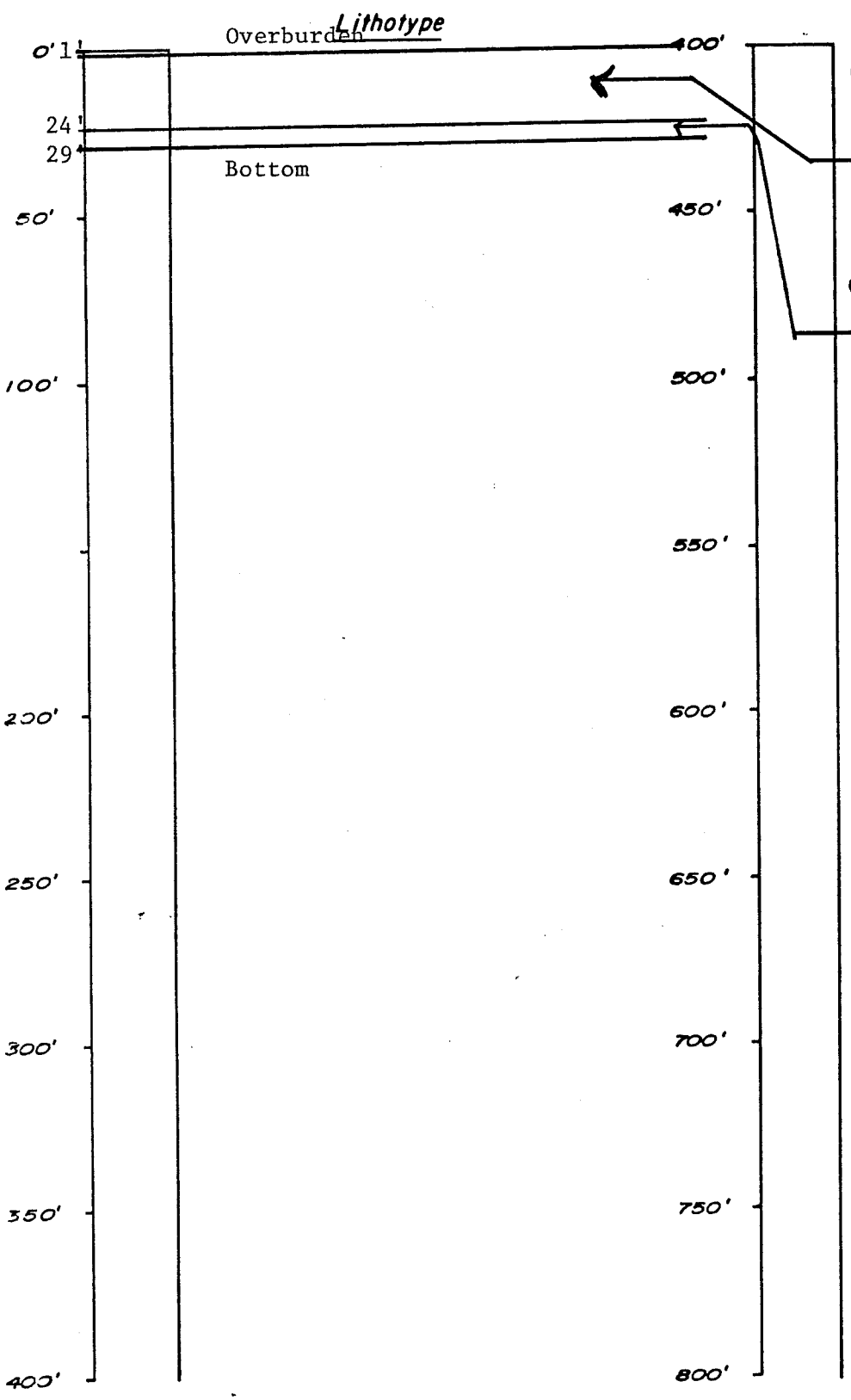
E. Skeffington

J.S. Cummings Inc.

LITHOLOGIC LOG

Project Chandler Mtn . North **Hole no.** CHN-3A **Dip** -45° **Started** 6/8/80 **Elev.** _____

Job no. 264.2 **Township** T10-R8 **Coord.** 61900N 29300E **Direction** N21E **Completed** 6/9/80



Lithotype

Dacitic Gritty Tuff
Grey, fine grained, siliceous (harder than knife, but scratchable with hacksaw, visible fragments of feldspar, badly broken and weathered. (Vuggy in places) and dacite fragments

Dacite
Grey, very fine grained, siliceou massive, possible chlorite or amphibole veins, quartz veinlets

Rock is badly broken with three bits used from 9' - 29'

U.S. Cummings Inc.

E. Skeffington

SULPHIDE LOG

Project: Chandler Mtn. North Hole no.: CHN-3A Dip: -45° Started: 6/8/80 Elev.:

Job no.: 264.2 Township: T10-R8 Coord.: 61900N 29300E Direction: Completed: 6/9/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0	1'	1'	Overburden		
1'	29'	28'	<1%	Flecks of Aspy, Po, Py	
	Bottom				

NOTE: Hole was aborted due to poor recovery and usage of diamond bits (3 impregnated bits used from 9' - 29')

E. Skeffington

J.S. Cummings Inc.

LITHOLOGIC LOG

Project Chandler North **Hole no.** CHN-3 **Dip** Vertical **Started** 6/10/80 **Elev.** _____

Job no. 264.2 **Township** T10-R8 **Coord.** 61965N 29300E **Direction** _____ **Completed** 6/16/80

Lithotype

0' 5' Overburden

29'

43'

50'

87' Bottom

100'

200'

250'

300'

350'

400'

400'

450'

500'

550'

600'

650'

700'

750'

800'

Lithotype

Dacite - Dark grey, very fine grained, siliceous, displaying bleached veins and veinlets Few small (1/16") feldspar fragments, brownish-black mineral - Possibly biotite

Dacitic Tuff - Grey, fine grained, siliceous, hazy matrix, small (1/16") feldspar and quartz fragments (angular) chlorite and/o amphibole stringers

Dacite - Dark grey, very fine grained, similar to unit 5' - 29' Many bleached veins

J.S. Cummings Inc.

E. Skeffington

SULPHIDE LOG

Project Chandler Mtn. North Hole no. CHN-3 Dip Vertical Started 6/10/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 61965N 29300E Direction _____ Completed 6/16/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0'	5'	5'	Overburden		
5'	87'	82'	<1%	Arsenopyrite flecks,	
			Pyrrhotite	~~Porphyry~~ stringers and blebs, Pyrite flecks	
				1 or 2 chalcopyrite flecks with ~~porphyry~~ pyrrhotite	
	Bottom				

E. Skeffington

J.S. Cummings Inc.

LITHOLOGIC LOG

Project: Chandler Mtn . North Hole no. CHN-4 Dip: Vertical Started: 6/17/80 Elev. _____

Job no. 264.2 Township: T10-R8 Coord. 61685N 28800E Direction _____ Completed: 6/18/80

Lithotype

0'–3': Overburden

3'–20': Dacitic Gritty Tuff - grey, fragments of feld., chloritized frag. & rhyo. frags.

20'–84': Dacite - Dark grey, very fine grained, siliceous (scratchable with hacksaw blade) Locally fragmented. Fragments the same composition as matrix but surrounded by quartz, epidote? and calcite. The matrix is hazy or cloudy few bleached veins (chlorite or amphibole filled)

84'–90': Rhyolite Breccia
Grey, very fine grained, siliceous

90'–100': Altered Rhyolite
Dark grey, fine grained

100': Bottom

Lithotype

0' 50' 100' 200' 250' 300' 350' 400' 450' 500' 550' 600' 650' 700' 750' 800'

J.S. Cummings Inc.

