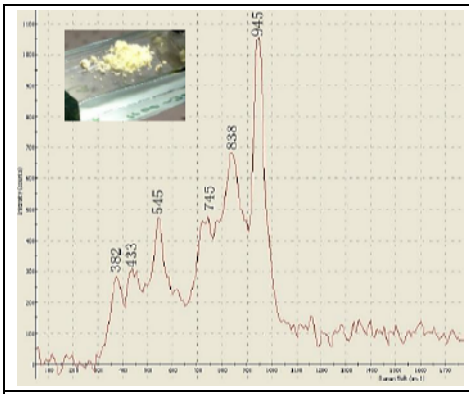
[Form 2 (to be reported to Committee on Countermeasures for Contaminated Water Treatment and to be disclosed to public)

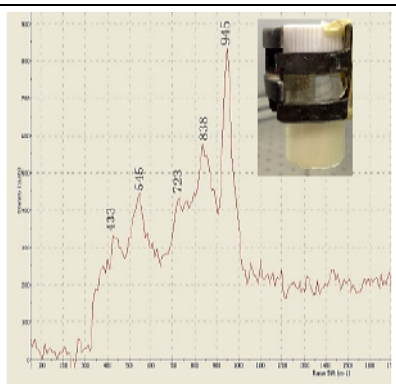
Technology Information	
Area	1 and 2 (Select the number from “Areas of Technologies Requested”)
Title	Standoff monitoring
Submitted by	UK National Nuclear Laboratory (NNL)

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

NNL is developing standoff Raman and laser induced breakdown spectroscopy (LIBS), both of which offer remote and at-a-distance monitoring capabilities. For monitoring of the composition of effluent liquors, Raman is the most promising technology, enabling measurement of the identity of compounds and species in solution. NNL has developed standoff Raman (tested to distances of several metres to date) on solids, liquids and on solids suspended in liquids. In each case, the composition of the solids was identified. Present work undertaken by NNL concerns identifying solids causing blockages in effluent transfer pipes. Figure 1 gives an example of zirconium molybdate measured at 2m distance, both suspended in solution and as a solid. Apart from a 50% lower intensity in solution, both spectra are identical. This approach is intended to identify the potential to block waste effluent transfer pipes.



Solid zirconium molybdate



Zirconium molybdate suspended in water

Figure 1. Raman measurement of zirconium molybdates spectra.

NNL is also undertaking work to identify dissolved solutes using standoff Raman, for example, development work to identify the presence of organic radionuclide complexing agents in effluent waters (humics, fulvics, detergents and chelating agents). NNL is extending this study to dissolved complexants having shown that this technology is feasible. The overall goal is to provide effluent treatment technologies with information about the presence of potential complexants that could reduce the effectiveness of radionuclide removal.

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

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

TRL 3 (proof of concept) has been completed, now moving towards TRL 4 (testing of individual components).

- Challenges

The means of remote deployment: either using fibre optic cables to act as a wave guide for transmission/ return signals or developing a transparent window into a tank/flow pipe. We have demonstrated that glass or perspex is transparent to the Raman laser.

- Others (referential information on patent if any)

This technology is under development through a memorandum of understanding with the University of Manchester.

【Areas of Technologies Requested】

(1) Accumulation of contaminated water (Storage Tanks, etc.)
(2) Treatment of contaminated water (Tritium, etc.)
(3) Removal of radioactive materials from the seawater in the harbor
(4) Management of contaminated water inside the buildings
(5) Management measures to block groundwater from flowing into the site
(6) Understanding the groundwater flow