

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

Technology Information	
Area	4 (Select the number from "Areas of Technologies Requested")
Title	Development of a tool to understand activity transport through building structures, for design and optimization of processes.
Submitted by	
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p>Understanding how activity moves and concentrates around a nuclear site and its environs is an essential requirement. Most of this is usually associated with transport in groundwater or in the open air. However, the Fukushima site has an additional issue associated with transport within buildings and other man-made structures.</p> <p>The UK National Nuclear Laboratory (NNL) have an extensive process modelling capability that has been applied over 20 years to many plants and facilities, including a wide range of activity location and transport problems. The movement and location of activity within buildings is not a common use of this capability, it is little different to transport through complex ponds, silos and other civil structures, especially when it is combined with a modelling and assessment capability related to uptake by particulate material, cement and steel structural items and the natural environment surrounding and within these structures. This kind of assessment has been undertaken within the NNL before for UK government, related to "CBRN" contamination issues. It is however, fundamentally different to the approach taken in environmental geochemical modelling assessments (but complimentary to this approach).</p> <p>The first part of the NNL offering is to provide a simple support tool that will allow the flow of water and air in, through and out of buildings to be mapped, and for this to allow activity and flow to be located within this map. This tool will be populated with available mechanistic models of activity hold up and transport – so the model is fundamentally underpinned.</p> <p>The second part of the NNL offering is to use its extensive experience of providing advice on management of activity movement – particularly in legacy plant structures – to suggest approaches to minimising movement of activity. The information provided will not only prove invaluable in controlling the movement of activity, but also locating it so that it can be used in devising decontamination and decommissioning strategies.</p>	
<p>2. Notes (Please provide following information if possible.)</p> <ul style="list-style-type: none"> - Technology readiness level (including cases of application, not limited to nuclear industry, time line for application) <p>The modelling approach is well-established and well-used. It is also well-trusted by the UK</p>	

regulator and UK site operators. While this proposal does not describe the process, but the approach to defining it (as a combination of process features) it will by preference choose approaches that are well tested and therefore a TRL of 9. More novel approaches can however be fit into this tool and used to assess their effectiveness.

- Challenges

The challenge to this work is validation of approaches against real data. This work is predictive even with little pre-characterisation of the area, but is significantly improved if it is parameterised against detailed site chemistry/radiochemistry. The approach however is (from experience) able to guide characterisation needs and capture this data in a meaningful form to allow greater understanding of the developing environment within the building.

- Others (referential information on patent if any)

No intellectual property associated with the modelling output, though depending on how the customer wishes to use the product models, there may be ongoing license issues to be considered. At the outset, no issues are anticipated with regard to the use of technology, though this would have to be assessed as the understanding of specific issues at the site develops.

【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