[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to the public)

Technology Information	
Area	2 (Select the number from "Areas of Technologies Requested")
Title	**Kurion Modular Detritiation System (MDS™)**
Submitted by	**Kurion, Inc.**

1. Overview of Technologies (features, specification, functions, owners, etc.)

Kurion has demonstrated that its patent-pending Modular Detritiation System (MDS™) successfully solves the three basic challenges for application of detritiation at Fukushima: can the technology i) perform light water detritiation? ii) process inlet water of low tritium activity ($1x10^6$ to $5x10^6$ Bq/l) to achieve an effluent of less than or equal to $6x10^4$ Bq/l? and iii) achieve a throughput of tritiated wastewater of several dozen cubic meters per day to several hundred cubic meters per day in a cost effective manner? No other technology in the world except Kurion's has demonstrated it can successfully solve these three challenges.

Technology Name: Kurion Modular Detritiation System [1] (MDS™) and all necessary technologies (pre-treatment, secondary waste treatment, final waste treatment) to enable total water treatment and preparation for final disposal or recycle of tritium.

[1] http://www.kurion.com/technology/separation/detritiation

Technology Type and Function: Based on significant advancements to the Combined Electrolysis and Catalytic Exchange (CECE) process tailored for light water detritiation, the MDS is a highly advanced technology that has been successfully and uniquely adapted for low activity light water treatment. Technology demonstration plan for Fukushima deployment has already successfully been completed.

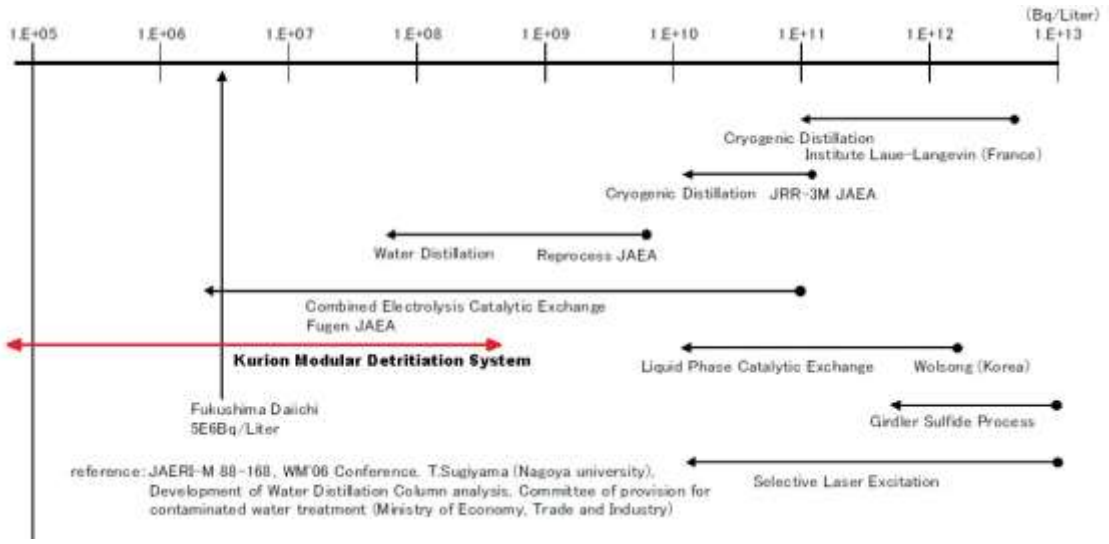
Technology Description: The decontamination of tritium (T) is particularly problematic: it is a special form of hydrogen that creates tritiated water (HTO vs. H2O), which does not lend itself to removal by conventional technologies. This is because instead of the contaminant being carried along in water in suspended or dissolved form, the water molecule itself is modified. As a result, tritiated water is particularly difficult to treat and can spread easily if it escapes into the environment.

