BACKGROUND

The Coquitlam Dam is located on the Coquitlam River, 15km (9.3 miles) upstream from its confluence with the Fraser River near the city of Port Coquitlam. The Dam provides additional storage and flows, which are diverted via a tunnel to Buntzen Lake and then to the Buntzen Generating Station. Coquitlam Lake is also used for domestic water supply to the Greater Vancouver Water District through an intake located 300m (984 ft) above the dam on the east shore of the reservoir. The 36.6m (120 ft) thick dam is a hydraulic fill embankment structure, which is approximately 31m (102 ft) high with a crest length of 290m (951 ft).

The Dam was originally poured on top of granite. However, the granite had water coming out through the fissures, nearly 10-12psi of water pressure (25-30ft of head pressure). As a result, the water worked its way up to the top to where the new concrete was poured. Leaking occurred in all the cold joints with significant vertical and horizontal cracks. Since the Dam had layers of backfill material against its backside (the Dam was built as a key into the mountain), it was vital that the project team stop the leakage and prevent contamination to the hydraulic fill. This would cause improper readings from sensitive monitoring systems installed in the dam face to sense changes in the structure. The team required a crack and repair waterproofing solution that could address the significant head pressure and one that could stop the leaks on all the cold joints.

SOLUTION

The project team turned to Kryton International for their Krystol® crack repair system for concrete waterproofing. When applied to existing concrete, crystalline chemicals are absorbed into the concrete by capillary action (the natural wicking movement of liquids through a porous structure) and diffusion (the natural movement of chemical molecules). Inside the concrete, crystalline chemicals begin to grow millions of needle-like crystals that spread and fill the pores, spaces, and cracks between concrete particles. Once the concrete has been sealed, Krystol lies dormant until a new crack forms due to settling and seismic activity.

Several of the vertical cracks ranged in length from 2.4m, 5.5m and 15.2m (7.9ft, 18.0ft and 49.9ft respectively).
Water entering through the crack reactivates the chemicals and causes new crystals to form and grow, which self-seals the crack and maintains a watertight seal. This self-sealing property is one of Krystol’s most unique and useful features and can often reduce long-term maintenance and repair costs.

For the Coquitlam Dam, Kryton led the project team in the following steps:

1. Prepare the cracks by chiseling out a chase along the length of each crack, and removing large 10cm (3.9 inches) stone aggregate since the leaks were discovered behind the aggregate, then cleaned and pre-wet.
2. Pack the cracks with cementitious, highly concentrated crystalline dry packs known as Krystol Plug™, Krystol T1/T2® and Krystol Bari-cote™. In the areas where the cracks were thicker than 7.6cm (3.0 inches), Bari-cote™ was mixed with pea gravel to act as an effective filler and to prevent further cracks.
3. Finish the area with cementitious slurry coatings.

The project team successfully repaired both horizontal and vertical cracks. Several of the vertical cracks ranged in length from 2.4m, 5.5m and 15.2m (7.9ft, 18.0ft and 49.9ft respectively). “Everyone was thrilled with the Kryton product,” Al Polonuk, Installer at White Van. “Everywhere we applied the product, the leakage stopped and dried out. BC Hydro was impressed and is looking to specify it for another one of their projects.”

LOCATION
Coquitlam, British Columbia

OWNER
BC Hydro

KRYTON DISTRIBUTOR
Cascade Aquatech

APPLICATOR
White Van

CONTRACTOR
JJM Construction

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