

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

Technology Information	
Area	5 (Select the number from "Areas of Technologies Requested")
Title	Monitored Natural Attenuation (MNA)
Submitted by	UK National Nuclear Laboratory (NNL)
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p>Natural Attenuation (NA) is the effect of physical, chemical and biological processes that act, without human intervention, to decrease contaminant concentrations, flux and toxicity, and thereby reduce the risks posed by contamination. Monitored natural attenuation (MNA) is a remedial method that takes advantage of the natural attenuation processes.</p> <p>Application of MNA is not a 'do-nothing' approach, and instead requires rigorous demonstration that natural attenuation processes are occurring at a rate that protects the wider environment and achieves remedial objectives within a reasonable time-frame. If MNA can be justified, then potential benefits to any site include significantly lower waste arisings and lower worker dose rates when compared to more intrusive methods.</p> <p>It is considered that at Fukushima Daiichi that once all the contaminants of concern have been identified, and any immediate threat to receptors mitigated, that MNA may be an appropriate remedial technique for some radionuclides, particularly those which can be demonstrated to be highly attenuated to the site soil, and have shorter half-lives.</p> <p>Investigations that will be required to support the development of an MNA strategy include:</p> <ul style="list-style-type: none"> • Demonstration that natural attenuation (NA) is occurring through collection of site groundwater and soil characterisation data; • Development of conceptual models of contaminant behaviour; • Assessment of the performance of MNA against the remedial objectives; and • Long-term monitoring of NA performance. <p>The NNL have extensive experience of undertaking all the required investigations to develop an MNA remedial strategy for radiologically contaminated land, from site characterisation, laboratory experimentation, geochemical assessment and contaminant transport modelling. This experience has been gained through decades undertaking contaminated land assessment on UK nuclear licensed sites, particularly Sellafield, a coastal site like Fukushima Daiichi. At Sellafield radioactive leaks from a number of plants have occurred in the past, and further liquor leakage cannot be entirely ruled out. The NNL are currently assisting the Sellafield site in</p>	

exploring the feasibility of MNA and other remedial strategies for a wide number of radionuclides.

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

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

MNA is an accepted technique in both nuclear and non-nuclear industries and has been used on numerous sites.

- Challenges

NA has a lower success potential where:

- There are continuing sources of contamination
- Groundwater flow rates are rapid/contaminant retardation rates are low
- There is a high risk to receptors
- Where the site hydrogeology is complex

- Others (referential information on patent if any)

N/A

【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