# CASE STUDY

## Optimizing Recovery in Uphole Stopes with WebGen™

**La Ronde Complex, Agnico Eagle, Québec, Canada**

### Site Profile

LZ5 is an underground gold mine in the Abitibi region of Quebec, Canada. It is part of the LaRonde complex managed by the Canadian gold company Agnico Eagle. LZ5 began production in June 2018. The mine is accessed by a ramp located at the bottom of an old open pit.

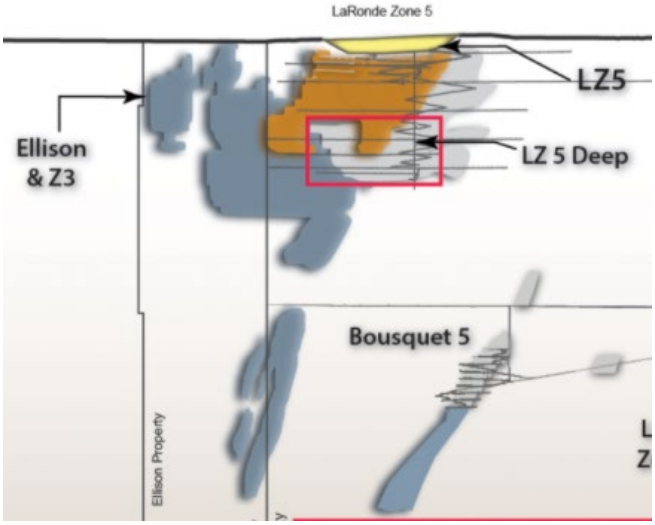


Figure 1 Longitudinal view of the LZ5 mine

### The Situation

Blasting results from the uphole stopes on the first production level were not meeting expectation. Some failed achieve 10 metres of height against a design of 23m. The mine contacted Orica in January 2021 to explore ways to use Orica's WebGen™ wireless blasting system to improve outcomes in the uphole stopes.

### Technical Solutions

WebGen™ is a system that initiates blastholes wirelessly by sending signal through rock, air and water. Orica implements WebGen™ on behalf of our customers after a detailed assessment of feasibility and risk, with a rigorous change management program.

At the mine's request Orica's WebGen™ Team and Agnico Eagle reviewed the uphole stope design, and implemented the following improvements:

- Drilling a 760mm rise for the opening void, and optimizing the void for each subsequent blast
- Changing the drill pattern and hole angles to decrease drill metres by 25% in the first WebGen™ stope

As part of the WebGen™ service, Orica's WebGen™ Specialists managed quality control, including verifying compliance against drilling and charging standards.

### Blast Flexibility

WebGen™ stopes are often pre-loaded to eliminate the need to re-enter during mining, and during charging blastholes are assigned groups called GIDs. By thoughtfully assigning GIDs during the design stage, groups can be separated or combined based on the results of cavity monitoring scans as the stope is mined. If scans show the stope is progressing well, GIDs are combined to create larger, more productive blasts. This is done remotely, with no need for anyone to access the blastholes to make physical connections.

Figure 2 illustrates the blasting sequence for the CH-09-05-107 stope. Based on the performance of the slot and rise, group BTU1 was fired next. After a scan showed BTU1 achieved the desired height, groups BTU2 and BTU3 were merged into a single blast.

WebGen™
Wireless Electronic Blasting Systems



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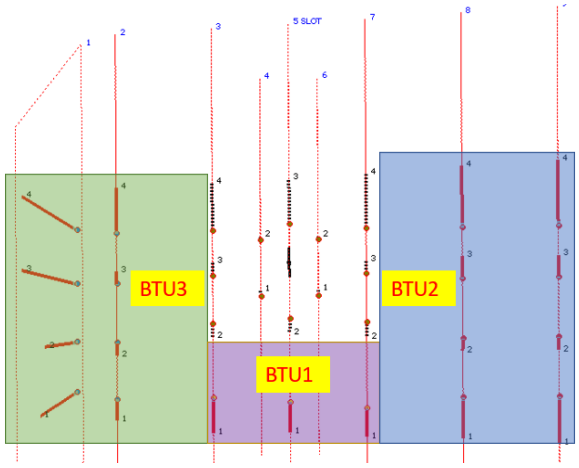


Figure 2 Groups for the CH-09-05-107 stope plan view

Figure 3 shows the sequence of the CH-09-05-108 stope. After the rise and slot were successful, BTU4, BTU5 & BTU6 were merged and fired as a single blast. BTU7, BTU8 and BTU9 were merged for the third blast. BTU8 included holes in the southern walls that recovered more ore than the original design.