E. Skeffington

SULPHIDE LOG

Project: Chandler Mtn. North Hole no. CHN-4 Dip: Vertical Started: 6/17/80 Elev.:

Job no. 264.2 Township: T10-R8 Coord.: 61685N 28800E Direction: Completed: 6/18/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0	3'	3'	Overburden		
3'	100'	97'	<1%	Trace Py, Po, chpy (flecks)	Silica
	Bottom				

C. Mattson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project Chandler North Hole no. CHN-5 Dip Vertical Started 6/19/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 61800N 28328E Direction _____ Completed 6/20/80

Lithotype

0' 3' Overburden

Dacitic Gritty Tuff - Many fine grained quartz fragments - minor light green fragments (soft and well rounded) Matrix very fine grained - Brown-grey colored

37'

50'

66'

99' 100' Bottom

200'

250'

300'

350'

400'

Lithotype

400'

450' Dacite? - Very fine grained - no visible layers - brown-grey colored Many quartz veins visible - bleach core up to 1/4". Possible lineatio of grains toward end of section. Brecciated in sections

500' Rhyolite Mixed with Fine Grained Felsic Tuff - Tuffs finely layered almost to core axis. Layered sections appear rhyolitic but can be scratched. Rhyolites light grey colored with quartz veins causing bleaching

550'

600'

650'

700'

750'

800'

U.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Chandler Mtn. North Hole no. CHN-5 Dip Vertical Started 6/19/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 61800N 28328E Direction _____ Completed 6/20/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0	3'	3'	Overburden		
3'	99'	96'	<1%	Pyrite & Pyrrhotite	
	Bottom				

C. Mattson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project: Chandler North Hole no. CHN-6 Dip: Vertical Started: 6/21/80 Elev. _____

Job no. 264.2 Township: T10-R8 Coord. 62190N 28343E Direction _____ Completed: 6/22/80

Depth	Lithotype
0' – 5'	Overburden
5' – 33'	Fine Grained Gabbro - Similar to other sections in Chandler drilling - Although poor recovery and slightly more siliceous than other sections - Visible ilmenite?
33' – 69'	Rhyolite - Ignimbrite - Fine grained, siliceous, massive with minor layering ±85° to core axis. Highly fractured in sections with carbonate fillings. Dark grey colored
69'	Bottom

Lithotype

Lithotype

0' 50' 100' 200' 250' 300' 350' 400'

400' 500' 550' 600' 650' 700' 750' 800'

U.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project: Chandler North Hole no. CHN-6 Dip: Vertical Started: 6/27/80 Elev.

Job no. 264.2 Township: T10-R8 Coord. 28343E 62190N Direction Completed: 6/22/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERA
0'	5'	5'	Overburden		
5'	69'	64'	<1%	Py, Aspy, & Po - Finely disseminated	
	Bottom				

C. Mattson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project: Chandler North | Hole no. CHN-7 | Dip: Vertical | Started: 6/22/80 | Elev. _____

Job no. 264.2 | Township: T10-R8 | Coord. 61890N 27758E | Direction _____ | Completed: 6/23/80

Depth	Lithotype
0' – 4' (POOR)	Overburden
4' – 15'	Dacite - Brown colored with veins bleaching the core. Massive - fine grained
15' – 34'	Rhyolite Breccia grading to a Rhyolite at 30' - Rhyolite fractured with carbonate fillings - Similar to CHN-6
34' – Bottom	

Scale: 0', 50', 100', 200', 250', 300', 350', 400' ... 400', 450', 500', 550', 600', 650', 700', 750', 800'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Chandler North Hole no. CHN-7 Dip Vertical Started 6/22/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 61890N 27758E Direction _____ Completed 6/23/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0	4'	4'	Overburden		
4'	15'	11'	1%	Aspy, Py & Trace Chpy	
15'	34'	19'	<1%	Aspy, Py	
	Bottom				

C. Mattson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project: Chandler North | Hole no. CHN-8 | Dip: Vertical | Started: 6/24/80 | Elev. _____

Job no. 270.2 | Township: T9-R8 | Coord. 61570N 27880E | Direction _____ | Completed: 6/30/80

Lithotype

0'4' Overburden

25'

Dacite
Massive, very fine grained, brownish-red colored - Sections with many bleached veins. Same as other CHN holes

100' Bottom

Lithotype

Felsic Gritty Tuff
Quartz and Feldspar fragments - Some soft rounded fragments - Some fragments soft and altered Minor bleached veins - Same as other CHN holes

0' 50' 100' 200' 250' 300' 350' 400'

400' 450' 500' 550' 600' 650' 700' 750' 800'

J.S. Cummings Inc.

SULPHIDE LOG

C. Mattson

Project Chandler North Hole no. CHN-8 Dip Vertical Started _____ Elev. _____

Job no. 270.2 Township T9-R8 Coord. 61570N 27880E Direction _____ Completed _____

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0	4'	4'	Overburden		
4'	100'	96'	<1%	Py, Po, trace Aspy	
	Bottom				

C. Mattson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project Chandler North Hole no. CHN-12 Dip -45° Started 7/18/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 62400N 27372E Direction North 21°mag Completed 7/21/80

Depth	Lithotype
0' – 16'	Overburden
16' – 128'	Gabbro Medium-fine grained, massive, green-grey colored. Same as other CH and CHN holes Disseminated chalcopyrite and pyrrhotite Visible ilmenite and magnetite Some sections magnetic - others not
128' – 144'	Altered Felsic Fragmental Feldspar laths, minor quartz fragments and mostly cream colored soft fragments. Matrix shows some sericite alteration - minor calcareous veins and fragments Pyrite and arsenopyrite in disseminated grains and blebs - calcite alteration
144' – 180'	Gabbro Same as above
180' – 400'	Bottom of hole

Depth scale: 0', 50', 100', 200', 250', 300', 350', 400' ... 400', 450', 500', 550', 600', 650', 700', 750', 800'

U.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Chandler North Hole no. CHN-12 Dip -45° Started 7/18/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 62400N 27372E Direction North 21°mag Completed 7/21/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
2'	128'	126'	<1%	Pyrrhotite, chalcopyrite	
128'	131'	3'	<1%	Pyrite, arsenopyrite	Sericite
131'	144'	13'	± 3%	Pyrite, arsenopyrite	Sericite, calcit
144'	180'	36'	<1%	Pyrrhotite, chalcopyrite	
	Bottom				
			NOTE: 136' - 143' is best arsenopyrite section with 1 - 2% TCW		

J. S. Cummings, Inc.

DDH CHN-12 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy
134 - 139	5'				None	0.010	0.62	1.17
139 - 144	5'				None	0.010	1.02	1.24

Bottom of Hole: 180'

J.S. Cummings Inc.

LITHOLOGIC LOG

C. Mattson

Project Chandler North Hole no. CHN-13 Dip -45° Started 11/9/80 Elev.

Job no. 264.2 Township T10-R8 Coord. 29000E 62440N Direction 160° Completed 11/12/80

Lithotype

0'

Overburden

24'

Gabbro - finer grained than other CHN holes. Also silicified. First 6' brecciated, many quartz-calcite veins, veins much less frequent 30'-49'.

49'

50'

Fractured Rhyolite - highly fractured grey rhyolite - fractures flooded with criss-crossing veins of qtz., calcite, and alt. green grainy mineral. Veins cut across each other. Some cause bleaching where in contact with rhyolite. Visible aspy in disseminated grains and veins.

83'

Gritty Tuff - dark grey-brown colored matrix hides visible fragments.

100'

102'

Fractured Dacite *

122'

Gritty Tuff - same as 83' - 102'

131'

Fractured Dacite - same as 102' - 122'

150'

159'

Bottom of hole

200'

Fractured Dacite *
similar to other CHN holes, brown colored dacite with carbonate, qtz., and green mineral veins filling fractures, sometimes brecciating core and also bleaching dacite.

250'

300'

350'

400'

U.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Chandler North Hole no. CHN-13 Dip -45° Started 11/9/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 29000E 62440N Direction 160° Completed 11/12/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
24'	30'	6'	1% - 2%	Po, Chpy, and Aspy	
30'	45'	15'	< Trace	Py, and Po	
45'	46'	1'	1%	Po, Chpy, and Aspy	
46'	49'	3'	< Trace	Py, and Po	
49'	54'	5'	1%	Aspy and Po	
54'	55'	1'	1% - 2%	Aspy and Po	
55'	61'	6'	< 1%	Aspy and Po	
61'	63'	2'	1% - 2%	Aspy and Po	
63'	70.5'	7.5'	2% - 3%	Aspy	
70.5'	74'	3.5'	1%	Aspy	
74'	100'	26'	< 1%	Py, Po, Chpy, and Aspy	
100'	122'	22'	< Trace	Py	
122'	131'	9'	< 1%	Py, and Aspy	
131'	159'	18'	< Trace	Py	
	Bottom of hole				

J. S. Cummings, Inc.

DDH CHN-13 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy
24 - 30	6'	None	None		None	None	0.46	0.35
30 - 40	10'	Trace	None		None	None	None	None
40 - 49	9'	Trace	0.006		None	None	None	None
49 - 55	6'	None	None		None	None	0.26	0.52
55 - 61	6'	None	0.006		None	None	None	0.39
61 - 63	2'	None	0.006		None	None	0.06	1.09
63 - 70.5	7.5'	None	None		None	None	0.20	1.30
70.5 - 74	3.5'	None	0.006		None	None	None	0.52

49 - 75

25' / 0.18 Aspy

Bottom of Hole: 159'

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Chandler Mtn. North Hole no. CHN-14 Dip -45° Started 11/17/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 29000E 62440N Direction 291° Mag Completed 11/20/80

Lithotype

0'

Overburden

47'
50'

Sludge samples taken from 60'-89' and samples recovered in core barrel all show a heavily graphitic shale.

