

### Treatment of Problematic/Orphan Wastes Using a Novel Technology from the UK

#### PARTNERS



NuVision Engineering (NVE) and Arvia



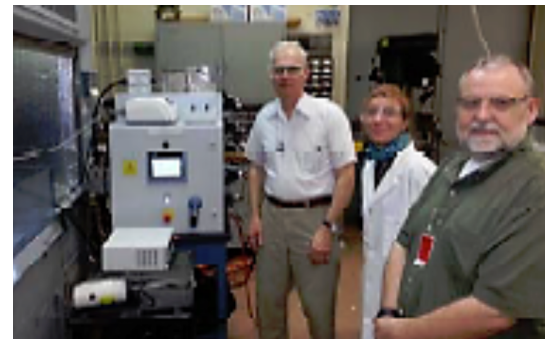
DOE OREM, DOE HQ, URS/CH2M Oak Ridge (UCOR) and Materials and Chemistry Laboratory Inc. (MCL)

#### Technical Summary

There are a wide variety of waste streams across the DOE complex, many of which have well documented and well proven disposition pathways. However, there are also a number of waste streams, particularly those containing organics such as dioxins and furans for which the disposition path is not clear or does not exist at all. DOE EM is collaborating with Arvia Technology and NuVision Engineering to evaluate and demonstrate the effectiveness of an innovative technology that combines adsorption, using a patented material called "Nyex™", with electrochemical oxidation for non-thermal destruction of organic components of radioactive liquid organic waste streams. The Arvia Organics Destruction Process is a highly efficient system to convert organic materials to carbon dioxide and water while partitioning radioactive and inorganic constituents into an aqueous stream that can be readily treated by a local active effluent treatment plant. The Nyex™ acts as a catalytic agent and is regenerated during the process, which makes the approach both environmentally friendly and cost effective. Specific waste streams with no current disposition pathway (e.g. dioxins and furans) have been identified and both radioactive and non-radioactive trials conducted to demonstrate the ability of the Arvia technology to treat these wastes, removing problem organic species to below regulatory limits thereby rendering them suitable for treatment by other, more conventional means. Successful demonstration of this technology for the dioxin and furan and other F027 coded wastes identified at Oak Ridge will enable DOE to treat these orphan wastes, allowing their final disposition.

#### Path Forward

- Develop the permitting strategy for application to treatment of actual radioactive orphan waste in the DOE inventory.
- Determine the necessary throughput rate versus plant size versus cost and schedule for effective processing and treatment of actual wastes at Oak Ridge.
- Develop a more detailed preliminary design for the pilot unit for radioactive waste treatment, in accordance with the permitting strategy.



Members of the Arvia, UCOR and NVE team with the Arvia treatment unit.

#### Key Accomplishments

- Demonstrated the Arvia unit's ability to remove and treat target organics (i.e., F027 coded wastes such as dioxins, furans) effectively to meet regulatory limits such that residual waste can be processed using existing treatment systems.
- Developed the overall conceptual design, operational parameters and protocol that will be essential in applying the technology to radioactive wastes.
- In collaboration with DOE EM, established UCOR and OREM support, engagement, and commitment to overall approach, which will help ensure effective deployment starting in FY18.

#### Key Benefits

- Treatment and disposition of part of the DOE EM inventory of orphan wastes that currently has no identified disposition path. This will provide significant cost savings by eliminating the need for long term storage, as well as risk reduction related to handling and management of these materials.
- DOE EM leveraged significant investment by the UK in development and demonstration of the Arvia technology at Magnox Plant in the UK. Although some adaptation to the EM application has been necessary, this approach provides more cost-effective and faster implementation for processing of actual waste in the DOE EM inventory.
- The technology has application to other waste streams throughout the DOE complex.