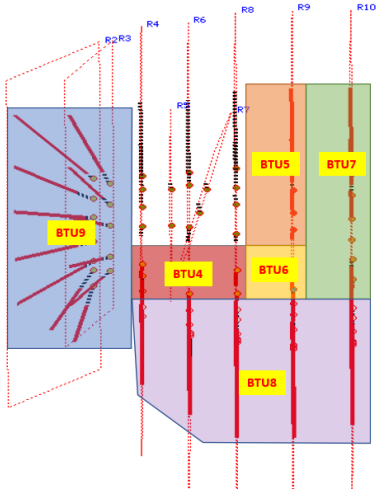


Figure 3 Groups for the CH-09-05-108 stope

WebGen™ gives users the flexibility to change the blasting sequence to suit the available void, without exposing workers to the hazards of re-entering the stope to connect blastholes. This type of optimization is usually not possible with conventional blasting methods and connected initiation systems.

### The Result

Several upper stopes were mined using WebGen™ after the success of the first uphole stope. Figure 4 shows the vertical recovery improvement achieved in the WebGen™ stopes. The orange part of the 09-05-108 stope could not be scanned, but the mucking performance of the stope shows this volume was broken and recovered.

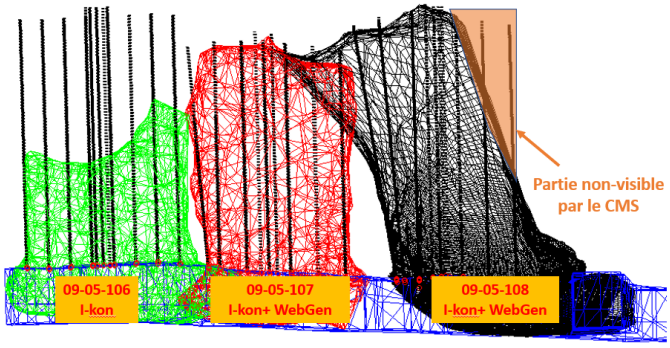


Figure 4 Improved recovery using WebGen™

Table 1 list results for the three stopes shown in Figure 4.

| | 09-05-106 | 09-05-107 WebGen™ | 09-05-108 WebGen™ |
|---|---|---|---|
| **Height actual/design** | 10m/ 23m | 21m/21m | 24m/24m |
| **Recovery (%)** | 65 % | 77% | 92% |
| **Dilution (%)** | 24 % | 2% | 2% |

Table 1 Final results of the stope

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Overall, the WebGen™ stopes improved recovery by 27% and reduced drill metres per tonne by 7%, with a corresponding decrease in drilling costs.

## Testimonials

*"Using WebGen has allowed us to improve the recovery of our upper stope. That would have been almost impossible without this type of detonator. We were able to do several blasts in the same stope without exposing the blasters"*.

**Luc Gauthier, Drill and Blast Technician, Agnico Eagle**

*"Implementing WebGen allowed us to greatly improve recovery in our upper stopes, because they allow us to perform several blasts and have an adequate void volume. The success of our WebGen trials allow us to believe in the possibility of applying this technology to perform mining in sectors previously not possible. This is a significant gain for us. The management of blasted material can become complex because there is the possibility that activated detonators end up there. The WebGen team supported us in this management, and we had the support of the mining operations department".*

**Vincent Bouillon, Mining Engineer, Agnico Eagle**

## Acknowledgements

Orica would like to thank Agnico Eagle LZ5 mine for their support and permission to publish this case study.

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## Disclaimer