CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: Lucky Friday Mine and Spokane Mining Research Center of the U.S.B.M.

DATE AND PLACE: October 17-18, 1989
Mullan, Idaho, and Spokane, Washington

AUTHOR: Simon Hsiung

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PERSON PRESENT:

CNWRA	SWRI	ITASCA	HECLA MINING CO.	U. S. BUREAU OF MINES
S. Hsiung	W. Vanzant	B. Brady	G. Pierson	T. Williams
			L. Lacerda	J. Whyatt
			T. Devoe	E. Corp
			B. White	M. Poad
				D. Scout

BACKGROUND AND PURPOSE OF TRIP:

To consider site suitability and technical support for instrumented field studies at the Lucky Friday Mine, Mullan, Idaho for seismic rock mechanics research project. The studies are concerned with seismic performance of excavations in jointed rock, and seismic effects on groundwater hydrology.

SUMMARY OF PERTINENT POINTS:

The Lucky Friday Mine is technically an attractive site in which to conduct the excavation performance and groundwater hydrology experiments.

The project will need to demonstrate the prospect of positive benefit to the mine before management will agree to its execution at the site.

There is real interest among mine technical staff in execution of the project at the mine.

The U.S.B.M. possesses equipment which is essential to the project, but in other respects they have little to contribute technically to the overall effort.

Mine staff favored physical execution of the field work by Itasca.

The Center will prepare a technical proposal on the field studies, for submission to the management of Hecla Mining Co.

SUMMARY OF ACTIVITIES:

Oct. 17, 1989 - Lucky Friday: Site Inspection
Lauro Lacerda, Mine Engineer, Lucky Friday Mine
Gene Pierson, Assistant to V.P., Hecla Mining Co.
Ted Williams, Mining Engineer, U. S. Bureau of Mines
Terry Devoe, Mine Geologist, Lucky Friday Mine
Barry Brady, Itasca
Simon Hsiung, CNWRA
Bill Vanzant, SwRI

In-depth discussions were held at the 5100, 5300, 5150, and 4660 levels in the mine between Brady, Lacerda, Williams, Hsiung, and Vanzant. Significant rockbursts had occurred at the 4660 level. Williams was monitoring closure transducers at the 4660 level. Detritus made access to certain extremities very difficult and it was pointed out that one set of car rails had shifted so as to be unusable. At one intersection the wall was distorted out into the tunnel. Rock bolts and wire mesh were used extensively through the tunnels observed, but they had little ability to restrain shattering in the vicinity of rockbursts, some of which approached 4 on the Richter scale. Observations in some areas were made hurriedly since rockbursts and their severity are not predictable. Also, observations in wet areas were made hurriedly. The primary surmisal of these close-up observations is that the mine is extremely active in the realm of seismic events. The influence of San Andreas activity on seismicity in the Lucky Friday was questioned, but it was mentioned that no correlation had been identified. (The San Andreas became active later on the 17th; a rockburst in the mine was detected by monitors during the overnight interval).

Pierson joined discussions at mine headquarters, along with Devoe and Lacerda. Brady, Hsiung and Vanzant were attendant during these discussions. Plans for future activities at the mine were discussed along with previous difficulties. Mine production procedures were explained in terms of stope accessibility, rockburst difficulty and hydrological possibilities. Brady discussed pillar mining and sequencing along with concepts for investigating seismic events and reducing their probability and severity. Pierson stated that mine profitability was of utmost concern. Consequently, resident personnel would not be able to assist in outside studies relating to rock bursts; the mine could not staff up to help; any studies would have to be made by personnel familiar with the mine; and any information obtained from a study would have to be of use to the mine.

Current plans are to deepen production to 6600 ft. should economic conditions warrant such development. It was suggested that an exploratory borehole at 5700 ft. would provide both hydrological information to the Center and useful information to the mine. This region is properly wet in that it has not been drained. Also, the geology has not been mapped. Further, it is in proximity to activity and associated rockbursts, so that correlation between rockbursts and hydrological phenomena may be possible. This exploratory borehole would provide some assurance that the mine can remain operational. Concurrent with the drilling and instrumentation, the deepest

operational level of the mine would be instrumented to monitor seismicity. This scenario would provide the needed information for both the Center and the mine. It is important that the mine remain open for an extended period of time to allow for rockbursts to occur and data to be accumulated.