89'
100'

Black and Dark Grey Shale - very fine grained, layering visible but distorted, ≈30°-40° to core axis, minor graphite on fractures.

111'

Dacite -
Similar brown color as other sections drilled on CHN. Similar siliceous veins bleaching core. Sections massive others speckled. Last 30' or 40' broken and fragmented by veins and more chlorite alteration. Visible aspy in sections.

150'

198'
200'

Bottom of Hole

250'

300'

350'

400'

U.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Chandler Mtn. North Hole no. CHN-14 Dip -45° Started 11/17/80 Elev.

Job no. 264.2 Township T10-R8 Coord. 29000E 62440N Direction 291° Mag Completed 11/20/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
89'	111'	22'	1%	Po	
111'	144'	33'	1%-2%	Po, Py & Chpy (trace)	
144'	150'	6'	1%-2%	Po, Py & Chpy (trace, Trace Aspy	
150'	163'	13'	2%-3%	Po, Py, Trace Chpy, 1% Aspy	
163'	178'	15'	1%	Po, Py, Trace Aspy	
178'	180'	2'	2%-3%	Po, & 1%-2% Aspy	Minor Chlorite
180'	198'	18'	1%	Po, and Py	Chlorite
	Bottom of Hole				

J. S. Cummings, Inc.

DDH CHN-14 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy
102 - 107	5'	None	0.012		None	0.010	1.78	None
150 - 157	7'	0.05	0.025		None	Trace	2.18	0.52
157 - 163	6'	Trace	0.006		None	Trace	1.88	1.15
178 - 180	2'	Trace	0.006		None	0.020	0.48	3.47

Bottom of Hole: 198'

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Chandler Mtn. North Hole no. CHN-15 Dip -45° Started 11/21/80 Elev.

Job no. 264.2 Township T10-R8 Coord. 62440N 28860E Direction 291° Mag. Completed 11/26/80

Lithotype

0'

Overburden

20'

50'

Gabbro -
Massive, dark green colored, same as other CHN holes. Visible py and po throughout. Traces of chpy and aspy. Ilmenite visible throughout, not magnetic.

100'

150'

200'

Bottom of Hole

250'

300'

350'

400'

U.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Chandler Mtn. North Hole no. CHN-15 Dip -45° Started 11/21/80 Elev. _____

Job no. 264.2 Township T10-R8 Coord. 62440N 28860E Direction 291° Mag Completed 11/26/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
20'	164'	144'	<1%	Py, Po, Trace Chpy	
164'	172'	8'	<1%	Po and <1% Aspy	
172'	200'	18'	1%	Po, Py, Trace Chpy, Trace	Aspy
	Bottom	of Hole			

J.S. Cummings Inc. C. Mattson

LITHOLOGIC LOG

Project: Pinnacle Grid | Hole no. PNL-1 | Dip -45° | Started 8/13/80 | Elev. ____

Job no. 264.4 | Township T10-R8 | Coord. 67400N 31600E | Direction 336° Mag | Completed 8/16/80

Lithotype

0' — Overburden

16' — Black Graphitic Shale and Mudstone

Layered black and grey units, layers from <1/4" to >1'. Layers wavy, and sometimes broken. Orientation to core axis goes from almost 80° to 10°. Some layers heavy graphite and others less foliated but still black. Calcite veins throughout core. Visible sphalerite and galena from 66' to 78' in calcite brecciating core.

74' - 99' - Many calcite veins brecciate core

Sections in first 60' are fragmental with gritty sized fragments

Visible pyrite cubes up to 1/4" throughout shale

Network of hairlike pyrite veins from 108' - 116', 157' - 174'

50' 100' 200' 250' 300' 350' 400' 450' 500' 550' 600' 650' 700' 750' 800'

Lithotype

422' — BOTTOM OF HOLE

ACID TESTS

DEPTH	APPARENT ∡	ACTUAL ∡
200'	54°	48°
300'	52°	46°
400'	54°	48°

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project PINNACLE GRID Hole no. PNL-1 Dip -45° Started 8/13/80 Elev. _____

Job no. 264.4 Township T10-R8 Coord. 67400N 31600E Direction 336° Mag Completed 8/16/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
0'	16'	16'	Overburden		
16'	66'	50'	1% - 2%	None	
66'	69'	3'	1% - 2%	Trace Zn & Trace Pb	
69'	74'	5'	1% - 2%	±.1% Zn & Trace Pb	
74'	78'	4'	1% - 2%	Trace Zn & Pb	
78'	108'	30'	1% - 2%		
108'	116'	8'	2% - 3%	Fine hair-like veins on fractures	
116'	157'	41'	1% - 2%		
157'	174'	17'	2% - 3%	Fine hair-like veins on fractures	
174'	422'	248'	±1%		
	Bottom				

J. S. Cummings, Inc.

DDH PNL-1 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	Approx. % Sulphide
59 - 64	5'	0.05	0.006				2.1
64 - 69	5'	0.20	0.006				1.1
69 - 74	5'	0.70	0.006	Trace	None	None	1.3
74 - 79	5'	0.10	0.006				2.8
79 - 84	5'	0.05	0.006				2.0
159 - 169	10'	None	None		0.2	None	2.3

Bottom of Hole: 422'

J.S. Cummings Inc.

LITHOLOGIC LOG

I. K. Carlson
C. E. Mattson

Project Pinnacle Grid Hole no. PNL-2 Dip Vert. Started 1/20/81 Elev. _____

Job no. 264.4 Township T10-R8 Coord. 72970N 27530E Direction _____ Completed 1/21/81

	Lithotype
0' – 2'	Overburden
2' – 9.5'	Rhyolite/Ignimbrite - banded in soft grey colors. Slightly sugary texture.
9.5' – 50'	Basalt - well chloritized, fine grained, "chill margin?" 9.5-13', elsewhere coarse to very coarse grained where feldspar euhedra are up to .3". Strongly to non-magnetic. Small pyrite blebs <1%.
50' – 51'	Bottom of Hole

0' 100' 150' 200' 250' 300' 350' 400'

J.S. Cummings Inc.

I. K. Carlson
C. E. Mattson

SULPHIDE LOG

Project Pinnacle Grid Hole no. PNL-2 Dip Vert. Started 1/20/81 Elev. _____

Job no. 264.4 Township T10-R8 Coord. 72970N 27530E Direction _____ Completed 1/21/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
2'	9.5'	7.5'	—		
9.5'	51'	41.5'	<1% Pyrite		
Bottom of Hole					

J.S. Cummings Inc.

LITHOLOGIC LOG

I. K. Carlson
C. E. Mattson

Project Pinnacle Grid Hole no. PNL-3 Dip Vert. Started 1/22/81 Elev. _____

Job no. 264.4 Township T10-R8 Coord. 73845N 28000E Direction _____ Completed 1/24/81

Lithotype

0'–2' Overburden

Basalt-Gabbro -
Relatively fresh looking, showing nice range of crisp igneous textures.
2'-16' - section appear siliceous but very crystalline
2'-31' - fine grained with some feldspar phenocrysts up to .5"
31'-67' - coarse grained basalt
67'-101' - gabbro, zoned feldspar and pyroxene crystals up to .6"; ophitic textures

some chlorite and magnetite in matrix

101' Bottom of Hole

0' 50' 100' 150' 200' 250' 300' 350' 400'

J.S. Cummings Inc.

SULPHIDE LOG

I. K. Carlson
C. E. Mattson

Project Pinnacle Grid Hole no. PNL-3 Dip Vert. Started 1/22/81 Elev. _____

Job no. 264.4 Township T10-R8 Coord. 73845N 28000E Direction _____ Completed 1/24/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
2	16	14'			
16	101	85'	<1% Pyrite		
Bottom of Hole					

J.S. Cummings Inc.

LITHOLOGIC LOG

I. K. Carlson
C. E. Mattson

Project Pinnacle Grid Hole no. PNL-4 Dip -45° Started 1/24/81 Elev.

Job no. 264.4 Township T10-R8 Coord. 73845N 28000E Direction 156° Mag Completed 2/6/81

Lithotype

0' Overburden

6' Basalt - medium grey, fine to superfine grained, siliceous, short sections with dark groundmass with visible (.1") feldspar and qtz., remainder homogenously superfine grained.

