MACTEC

engineering and constructing a better tomorrow

April 25, 2007

Mr. Joseph T. Martella II, Senior Engineer
RIDEM Office of Waste Management
Site Remediation Program
235 Providence Street
Providence, RI 02908

RE: Soil Vapor Investigation
Former Gorham Manufacturing Facility, Retail Complex
333 Adelaide Avenue, Providence, Rhode Island
MACTEC Project No. 3650050041.07

Dear Mr. Martella:

The objective of this investigation is to assess soil vapor concentrations beneath and in the immediate vicinity of the retail complex at the former Gorham Silver Manufacturing Site.

BACKGROUND

Based on low-level sampling results from two monitoring wells identified as MW-220S and MW-221S located along the southern perimeter of the retail complex as shown in Figure 1, additional investigation is necessary to further evaluate the potential for vapor migration from groundwater and subsurface soil into the retail complex.

SCOPE OF WORK

Recommended Investigation Approach

Consistent with several recommended approaches (CT DEP, 2003; ITRC, 2007a; ITRC, 2007b; NYS DOH, 2006; US EPA, 2002) for investigation of the vapor intrusion pathway, the next phase of investigation focuses on the characterization of the soil gas in the subsurface. The "soil gas" is the air within the soil pores. This assumes there are no direct conduits for vapor intrusion from the sources to the indoor air. The soil gas immediately beneath the slab represents the conditions at the potential point of transfer of vapors from the subsurface into the building. The potential for vapor intrusion will be evaluated by comparing measured soil gas concentrations to the Connecticut Department of Environmental Protection (CT DEP, 2003) Proposed Target Industrial/ Commercial Soil Vapor Screening concentrations. The CT DEP Soil Vapor Screening Values for compounds detected in groundwater in the vicinity of the retail building are shown in Table 1.

The investigation activities will include:

1. Building reconnaissance (and review of as-built plans, if available) to determine:
   - If there are any direct or indirect conduits (subsurface structures, pipelines, utility corridors, sumps, etc.) for vapor migration from the subsurface into the building;

- The characterization of the ventilation system in each section of the building.

2. A soil gas survey conducted to characterize the potential for vapor migration from the subsurface into the building.
3. Evaluation of the results of the soil gas survey to determine if the vapor intrusion pathway should be eliminated as a pathway of concern or if additional investigation of the pathway is necessary.

SITE PREPARATION ACTIVITIES

MACTEC will update the Site Specific Health & Safety Plan (HASP), as necessary, to support the implementation of this Work Plan. The HASP will cover MACTEC personnel and any subcontractors. MACTEC will distribute written notification of this work to the abutters, stakeholders and building owner/occupants in accordance with the Remediation Regulations prior to conducting the work. Textron and MACTEC will coordinate with the building owner and occupants to minimize disturbance of business activities.

PROPOSED SOIL VAPOR SURVEY

A soil vapor survey will be completed at nine locations to identify and measure concentrations of VOCs in sub-slab soil gas beneath the building and at three locations along the perimeter of the building. Proposed sampling locations are presented in Figure 1 with soil vapor locations labeled as SG-1 through SG-9.

Soil vapor samples will be collected as outlined below at all locations to minimize possible discrepancies.

PRE-SAMPLING INSPECTION

A pre-sampling inspection will be performed to evaluate the physical layout and conditions of the retail building being investigated, to identify conditions that may affect or interfere with the proposed sampling and to prepare the building for sampling. In addition, any direct or apparent indirect conduits for vapor between the subsurface and the building interior will be identified. These will be documented in the field log book and photographed.

Prior to installation of the sub-slab vapor probes, the building floor will be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) noted, recorded, and photographed.

