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

Technology Information	
Area	6 (Select the number from “Areas of Technologies Requested”)
Title	Geospatial Database for handling large datasets
Submitted by	UK National Nuclear Laboratory (NNL)

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

In order to support the understanding of groundwater flow at the Fukushima site, continuous monitoring of groundwater levels around the buildings, groundwater flow and water quality is required. Management of the data in a systematic way is necessary to enable its assessment to identify trends etc. A geospatial database enables large datasets to be handled and analysed efficiently.

NNL currently manages and maintains groundwater monitoring programmes for a number of nuclear licensed sites in the UK and in Europe. The monitoring programme covers both daily telemetry, using installed probes at fixed locations in regional or perched aquifers, to sampling and transfer of samples to dedicated laboratories for analysis.

Data capture and control is an integral component of the environmental monitoring regime, informing the 'on location' physical activities, and is an iterative process (Figure 1). NNL have been collecting and collating data from UK nuclear licensed sites for over 20 years and have built up both a considerable body of experience and data, over 20 million data points.

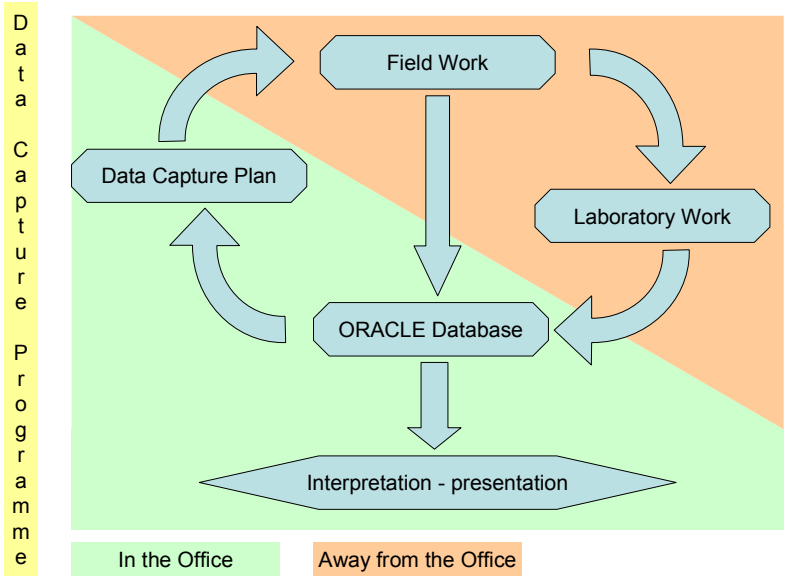

Figure 1

NNL have developed and maintained a geospatial database structure that allows quick and efficient analysis either through geospatial tools, such as ARC GIS, statistical tools or standard reporting media.

Within this bespoke geospatial database, the results are linked to the sample location, sample time and sample type, be it groundwater, soil, leachate or grass.

To deliver a robust approach to sample and result integrity, a series of installation and monitoring templates have been developed and used to ensure that installation, sampling and monitoring regimes are controlled (Figure 2).

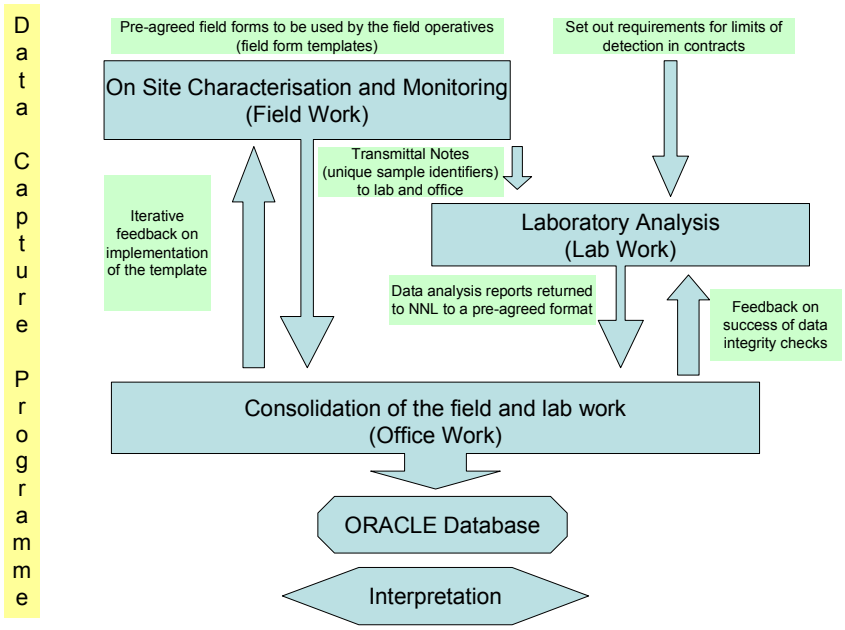

Figure 2

The architecture developed by NNL allows analytical tools set up for existing sites, be they statistical or geospatial, to be reproduced for new sites with little additional effort.
Integrity checks have been built into the database design, such as parent-child relationships, foreign keys and primary keys to control data entry and data accuracy. This is before statistical analysis of the results is undertaken to highlight anomalous results or outliers. Such checks are coupled with a good interaction with the field operatives and laboratory technicians to quickly and efficiently explain any deviations from the norm.

Processes have already been developed to efficiently and quickly upload the telemetry from leak detection and monitoring technologies currently used in environmental monitoring by NNL.
Automated processes already exist for expediting the capture of Blind tube gamma logs, daily telemetry from a European site and the large quantity of results from laboratory analysis.

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

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

The database systems required to handle large datasets are currently being used in the UK and within the nuclear industry. Application to Fukushima would require identification of the geospatial data required. Appropriate data capture processes would need to be identified.

- Challenges

The principal challenge would be to ensure that a common language is used or at least an agreed translation of terminology can be set up.

- Others (referential information on patent if any)

【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