

Total Ore Processing Integration and Management

7th Quarterly Technical Progress Report

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written by

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Abstract

This report outlines the technical progress achieved for project DE-FC26-03NT41785 (Total Ore Processing Integration and Management) during the period 01 January through 31 March of 2005.

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Executive Summary

Work in Progress: Minntac Mine

The lessons learned from ore segregation test #3 were presented to Minntac Mine personnel during the reporting period. Ore was segregated by A-Factor, with low values going to Step 1/2 and high values going to Step 3. During the test, the mine maintained the best split possible for the given production and location constraints. During the test, Step 1&2 A-Factor was lowered more than Step 3 was raised.

All other ore quality changes were not manipulated, but the segregation by A-Factor affected most of the other qualities. Magnetic iron, coarse tails, fine tails, silica, and grind changed in response to the split.

Segregation was achieved by adding ore from HIS to the Step 3 blend and lowering the amount of LC 1&2 and somewhat lowering the amount of LC 3&4. Conversely, Step 1&2 received less HIS with a corresponding increase in LC 1&2. The amount of IBC was increased to both Steps about one-third of the way into the test. For about the center half of the test, LC 3&4 was reduced to both Steps. The most noticeable layer changes were, then: an increase in the HIS split; a decrease in the LC 1&2 split; adding IBC to both Steps; and lowering LC 3&4 to both Steps.

Statistical analysis of the dataset collected during ordinary, non-segregated operation of the mine and mill is continuing (see Statistical Analysis, below).

Graphical analysis of blast patterns according to drill monitor data was slowed by student classwork. It is expected to resume after the semester ends in May.

Work in Progress: Hibtac Mine

Sample preparation for laboratory rock strength tests continues, for comparison with the density and point-load test results measured last summer.

Dr. David Drain of the UMR Dept of Mathematics and Statistics with Dr. Richard Gertsch are examining the predictability of crushed ore size distribution from source layer data at Hibtac Mine. Preliminary results show poor predictability using multiple linear regression, but surprisingly good predictability with a cluster-analysis derivative method.

Future Work

At Minntac Mine, the statistical analyses currently underway will be expanded to address issues identified by their results. The analysis of blasthole drill monitor data will continue with additional blast patterns.

At Hibtac Mine, the strength of exploration core samples will be measured and compared to their field test results. Crushed ore size distribution data will continue to be collected and analyzed in comparison with mill operational parameters.

Dissemination and Outreach

One technical paper was prepared for and two presentations were given at the SME Annual Meeting held in Salt Lake City, UT during the quarter. Mike Orobona of Hibtac Mine is preparing another paper for the regional technical meeting of the Duluth SME Chapter in April, 2005.

Introduction

This seventh quarterly report discusses the activities of the project team during the period 1 January through 31 March 2005.

Work in Progress

Minntac Mine

The lessons learned from ore segregation test #3 were presented to Minntac Mine personnel during the reporting period. Ore was segregated by A-Factor, with low values going to Step 1/2 and high values going to Step 3. During the test, the mine maintained the best split possible for the given production and location constraints. During the test, Step 1&2 A-Factor was lowered more than Step 3 was raised.

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STEP 1&2	HIS	IBC	LC3&4	LC1&2
Before	18.8%	4.2%	45.1%	31.1%
SPLIT	10.3%	13.5%	39.5%	35.2%
After	16.7%	14.5%	37.4%	31.4%
STEP 3	HIS	IBC	LC3&4	LC1&2
Before	18.6%	4.1%	45.3%	32.0%
SPLIT	31.9%	13.2%	33.9%	19.5%
After	17.6%	13.9%	35.4%	33.3%

Statistical analysis of the dataset collected during ordinary, non-segregated operation of the mine and mill is continuing. In addition, comparison of standard operations and operations during ore segregation tests is underway.

Graphical analysis of blast patterns according to drill monitor data was slowed by student classwork. It is expected to resume after the semester ends in May.

Hibtac Mine

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Future Work

Minntac Mine

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Hibtac Mine

The strength of exploration core samples will be measured and compared to their field test results. Crushed ore size distribution data will continue to be collected and analyzed in comparison with mill operational parameters.

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