SUB-SLAB VAPOR PROBE INSTALLATION

Temporary sampling ports will be installed through the floor slab to a depth no greater than two inches below the bottom of the flooring. The temporary sampling ports will be installed by drilling a 1.5-inch hole through the slab using a Bosch hammer drill as shown in Figures 2 and 3. These temporary sampling ports will be filled with concrete upon completion of the sampling event. Sub-slab probes will be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures will be followed for sub-slab vapor sampling:

- temporary probes will be constructed with polyethylene or Teflon® tubing inserted through a rubber stopper;
- tubing will not extend further than two inches into the sub-slab material;
- coarse sand or glass beads will be added to cover about one inch of the probe tip; and
- the implant will be sealed to the surface with permagum grout, melted beeswax, putty, or other non-VOC-containing products and the tubing connected to the Summa canister. A typical sub-slab sampling configuration is shown in Figure 4.

SUB-SLAB SAMPLING PROTOCOL

Sub-slab vapor samples will be collected in the following manner:

After installation of the probes, three sampling train volumes (the volume of the sample probe and tubing) will be purged using a sampling pump calibrated to 200 milliliters per minute (ml/min) prior to sampling to ensure collection of representative samples. During purging, soil gas will be screened with a ppb RAE PID (a very sensitive handheld VOC monitor with a photo ionization detector) or equivalent and the measurements recorded. In addition, a helium leak test will be conducted at the first soil gas sample location. The helium leak test will be performed by encapsulating the sample point with a bucket and filling the bucket with helium. The sample port will be tested for helium breakthrough before and after collection of the soil gas sample. The typical configuration for the helium leak test is shown in Figure 5. Figure 6 shows a helium detector used in the leak test. The soil gas samples will be collected with one liter SUMMA–type canisters with flow regulators set to approximately 20 minutes per sample. Soil gas samples will be shipped under chain of custody to the analytical laboratory for TO-15 analysis.

When sub-slab vapor samples are collected, detailed notes will be taken to document the following conditions during sampling:

- VOCs used in commercial or industrial processes and/or during building maintenance will be identified;
- Heating and air conditioning system operation during sampling will be noted;
- Floor plan sketches will be drawn, and will include identification of sample locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and other utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), and any other pertinent information useful for data interpretation;
- Photographs will be taken to accompany floor plan sketches;
- Outdoor plot sketches will also be drawn and will include the building site, area streets, compass orientation (north), footings that may create separate foundation sections, and paved areas;
- Weather conditions (e.g., precipitation, indoor and outdoor temperature, and barometric pressure) and ventilation conditions (e.g., heating system active and windows closed) will be noted; and
- Any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., PID readings), will be recorded.

These data will be used during data review and interpretation.

Conditions for No Further Investigation

The analytical data from the sub-slab soil gas samples will be compared to the CT DEP Proposed Soil Vapor Volatilization Criteria. Consistent with the proposed CT DEP regulations, if the analytical results are below these criteria, no further investigation of the vapor intrusion pathway will be required for the retail building.

Reporting

A field sampling report to document the sampling program and the analytical results will be prepared and submitted to RIDEM approximately 60 days following the field work.

Proposed Schedule

The project schedule will be developed when it is determined that access to the property will be granted and will be distributed to RIDEM and the stakeholders.

We look forward to working with RIDEM on the review and execution of this Soil Vapor Investigation Work Plan. Feel free to contact either Michael Murphy at (781) 213-5600 or Greg Simpson of Textron at (401) 457-2635 with any questions. We are available either for a conference call or to meet with RIDEM to address any questions you may have on this Work Plan.

Sincerely,
MACTEC Engineering and Consulting, Inc.

Michael Murphy
Senior Principal Scientist
by with permission

David E. Heislein
Principal Engineer

Attachments: Table
Figures
Attachment A - References

cc: T. Dellar, City of Providence
P. Grivers, EA Engineering, Science, and Technology
T. Regan, EA Engineering, Science, and Technology
G. Simpson, Textron, Inc.
D. McCabe, Textron, Inc.
Knight Memorial Library Repository
MACTEC Project File [P:\TEXTRON\GORHAM\Stop & Shop\Work Plan - Soil Gas SamplingFINAL .doc]