



Left: The main spillway is approximately 500 m in length. The spillways were designed to convey any overtopped heap leachate in case of extreme weather events. **Right:** The secondary emergency spillway is approximately 140 m in length of varying width at 50% gradient.

PROTECTING A NORTHERN MINE LEACHATE SPILLWAY WITH CONCRETE CANVAS

By **Ron Drewry, Phill Greer, Rebecca Spitzer** and **Chantal Lambert**

Concrete Canvas® is a new class of construction material called geosynthetic cementitious composite mats (GCCMs). It consists of a three-dimensional geosynthetic fibre matrix filled with a high early-strength cementitious powder mix that hardens on hydration to form a thin, durable, waterproof and low-carbon concrete layer. Essentially, it is concrete on a roll and allows concrete construction without the need for plant or mixing equipment.

Used for a wide range of erosion control applications, Concrete Canvas (CC) has numerous benefits that make it an attractive product. First, its low mass, low-carbon technology uses up to 95% less material than conventional concrete for many applications. Secondly, CC's roll format makes it logistically easier to handle and easier to install than conventional concrete – you just unroll, place and add water. Thirdly, it can be installed rapidly at a rate of 200 m²/hour. This is up to 10 times faster than conventional concrete solutions.

Once hydrated, CC typically sets to 80% full-strength within 24 hours. Once at full strength, its climatic resistance and durability should provide in excess of 120 years of performance.

CC was used for two spillway erosion control lining projects recently completed at Eagle Gold Mine. This site is located in the Yukon, approximately 200 km from the Alaska border. It is subject to a seasonal temperature variance of +20° C to -30° C.

The spillways are designed to convey any overtopped mine heap leachate in extreme weather conditions. The first is the main spillway that connects a heap leach pad to an events pond. The second is an emergency spillway for the events pond. The

mine site is heavily monitored by Canadian regulators.

Poured concrete with an applied coating was considered as the protective liner, but discounted due to logistical and installation complexities. Concrete Canvas alleviated these concerns and was chosen for the projects. A total of 8,240 m² of CC8 and CC13 was installed.

The main spillway is approximately 500 m long with profile sections of 5 – 8 m at a 7% – 15% gradient. In this spillway, CC8 (8 mm thickness) was used for fall sections of 7.5% and CC13 (13 mm thickness) was used where the fall of the section increased to 15%. Installation was completed per standard channel lining details: hydrated overlaps, Soudseal 250XF bead, SS screws at 200 mm centres, 100-150 mm overlap with a 1.3 m anchor trench (0.75 x 3) along either crest with ground pins. Intermediate fixings were not required.

The emergency spillway is approximately 140 m long with varying widths at a 50% gradient. It was lined exclusively with CC13 per the engineering specifications. Installation was done a little differently than the main spillway and included gripple rock anchors at fixings not less than 1.8 m centres along its main section. At the 90° corner, anchor centres were not less than 0.5 m apart.

The project was completed in May 2019. Titan Environmental Containment supplied the Concrete Canvas and JDS Energy and Mining Inc. completed the installation at a rate of 750 – 850 m² per day at 15°C. ■

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