Steam generators are one of the key components in NPPs, which need to be maintained in excellent condition. Chemical cleaning provides a method to clean the whole steam generator from tube sheet to top of bundle. Since each plant has its own history and design it is mandatory to tailor any treatment specifically to each plant to obtain optimum results. The AREVA C³ toolbox is providing processes ranging from maintenance to full scale cleaning.

Steam generator condition is a key factor for plant performance, high plant availability, life time extension and is important to NPP safety. Ingress of corrosion products originating from the steam-water cycle into the steam generators and formation of deposits is a matter of fact. Amount, composition and characteristics of material ingress vary from plant to plant due to different water chemistry, material concept, blow-down techniques and effectiveness, etc. Consequently, the amount of corrosion products, the deposition area and the deposit composition are plant specific and can vary in a wide range.

Removal of deposits or deposit minimization strategies are an essential part of the asset management program of the steam generators in NPPs. It is evident that such a program is plant specific, depending on the individual prevailing conditions. Parameters to be considered are for example:
- Steam generator and balance of plant design
- Secondary side water chemistry treatment
- Deposit amount and constitution
- Deposit distribution in the steam generator
- Existing or expected corrosion problems

AREVA’s process portfolio:
- Maintenance/preventive cleaning:
  - Deposit Minimization Treatment – DMT
- Intermediate cleaning processes:
  - Deposit Accumulation Reduction Treatment at Low Temperature – DART LT
  - Deposit Accumulation Reduction Treatment at High Temperature – DART HT
- Full scale/curative cleaning processes:
  - High Temperature Chemical Cleaning – HTCC
  - EPRI SGOG

AREVA’s approach for tailored chemical cleaning processes
Customized Chemical Cleaning C³ – concept

Your Benefits at a Glance

- AREVA’s international experience and expertise covers hundreds of steam generators with designs of various OEMs
- AREVA’s C³ toolbox provides cleaning processes, which are suited to answer to each steam generator condition
- The chemical cleaning process is tailored to the individual needs and requirements of each individual plant

**Characteristics of the DMT process**

- Designed for multiple applications
- High magnetite dissolution capacity up to one ton per steam generator
- Very low corrosion of carbon steel due to self-inhibition effect (< 30 μm)
- Innocuous towards stainless steel and nickel base alloys
- No use of hydrazine or other toxic substances
- No release of ammonia to environment
- Easy decomposition of waste
- The complete steam generator from TSP to TOB is accessible and cleaned

**Characteristics of the DART/HTCC processes**

- High magnetite dissolution capacity up to several tons per steam generator
- Excellent hard sludge, crevice and broach hole cleaning efficiency
- Low to moderate corrosion of carbon steel (DART LT/HT: < 50 μm, HTCC: < 250 μm)
- Innocuous towards stainless steel and nickel base alloys
- Very short application duration
- Low plant intrusiveness
- The complete steam generator from TSP to TOB is accessible and cleaned

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Pre-assembled modular chemical cleaning equipment

A glance in the steam generator after cleaning process application