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

Technology Information	
Area	**1.3 Accumulation of contaminated water (Storage Tanks, etc.)** **Technology for detection of minor leaks** **Improvement in the detection ability of beta rays on patrol**
Title	**On line monitoring system and data processing in real time for detection of leaks with a mobile wide-area α/β surface contamination monitor (AREVA 1-3-2)**
Submitted by	AREVA

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

Objective

Detection of any water leaks from the tanks (even located in places that are difficult to detect).

We have proposed installed instruments as an alternative to deploying a large crew of technicians to walk around the tanks to hunt for leaks.

To complement our proposed installed instruments, we propose a tool to make the task of performing further investigations by qualified radiation measurement

technicians easier, more sensitive, and more reliable.

Proposed Solution:

On-line monitoring system that can detect low levels of Sr90 of the concrete area surrounding the tanks filled with water, where those tanks have high concentrations of Sr90.

The system combines sensors for measuring ^{90}Sr with a data processing which allow to detect an increase (for a small area) of the signal corresponding to a leak

We propose a modification of the system shown in the adjacent image to develop a mobile instrument and will provide reliable repeatable results in the elevated 50µSv/hr background.

Length L	38.5 cm
Width W	38.5 mm
Height	135.5 cm
Weight	12 kg

Main specifications:

- Detectors devices :
    - -Type: Mobile, self-contained
    - BarCodes or RFID tags reading capability
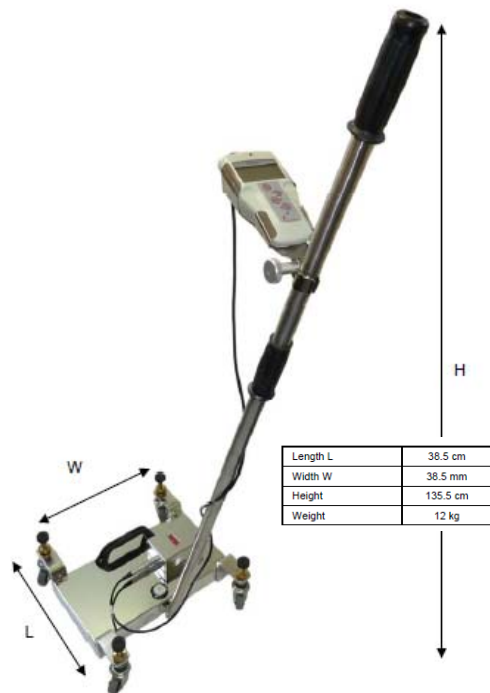
- o Measurement logging capability
- o - Emitters: β only, or alpha/beta, or beta/gamma, depending upon the type of probe
- o - Detector: very large area very thin beta scintillator
- Software :
  - o Data collecting (value, date and position)
  - o Data processing (geostatistic calculation)
  - o Cartography of data with alarm in case of overtaking of threshold

Description:

Install a ^{90}Sr beta monitoring mobile station in each row between tanks. This mobile station moves automatically (step by step or continuously) in the row and transmits the result of measure, the time and the position to a supervisor software.

Another software process these data (geostatistic calculation) and in real time allows to detect a leak.

Owners: All of the key elements of the sensors are manufactured by AREVA/Canberra.and the software will be develop by AREVA

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 critical element in the success of the radioactive water leak detection instrument are

2.1 The radiation detector :

The primary sensor proposed is a plastic scintillator beta module from our Argos Total Body Contamination Monitoring system. A graphic of the sensor is shown here. It is a large area sensor [16cm x 36cm] for maximum efficiency. The beta-sensitive layer is very thin to minimize the gamma sensitivity.   Other sensors are available for alpha and gamma monitoring applications.
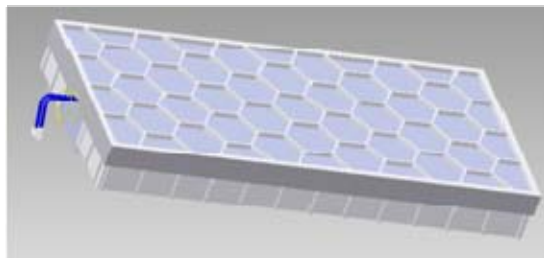
The sensor proposed is a plastic scintillator beta module from our Argos Total Body Contamination

Monitoring system. Many hundreds of the sensors have been provided. The technical software is the same as in the standard Argos product, so no new technology to be developed. All of the key elements are manufactured by Canberra.

More information on the Argos technology available from the under link:

http://www.canberra.com/products/hp_radioprotection/pdf/Argos-PB-SS-C40004.pdf

2.2 Supervisory Software

Horizon is a real-time data acquisition and control system that provides supervisory oversight of your radiological instruments. It combines Canberra's radiological monitoring expertise with industry leading technology for SCADA (Supervisory Control and Data Acquisition) applications. The result is software that delivers an easy to use, reliable, monitoring and control solution for nuclear facilities.

2.3 Data processing software for built the 2D mapping in real time

This software process these data (geostatistic calculation) and built a 2D mapping allowing the detection of a minor leak..
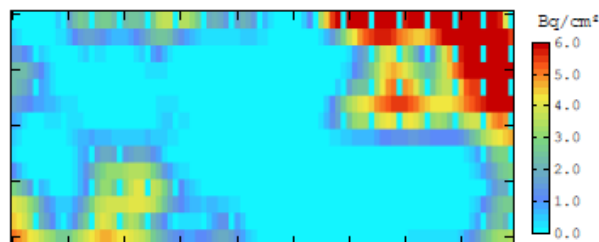
- Challenges

There are no major technical challenges for the sensors

- Computer simulations have been performed and these were used to predict the performance.
- These simulations need to be validated with traceable radioactive sources to document the accuracy of the calibrations.

The instrument needs to give reliable results in a high background radiation area. We believe we have the sensor to meet this challenge.

The challenge is on the capacity for the software to process the data in order to detect the overtaking of threshold corresponding to a (minor) leak and identify the tank which have a leak.

- Others (referential information on patent if any)

Patent pending on the beta/gamma discrimination.