It remains to ensure that the research be accomplished without interruption of mine activities. This means that instrument installation and data acquisition must be accomplished without requiring mine personnel to accompany research personnel. It was suggested that Itasca submit a proposal to the mine, through the Center, outlining in detail what has to be done and at what levels. The subsurface installation and monitoring would be done by Itasca personnel who are familiar with the mine and require no escort. Pierson indicated that such a proposal would receive prompt and favorable attention.

A 16 channel macro-seismic monitoring system, installed by the Bureau of Mines, at the mine is currently under operation. Williams demonstrated the data storage system, which includes time of arrival and frequency-duration data. Efforts to send the data by phone to the Bureau of Mines Spokane Research Center have not been successful due to phone noise. The transducers are monitored by Bureau personnel, but the mine considers that feedback from the government in terms of useful information is deficient.

Sketch of the mine layout and level that could be of interest for the defined rockburst/microseism/hydrological scenarios were given to the Center representatives. This information is appended.

Oct. 18, 1989 - Hecla Mining Co.
Brian White, Geologist, Hecla Mining Co.
Simon Hsiung, CNWRA
Barry Brady, Itasca
Bill Vanzant, SwRI

White explained the geology of the area, and the boundary positions of the Osburn and White Ledge faults. Sketches of the cross sectional geology are appended. The St. Regis (purple argillite) is the upper formation and the Revette (interbedded units of vitreous quartzite, sericitic quartzite, and greenish siltite-argillite) the lower formation encompassing the target stope of the mine. The Revette Formation contains well-defined upper, middle and lower members. The strata (St. Regis and Revette) were folded. The syncline dips a few degrees eastward. Rocks at the mine horizon reach the surface in the west of the structure. The ore-bearing strata which strike E-W and dip nearly vertically, lie primarily within the Revette Formation and are located at the north side of the syncline. The permeability of the Revette Formation is very low. Most of the drifts and boreholes within the Revette Formation are dry. Water is found within the Osburn fault, White League fault, fractured zones near the faults, ore-bearing strata, and several other minor faults between the Osburn and the White Ledge. At 5100 ft. (middle Revette), the formation is dry, but at depths below 5300 ft. 110°F water is available at 300 gal/min. Information on geology below 5600 ft. would be of benefit to the mine. The water path into the mine formations is through the Osburn. White was very interested in Brady's proposal to drill an oriented borehole in a wet area, possibly at the 5500 ft. sublevel, to monitor the hydrological effects due to seismic events. This proposed borehole is expected to intersect a

fractured sandy layer, a couple of minor faults and the ore vein. White also provided copies of papers relating to geology in the area.

Oct. 18, 1989 - U. S. Bureau of Mines, Spokane
Ted Williams, Mining Engineer, U.S.B.M
Jeff Whyatt, Mining Engineer, U.S.B.M.
Ernie Corp, Supervisor, U.S.B.M.
Mel Poad, Supervisor, U.S.B.M.
Doug Scott, Geologist, U.S.B.M.
Hsiung, Brady, Vanzant, Center Representatives

Williams provided a paper on Bureau surveillance at the Lucky Friday. Whyatt provided papers on other Bureau interests in Deep Mining and discussed the importance of full wave information for seismic motions in that transforms could be derived to indicate motions at the source. Corp and Poad expressed interest in being involved with the project. Scott demonstrated plastic overlays for mapping geology at the Lucky Friday. He was quite interested in possible input from the exploratory borehole recommended for hydrological studies. Williams stated that Chuck Wideman (U. of Western Montana) had suggested a surface site for hydrological studies may be suitable. Brady indicated that such sites had been considered, but were inferior to underground sites.

IMPRESSIONS/CONCLUSIONS:

None

PROBLEMS ENCOUNTERED:

None

PENDING ACTIONS:

Submission of a technical proposal on the instrumented field studies to the management of Hecla Mining Co.

