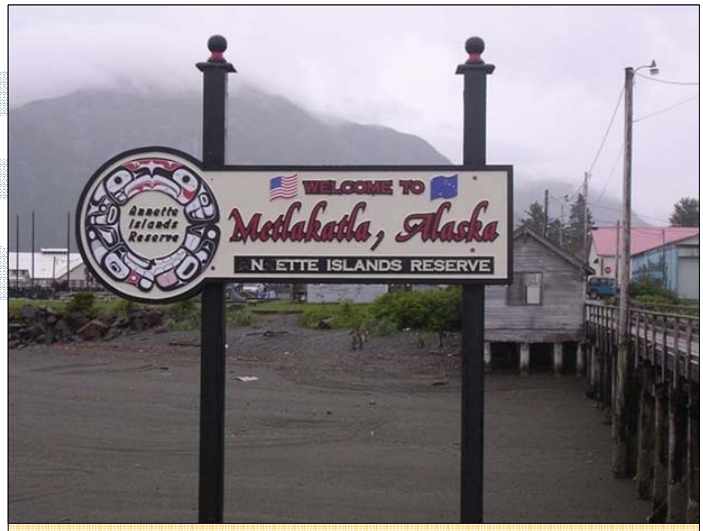
Case Study

Circuit Owner: Metlakatla Electric (Metlakatla, Alaska, U.S.A.)
Cable: 15 kV, XLPE: 3φ 4/0 and 750 kcm, 1,968 ft (600 m)
Problem: Having experienced a failure on one feeder and finding water inside the cable, this circuit owner wanted to prevent failures on the other feeders. The circuits run from the substation through a cable tray and conduits to three riser poles.
Solution: Novinium® Ultrinium™ 732 formulated for colder weather.

Metlakatla Electric provides electrical power to the Annette Island Reserve. The area is one of the wettest spots in the United States, receiving 4 meters of rain each year. That's 157 inches per year or almost ½ inch per day.

4/0 & 750 MCM Cable Project—the cables were terminated inside breaker cabinets at the substation and were de-energized one feeder at a time and injected. The copper strands were heavily corroded from bulk water in the strands. One or two gallons of water along with metallic salts and oxides were removed from each phase during the injection process. Additional bulk water was drained from under the jacket. The original terminations were of the bolt-on type and were not designed for an environmentally exposed medium voltage application. The bolt-on terminators were replaced with proper 2-hole sealed lugs and swaged to the injection adaptors. Novinium injection adaptors seal these cable from all future water intrusion.

All of the water that had accumulated in the strands was displaced with Novinium® Ultrinium™ brand rejuvenation fluid. More importantly, the fluid diffused in days into the insulation repairing the damage done by years of water treeing and returning the reliability of the cable to like-new.



Off the beaten path

Metlakatla, Alaska is a community of Tsimshian people who followed a missionary of the Anglican Church of England, Mr. William Duncan to a new home in the U.S. from their previous home in British Columbia. The U.S. Congress granted recognition to the new community in 1891 by creating the Annette Islands Reserve. Metlakatla means "salt water passage" in Shim-all-giack, the language of the Tsimshian. Metlakatla is located 15 miles southwest of Ketchikan, near the southern end of the Alexander Archipelago, a chain of hundreds of rugged, glacially carved islands interwoven with deep fjords and protected passages. Metlakatla is located approximately midway in the Inside Passage between Seattle, Washington, about 600 miles to the south, and Skagway, Alaska, 600 miles to the north.

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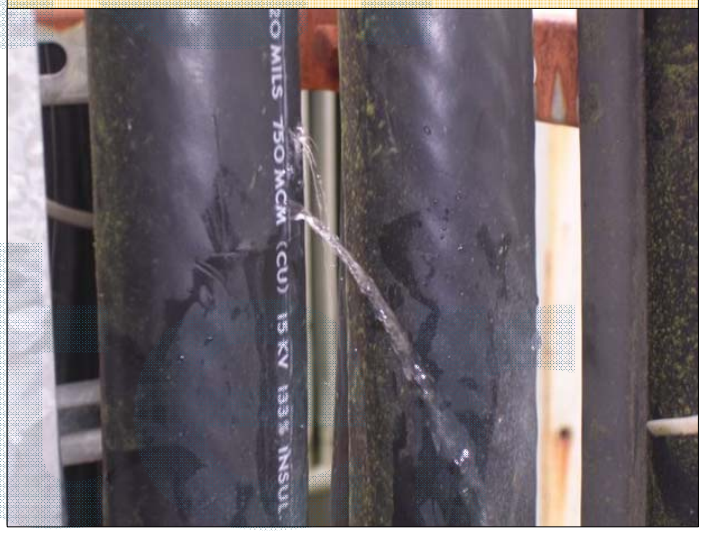
Floyd Russell, plant manager said: "We were not aware that we had that much water in our cables. I was also surprised that incorrect terminations had been used on these cables when they were originally installed. Novinium was well prepared for this project and efficiently injected the cables. We are pleased that we were able to bring these feeders back to like-new condition and look forward to trouble free operation for the next 40-years. Because of what we witnessed on this Novinium project, we are planning to do more injection work in our hydroelectric plant."

Water and red gook

Some oxidation states of copper are red. Water, copper oxides, and copper salts pour from a cable end as Ultrinium™ fluid is injected into the other end of the cable. While water is ubiquitous in the environment it is actually quite unusual to have bulk water in the strands of cable, even in particularly wet environments. Exposed, leaky terminations are usually the culprit. Proper termination design and installation techniques can solve this problem.

Substation get-a-ways were flooded with water. Years of water filled strands accelerated the growth of water trees and reduced the reliability of the circuits. Leak-proof injection adaptors seal water out of the strands and rejuvenation fluid in the cable.



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