

Samatosum  
825103

MINNOVA INC.

DATE: November 6, 1989.

TO: Alex Davidson, Ian Pirie.

COPIES TO: Bob Friesen, Al Hill.

FROM: Dave Heberlein, Kerry Curtis.

SUBJECT: An alternative exploration strategy for Sam.

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Exploration to date on the Samatosum and adjoining Victory properties has relied primarily on a stratigraphic model for the mineralization. As a result our drilling strategy has concentrated on the identification of mineralized "horizons" (i.e. the Sam, Rea and 266 horizons). This approach has had some success; the discovery of the 266 Zone being the best example. Nevertheless, despite drilling over 12,000 metres on the Sam property in 1989, we still do not have a good feel for the property stratigraphy nor do we have any well defined targets outside of the 266 Zone and the immediate vicinity of the open pit. Generation of quality targets in the future using our current approach will become increasingly more difficult as we progress to the northwest of the mine, into areas of deeper overburden. Our current approach of drilling fences across the property, has proven to be an expensive and ineffective method of exploration. We are in essence using the drill to prospect, rather than using it to test specific targets.

There are two ways we can sharpen our ability to define targets on the Sam and Victory properties. The first, which we have already embarked on, is the development of a predictive model for the Sam style of mineralization (see the memo dated October 19th). The ultimate objective of this work will be to increase the target size, thus maximizing our chances of hitting an ore bearing system.

The second approach is intimately tied into the first. It is a method whereby we can more (cost) effectively outline areas of higher potential for diamond drill testing and in so doing reduce the amount of drill metrage spent on areas with low or no potential. An excellent tool to accomplish this is the Reverse Circulation Drill. Using this type of drill we can cheaply and rapidly drill through the overburden to sample basal till and bedrock. Bedrock sampling will allow us to: a) produce a subcrop geology map (without the cost of diamond drilling); and b) to effectively use lithochemistry to identify alteration zones in the subcrop. Basal till sampling will help us identify glacial dispersion trains from subcropping mineral occurrences that may lie outside of our current corridors of exploration (i.e. the stratigraphic trends of the known mineralized zones). These could be missed using our current method of exploration.

To apply this approach to finding a blind or subcropping Sam-type orebody, the size of the target in plan view must be considered. At Sam, the target presented by the surface exposure of the ore is extremely small. (i.e. about 100m in strike length and perhaps an average of 3m in width) and therefore not a practical target. The alteration halo, however, presents a much bigger target. In plan the alteration occupies an area of at least 75m in width and 500m in strike length. This size of target could easily be found by drilling RC holes spaced at 50m on 200m spaced sections. Lithochemical fingerprinting of the alteration zones at Sam (in progress) will provide us with a means of evaluating significance of alteration discovered by RC drilling.

Glacial dispersion, down-ice from the subcrop of the ore also presents a sizable target. At Sam, mineralized boulders were detected up to 200m down-ice from the original test pit. If coarse material is present at this distance, then finer grained debris should persist for a much longer distance down-ice. This type of anomaly could be detected by conventional heavy mineral and/or geochemical techniques on basal till samples. Basal till dispersion trains are generally fan-shaped and decrease in intensity away from the source. Once such targets are identified, they can be prospected with the RC drill to identify the source and the best locations for diamond drill follow-up.