RECOMMENDATIONS:

None

SIGNATURE: Sui-Min Hsiung

REFERENCES:

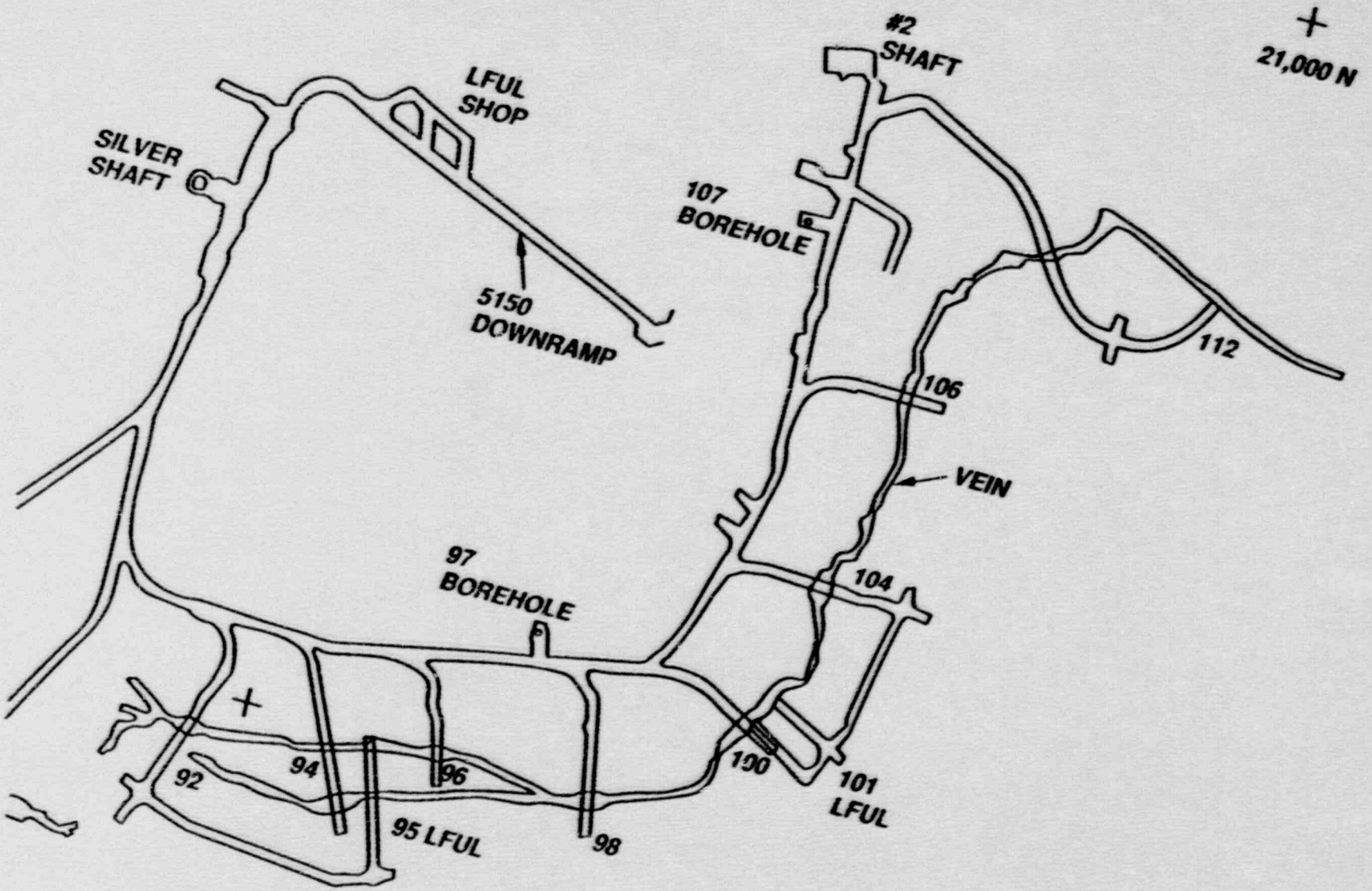
None

CONCURRENCE SIGNATURE AND DATE:

