TECHNICAL MEMORANDUM #1

TO: Joan Taylor and Cynthia Gianfrancesco/RIDEM

FROM: Edward Summerly (GZA) and Michael Healey (Charbert)

DATE: July 25, 2006

FILE NO: 32795.12-C

SUBJECT: Recommended Drilling Locations for Bedrock Aquifer Assessment

The purpose of this memorandum is to recommend three drilling locations for multi-level bedrock monitoring wells designated GZML-1, GZML-2 and GZML-3. The objective of the bedrock aquifer assessment, as stated in the March 15, 2006 *Bedrock Aquifer Evaluation Work Plan* (Work Plan), is to characterize the type and physical condition of bedrock underlying the Site, and to evaluate the nature and extent of chemical contaminants within bedrock, if any. The recommended drilling locations are shown on Figures #1 and #2, attached. As noted in the Work Plan, we also recommend that the boreholes be advanced to a depth of 200 feet below ground surface. Our rationale for selecting the locations and depth is discussed in the following paragraphs.

To aid in the selection of a drilling location, GZA contracted with Hager Geosciences, Inc. of Woburn, Massachusetts (HGI) to perform a suite of surface geophysical investigations along six primary transects covering the majority of the Charbert Facility. Geophysical studies initially consisted of seismic refraction as outlined in Task 1 of the March 15, 2006 Work Plan. As the work progressed, Charbert elected to add ground penetrating radar (GPR) and very low frequency (VLF) studies to the program to better define the overburden thickness and bedrock characteristics. HGI's final report is attached. GZA and Charbert personnel, in concert with HGI, utilized the findings and recommendations of these geophysical studies, in conjunction with the findings of prior geohydrological investigations, to select these recommended drilling locations.

Borehole GZML-1 is located in the southern gravel pit area just north of Lagoon 1. This area was initially targeted because of the presence of deep overburden contamination (tetrachloroethene, trichloroethene and cis-1, 2-dichloroethene) in well GZ-2 (see Figures 12, 13 and 14 of the June 2, 2005 *Site Investigation Report*) and the possibility that the lagoons are acting as a secondary source area for chlorinated hydrocarbon contamination. HGI's work shows a localized trough in bedrock, several seismic low velocity zones (indicative of more extensive bedrock fracturing), a VLF anomaly (potentially indicative of a linear bedrock fracture zone), and a thinning of the till mantel within the vicinity of the proposed boring. Refer to grid model slice C-C', seismic lines B3 and D1, and VLF profile D2.

Borehole GZML-2 is located on River Street just east of the facility. This general area was initially targeted because it lies between the release area (i.e., former dry cleaning still) and several nearby residential water supply wells). HGI's work shows another localized trough in bedrock in this area deepening west to east and one moderate seismic low velocity zones (indicative of more extensive bedrock fracturing) in the vicinity of the proposed boring. The

till mantel over bedrock is also interpreted to be relatively thin (i.e., 20 feet) in this area. Refer to grid model slice A-A' and seismic line A5.

Borehole GZML-3 is located in the western facility yard area. This general area was targeted because it lies immediately downgradient of the primary PCE release area (i.e., former dry cleaning still) in the vicinity of significant overburden groundwater contamination (see Figures 12 thru 15 of the June 2, 2005 *Site Investigation Report*). HGI could not perform geophysical testing in the immediate area due to the presence of numerous subsurface utilities and other interferences. However, their extrapolations into this area show a local bedrock high and a thin (i.e., 0 to 5 feet) till mantel.

We look forward to discussing our recommended drilling location with RIDEM at your earliest convenience. We will not initiate the drilling program until we receive your approval of the drilling locations.

cc: Mary Morgan, Richmond Town Clerk
Clarks Memorial Library – Charbert Repository

Attachments: Hager Geosciences, Inc. Geophysical Investigation for Bedrock Aquifer Evaluation Report, dated July 2006
Figure 1 - Bedrock Evaluation Map & Proposed Wells
Figure 2 – Till/Thickness Map & Proposed Wells

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