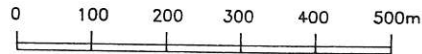
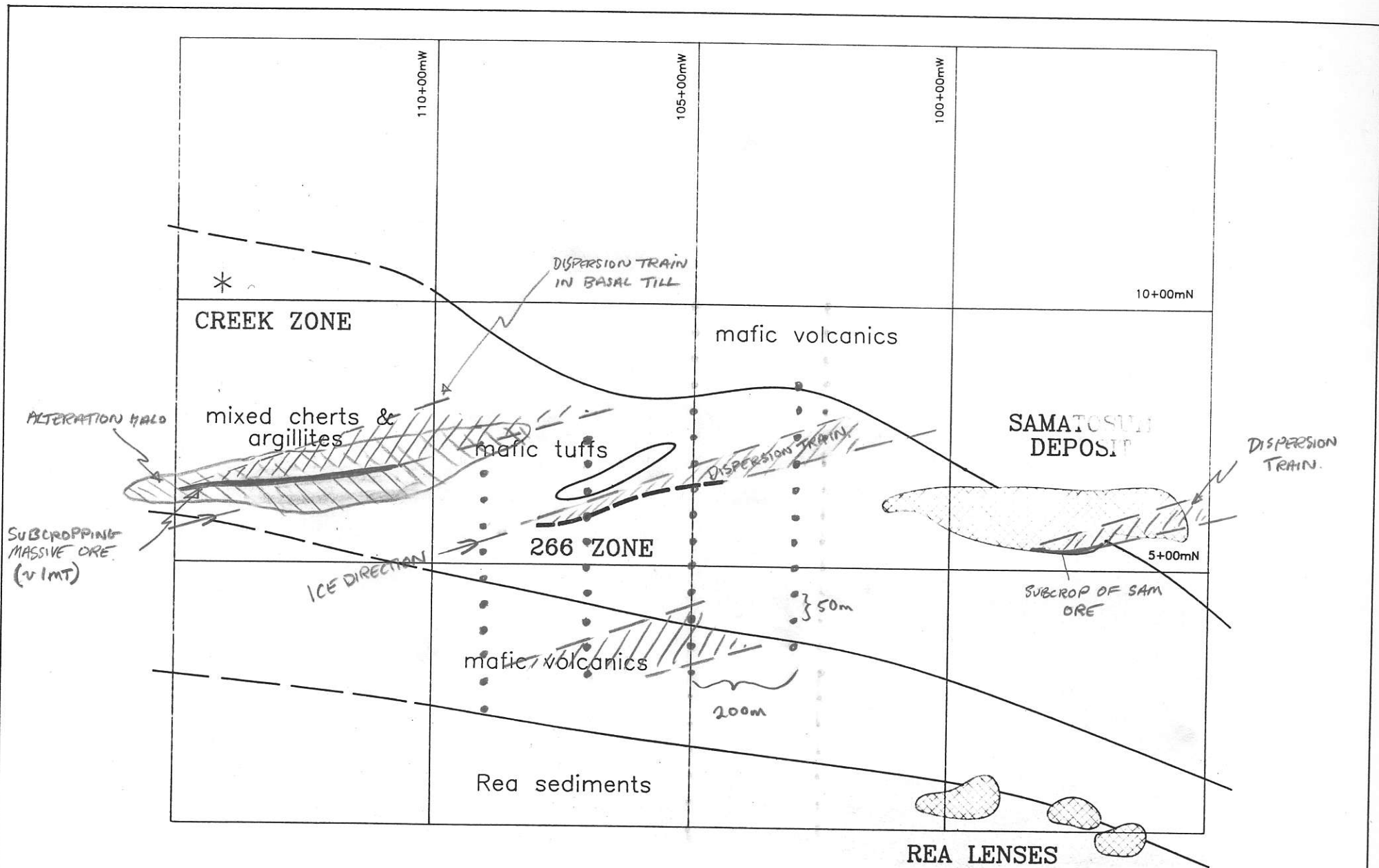
Advantages of RC-drilling at Sam are:

1) Low Cost - all-in drilling cost for RC is about \$45/m. Assuming average overburden depths of 30m on the NW part of the property and a drill spacing of 50m on 200m spaced lines, the area covered by the 1989 diamond drill program could have been tested for approximately \$60,000 (44 x 30m holes @ \$45/m) and still identified the 266 Zone (see attached map).

2) High production rate (+75m per shift ?).

3) Amenable to winter conditions. This type of program could precede a diamond drill program and generate specific targets for follow-up.

4) Can be used for geological and lithochemical mapping of subcrop.



# SCHEMATIC PLAN SAMATOSUM-REA 266 ZONE

# RC Memo.

## Availability and Costs of equipment:

- Companies
- S. B. C only.
- \$/m & production rate.

