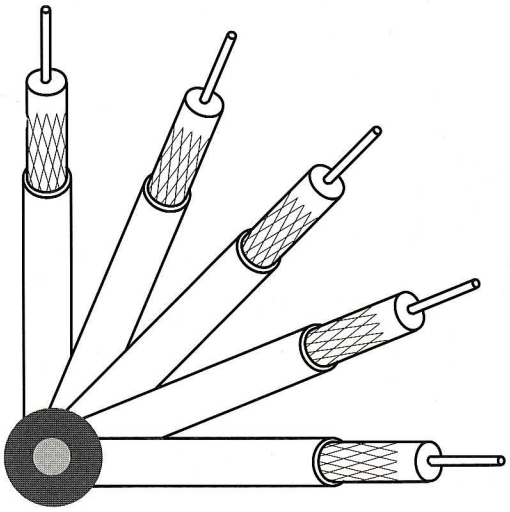

Current News

Another Electrifying Publication of Delta-Therm

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Super Bugs To Reclaim Contaminated Soil

In February 1994, an oil well in Trecate, Italy ruptured and sprayed oil for thirty-six continuous hours over five square miles of adjacent farm land. The property owners were appalled. As it turns out, these particular farms have been in the families of Trecate since the Middle Ages and were, until the spill, among the highest yielding wild rice fields in the world. With their options limited, the owners agreed to the idea of reclamation. A search for companies qualified to handle such a project led to Foster Wheeler Environmental Corporation, an international firm who was contracted to design and implement the cleanup.

"Super Bugs turn oil into carbon dioxide and water. . ."

Foster Wheeler's first challenge resulted from the vastness of the spill. Never before had a project of this scope been attempted. A typical reclamation project, for instance, might involve cleaning up a gas station spill, where leaky tanks may taint up to 1,000 cubic feet of earth. But handling approximately 900,000 cubic feet of polluted soil was far from typical, so Foster Wheeler joined forces with another environmental firm, Integrated Sciences Technology, and quickly devised a comprehensive plan to reclaim Trecate's soil.

The plan called for *bioremediation*, a process of healing the soil by using microorganisms as cleansing agents. To prevent excessive saturation, Foster Wheeler would immediately remove the affected soil to a stockpile.

The soil would then be divided into two piles—one 480,000 cubic feet, the other 427,000 cubic feet—so that oxygen, nutrients, and heat could be introduced to the microorganisms that naturally reside in the soil. The expected result: oil-eating super bugs that turn oil into carbon dioxide and water.

Supplying the bugs with oxygen and nutrients is not nearly as difficult as providing the heat, a tricky proposition that Delta-Therm was asked to consider. Microorganisms thrive only within a narrowly defined temperature range. In soil below 90°F, they go dormant; in soil above 100°F, they become slow and inactive. And in temperatures above 104°F, microorganisms die.

Delta-Therm project engineer, Jeff Duszynski, said, "the main problem was determining the proper heat output to maintain a soil temperature

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Italian contstruction workers prepare the soil for Delta-Therm's mineral insulated heating cable on BioPile No. 1. The photo shows the third of six total levels.

of 95°F using our mineral insulated heating cables."

Factors such as wind, soil density, moisture content, and outside air temperature were the unknown variables affecting the design of the heating system. "We knew it would take much more heat to reach the required temperature than it would to actually maintain it," Duszynski said.

What he eventually discovered was that dry, compact soil requires a thermal conductivity of 35 btu's per cubic foot to raise soil temperature 1°F in one hour. Duszynski used that information to determine wattage values for achieving and then maintaining the desired 95°F maintenance temperature. To prevent the soil from overheating, Delta-Therm also supplied high-limit, line-sensing thermostats for the project.

Workers laying out mineral insulated cable.

With the heating cable design behind them, Delta-Therm faced another challenge—how to provide a ground path for the cable. Ordinarily this is not a problem because their mineral insulated cable designs use a 3/4" metal t-condulet to house and protect the ends of the cable. The cold leads of the cable are usually run through metal conduit which is attached to the condulet, and then on into a grounded junction box to provide an overall system ground.

On this project, however, the condulet was attached to PVC, which provided no ground path. To surmount this problem, Delta-Therm designed a special grounding lug which attached to the inside of the condulet, allowing a ground wire to run from each cable to a grounded junction box.

Engineering challenges weren't the end of the story, though. Delta-Therm, for its part, still had to manufacture and deliver an incredible amount of fully terminated

"Solar drying system helps remove moisture in soil. . ."

mineral insulated heating cable-more than twenty-three miles worth—for a total of 467 individual cable systems. According to shop technician, Steve Rohde, it takes approximately two days to properly terminate and test one mineral insulated cable system. By carefully planning the work load, however, Delta-Therm's shop was able to complete and ship the order within six weeks, right in line with Foster Wheeler's schedule.

Unfortunately, Foster Wheeler's schedule was sidetracked by the worst rains and flooding Italy has seen in the last 100 years. The rain saturated the soil so thoroughly that it became unworkable. So, during a six-month period, from November 1994 to April 1995, Foster Wheeler designed and operated a solar heating system to speed along the soil-drying process.

The project is now back on track and scheduled for completion this year. Then, after the super bugs gorge on oil for eighteen months, the soil will be reintroduced to the farmlands—and the rich legacy of rice farming in Trecate can continue.