34' Basalt/Gabbro -
fine to extremely coarse grained, mostly very crisp fresh phaneritic texture. Some chloritization, nice display of coarse textures. Feldspar laths sometimes over 1" long. Even accessory minerals visible under binoc in coarsest sections.

50'

100'

150'

200'

250'

300'

350'

353' Bottom of Hole

400'

J.S. Cummings Inc.

SULPHIDE LOG

I. K. Carlson
C. E. Mattson

Project Pinnacle Grid Hole no. PNL-4 Dip -450 Started 1/24/81 Elev.

Job no. 264.4 Township T10-R8 Coord. 27845N 28000E Direction 156° Mag Completed 2/6/81

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
6	353	347'	<1%		
Bottom of Hole					

HOLE #	COORDINATES	DATE COLLARED	DATE COMPLETED	DIP	MAGNETIC BEARING	DEPTH	DRILLED BY
PNL-1	67400N, 31600E	8/13/80	8/16/80	-45°	291°	422'	County
PNL-2	72970N, 27530E	1/20/81	1/21/81	Vert.		51'	County
PNL-3	73845N, 28000E	1/22/81	1/24/81	Vert.		101'	County
PNL-4	73845N, 28000E	1/24/81	2/06/81	-45°	156°	353'	County
					SUB TOTAL		

PINNACLE (T10-R8) DRILLING

J. S. CUMMINGS, INC.

J.S. Cummings Inc.

LITHOLOGIC LOG

Project South Branch Hole no. SB-1 Dip 45° Started 6/7/79 Elev. _____

Job no. 264 Township T10-R8 Coord. 69600N 23900E Direction 111° Completed 6/11/79

Lithotype

0'

16' Overburden

Graphitic Shale

50'

63' Bottom of Hole

100'

150

200'

250'

300'

350'

400'

Lithotype

400'

450'

Light grey to black, layering 45° to core axis. Graphite occur as fragments and as layers. Some sections (28-32'), (37-39') of lapilli agglomerate, fragments of graphite, shale and some rhyolite, very similar to 98-3. Pyrite mineralization.

500'

550'

600'

650'

700'

750'

800'

J.S. Cummings Inc.

SULPHIDE LOG

Project South Branch Hole no. SB-1 Dip 45° Started 6/7 Elev. _____

Job no. [illegible] Township T 10 R8 Coord. 69600 N 23900 E Direction 111° Completed 6/11

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
16'	63'	47'	≤ 1%	—	

J. S. Cummings, Inc.

DDH SB-1 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	S
45 - 48	Trace	0.018	Trace	None	Trace	0.49
48 - 50.8	None	0.018	None	0.1	Trace	0.60
50.8 - 51.5	None	0.012	None	None	Trace	0.19
51.5 - 52	None	0.044	Trace	None	Trace	0.78
52.5 - 53.25	None	0.012	Trace	None	Trace	0.42
53.25- 57	0.10	0.037	Trace	None	Trace	0.01
57 - 61	None	0.018	None	None	Trace	0.01

Bottom of Hole: 63'

J.S. Cummings Inc.

LITHOLOGIC LOG

Project South Branch Hole no. SB-2 Dip 45° Started 6/12/79 Elev. _____

Job no. 264 Township T10-R8 Coord. 22690E 69605N Direction 291° Completed 6/19/79

Lithotype

0'

12' Overburden

Graphitic Shale -
locally calcareous, nodules of pyrite, more graphitic toward bottom of hole

50'

60' Bottom of Hole

100'

150'

200

250'

300'

350'

400'

Lithotype

400'

450'

500'

550'

600'

650'

700'

750'

800'

J.S. Cummings Inc.

LITHOLOGIC LOG

Project: South Branch | Hole no. SB-3 | Dip 45° | Started 6/22/79 | Elev. _____

Job no. 264 | Township T10-R8 | Coord. 19505E 71205N | Direction 111° | Completed 6/23/79

Depth	Lithotype
0' – 16'	Overburden
16' – 67'	Graphitic Shale - some nodules of pyrite, vein of calcite at 60-61', shale becomes more graphitic with depth
67'	Bottom of Hole

Depth scale: 0', 50', 100', 150', 200', 250', 300', 350', 400'

Lithotype

Depth scale: 400', 450', 500', 550', 600', 650', 700', 750', 800'

Lithotype

J.S. Cummings Inc.

SULPHIDE LOG

Project SOUTH BRANCH Hole no. 3 Dip 45° Started [illegible] Elev. _____

Job no. 664 Township T10R8 Coord. [illegible] Direction 111° Completed [illegible]

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
16'	67'	51'	<1%	—	

HOLE #	COORDINATES	DATE COLLARED	DATE COMPLETED	DIP	BEARING	DEPTH	MOST SIGNIFICANT SULPHIDE INTERSECTION
SB-1	69600N,23900E	6/09/79	6/11/79	-45°	East	63'	Graphite
SB-2	69605N,22690E	6/12/79	6/19/79	-45°	West	60'	Graphite
SB-3	71205N,19505E	6/22/79	6/23/79	-45°	East	67'	Graphite
					TOTAL	190'	

SOUTH BRANCH (T10-R8) DRILLING

J. S. CUMMINGS, INC.

I. Carlson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project SPECTACLE GRID **Hole no.** SPL-1 **Dip** 45° **Started** 8/17/80 **Elev.** _____

Job no. 264.5 **Township** T10-R8 **Coord.** 80800N 16050E **Direction** 111° Ma **Completed** 8/20/80

Lithotype

0'

11' Overburden

Andesite

Slightly altered, very fine grained. Spotted with many chlorite blebs - mostly tiny but up to 2" - Pyrrhotite (to 175') and pyrite as blebs within groundmass and in stringers along calcite or chlorite veins. Some short siliceous sections (example - 4" at 92'). Beginning at 106', intermittent fragmental sections - angular fragments in chlorite or calcite matrix. Good pyrite in chlorite fragmental sections

220' 202' Cal. Basalt - gradational transition, less chlorite in blebs than above. Fragmental sections with black siliceous matrix included rhyolite fragments - up to 3". Pyrite fine grained disseminated, some veinlets

240'

250' 252'

263'

267'

BOTTOM OF HOLE

Note: Weak magnetite in black zones

50' 100' 300' 350' 400'

Lithotype

400' 450' 500' 550' 600' 650' 700' 750' 800'

Siliceous Graphitic Black Chert

Cryptocrystalline, evenly textured - Occasional seams of heav graphite - parting along these seams. Pyrite in stringers (up to 1/4" wide) and blebs (up to 1")

Siliceous Graphitic Black Chert

Calcareous Basalt Fragmental

Large angular chunks of dacite as above. Pyrite disseminated up to 7+% within dacite. Matrix is black siliceous cryptocrystalline material

Siliceous Graphitic Black Chert

As above. A few thick pyrite stringers (.05 - 1" wide) and sizable blebs of pyrite

J.S. Cummings Inc.

I. Carlson

SULPHIDE LOG

Project SPECTACLE Hole no. SPL-1 Dip 45° Started 8/17/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 80800N 16050E Direction 111° Mag Completed 8/20/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
8'	138'	130'	<1% pyrite, pyrrhot.		
138'	188'	50'	1% pyrite		
188'	198'	10'	3-5% pyrite		
198'	202'	4'	1% pyrite		
202'	225'	23'	5-7% pyrite		
225'	229'	4'	1-2% pyrite		
229'	240'	11'	4-6% pyrite		
240'	264'	24'	3-5% pyrite		
264'	267'	3'	1-3% pyrite		
	Bottom of Hole				

J. S. Cummings, Inc.

DDH SPL-1 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy
202 - 212	10'						3.2	
212 - 222	10'						3.8	
222 - 232	10'						3.2	
232 - 242	10'						4.2	
242 - 252	10'						3.0	
252 - 267	15'						4.0	

70' (6) 65' @ 3.6% Py

Bottom of Hole: 267'

I. Carlson

J.S. Cummings Inc.

