- amount of "noise" in the area guarantees anomalies
↳ fault related
↳ dol "Scarlet-type" veining
↳ Twin style shearing

Cana
824481

MINNOVA INC.

- what does it tell us that we don't already know?
- can it eliminate areas when we know it cannot detect blind deposits.

DATE: April 26, 1990

TO: Ian Pirie

COPIES TO: Alex Davidson.

FROM: Cam Clayton, Dave Heberlein.

SUBJECT: 1990 Samatosum Reverse Circulation Drilling Orientation Survey

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- undestimated costs for site prep.
- " staff levels 1geol + 2-3 assistants to take and sort samples for shipping
- data evaluation, interpretation and presenting.

General:

A reverse circulation drilling orientation survey was carried out over the 266 Zone during March, 1990. A total of 22 holes (500m) were drilled on three 100m spaced lines (105+00mW, 106+00mW, and 107+00mW) to evaluate the effectiveness of RC as an exploration tool in areas of extensive glacial overburden and limited outcrop exposure. The survey was designed to:

1) determine the nature of the geochemical response in basal till and the overlying stratified till of a known mineralized zone.
2) optimize sampling procedures (size fraction, sample medium, analytical technique etc.) to maximize anomaly contrast.
3) measure the effects of glacial dispersion on the geochemical response of the 266 Zone.
4) determine the overall effectiveness of this method as a bedrock geological mapping tool.

Sampling:

A variety of sampling procedures and techniques were evaluated by the survey. This was done to determine the most effective and cost effective technique for use in an exploration RC program.

Drilling was initially attempted dry to facilitate sample recovery and minimize any loss of fines. Because of the high clay content of much of the till, it was found that water was necessary to ensure a complete return of the sample. The use of a splitter under the cyclone to produce manageable, representative samples was also ineffective, again a result of the high clay content of the till. The following procedure and techniques were found to produce the best results.

1) Samples were manually collected from the cyclone in 12" x 20" plastic bags over 5' intervals. On average, 4 bags of sample were collected from each run, each containing approximately 50% water (and suspended material) and 50% coarse fraction. Two millilitres of polymer were added to each sample at the drill site to flocculate and settle out the suspended matter. When settled completely the water was decanted off and the solid material was combined into a single representative sample for each interval. From each hole, two bedrock samples and three till samples were taken.

2) Till samples were logged directly at the site by the geologist, who recorded data on colour, clay-silt-sand-gravel content, rock fragment type and sample viscosity. Once decanted, a representative sample of rock chips was taken for microscopic examination and identification.

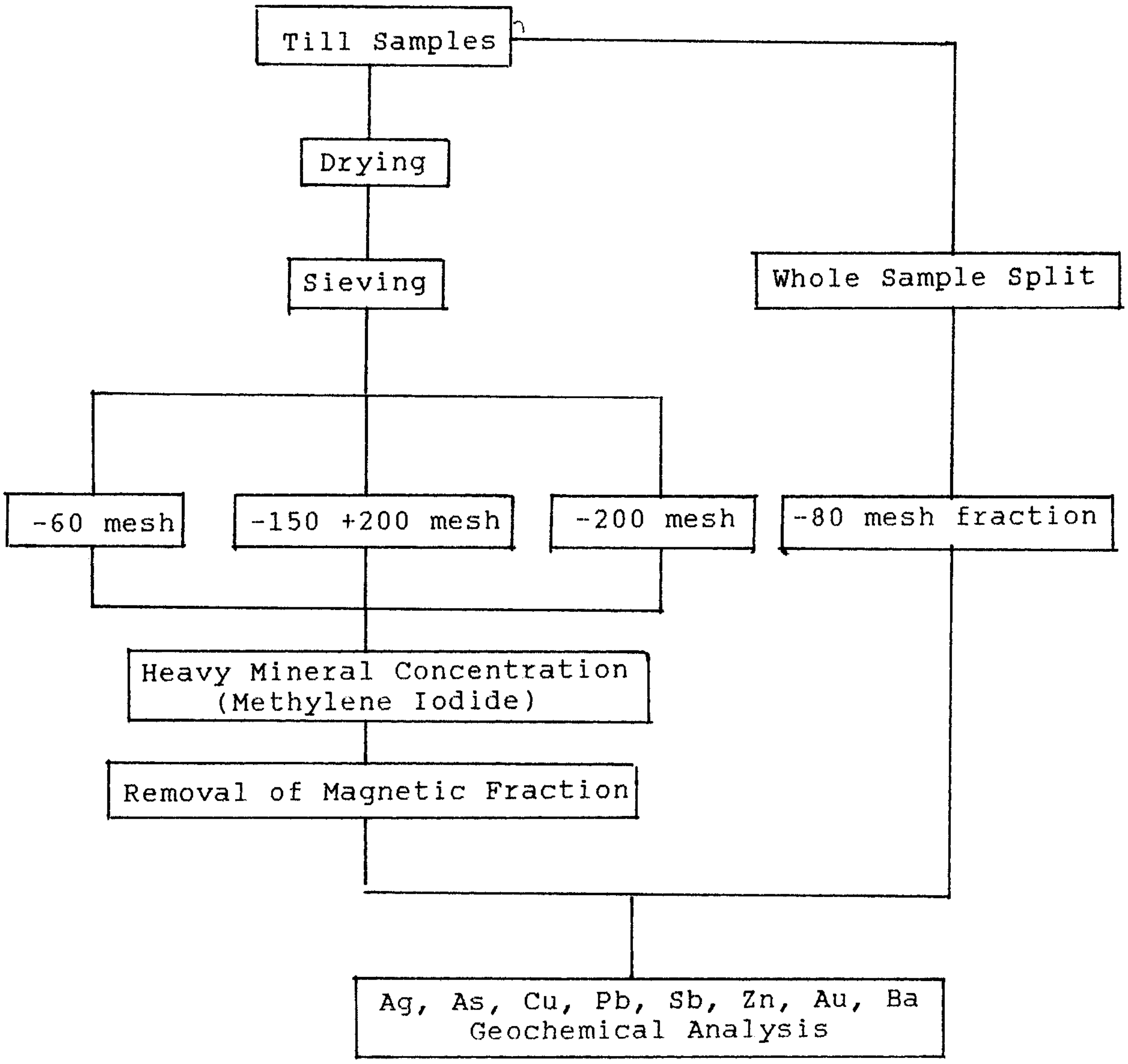
Analytical Techniques:

