

Case History: High Purity Water Purification

Problem:

CANDU nuclear reactors use heavy water (D₂O), which, over time, becomes contaminated with organic compounds. These levels of contamination are classified as chronic or acute levels of Total Organic Carbon (TOC). To upgrade and reuse the D₂O, the TOC must first be removed. In the early 1990's, UV/peroxide was initially chosen as the solution to treat the contamination. However, traditional UV/peroxide could not treat the turbid fluids. In addition, there was the safety hazard associated with the use of peroxide within the confined space of the reactor facility. Purifics has manufactured & supplied several Photo-Cat systems to the Nuclear industry to purify water with organic contamination and other challenges. Our latest installation for a CANDU reactor was commissioned in 2005.

Requirements:

- **Automated** water purification solution with remote control
- **Chemical-free** process that eliminates peroxide and its hazards
- Significantly **reduced** operating and maintenance costs
- Certification under the Boiler and Pressure Code as a **Registered Piping System**
- Treatment of turbid fluids from 1000ppm TOC to less than **1ppm** TOC using a chemical-free method



Solution:

A Photo-Cat system based on a new generation of technology, and customized to client requirements.

Unique Technologies ... Eliminate Problems ... Achieve Solutions

Benefits:

- Treatment of water to a purity level of 1ppm TOC
- **Chemical-free process** that does not generate waste, and eliminates associated chemical hazards
- Durable stainless steel construction
- Power monitoring
- Regulated flow control up to 60 l/min
- A ten-year pedigree featuring a 24,000 hour service interval
- Magnetically-coupled pump eliminates seals and service
- Total system integration & closed-loop design, palletized with a small footprint
- Novel aeration device to supply stoichiometric oxygen for organic mineralization
- Fully automated expert system featuring modular I/O and remote SCADA
- Single CRN registration to meet QA/QC requirements
- Global access to technical service

Results:

In operational use, the Photo-Cat met client requirements by successfully treating downgraded heavy water from 1000ppm TOC to less than **1ppm** TOC in a chemical-free process.



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