

## On-line NobleChem™

## product update

### 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. Plant personnel conduct the On-line NobleChem process while a plant is operating. Compared to conventional NobleChem™, this eliminates the need for an average of 60 hours of critical path time, saving over a million dollars in replacement power every four to six years.

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. IGSCC occurs in areas where an oxidizing environment, stress, and susceptible material are present. On-line NobleChem with low hydrogen is a process to mitigate IGSCC.

Introduced in 1996, GEH's conventional NobleChem process involves injections of both platinum and rhodium during plant shutdown, requiring valuable critical path time. Building on this proven technology, GEH's On-line NobleChem optimizes the process by only requiring the use of the noble metal platinum during normal plant operations. Plant operators and fuel engineers appreciate the elimination of rhodium and the reduction in the number of other chemical species injected through On-line NobleChem.

#### Available Now

On-line NobleChem is now ready for your reactor. The process is available for both first-time applications or for plants already using NobleChem. Before the first application, a plant walk-down is necessary to identify any potential plant modifications necessary for injection of the chemical into the feedwater.

### Better Crack Mitigation

The special patented process of On-line NobleChem generates nanoparticles of platinum that penetrate cracks more successfully. Additionally, since cracks can be more open during the normal flow and temperature of full plant operation, the noble metal promotes better penetration to the crack mouth. Combined, these features should lead to improved mitigation of IGSCC growth. Since On-line NobleChem is applied during normal plant operations, plants can also address crack flanking, a condition that can occur when the hydrogen water chemistry supply is interrupted for extended periods of time.

### Plant Savings

Since this process allows plants to save approximately 60 hours of critical path time, On-line NobleChem pays for itself quickly. GEH will complete the first On-line NobleChem application and provide hands-on training to plant personnel, allowing them to complete future injections. Besides convenience, a self-sufficient plant application team will also eliminate the need for onsite vendor teams normally associated with conventional applications at outage time. This helps save costs and ease logistics associated with in-processing time, set up, and dose for the application team.



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## Features

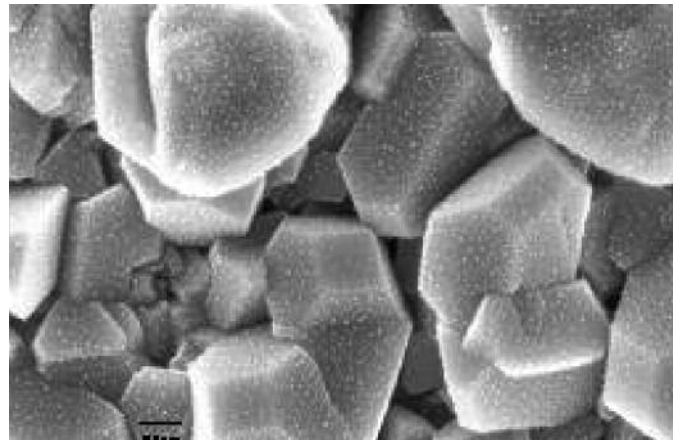
- Application occurs during normal plant power operation
- Uses the noble metal platinum and eliminates the need for rhodium and other chemical species used in the conventional process
- License to inject NobleChem during plant operation by a method that produces more effective platinum nanoparticles
- Produces noble metal nanoparticles up to 40 times smaller than the conventional process, resulting in more uniform distribution and better penetration into cracks and crevices
- Available for both first time NobleChem applications and for plants already applying NobleChem
- Proven to not increase N16 operating dose
- Specially designed injection skid that remains on site
- Training provided to plant personnel, eliminating the need for onsite vendor personnel for future injections

## Proven Results

On-line NobleChem is proven both through extensive lab testing and in an operating reactor. The first On-line NobleChem application was performed at an international BWR-4 in June/July, 2005, with a reapplication to the same BWR occurring in January 2006. An application has also occurred at a BWR-2 in the U.S. In both cases, the On-line NobleChem application had no unexpected adverse impact on the main steam line radiation monitor readings or the fence dose rates. Additionally, there was no impact on any of the plant operating parameters, including water chemistry or on fuel cladding performance.

## 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 low temperature process when hydrogen is interrupted
- Similar dose reduction benefit as conventional NobleChem compared to Hydrogen Water Chemistry
- Improved on-line crack growth mitigation strategy from a plant life extension perspective
- More efficient nanoparticle approach that increases catalytic surface area and sites by a factor of 1000 or more



Platinum nanoparticles deposited on an oxidized stainless steel surface



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For more information, contact your GE Hitachi Nuclear Energy sales representative or visit us at [www.ge-energy.com/nuclear](http://www.ge-energy.com/nuclear)

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