LITHOLOGIC LOG

Project SPECTACLE Hole no. SPL-2 Dip 45° Started 8/25/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 81200N 16100E Direction 291°W Completed 8/28/80

Lithotype

0'

Overburden

15'

Calcareous Basalt Frag. & Graphitic Chert*

23'

Basalt Andesite**

34'

Calcareous Basalt ***

50'

62'

Black Siliceous Graphitic Chert****

70'

Calcareous Basalt

As before, grades into basalt in short sections. Intermittent fragmental sections with calcite and rockhash matrix. 70'-73' curious black rims penetrating the large dacite chunks. Py & Po 5-7%+. Moderately to strongly calcareous throughout. Some wide milky white quartz veins with surrounding alteration. Sericite veins with quartz and calcite

100'

142'

Calcareous Basalt Fragmental *****

164'

Tuffaceous Sediment

Alternating layers of fine sand size rock and crystal fragments, moderately well sorted, calcareous dirty sandstone/greywacke and superfine grained to cryptocrystalline black siliceous shale/chert. Layers dip 30° to 45° to core axis. Layered pyrite disseminated throughout in coarse section 2-4%, 1-3% in cherty section

Angular fragments in some sections indicate gritty tuff.

200'

232'

250'

BOTTOM OF HOLE

300'

350'

400'

Lithotype

Calcareous Basalt Fragmen
and Graphitic Siliceous C
As in the bottom of SPL-
tions of large rounded a
tured chunks of very fin
grey dacite with black s
matrix. Short sections
iceous graphitic materia
dacite fragments. Good
layered blebs in black s
disseminated in fragment

Basalt-Andesite **

Grey, very fine grained.
phaneritic texture, very
chlorite. Good pyrite i
especially with calcite

Calcareous Basalt ***
Gradational transition,
grained to cryptocrystal
Light to medium grey.
mental sections with bl
iceous matrix. Very ca
pyrite concentration be
areas

Black Siliceous Graphitic
Chert ****

Super fine grained. Fi
layering visible in som
Graphite in thin seams.
disseminated throughout
layering up to 1" wide.
ately calcareous

Calcareous Basalt Fragmen

Basalt as before in la
chunks (up to 18") goo
disseminated up to 10%
ments. Matrix is fine
poorly sorted, rock ha
calcareous, angular to
felsic fragments, mica
ments. Pyrite blebs u

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project SPECTACLE GRID Hole no. SPL-2 Dip -45° Started 8/25/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 81200N 16100E Direction West 291°mag Completed 8/28/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
13'	20'	7'	2% - 3%		
20'	24'	4'	3% - 5%		
24'	29'	5'	1% - 2%		Minor chlorite
29'	30'	1'	>5%		
30'	58'	28'	±2%		Minor chlorite
58'	62'	4'	3% - 5%		
62'	70'	8'	3% - 5%		
70'	72'	2'	5% - 7%		
72'	90'	18'	1% - 2%		
90'	93'	3'	3% - 5%		
93'	97'	4'	1% - 2%		
97'	97.4'	0.4'	10% - 15%		
97.4'	160.0'	62.6'	1% - 2%		Sericite
160.0'	172.0'	12.0'	2% - 3%		
172.0'	232.0'	60.0'	1% - 2%		
	Bottom of Hole				

J. S. Cummings, Inc.

DDH SPL-2 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy
15 - 25	10'						4.7	
25 - 35	10'						3.0	3%
35 - 45	10'						2.7	
45 - 58	13'						2.1	
58 - 68	10'	None	None	None	None	Trace	7.7	
68 - 72	4'	None	0.006	None	None	Trace	8.1	
72 - 82	10'						1.5	
82 - 92	10'						2.5	
92 - 102	10'						2.7	
102 - 112	10'						1.2	
112 - 122	10'						1.3	
122 - 132	10'						1.4	
132 - 142	10'						1.3	
142 - 152	10'						3.3	
152 - 162	10'						2.4	
162 - 172	10'						5.0	
172 - 182	10'						5.6	
182 - 192	10'						3.3	
192 - 202	10'						3.1	
202 - 212	10'						6.4	
212 - 222	10'						3.3	
222 - 232	10'						3.9	

Bottom of Hole: 232'

J.S. Cummings Inc.

LITHOLOGIC LOG

C. Mattson
TCW

Project: Spectacle Grid
Hole no.: SPL-3
Dip: -45°
Started: 8/28/80
Elev.:
Job no.: 264.5
Township: T10-R8
Coord.: 81600N 15550E
Direction: West 291° Mag
Completed: 9/10/80

Lithotype

0'	Overburden
15'	Gritty Tuff and Siliceous Mudstone or Chert - very fine grained, layered (65°-7 core axis), lt. grey gritty layers & some fine grained black (harder) layers, gritty matrix somewhat calcareous.
33'	Calcareous Basalt - Fine grained, light grey-green colored, some carbonate throughout matrix, als veins. Sections appear fragmented due to amount of siliceous veins with sulp in them, appears altered at contact with veins. (More siliceous and bleached.
50'	
89'	Black Siliceous Mudstone or Cherty Sediment - layered pyrite
95'	Calcareous Basalt - Same as 33' - 89'
100'	
122'	Basalt (silicified?) with minor cherty sediment - Fine grained, much harder, carbonate amygdules and veins. 132'-134' and 144'-150' Black Cherty Sediment
150'	Calcareous Basalt - fine grained with carbonate veins
160'	Gritty Tuff - minor sections at 161' & 173' are soft and altered, the rest is ceous and welded - fragments vague.
174'	Black Siliceous Mudstone or Cherty Sediment - Black, very fine grained, well layered (sulphide occurs in layers and as lay graphite on fractures, similar to other sections in this hole and other SPL
200'	
208'	Gritty Tuffs & Cherty Sediment, layers and fragments - Tuffs show some chlori sericite alteration. Cherts light & dark grey colored, some layers wavy oth real sharp but various angles to core axis.
239'	Basalt - Medium grained, massive, minor chlorite alteration. Minor carbonate veins, grey-green colored.
250'	
292'	Interlayered Chert-Sericite-Exhalite and some Gritty Tuff - Last 20' getting better layered, 70°-80° to core axis, also picking up some slight reddish-maroon color. 1/2"-2" layers of chert make up 20-25% of core.
300'	
344'	Layered Iron Formation - Crystal tuff, hematite, magnetite, chert, sericite. Layers - grey, green, brick red. 1/2"-2" chert layers make up 10-20% of core.
350'	
384'	Sericite-Exhalite-Chert - (Cont'd)
400'	

J.S. Cummings Inc.

LITHOLOGIC LOG

C. Mattson
TCW

Project Spectacle Grid Hole no. SPL-3 Dip -45° Started 8/28/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 81600N 15550E Direction West 291° Mag Completed 9/10/80

Lithotype

400'

Sericite-Exhalite-Chert -
Same as 292'-344' except more sericite, no reddish-maroon coloring and less chert. All grey and green, minor grit.
(2-3% 1/2"-1" layers of chert)

450'

465'

Interlayered Black and Grey Sediment -
Minor tuffaceous sections. Black sediment, non-fissile and slightly graphitic. Grey sediment, soft, non-fissile, slightly calcareous. Layering somewhat contorted. Calcareous veins throughout.

500'

550'

551'

Bottom of Hole

600'

650'

700'

750'

800'

Acid Tests

Depth	Apparent ∠	Actual ∠
180'	55°	49°
270'	55°	49°
450'	52°	46°

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-3 Dip -45° Started 8/28/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 81600N 15550E Direction West 291° Mag Completed 9/10/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERAT
15'	33'	18'	1%-2%	Py	
33'	39'	6'	3%	Py	
39'	49'	10'	3%-5%	Py	
49'	57'	8'	1%-2%	Py	
57'	58'	1'	7%-10%	Py	
58'	89'	31'	1%-2%	Py	
89'	95'	6'	3%-5%		
95'	132'	37'	1%-2%		
132'	134'	2'	2%-3%		
134'	144'	10'	2%		
144'	150'	6'	3%-5%		
150'	165'	15'	1%-2%		
165'	171'	6'	2%-3%		
171'	171.1'	0.1'	> 50%		
171.1'	208'	36.9'	2%-3%		
208'	551'	343'	< 1%		
	Bottom	of Hole			

J. S. Cummings, Inc.

DDH SPL-3 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	% Py	% Aspy	%F
15 - 25	10'	None	None				3.4		
25 - 35	10'	None	None		0.3	None	4.6		
35 - 45	10'	Trace	0.006		None	None	4.4		
45 - 55	10'	None	0.006				3.4		
55 - 65	10'	None	0.006				3.5		
65 - 75	10'	None	0.006				2.7		
75 - 89	14'	Trace	0.006				2.7		
89 - 95	6'	None	0.006				12.4		
95 - 105	10'						4.0		
105 - 115	10'						3.5		
115 - 125	10'						2.2		
125 - 135	10'						1.5		
135 - 145	10'						2.7		
145 - 155	10'						2.8		
155 - 165	10'						3.0		
165 - 175	10'						4.3		
175 - 185	10'						2.8		
185 - 195	10'						2.9		
195 - 208	13'						4.8		
at 350'					0.1	None			16.
344 - 354	10'				0.1	None			9.
354 - 364	10'				0.1	None			7.
364 - 374	10'				None	None			7.
374 - 384	10'				0.1	None			5.

