Magnetic Field Measurements at the SNO Site 6800 ft Level, Creighton Mine

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INTRODUCTION

To verify the estimates of terrestrial magnetic fields at the SNO Laboratory site, a series of measurements of vertical and horizontal field components were made with a portable MEDA μMAG Magnetometer (Model 206). The survey was carried out at grid points in the cavity dome (Figure 1), at the laboratory entrance (including the former wash station location) (Figure 2) and in the vicinity of an assembled deck truss lying flat in utility room # 6 (Figure 3). Spot measurements were also made at a former ore pass and along the drift from the laboratory to the refuge station. In general, the measurements compare favorably to those reported in SNO-STR-90-101, but the more accurate instrument used here allows better average fields and variations to be found.

RESULTS

The μMAG instrument is self calibrating, easily readable and has a quoted accuracy of ± 10 mG. Vertical field values along the drift were observed to vary between 450 mG and 620 mG during a walking survey.

Location		Vertical Field (mG)	Horizontal Field (mG)
1) Former wash station			
a) entrance end		558	144
b)		560	124
c)		546	180
d)		533	132
e)		566	188
	Average	553 ± 12	154 ± 20
2) Cavity Dome			
a)		523	126
b)		537	161

c)	527	156
d)	566	135
e)	524	126
f)	566	95
g)	512	117
h)	558	179
i)	476	175
Average	532 ± 30	141 ± 25
3) Neutrino drift entrance	564 ± 20	136 ± 10
4) Former ore pass	523	89
5) Deck Truss in Utility Room		
a) About 50 cm above truss	523	137
b)	512	101
c) About 1 m above truss	551	129
d)	497	160
e)	365	105
f)	564	115
g)	557	144

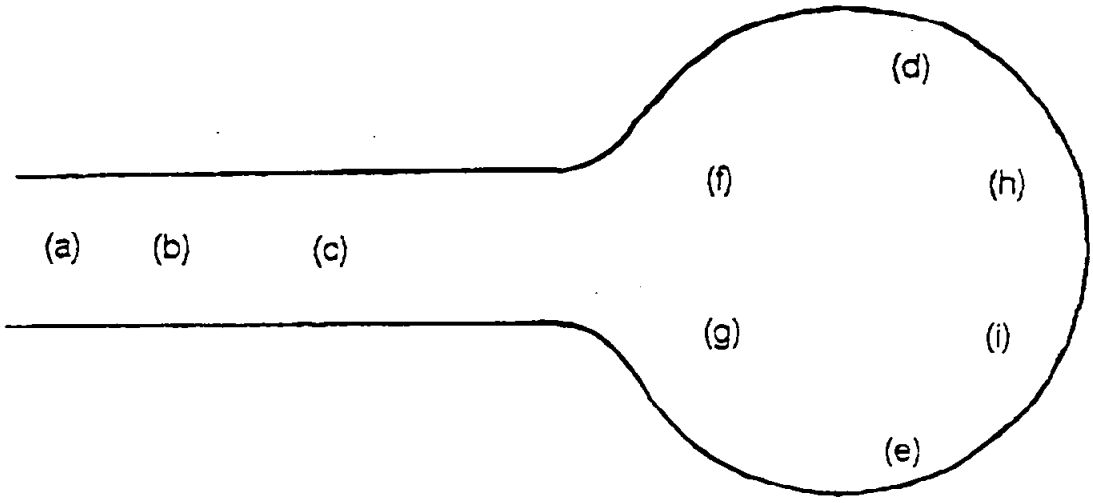

Figure 1. Location of measurements taken in the cavity dome (from the top of bench 2).