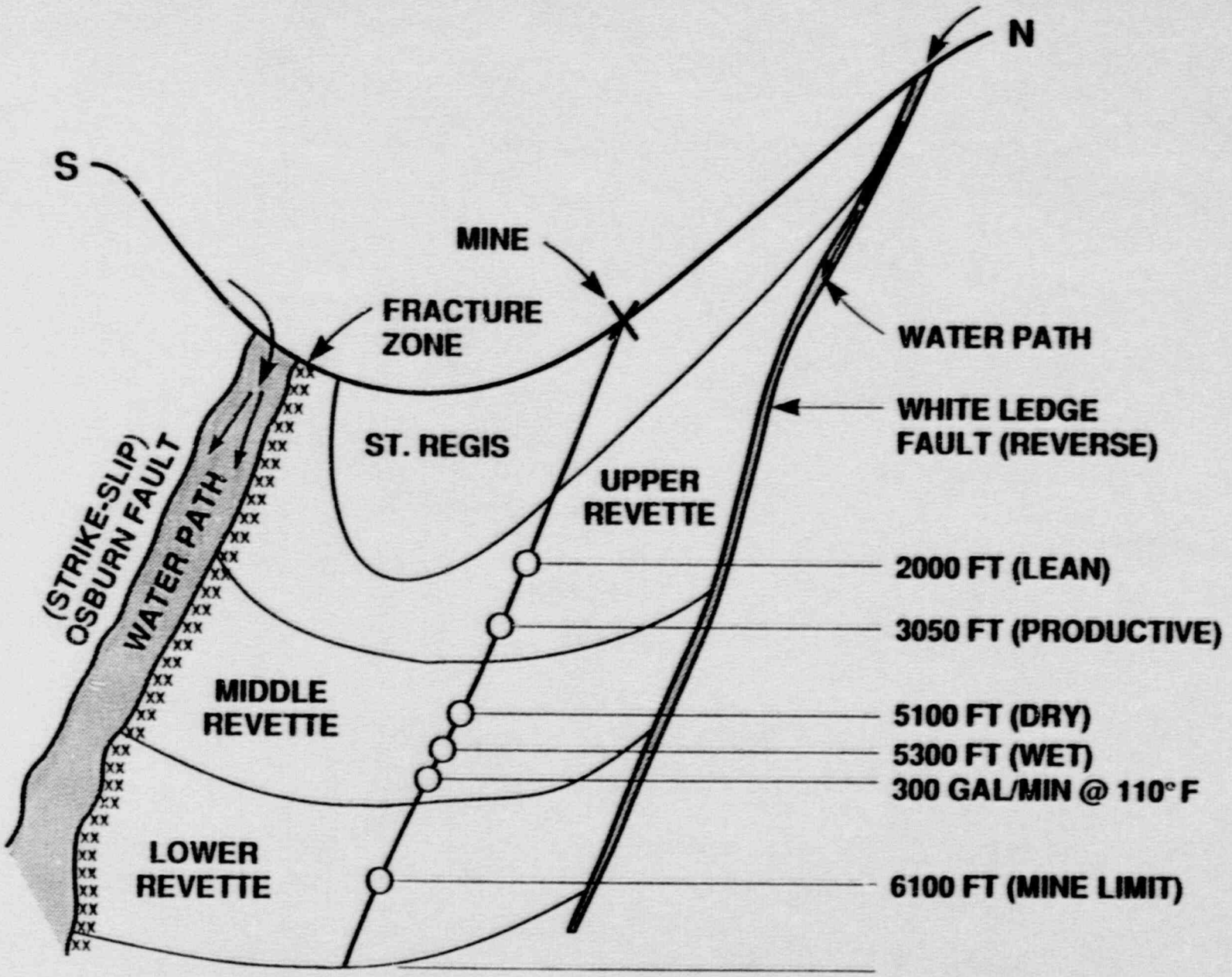
Allen R. Whiting
Allen R. Whiting
Director, WSE&I

11/22/89
Date

5100 LEVEL
VENTILATION SURVEY



SCHEMATIC OF GEOLOGY @ LUCKY FRIDAY



SCHEMATIC OF BOREHOLE - PLAN VIEW @ 5500'