Bottom of Hole: 551'

Assays Spectacle SPL-3

HOLE #	DEPTH	% $CaCO_3$	% SiO_2
SPL-3	59'	3.03	43.75
SPL-3	76'	6.44	44.20
SPL-3	268'	2.80	43.50

Length of Hole: 551'

J.S. Cummings Inc.

C. Ma

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-4 Dip Vert. Started 9/10/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 81600N 15300E Direction Completed 9/11/80

Lithotype

0'

Overburden

10'

Cherty Sediment and Gritty Tuff - black cherty sediment interlayered with gr
tuff. Layers 60°-70° to core axis. Similar to SPL-3.

28'

Intermixed Calcareous Basalts and Cherty Sediment -
28'-42' - basalt with siliceous veins fracturing and bleaching basalt.
42'-54' - black cherty sediment with sulphide in layers.
54'-76' - basalt, not as many siliceous veins with minor cherty sediment
76'-96' - black cherty sediment.
96'-102'- chert and gritty tuffs; chert - grey colored; tuffs show some c
alteration.

50'

100'

102'

Bottom of Hole

150'

200'

250'

300'

350'

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project: Spectacle Grid Hole no. SPL-4 Dip: Vert. Started: 9/10/80 Elev.:

Job no. 264.5 Township: T10-R8 Coord.: 81600N 15300E Direction: Completed: 9/11/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERA
10'	28'	18'	1%-2%		Minor Gra
28'	42'	14'	2%-3%		
42'	54'	12'	2%		Minor Gra
54'	62'	8'	< 1%		
62'	64'	2'	3%-5%	Trace Malachite at 64'	Minor Gra
64'	76'	12'	1%-2%		
76'	96'	20'	2%		Graphite
96'	102'	6'	< 1%		Minor Gr
	Bottom	of Hole			

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

TCW

Project Spectacle Grid Hole no. SPL-5 Dip Vert. Started 9/12/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 81600N 14750E Direction Completed 9/17/80

Lithotype

0'

8' Overburden

Basalt -
Medium to coarse grained (at lower contact), massive, green. Minor chlorit alteration. Magnetic - carbonate veins. Becoming coarser grained and hav more carbonate in matrix last 20'.

50'

100'

110' Cherty Sediment (or chert) and Minor Gritty Tuff - chert is grey colored; tu are greenish and not well layered

122'

Layered Iron Formation -
Same as SPL-3. Cherty layers, gritty layers, and red hamatitic layers. Magnetic in sections. Well layered, layers ±70° to core axis. Bands of chert make up about 40%.

150'

192' Same as 110'-122' but well layered

197'

200'

Sericite and Minor Chert - Exhalite -
Fine grained, layered in sections (15°-45° to core axis shows much steepe than iron formation). Grey-green, minor black sections, some layering co wavy and broken. Minor fractured chert toward end of section.

250'

255'

Chert-Sericite-Exhalite -
Chert layers up to 4" thick interbedded with fine sediment and some gritt (thin beds). Well layered, layers ±70° to core axis. Chert layers well and filled with black material. Chert layers become less frequent towarc of section. 30% of core is chert bands.

300'

312' Well Layered Tuffs and Sediments - layers 1/4"-4", gradual change to less t and more grey and green sediment. Layers still ±70° to core axis.

338'

Grey-green and Black-green Interlayered Sediment -
from 338'-371' - well layered and grey colored sediment slowly turning b somewhat graphitic.

from 371'-443' - interlayered like above but layers are wavy and broken.

350'

400'

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-5 Dip Vert. Started 9/12/80 Elev. ___

Job no. 264.5 Township T10-R8 Coord. 81600N 14750E Direction ___ Completed 9/17/80

Lithotype

400'

Grey-green and Black-green Interlayered Sediment -
Grey sediment is sometimes calcareous and some black layers show heavy graph

443'
450'

Black Graphitic Sediment -
Section shot throughout with quartz veins and veinlets up to 6" thick. Mino
gritty tuff. Graphite heavy.

472'

Black Graphitic Sediment and Gritty Tuff -
Interlayered, layers 50°-60° to core axis. Graphite heavy in sections. Las
shows two 6" zones with lapilli sized fragments, some containing > 5% sulphic
Also sulphide in matrix around fragments. Black graphitic sections
again like black cherty sediment in SPL-3 and SPL-4. Minor sulphide
layers like SPL-3 and SPL-4.

500'
503'

Bottom of Hole

550'

600'

650'

700'

750'

800'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project: Spectacle Grid Hole no.: SPL-5 Dip: Vert. Started: 9/12/80 Elev.:

Job no.: 264.5 Township: T10-R8 Coord.: 81600N 14750E Direction: Completed: 9/17/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
8'	197'	189'	<1%		Minor Chlori
197'	255'	58'	1%		
255'	312'	57'	< 1%		
312'	443'	131'	1%-2%		Graphite
443'	472'	29'	±3%		Graphite
472'	501'	29'	1%-2%		Graphite
501'	503'	2'	±3%		Graphite
	Bottom of Hole				

J. S. Cummings, Inc.

SPECTACLE
Hole SPL-5

SAMPLE NUMBER	DEPTH	% Zn	% Cu	% Pb	Oz/Au	Oz/Ag	% Fe	%
SPL-5	138'		None		Trace	0.3	9.5	
SPL-5	141'		None		Trace	0.6	11.8	
SPL-5	150'		None		Trace	0.1	9.5	
SPL-5	159'		None		0.005	0.2	14.7	
SPL-5	184'		None		None	0.4	9.5	

Length of Hole: 503'

J.S. Cummings Inc.

C. Mat

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-6 Dip Vert. Started 9/22/80 L

Job no. 264.5 Township T10-R8 Coord. 80800N 16500E Direction _____ Completed 9/23/8

Lithotype

0'

Overburden

12'

Black Graphitic Mudstone - black, non-fissile, heavily graphitic, mudston strongly calcareous), interlayered with minor gritty tuff, containing q fragments and other volcanic fragments, also strongly calcareous. Laye from 20°-35° to core axis. Sections in mudstone cannot be scratched.

50'

61'

Bottom of Hole

100'

150'

200'

250'

300'

350'

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-6 Dip Vert. Started 9/22/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 80800N 16500E Direction _____ Completed 9/23/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
12'	61'	49'	1%-2%		
	Bottom	of Hole			

J.S. Cummings Inc.

C. Mattsor

LITHOLOGIC LOG

Project: Spectacle Grid Hole no. SPL-7 Dip -45° Started 9/23/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 80800N 16700E Direction West 291° Mag Completed 9/25/80

Lithotype

0'

Overburden

19'

Black Graphitic Sediment and Gritty Tuff -
Well layered, most layers ±80° to core axis. Black sediment, sections hig graphitic and sections calcareous, not fissile. Sections hard. Gritty tu fine grained, abundant quartz grains, matrix calcareous.

50'

63'

Lapilli Agglomerate and Black Graphitic Sediment - *

81'

Black Graphitic Sediment -
Sections heavily graphitic, some sections hard. Minor sections of sedimen green and black, chlorite and sericite altered, (122'-125'). Sections wel layered, others not layered. Pyrite in layers and blebs, also calcareous veins.

100'

150'

190'

Bottom of Hole

200'

250'

300'

350'

400'

* Lapilli Agglomerate and Black Graphitic S

Interbedded units, black sediment secti highly graphitic. Agglomerate, many gr fragments, mostly soft in a black-dark matrix.

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-7 Dip -45° Started 9/23/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 80800N 16700E Direction West 291° Mag Completed 9/25/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
19'	55'	36'	1%-2%		
55'	81'	26'	2%	M.S. Clasts at 80'	
81'	190'	109'	2%-3%		
	Bottom	of Hole			

J.S. Cummings Inc.

LITHOLOGIC LOG

C. Mattson

TCW

Project Spectacle Grid Hole no. SPL-8 Dip -45° Started 9/26/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 86800N 16900E Direction West 291° Mag Completed 9/28/80

Lithotype

0' Overburden

23' Fragmental Andesite-Dacite - *

40' Felsic Fragmental - **

50'

63' Mixed Massive Greenish Rhyolite-Dacite and Fragmental andesite-dacite which shows andesite fragments and felsic matrix (vent breccia?).