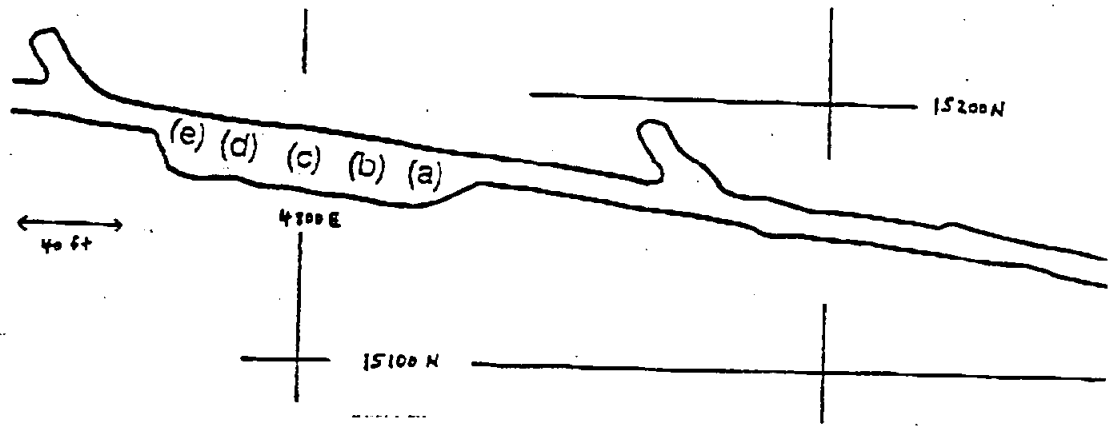

Figure 2. Location of measurements taken at the former wash station near the SNO Laboratory entrance.

(b)

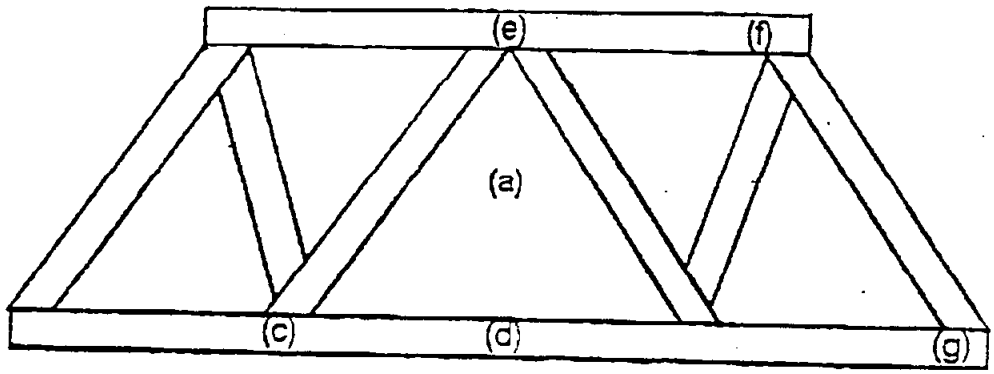

Figure 3. Location of measurements taken near the deck truss in the utility room.

CONCLUSIONS

It is evident that the magnetic field values in the cavity are reasonably uniform, with an average value of 532 ± 30 mG (vertical) and 141 ± 25 mG (horizontal). The horizontal field appears to be in the direction of magnetic north as expected, and the dip angle is close to the usual surface value of 75° for the Sudbury area. Near the deck trusses, larger variations are present, but for distances greater than 2 m, the field appears to be constant to within less than 10%. Further surveys of the cavity fields are planned as the excavation continues.

REFERENCE

E.D. Hallman and D.L. Cluff, Magnetic Field Measurements at the Creighton Mine, SNO-STR-90-101 (1990).

Second Thoughts on Biocidal Washing

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Evaluation of Biocides

After an initial evaluation of biocides, John Smit and Bill Ramey have made the following observations:

1. At 200ppm Adesol 20 and Amberquat kill 3-4 logs of attached bacteria (i.e. the biological activity as expressed in uptake of radiolabelled nutrients goes down by 3-4 orders of magnitude).

2. At 0.01-10ppm these biocides *stimulate growth*. These are both quaternary ammoniums and can provide organic carbon and nitrogen in media where these are normally limited. The molecules are charged and may well adhere to plastic surfaces and be resistant to removal.

3. Cidex (a glutaraldehyde formulation) stimulated growth even more than the quats. This may, however, have been due to nitrites in the mixture.

Implications

1. The extremely low levels of organic biocides which can stimulate growth make adequate rinsing extremely difficult.

2. A bleach treatment of Volume 1 at 100ppm would be much more effective and safe from a biological point of view. We have sent samples to Jerry Stachiw to test for crazing effects.

3. Bleach does not seem to acceptable anywhere near the concentrators.

4. It is possible that we will have to rely on degassing the water and providing a cover gas during the fill.

Cover gases under consideration are:

(a) Argon

(b) Nitrogen

(c) Carbon Dioxide

(d) Sterile Air

(a)-(c) are either totally or mostly useless to the nutrient-limited life we are worried about.

As with the biocides it is transitions which are hazardous. Getting to an anoxic state might create problems as low oxygen levels (0.1% - 5%, Ramey guesses) can stimulate otherwise dormant