## Orientation Survey:

- Rational
- Approach

✓ Cheaply test large area for subcropping mineralized and altered zones.

✓ Test area of known subcropping mineralization.

✓ Test over zone and in down-ice direction to see if there is a dispersion train.

✓ Try different sampling techniques.

✓ a) Baral Till - Whole sample geochem.  
- HM.

✓ b) Bedrock. - Whole sample geochem.  
- Whole Rock.

✓ c) Screening of coarse material for logging.

- Survey will provide:

✓ a) Subcrop geology

✓ b) Litho geochem map.

✓ c) Baral till sample → Dispersion trains.

✓ d)

## Methods

- Vertical Drilling - no bias. 5' runs.

- 50 x 200 m grid chosen to maximize coverage of ground and minimize chance of missing a Sam size orebody. (Larger ones no problem).

- Dispersion trains known to trend NW → SE

✓ - a) from glacial Striae on outcrops and from erratic boulders e.g. Sam Monzonite.

- Sampling of 15' above & 10' below subcrop surface.

- Till sample can be treated as a soil.

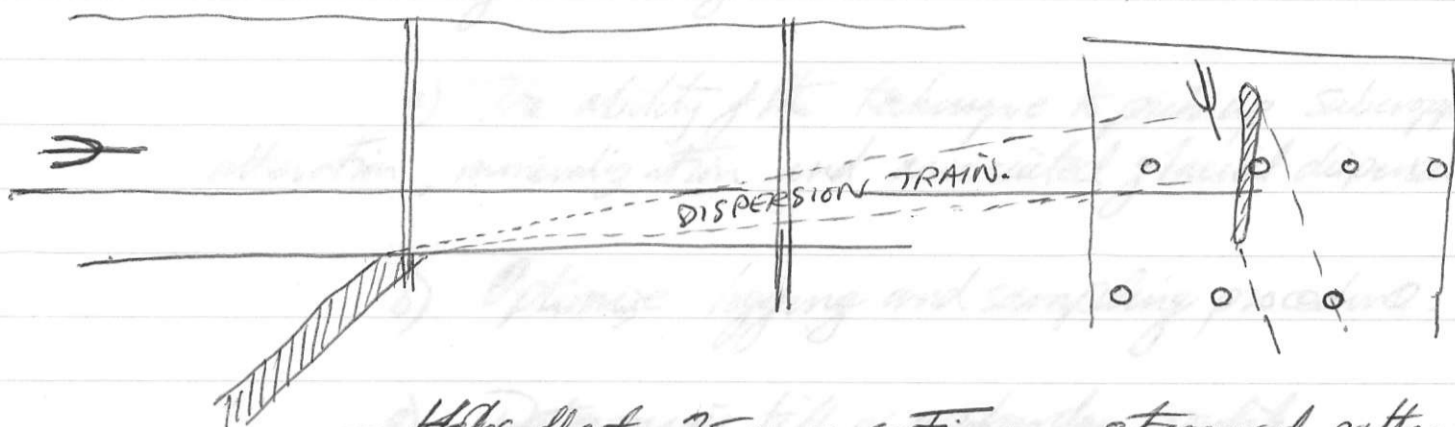
- when: → coarse chips sieved out.

- Heavy mineral separation → Trace analysis.

— Whole sample trace analysis.

↳ Different size fractions?

— Holes that hit mineralization should be run for all intervals.



— Holes offset 25 m on sections - staggered pattern.

— Rapid analytical turnaround required if program expands. ⇒ KRAL?

### Program Requirements.

1. Geologist or Geological Technician. - full time at drill.

Vehicle.

Possible Cat time for clearing snow on sections.

### Sections

103+80 E. - 7 holes

105+20 E - 9 holes

107+20 E - 8 holes.

## Reverse Circulation prog.

Orientation Survey is designed to test:

- a) The ability of the technique to pick up subcropping alteration, mineralization and associated glacial dispersion.
- b) Optimize logging and sampling procedure.
- c) Determine till or overburden profile.
- d) See if idea works on a known mineral occurrence.
- e) to test the ability

The survey.