100'

127' Massive-Greenish Rhyolite-Dacite and Fine grained, massive, greenish colored, minor calcite in veins.

150'

160' Mixed Massive Rhyolite and Dacite Fragmental - Similar section to 63'-127'. Also some lapilli fragmental with fuzzy fragments.

200'

205' Bottom of Hole

250'

Acid Test

Depth	Apparent ∢	Actual ∢
190'	53°	46°

300'

*Fragmental Andesite-Dacite - Highly weathered and broken, fragments dacite to basalt up to 3" in size, some smaller ones chloritized. Matrix cream colored and more felsic.

350'

**Felsic Fragmental - Some wavy layering visible, 40°-50° to core axis. Many quartz fragments visible, in sections seem to be floating in a chloritic matrix. Other sections wavy layering but silicified, weak sericite.

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-8 Dip -45° Started 9/26/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 86800N 16900E Direction West 291° Mag Completed 9/28/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
23'	178'	155'	< 1%		Chlorite
178'	178.5'	0.5'	5%		Chlorite
178.5'	205'	26.5'	1%-2%		Chlorite
	Bottom of Hole				

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project: Spectacle Grid Hole no. SPL-9 Dip: -45° Started: 9/28/80 Elev.:

Job no. 264.5 Township: T10-R8 Coord.: 86800N 16900E Direction: East 111° Mag Completed: 9/30/80

Lithotype

0'

Overburden

28'

Fragmental Rhyolite-Dacite -
Fragments of rhyolite and dacite (which contain phenocrysts of feldspar), matri is creme colored and siliceous. Sections appear more like a massive dacite porphry. Core is very broken and recovery is 60% for the hole.

50'

Very similar to 23'-40' in SPL-8 but so weathered and broken in that hole it wa hard to describe.

100'

113'

Bottom of Hole

150'

200'

250'

300'

350'

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-9 Dip -45° Started 9/28/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 86800N 16900E Direction East 111° Mag Completed 9/30/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
28'	113'	85'	<1%		
	Bottom	of Hole			

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project: Spectacle Grid Hole no. SPL-10 Dip: Vert. Started: 9/30/80 Elev.:

Job no. 264.5 Township: T10-R8 Coord.: 89450N 14800E Direction: Completed: 9/30/80

Lithotype

0' – 18'	Overburden
18' – 40'	Black Graphitic Shale - heavy graphite, layers almost parallel to core axis. Hole stopped because of bad angle.
40' – 50'	Bottom of Hole

0' 100' 150' 200' 250' 300' 350' 400'

J.S. Cummings Inc.

SULPHIDE LOG

C. Mattson

Project Spectacle Grid Hole no. SPL-10 Dip Vert. Started 9/30/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 89450N 14800E Direction _____ Completed 9/30/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
18'	40'	22'	< 1%		
	Bottom of Hole				

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project: Spectacle Grid | Hole no. SPL-11 | Dip -45° | Started 9/30/80 | Elev.

Job no. 264.5 | Township T10-R8 | Coord. 89450N 14800E | Direction West 291° Mag | Completed 10/8/80

Lithotype

0'

Overburden

36'

Black Graphitic Shale -
Black, heavily graphitic, layering is wavy and broken and difficult to see because of abundance of cross cutting veins and veinlets of calcite. Good layers are about 50°-60° to the core axis. Sections contain minor fragments and layers are fragmented and broken. Minor blebs of pyrite up to 2" in size.

50'

100'

106'

Same as above but without many of the calcite veins. Layers more visible.

142'

150'

Black graphitic layers alternate with grey, sometimes calcareous layers.

180'

Spectacle Mtn. Agglomerate -
Angular to rounded fragments include black shale (layered and massive) and a variety of fragments of intermediate to felsic volcanics. (Rhyolites, etc.) Fragments range in size from 1/16" to >8". Massive sulphide clasts appear at disseminated locations (up to 1.5" in size). Minor shaly layered sections, might be just large fragments. Many clasts and the matrix are calcareous.

200'

250'

281'

Bottom of Hole

300'

350'

400'

Acid Test

Depth	Apparent	Actual
270'	50° ⊣	44° ⊣

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project: Spectacle Grid Hole no. SPL-11 Dip: -45° Started: 9/30/80 Elev.:

Job no. 264.5 Township: T10-R8 Coord. 89450N 14800E Direction: West 291° Mag Completed: 10/8/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
36'	58.3'	22.3'	1%		Heavy Graphite
58.3	58.6'	0.3'	10%-15%	Py in layers, disseminated	Heavy Graphite
58.6	180'	121.4'	1%	Large M.S. bleb (2") at 123'	Heavy Graphi
180'	224'	44'	1%-2%	Minor M.S. clasts	
224'	225'	1'	3%-5%	Some M.S. clasts	
225'	261'	36'	1%		
261'	262'	1'	7%-10%	Numerous M.S. clasts	
262'	263'	1'	3%-5%	Black frags. containing layered pyrite	
263'	281'	18'	1%		
	Bottom of Hole				

J. S. Cummings, Inc.

DDH SPL-11 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	Approx. % Sulphide
190 - 192	2'		None		0.3	None	1.2
222 - 224	2'		None		0.2	None	1.3
224 - 224.4	0.4'		None		0.2	None	21.1
224.4 - 226.4	2'		None		0.2	None	1.4
259 - 261	2'		None		None	None	2.9
261 - 261.4	0.4'		None		None	None	39.0
261.4 - 263	1.6'		None		0.1	None	6.9

Bottom of Hole: 282'

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-12 Dip -45° Started 10/8/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 89850N 14725E Direction 171° Mag Completed 10/11/80

Lithotype

0'

8' Overburden

Spectacle Mtn. Agglomerate -
Same as SPL-11, 180'-281'.
From 90'-150', many short black shale sections, layering varies in angle to core axis from ≈ 90° to ≈0° indicating they might all be just fragments. Some over 12" in size. Some calcareous sections in matrix and some calcareous fragments that could be fossiliferous?. (Good example: fragment at 98'.)

50'

100'

149'

150' Calcareous Fragmental - fine grained clear quartz fragments and some rhyolite and other volc.frags. in a highly calcareous grey matrix. *

167' Altered Tuff -
Fine to medium grained fragments of quartz and other fragments, most fuzzy due to alteration. Matrix is cream-green colored and soft, possibly a mixture of chlorite and sericite. Wavy layering is faintly visible in section. **

200'

211' Rhyolite Porphry - grey-green rhyolite with white phenocrysts

222' Altered Tuff - same as 167'-211' but darker green matrix.

237' Rhyolite-Dacite Porphry -
Fine grained, grey-green colored, rhyolite and dacite. Phenocrysts or amygdules are present throughout.

250'

282' Bottom of Hole

300'

* Sample at 151' shows calcite grains and lesser qtz. and rock fragments.

** Three samples indicate unit is a massive rhyo-dacite tuff or flow with grains of qtz. and feldspar, weakly sericitic (TCW).

350'

Acid Test

Depth	Apparent ∢	Actual ∢
265'	48°	42°

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-12 Dip -45° Started 10/8/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 89850N 14725E Direction 171° Mag Completed 10/11/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
8'	9'	1'(.5' recovered)	1%		
9'	10'	1'(.5' recovered)	3%-5%	M.S. clasts	
10'	13'	3'	?	?	?
13'	18'	5'	2%-3%	M.S. clasts	
18'	42'	24'	1%		
42'	44'	2'	2%-3%	M.S. clasts	
44'	149'	105'	1%		
149'	167'	18'	1%-2%		
167'	180'	13'	3%		
180'	282'	102'	1%		
	Bottom of Hole				

J. S. Cummings, Inc.

DDH SPL-12 - (Assays for Portion of Hole)

DEPTH (FEET) FROM COLLAR	LENGTH	% Zn	% Cu	% Pb	Oz/Ag	Oz/Au	Approx. % Sulphide
8 - 15	7'		None		0.1	None	3.8
15 - 16	1'		0.006		None	None	28.4
16 - 19	3'		0.006		0.2	None	1.0
41.5 - 43.5	2'		None		0.3	None	3.2
43.5 - 44	0.5'		None		0.2	None	23.8
44 - 46	2'		None		0.1	None	3.3
120 - 122	2'		None		None	None	1.8

Bottom of Hole: 282'

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-13 Dip Vert. Started 10/12/80 Elev. _____

See Sketch

Job no. 264.5 Township T10-R8 Coord. 264-12 Direction _____ Completed 10/13/80

Lithotype

0' Overburden

1' Red Hematitic Chert
Well Layered, layers from 10°-40° to core axis. Sections very hard and sections easily scratched. Color varies from dull red-brown to red-orange. Minor Mn stain on weathered surface at top of hole. 2' and 3' sections of hem. siltstone. Last 2' appears to be a gritty tuff.

