

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

Technology Information	
Area	2: Treatment of contaminated water
Title	Radioactive soil assay with automated segregation and sorting (Orion ScanSort SM)
Submitted by	AMEC
<p>1. Overview of Technology (features, specification, functions, owners, etc.)</p> <p>In summary the ScanPlotSM (see separate submission) and ScanSortSM proven systems can be deployed on areas that have been contaminated in order to identify and quantify radioactivity (ScanPlotSM) which can subsequently be cleaned up with automatic segregation and sorting (ScanSortSM).</p> <p>AMEC's Orion ScanSortSM is a conveyor-based radiation detection/measurement system that detects radiation in excavated soil/materials and segregates it from unimpacted soil/materials. It can sort upwards of 300 tons/hour of soil and other solid flowable debris. Benefits of the system are:</p> <ul style="list-style-type: none"> • <i>Accurate monitoring and threshold alarms detect and sort waste, contributing to reduction of the volume of material and cost associated with packaging, transport and disposal;</i> • <i>Faster processing (up to 300 tons of soil and material per hour) than conventional methods reduces the project schedule;</i> • <i>Computerized processing and quality control reduces manpower requirements; and</i> • <i>Surveys can be designed to accommodate a variety of decommissioning activities and Final Status Survey requirements.</i> <p><i>Technology has exceeded customer expectations and demonstrated significant cost savings in the 100s of millions of dollars.</i></p>	

2. Notes (Plant in Japan, overseas plant, application in other industries, etc.)

- *Technology Demonstration in Naraha Town for Japan Ministry of Environment currently underway (2013-10-21 and later)*
- “Japan Town” Technology Demonstration Project in Naraha Town for JAEA. Used to assay and sort radiologically impacted soils removed from agricultural field and rice paddy. *AMEC demonstrated the ability for significant waste volume reduction through segregation/sorting.*



- Plum Brook Reactor Facility Decommissioning Project (Ohio, USA). Assayed and surveyed >100,000 tons of soil achieving a volume reduction in contaminated soil for disposal of >95%. *Waste volume reduction achieved by the ScanSortSM reduced the cost associated with the packaging, transportation and disposal of low-level radioactive waste, saving our customer \$30 Million Dollars.*



- Painesville FUSRAP Remediation Project (Ohio, USA). Scanned >47,000 tons of soil and achieved a volume reduction for disposal of 35%. *Less than 2% of the impacted soil volume processed required disposal as radioactive waste, saving the customer more than \$10 Million Dollars in project cost associated with the packaging, transportation, and disposal of radiologically contaminated waste.*



Summary of Orion ScanSortSM Soil Sorting System

Project	Volume Processed	Limits		
Japan Demonstration for MOE	Demo	Cs-137	Variable (100 – 1000 Bq/kg)	
Japan Demonstration for JAEA	Demo	Cs-137	Variable (500 – 5000 Bq/kg)	
USACE, Painesville FUSRAP Site	47,000 tons	Ra-226	6.1 pCi/g in 70 tons 12.2 pCi/g in 7.0 tons 18.3 pCi/g in 0.7 tons	
NASA Plum Brook Reactor Facility	105,000 tons	Cs-137	0.2 Bq/g	5.2 pCi/g
Louisiana TENORM	6945 tons	Ra-226 averaged over 1/10 ton	0.1 Bq/g	3 pCi/g

Point Source Soil Sorting Pilot Study	Demo	Ra-226	3.7k Bq	0.1 μ Ci	
Thorium Remediation Project	247,140 tons	Th-232 averaged over one ton	1.2 Bq/g	31.0 pCi/g	
Saxton: Soil Survey II	5,000 tons	Cs-137 averaged over 300 kg,			
Saxton: Soil Survey I	18,000 tons	10 μ Ci (0.4 MBq) Pt. Src.	0.1 Bq/g	2.9 pCi/g	

Challenges

- Highly contaminated near surface soils: *Provides 100% assay of volumetric solid waste streams making waste characterization extremely confident.*
- Soils that are radiologically impacted at concentrations near the approved limits: *Provides 100% assay plus segregates materials that are above the limit from those below the limit to minimize waste disposal volume to a minimum.*
- Radiologically impacted debris: *Earthen debris (such as concrete, asphalt, block, wood, etc) can be crushed or shredded and then assayed as a volumetric material which can then be sorted based on volumetric limits in order to minimize waste volume.*
- Heavily contaminated materials & debris: *Segregate waste that is acceptable for disposal at low-level waste storage/disposal site from heavily contaminated materials that require special handling.*

Technology Development (Example)

- Orion *ScanSort*SM can be modified and fitted to a dredge barge to perform assay and sorting of sediments that are dredged from the seabed. This would provide a comprehensive means of removing sediments with significant levels contamination from discharges to the bay.
- Orion *ScanSort*SM has been designed to operate in a radiological environment where radioactivity is present in relatively low levels (such as environmental remediation of soils off of the Fukushima Dai-Ichi plant site. However, the technology could be readily adapted to perform assays and segregation activities for much higher activity levels that are likely to be present on and near the plant site.

Others

- AMEC with Obayashi demonstrated the technology to JAEA at Naraha Town [11/2011 – 3/2012].
- Equipment is already in storage in Japan.