- To drill 3 sections across the 266 zone.
  - 10380 W - Down to from mineralization
  - 10520 W - ~~Should~~ Allow a sample of subcropping MRSX + alt.
  - 10720 W

CCF-13

# Reverse Circulation Drilling.

\* SDS Drilling. (VAN) — \$12/ft. + 10-15K mob. <sup>far out.</sup>  
 Truck unit preferable (Cheaper). 500-2000' available.

\* Tonto. (VAN) — \$11/ft. (30'/hr min).

Leon Alton (VAN) — \$8/ft Percussion.

\* NORTH SPAN EXPL LTD. (CAN) — \$10-12/ft. (300'/day). Track mounted  
 861 1937 (PATMOONEY). Mob. 1000 roundtrip. on excavator/under  
 Po Box 2027 Stn R. 3 3/4 RC pipe  
 Kelowna - V1X 4K5. 500' max. 620/ft.

At Miller (Canvère) — ~~\$7.50/ft~~ Percussion drill only. (\$10)/ft.  
 Midwest Drilling. Recommends a R-C rig. Percussion not that good without casing only.

## Arise Drilling.

105+20 ST00N → 9+00N

AH • 7+00 → 5+50

MSSX 6+50

107+20 AH 5+50 → 7+00N. (5+00 → 9+00).

MSSX 6+00N

103+80 8+50 → 5+50N.

24  
 3  
 12

Total 24 holes.

Assume: Overburden 25m.

10380 - 7

10520 - 9

10720 - 8

24

Total 30m holes.

Production 100m/day minimum

Water truck required - \$450/day.

Technician 10 days.

Track Mounted R-C rig most suited.



[ Reverse Circulation Drilling. ]

- Cost per m. - DCC. & ALLIN.
- Mob/Demob costs.

Bob Brosinsky.

Iron Mtn ~~Tonto~~

Cost/ft \$8 <sup>~400</sup> Percussion Drill  
 4 holes/day - mounted on D-8, Pump Setup  
 - Has water truck.  
 Minimal contamination  
 3" casing - good sample.  
 Fines preserved.  
 - Can penetrate into bedrock.  
 Mob/Demob  
 Production.  
 Wet/Dry.  
 Water Supply.

Tonto Drilling.

Cost/ft. → \$11. Bit size 30' / hour. Tricone, with R-C. 5 1/4" hole.  
 125 samples. Skirted Tricones. Blow up from rods.  
 No depth limit.

AJ Miller. 30  
 125 25  
 Quest Canada. - No - R-C rig.

SDS Drilling Ltd., Van  
 254 6217. Lars Anderson.  
 Northspan Exploration Ltd.  
 Kelowna. 765 0692.

SDS Drilling Ledcor. Tonto. \$12/ft. (10-15K for mob cost)  
 Sonic Drilling. Midwest. \$500-1500!  
 Chinook Construction Hanning Cyclone. Truck unit preferable.



## Summary. R.C. orientation survey - 266 zone.

As a follow up to our meeting last Thursday, I have contacted ~~several~~ ~~all of the~~ ~~or~~ 5 ~~for~~ drilling companies that have RC and/or Percussion capability. There are

SDS Drilling Ltd.

Tonto

Iron Mtn Drilling Ltd.

Northspan Exploration Ltd.

Al Miller.

Of these companies only SDS, Tonto and Northspan could supply a track mounted RC rig. The others either didn't think they could handle the job or could only supply Percussion equipment.

All gave similar cost estimates  $\sim \$30-36/m$  <sup>15</sup> 3-4 holes.  
Minimum production  $\sim 100m/day \equiv \sim 3$  ~~holes~~.

SDS appeared to be unfamiliar with mineral exploration. They insisted that it would cost us \$10K-\$15K to mobilize to Barriere.

Northspan and Tonto appear to be the best candidates. Northspan 'got good references from Al Miller.

Availability of drills.

The program

Estimated Cost and timing.

Methodology.