50' 51' Bottom of Hole

100'

150'

200'

250'

300'

350'

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-13 Dip Vert. Started 10/12/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. See Sketch 264-12 Direction _____ Completed 10/13/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
1'	51'	50'	None		
	Bottom of Hole				

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project: Spectacle Grid Hole no. SPL-14 Dip: -45° Started: 10/13/80 Elev.:

Job no. 264.5 Township: T10-R8 Coord.: See Sketch 264-12 Direction: West 291° Mag Completed: 10/22/80

Lithotype

0' — Overburden

9' — Layered Red Hematitic Chert and some Hematitic Siltstone Interlayered with Grey-Green Siltstone -
Well layered in sections, layers <1/8" to >6". Layers ±80° to core axis. Siltstone fine grained, layered, and soft. Red Chert well layered (except 58'-62' fragmented and broken). Some soft layers as well as hard. From 94'-105' red color is getting lighter and lighter.

50'

100'

105' — Felsic Fragmental - Fragments of rhyolite or qtz., red chert frags., and other fragments (minor chloritized ones). Unusual iron staining (yellow-brown) in sections up to 2' thick. Sections also calcareous.

127'

150'

Basalt -
Medium grained, massive, slightly chlorite altered. Minor carbonate and epidote veins. Sections contain visible magnetite and are magnetic.

193'

200' — Bottom of Hole

250'

300'

350'

400'

Acid Test

Depth	Apparent ∢	Actual ∢
175'	52°	46°

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-14 Dip -45° Started 10/13/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. See Sketch 264-12 Direction West 291° Mag Completed 10/22/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
9'	105'	96'	Trace		
105'	127'	22'	<1%		Minor Chlorite
127'	193'	66'	Trace		Minor Chlorite & Epidote
	Bottom of Hole				

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-15 Dip -45° Started 10/22/80 Elev.

Job no. 264.5 Township T10-R8 Coord. See Sketch 264-12 Direction North 21° Mag. Completed 10/23/80

Lithotype

0' Overburden

5' Red Hematitic Chert and Greenish Greywacke - Layering visible and almost appears to be drilling along layers or strike. Chert same as SPL-13 & 14. Some iron staining same as SPL-14 toward bottom of section

50'

63' Possibly into same felsic fragmental as SPL-14. Iron staining the same and fragments visible but too short of a section to be positive.

70' Bottom of Hole

100'

Sample at 69' shows 0.5" of laminated sericite-Mn(?)

150'

200'

250'

300'

350'

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project Spectacle Grid Hole no. SPL-15 Dip -45° Started 10/22/80 Elev.

Job no. 264.5 Township T10-R8 Coord. See Sketch 264-12 Direction North 21° Mag. Completed 10/23/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
5'	70'	65'	Trace		
	Bottom of Hole				

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project: Spectacle Grid Hole no. SPL-16A Dip -45° Started 10/23/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 80890N 22530E Direction S45E True 156° Mag Completed 10/24/80

Lithotype

0'
4' Overburden

Felsic Tuff and Rhyolite -
Very fine grained tuff, slight wavy layers visible, ±40° to core axis. No visible grains. Light green colored. Rhyolite is generally highly fracture and various colored from green to brown-orange colored.

50'
57' Bottom of Hole

100'

Sample at 27' shows qtz., sericite, calcite, very fine grained.

Sample at 15' is microcrystalline, siliceous, no visible grains, coul be a chert.

150'

200'

250'

300'

350'

400'

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project: Spectacle Grid Hole no. SPL-16A Dip -45° Started 10/23/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 80890N 22530E Direction S45E True 156° Mag Completed 10/24/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
4'	57'	53'	Trace		
	Bottom	of Hole			

J.S. Cummings Inc.

C. Matt

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-16 Dip -45° Started 10/24/80 El

Job no. 264.5 Township T10-R8 Coord. 81160N 22410E Direction 156° Mag Completed 11/7/80

Lithotype

0'

Overburden

5'

Alternating Felsic Tuffs, Sediments*, and Chert -
Mostly fine grained to gritty tuffs. Fragments when visible include qua rhyolite, feldspar, and other felsic fragments. Poorly layered but visil sections. Angle to core axis ranges from 20°-50°. Mostly green-grey co but chlorite altered fragments plentiful, section hematitic.

50'

Sediments very fine grained, not layered, mostly greenish colored, but s hematitic and cherty. (like 64'-70'.)

112'-123' - pale red (pink and white) chert section looks similar to section in SPL-14 going out of red hematitic chert.

100'

147' - another 6" of red hematitic chert.

Minor section with lapilli sized fragments at 158'-163'.

201'-202' - rock totally rotten? - recovered a very sandy material, near water stained sections.

150'

Sections of grit slightly calcareous.

* Samples at 49' and 61' suggest these are fine grained quartz-ser felsic tuffs.

200'

207'

Basalt -
Medium to coarse grained, massive, green-grey colored. Sections look ve similar to bottom of SPL-14. Minor chlorite alteration. Minor hematite veins and matrix. Quartz, calcite, and epidote in veins. Mostly all ma

250'

300'

350'

400'

continued next page

J.S. Cummings Inc.

C. Mattson

LITHOLOGIC LOG

Project Spectacle Grid Hole no. SPL-16 Dip -45° Started 10/24/80 Elev. _____

Job no. 264.5 Township T10-R8 Coord. 81160N 22410E Direction 156° Mag Completed 11/7/80

Lithotype

400'

Basalt

450'

475'

Grey-Green Volcanic Sediment * and Red Chert -
Grey-green sediment, fine grained, well layered. Layers ±20° to core axis. Red hematitic chert (499'-506'), sections well layered ±20° to core axis.

500'

511'

Bottom of Hole

*Sample at 498' is microcrystalline, quartz and ~~calcite~~. Sericite, calcite

550'

600'

650'

700'

750'

800'

Acid Tests

Depth	Apparent ∡	Actual ∡
200'	55°	49°
300'	49°	43°
400'	51°	44°
500'	48°	42°

J.S. Cummings Inc.

C. Mattson

SULPHIDE LOG

Project: Spectacle Grid Hole no. SPL-16 Dip -45° Started 10/24/80 Elev.

Job no. 264.5 Township T10-R8 Coord. 81160N 22410E Direction 156° Mag Completed 11/7/80

FROM	TO	INTERVAL	EST. % SULPHIDES	EST. METAL (Cu, Pb, Zn)	ALTERATION
5'	511'	506'	Trace		Chlorite and Hematite
	Bottom of Hole				

HOLE #	COORDINATES	DATE COLLARED	DATE COMPLETED	DIP	MAGNETIC BEARING	DEPTH	DRILLED BY
SPL-1	80800N, 16050E	8/17/80	8/20/80	-45°	111°	267'	County
SPL-2	81200N, 16100E	8/25/80	8/28/80	-45°	291°	232'	County
SPL-3	81600N, 15600E	8/28/80	9/ 9/80	-45°	291°	551'	County
SPL-4	81600N, 15300E	9/10/80	9/11/80	Vert.		102'	County
SPL-5	81600N, 14750E	9/12/80	9/17/80	Vert.		503'	County
SPL-6	80800N, 16500E	9/22/80	9/23/80	Vert.		61'	County
SPL-7	80800N, 16700E	9/23/80	9/25/80	-45°	291°	190'	County
SPL-8	86800N, 16900E	9/26/80	9/28/80	-45°	291°	205'	County
SPL-9	86800N, 16900E	9/28/80	9/30/80	-45°	111°	113'	County
SPL-10	89450N, 14800E	9/30/80	9/30/80	Vert.		40'	County
SPL-11	89450N, 14800E	9/30/80	10/08/80	-45°	291°	282'	County
SPL-12	89850N, 14725E	10/08/80	10/11/80	45°	171°	282'	County
SPL-13	See Sketch	10/12/80	10/13/80	Vert.		51'	County
SPL-14	See Sketch	10/13/80	10/22/80	45°	291°	193'	County
SPL-15	See Sketch	10/23/80	10/24/80		336°	70'	County
SPL-16A	80890N, 22530E	10/24/80	10/24/80	45°	156°	57'	County
SPL-16	81160N, 22410E	10/24/80	11/07/80	45°	156°	511'	County
					SUB TOTAL		

SPECTACLE (T10-R8) DRILLING

J. S. CUMMINGS, INC.