Analyses for till and bedrock samples were done at Minen Labs in North Vancouver.

Bedrock samples were split into two sub-samples. The first was pulverized to -80 mesh and analyzed for Ag, As, Cu, Pb, Sb, Zn by ICP and Au and Ba by AA. A non-magnetic heavy mineral concentrate was prepared from the second and analyzed for the same element suite. The weight percent of heavy minerals was also recorded for each sample.

Till samples were dried and screened into three size fractions from which heavy mineral concentrates were prepared (using heavy liquids). After removal of the magnetic fraction the samples were analyzed for the standard trace element suite (Ag, As, Cu, Pb, Sb, Zn) plus gold and barium. The procedure is summarized in the flow chart below:

ANALYTICAL PROCEDURE FOR TILL SAMPLES



Data Presentation:

In order to present the data in a clear and interpretable fashion, a graphical approach was used. Multi-variable XY plots using northing on the X-axis and element concentration on the Y-axis were chosen as the most suitable method of presentation. On each graph, the results for all three size fractions for a single element were displayed against the relative sample position on the drill section. Two sets of graphs were created, one representing data from the basal till layer (Level 1) and the other for the interval above the basal layer (Level 2). In addition to these, graphs for bedrock values were also plotted.

By this method the data could be rapidly evaluated to identify multi-element trends and to determine which size fraction and till horizon provided the best response.

Presentation of data in contoured plan form was found to be inappropriate as there are too many variables to be considered. However, in an exploration program where only one size fraction and one till horizon are being sampled, this method of presentation may be useful.

Till Stratigraphy:

Overburden in the survey area ranged in thickness from approximately 5 to 30m. In all holes it was found to be well stratified, with a prominent green, clay-rich basal layer overlain by mixed ablation till, channel sands and gravels. Boulders of granitic material were found to be abundant in the ablation till. These provided a useful marker for identifying these layers. More subtle units were identified based on their relative sand-silt-clay contents and relative proportions of rock chips.

The basal layer is unique in the stratigraphy and highly distinctive. It varies from 30 cm to 1.5m in thickness and consists mainly of an olive green clay. The presence of such a layer over the entire survey area may explain the poor soil geochemical responses over the 266 zone. This material would essentially form an impermeable barrier to the upward, hydromorphic dispersion of metals from the mineralized bedrock, thus minimizing the surface expression of the mineralized zone.

Results:

Key results of the orientation survey are as follows:
1. On the 266 Zone a strong response for As, Cu, Pb and Zn was detected over the mineralization between 5+25 and 5+75 N on lines 105+00mW and 106+00mW. The geochemical response could be detected in the heavy minerals up to 3m from the bedrock surface.

2. In bedrock the 266 Zone was best defined by %S in the whole sample and by weight percent heavy minerals. Responses for base and precious metals were elevated, but did not show any recognizable trends.

3. The position of the till anomaly with respect to the surface trace of the mineralization and the axis of the bedrock anomaly was found to be shifted consistently to the southwest by approximately 25 to 50m. This is most likely due to down-slope mechanical dispersion, however glacial dispersion may also have affected the distribution of metals in the till profile. If so the interpreted transport direction would by along a north-south axis.

