GE Hitachi Nuclear Energy

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On-Line NobleChem™

Mitigate Stress Corrosion Cracking with Critical Path Savings

On-Line NobleChem™ (OLNC) is GEH's new and improved solution for mitigating stress corrosion cracking in Boiling Water Reactor (BWR) nuclear power plants.

The extreme environmental conditions—such as high temperature, high radiation and high oxidants—inherent to reactor operations can result in intergranular stress corrosion cracking (IGSCC) of reactor vessel internal components and piping. OLNC applications and operation with low hydrogen is a process to mitigate IGSCC.

Plant personnel conduct the OLNC application process while a plant is operating. Compared to conventional NobleChem™, performed during outages from 1996 to 2009, OLNC eliminates the need for an average of 60 hours of critical path time, saving over a million dollars every four to six years in replacement power.

Available Now

On-Line NobleChem™ (OLNC) is now ready for your reactor. The process is available for both first-time applications or for plants already using NobleChem™.

Better Crack Mitigation

Since cracks may be more open during the normal pressure, temperature, and flow conditions of full power plant operation, OLNC promotes better penetration of noble metal into existing cracks, compared to conventional NobleChem™. Furthermore, with OLNC being applied during normal plant operation, plants can perform applications annually, vs. conventional NobleChem™ every four to six years. Frequent reapplications of OLNC reduces the risk of crack flanking, a condition that can occur when extreme material conditions or low hydrogen availability allow a crack to grow beyond the catalytic effects of the most recent NobleChem™ application.

Plant Savings

Since plants save approximately 60 hours of critical path time every four to six years, OLNC provides immediate cost benefits, along with the less tangible benefit of avoiding costly repairs in future years. GEH will perform the first OLNC application and will provide hands-on training to plant personnel, allowing them to perform future applications with GEH oversight or entirely on their own, as desired.

OLNC Injection Skid

For more information, contact your GE Hitachi Nuclear Energy sales representative.

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Features

- Application occurs during normal plant power operation, reducing outage costs
- Annual applications allow use of only the platinum chemical, eliminating the need for rhodium and its associated chemical species, providing more fuel-friendly conditions
- Injection under normal flow and pressure conditions allows better penetration into cracks and crevices
- Available for non-NobleChem™ plants and those already applying NobleChem™
- Plant chemistry and radiation responses to OLNC are moderate and manageable.
- Specially designed injection skids and operational training are provided to the plants, for subsequent customer use during annual OLNC reapplications

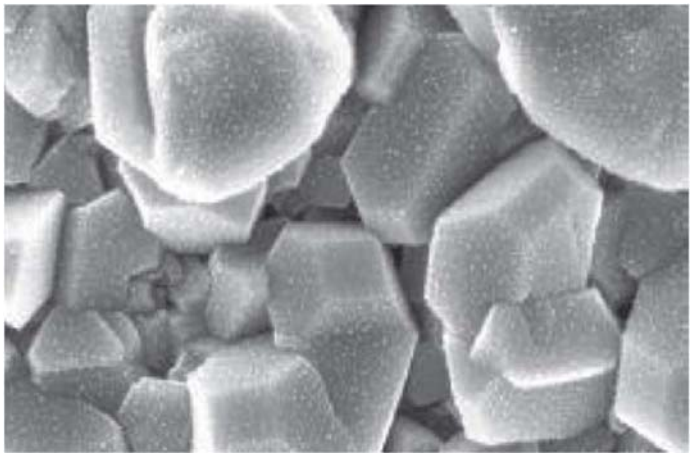
Benefits

- Saves 60 hours of critical path time, worth over a million dollars every four to six years
- Logistical and dose savings from reduced onsite vendor presence
- Addresses crack flanking that may occur with conventional NobleChem™ or during interruptions of hydrogen injection
- Similar dose reduction benefit as conventional NobleChem™ compared to Hydrogen Water Chemistry
- Improved on-line crack growth mitigation strategy from the perspective of plant life extension
- More efficient nanoparticle approach that increases catalytic surface area and sites by a factor of 1000 or more compared to conventional NobleChem™

Proven Results

On-Line NobleChem™ (OLNC) is proven, both through extensive laboratory testing and inspection results from operating reactors. The first OLNC application was performed at an international BWR-4 in June/July 2005, with reapplications annually. Since the initial 2005 application, 30+ additional BWRs have implemented OLNC.

Carefully controlled crack growth tests have repeatedly shown that OLNC applications and operation in excess hydrogen, where the hydrogen-to-oxidant ratio is greater than two, provide mitigation of IGSCC. Shroud cracks in the initial BWR-4 have shown significant reductions in growth rates since the implementation of OLNC.



Platinum nanoparticles deposited on an oxidized stainless steel surface

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