The industrial process of removing tritium from water has historically focused on cleaning highly contaminated “heavy water” for recycling back into nuclear reactors, such as the CANDU reactor design. However, this technology is prohibitively expensive for use with light water reactors. The Kurion MDS™ builds upon proven heavy water solutions and makes advances in throughput and efficiency where the tritium removal occurs. Kurion has developed an economical solution that – for the first time – allows for the recycling or clean release of reactor cooling water for light pressurized water reactors.

Technology Owners: Kurion, Inc. is the unique offeror of the patent-pending, proprietary MDS technology. The technology was developed in early 2000’s for both light and heavy water detritiation but with an emphasis on the latter. Effort on light water detritiation started shortly thereafter and intensified in 2009-2012, resulting in a breakthrough, demonstrated and patent pending technology.

MDS Specifications:

- Process up to 7.4×10^8 Bq/l
- Release well below the required 6×10^4 Bq/l with DF of >1000
- Electric consumption less than 50% that used by conventional CECE
- Only consumables are electricity, clean water, compressed air and argon/nitrogen purge gas
- Small footprint compared to other traditional systems (25-50% less)
- Innovative system allows for simple expansion to 400 m^3/day or more



Comparison of Demonstrated Tritium Technologies

The MDS is the only demonstrated cost effective technology to deal with the unique tritium problem at Fukushima because of the following:

- A fully integrated Kurion MDS is presently in operation in Houston, TX on an industrial scale with Light Water with inlet activities ranging from $1x10^6$ to $5x10^6$ Bq/l,
- All components needed to process Fukushima water have been assembled and demonstrated at high fidelity with water with Fukushima wastewater characteristics,
- Proven to have a release well below the required $6x10^4$ Bq/l (Fukushima reactor release limit),
- Unique electrolyzer and column design for the highest possible throughput per area and per energy (Bq/day/m^3 and m^3/Watt),
- Wide range of acceptable inlet activities, demonstrated up to $7.4x10^8$ Bq/l
- No abandoned streams – the tritium can be concentrated in a very small volume for stabilization (e.g. concrete) for disposal as low level waste or to a pure form for recycle as feedstock (e.g. ITER),
- Low cost consumables – electricity, water, argon/nitrogen and compressed air, and
- Low scale up risk

Kurion team unique capabilities: more than 20 years providing commercial integrated solution to the tritium industry.

- The Kurion MDS is based on years of work in the tritium industry. Kurion and its partners have been involved in tritium remediation since the mid-1980s working on various systems and a variety of tritiated wastes. Key detritiation processes offered and operated for commercial customers: Heavy Water Detritiation, TOX Tritium Oxidation for Organics, Thermal Desorption System.
- Tritium recovery and reuse services through the use of up to six combined systems including the above mentioned systems for integrated treatment and recovery.
- Wastes processed industrially for commercial customer include: high tritium organics and solvents, neutron generator devices, foils from electron capture detectors, ion getter pumps, metal components of tritium handling systems, radioluminescent devices, decontamination of getter beds and subsequent deactivation of the devices for land disposal.
- Unique experience designing and implementing integrated processes encompassing and dealing with all secondary and final waste streams so that a regulatory path to final disposal is easily attainable.

2. Notes (Please provide following information if possible.)

- Technology readiness level (including cases of application, not limited to nuclear industry, time line for application)

Technology Readiness Level

Kurion has implemented since 2009 Technology Readiness Assessments according to widely accepted guidance (NASA, DOE, UK-NDA). Under the DOE TRA methodology, the Technology Readiness Level must be evaluated for the entire system offered and according to three main criteria: Scale of testing achieved vs. intended full scale application, Fidelity of test and Relevant Environment. According to the DOE TRA Methodology, Kurion has achieved bench scale and pilot scale, prototypical system validation in the relevant environment. Scaling factors have been fully determined for the application at Fukushima. The pilot scale currently in operations is capable of performing all the functions that will be required of the operational system. The operating environment for the demonstration study closely represented the actual operating environment. As the result of the extensive development and testing, the technology is ready for industrial deployment at operating nuclear power plant, and with modest scaling, for application at Fukushima.

Additional information on the Technology Readiness Level and cases of application is disclosed in the Appendix.