4. The down-ice dispersion train was not sufficiently tested. Sections were drilled at 100m spacings instead of the planned 200m. This was due to access problems caused by poor ground conditions.

5. A new zone of highly anomalous Zn (to 60,000 ppm), Pb (2285 ppm), Ag (39.9ppm), and Au (150 ppb) was discovered at 8+00N on line 107+00mW. These anomalous values are associated with a strongly gossanous basal till layer which is interpreted to reflect a hitherto unknown mineralized zone. The anomaly was also detected on lines 106+00mW and 105+00mW. Here, in addition to the base metals, Au (to 2950 ppb) and Ba (to 5100 ppm) were significantly elevated in all heavy mineral fractions.

6. The reverse circulation drill proved to be an effective way of mapping bedrock geology. The rock chips collected from the samples were of sufficient size to be readily identifiable under a binocular microscope. Alteration types could also be clearly seen.

7. The optimum sampling medium in the till profile was found to be the lodgment till lying directly above the basal clay-rich layer. This material provided the sharpest contrast and the best defined multi-element trends. The basal layer was geochemically anomalous at most locations, however values were inconsistent. The highest quality anomalies were obtained from the non-magnetic fraction of the -150 mesh heavy mineral concentrate.

Conclusions and Recommendations:

The orientation survey over the 266 Zone clearly demonstrates that this exploration technique is effective for the detection of mineralization in areas of thick overburden. Results shows that the geochemical signature of the 266 Zone occupies an area significantly larger than the subcrop exposure. This is interpreted to be caused partly by down slope mechanical dispersion, partly by hydromorphic migration of elements and partly by smearing due to glacial action. The effect of the latter dispersion mechanism still remains to be determined, as the survey did not cover the area where a down-ice dispersion train would be expected (i.e. east of line 105+00mW). What it does tell us is that the size of a target is considerably enlarged by dispersion processes in the till, which has the effect of enhancing the detectability of a buried mineralized zone.

still must diamond drill to evaluate.

In addition to detecting the 266 Zone, the survey discovered a significant base and precious metal anomaly on lines 107+00mW and 106+00mW at approximately 8+00mN. In the till samples the zone was typified by abundant visible sphalerite and a strongly oxidized (gossanous?) basal layer. Bedrock underlying this target was found to be weakly anomalous, suggesting that the metals were derived from a source up-slope and perhaps, up-ice from the till anomaly. This would put it in an area close to the settling pond, where massive pyrite debris was identified in drill RG-263 (9+70mN, 108+50mW). This area should be regarded as a high priority drill target. Identification of this target underlines the usefulness of the RC drilling technique.

A cost break-down for the orientation survey is shown on the attached table. On a dollar per metre basis it is estimated that an exploration RC drilling program would cost approximately

$65/metre (all-in). The relatively high cost of the orientation survey ($93/metre) includes the costs of the various analytical techniques used to optimize sampling procedures and a sizable (and unforseen) road construction cost. Our experience from the orientation survey has shown that in the Adams Barriere area, this type of exploration is more suited to the dry summer months when access to most areas is much easier.

In conclusion it is recommended that Reverse Circulation drilling should be used as a method for diamond drill target identification, particularly in the deep overburden areas near the north boundary of Sam and on the Cana property.

COST BREAKDOWN

REVERSE CIRCULATION ORIENTATION SURVEY

Field Geologist	15 days @ $153 per	=	$ 2,295
Compilation/Interpretation	14 days @ $153 per	=	$ 2,142
Field Assistant	15 days @ $110 per	=	$ 1,650
2 field assistants + 1 warehouse assistant.	TOTAL SALARIES	=	$ 6,077
Total Drilling Costs	(500 m @ $43.67 per)	=	$21,835
Road Clearing Costs		=	$ 6,110
Analytical Costs		=	$10,945
Logistical Costs		=	$1,425
	TOTAL COSTS	=	$46,392
	TOTAL COST PER METRE	=	$ 93

ANTICIPATED COST PER METRE FOR A SIMILAR PROGRAM FOR EXPLORATION

Field Geologist	15 days @ $153 per	=	$ 2,295
Compilation/Interpretation	5 days @ $153 per	=	$ 765
Field Assistant	15 days @ $110 per	=	$ 1,650
	TOTAL SALARIES	=	$ 4,710
Total Drilling Costs	(500 m @ $43.67 per)	=	$21,835
Road Access Costs		=	$ 1,000
Total Analytical Costs		=	$ 3,438
Logistical Costs		=	$ 1,425
	TOTAL COSTS	=	$32,408
	TOTAL COST PER METRE	=	$ 65

the test survey demonstrated that this is not sufficient!