

[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	Understanding the Groundwater Flow Utilizing Conceptual Site Model, Hydrogeologic Investigation and Analysis, and Radionuclide Monitoring
Submitted by	Geosyntec Consultants, Inc.
<p>1. Overview of Technologies (features, specification, functions, owners, etc.)</p> <p>Distinguishing attributes of Geosyntec Consultants, Inc. (Geosyntec) are as follows:</p> <p>1.1 Groundwater flow investigation</p> <p>Geosyntec will investigate groundwater flow in the following steps.</p> <ul style="list-style-type: none"> - Addressing Data Gaps in the Conceptual Site Model (CSM) Developing accurate and informative CSMs is a cornerstone of Geosyntec's strategy for groundwater remedial projects. The following subsections describe investigation and data collection methods that may be used to fill existing data gaps and refine the existing CSM for the Site. - Evaluation of Borehole Installation Methods Geosyntec is well-versed in designing monitoring wells, from single to multi-depth completions in single boreholes. With the understanding that boreholes need to be completed to 30 m, the sonic drilling method may be a good option. This method uses sonic waves to advance the drill tools, while collecting continuous soil or rock samples in 5 to 10-foot (1.5 to 3.0 m) intervals. This method could be attractive in the site setting because it is very fast, geologic samples are collected to evaluate structure, and no groundwater is generated during drilling. - Groundwater Monitoring and Data Capture Systematic remote monitoring of groundwater elevations would be extremely beneficial at the Site to allow for a continual assessment of horizontal and vertical hydraulic gradients with minimal human exposure. Geosyntec is leading the industry in remote monitoring and control of distributed infrastructure through our OptiRTC platform (www.OptiRTC.com). This platform consists of a cloud-based suite of computing services developed entirely in-house at Geosyntec. - Understanding Groundwater Flow Geosyntec has a lot of experience in depicting complex hydrogeologic data in understandable illustrations using geologic characterization and hydraulic analysis. These experiences include illustrating complex sedimentary bedrock lithologies into 	

understandable conceptual models.

1.2 Analyze water quality

- Radionuclide Monitoring (Sr-90 and Tritium) in Groundwater

It may be possible to provide automated analysis of groundwater for tritium and Sr-90 (Burge Environmental, Inc.). Geosyntec's OptiRTC data platform can provide one web-accessible location to view groundwater elevation and contaminant concentration data.

Comparison of Current Laboratory Analytical Methods and Automated In-Situ Methods

	Strontium-90		Tritium	
	Detection Limit (Bq/L)	Analysis Time (days)	Detection Limit (Bq/L)	Analysis Time (days)
Current Method	(a) 0.1 (b) 0.8 (c) 0.8	(a) 24 (b) 7 (c) 4	80	1.125
Burge	0.3	0.3 to 0.5	370	0.15 to 0.25
Notes: (a),(b),(c), represents the three current analysis methods				

- Data Management

Geosyntec builds flexible data management systems for our projects that cover the entire "life cycle" of environmental data points, including sample collection, sample analysis, data validation and verification, data assembly, data analysis and data presentation. Use of an enterprise database and Geographic Information Systems (GIS) allows project team members to access data using secure web and mobile tools, including interactive data querying, and access to spatial data through interactive web-based map applications.

For details, please see Appendix.

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

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

- ✓ Groundwater flow investigation

Geosyntec has strong expertise in characterizing groundwater flow and contaminant migration in bedrock environments using a wide variety of investigation techniques. Geosyntec practitioners have conducted thousands of aquifer tests in many different geologic environments including layered sedimentary bedrock.

Geosyntec personnel have completed thousands of drilling projects using a range of borehole installation methods, including auger, air rotary, mud rotary, direct push methods, and sonic.

Geosyntec is leading the industry in remote monitoring and control of distributed infrastructure through our OptiRTC platform (www.OptiRTC.com) which is used in many fields.

✓ Analyze water quality

Geosyntec has developed numerous real-time, automated monitoring systems for both water level and water quality data collection.

Automated analysis of groundwater for tritium and Sr-90 was developed for the Hanford Nuclear Site in Washington, USA by Burge Environmental, Inc. (Burge) in conjunction with Pacific Northwest National Laboratories.

Data platform and management systems developed by Geosyntec have been applied to radioactive contamination sites.

- Challenges

- 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