INTRODUCTION

The Rock Handling System (RHS) at the Long-Baseline Neutrino Facility, Far Site Conventional Facilities project is the backbone of the entire excavation process. Because 800,000 tons of rock ultimately will be removed at the 4850 level of the Lab to provide space for the Deep Underground Neutrino Experiment detectors, the process by which all that rock can be removed is essential to the project, and by extension its level of efficiency will determine the overall efficiency of many aspects of the excavation—especially early in 2023 when cavern excavation reaches maximum production.

RESULTS

The average Grizzly cleartime is 4.2 minutes, which is longer than the required 2.5 minutes to meet maximum production demands. The Grizzly can be cleared most frequently at the 1- to 2-minute mark. The efficiency of the rock breaker depended mainly on the LHD (Load Haul Dumper) technique for muck dumping. It was also affected by how much metal debris was mixed in with the muck (metal clogs the Grizzly and many other areas of the RHS such as the Ore Pass, the Skip Loader, the Chain Feeder, and the Magnets—see Figure 3).

The typical skip time was consistent. However, I observed 18.3% of all skips hoisted were delayed and 3.7% were significantly delayed (accounting for 73% of the total delay time). The biggest reason for these delays was rock tended to clog the Skip Loader and require “blowpiping”—a forceful stream of compressed air used to loosen the rock and get it flowing properly again. A total of 55 minutes were lost over a period of 15.6 hours due to just the blowpiping delays, which resulted in an estimated 12 less skips hoisted over that period.

CONCLUSION

I suggest implementing an RC operated arm with a magnet on it (operated like the rock breaker for consistency) to pull out all metal debris before muck passes through the Grizzly. Without the flow of metal debris in the RHS, skipping efficiency could increase by 8.8% and combined with good LHD dumping technique, rock breaking efficiency could increase by 21%. These increases will become necessary when cavern excavation reaches maximum production in early 2023.