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April 7, 1999

Mr. Mal Salvadore
Sondler, Salvatore and Associates
400 Reservoir Avenue, Suite 3G
Providence, RI 02907

Subject: Proposed School Site, Springfield Avenue, Providence, Rhode Island

Dear Mal:

Per your request, we have reviewed information about the environmental conditions at the above referenced site. We received and reviewed the following reports:

Phase I Environmental Site Assessment, Springfield Avenue Lots, Providence, Rhode Island, by ATC Associates Inc., March 12, 1999.

Site Investigation Report, Springfield Avenue Sites, Providence, Rhode Island, by ATC Associates Inc., March 25, 1999.

In addition, we discussed the reports with Adam Sullivan of ATC Associates Inc. (ATC), who provided some clarification of items in the report, a copy of the a letter from DEM dated April 5, 1999 containing DEM's comments on the Site Investigation Report, and a summary of additional groundwater sample analysis results.

ATC's investigation of the site included the following activities:

- Visual site inspection.
- Review of the site history through Polk City Directories, Sanborn Fire Insurance Maps, Aerial Photographs, and interviews with neighbors.
- Review of available regulatory databases and file information including files for a DEM investigation of possible auto fluff dumping at the site, and files regarding the former gas station located on the northeast corner of the site.
- Magnetometer survey of the site to detect buried metal objects, such as tanks or drums.
- Test pit excavation with soil sampling and analysis.
- A soil gas survey, using an on-site gas chromatograph and laboratory analysis of bag samples.
- Installation of microwells, and sampling and analysis of groundwater.

Significant findings of the investigation are noted below:

- The site was used by the City of Providence as a municipal solid waste landfill during the late 1960's and early 1970's. The test pit excavations confirmed the presence of large quantities of solid waste.

- A gasoline filling station occupied the northeast corner of the site. The underground storage tanks have been removed from the site, and DEM issued a no further action letter for the gas station.

- Soil sampling revealed concentrations of arsenic, lead and total petroleum hydrocarbons at concentrations above the DEM residential direct exposure criteria in some of the soil samples. Arsenic concentration exceedances were the most prevalent, with 20 out of 28 samples having arsenic concentrations above the DEM residential direct exposure criteria.

- Soil gas and groundwater sampling detected low concentrations of volatile organic compounds in groundwater and soil gas, but the concentrations detected were below published standards.

- Soil gas sampling for methane indicated a very limited amount of methane currently exists in the subsurface.

ATC has proposed a remedial action for the site. ATC proposed covering unpaved area of the site with at least two feet of clean fill. ATC also proposed a soil gas collection system under the middle school building, and proposed excavating solid waste from beneath the elementary school building. ATC did not propose any soil gas collection or monitoring for the elementary school.

DEM reviewed ATC's proposed remedy and asked for additional details regarding the construction of the soil gas collection system, and for additional information regarding the need for a soil gas collection or monitoring system for the elementary school.

Our comments regarding the site issues are provided below:

Lead

The source of the lead in the soil has not been determined. The lead could possibly be attributed to the solid waste materials, which could include lead based paint or other sources of the lead.

The DEM Residential Direct Exposure Criteria (RDEC) for lead is 150 mg/kg. This standard is based on the Rhode Island Department of Health (RIDOH) standards for lead in soil. The RIDOH standards set several different standards for lead. Under the RIDOH regulations, soil with concentrations of lead up to 150 mg/kg are classified as lead free.

Soils with lead concentrations of 150 mg/kg to 500 mg/kg are classified as lead safe, and do not require any action. Soil containing between 500 mg/kg and 1,000 mg/kg are considered to be a lead hazard, unless they are covered by grass of other materials. The regulations require that areas where lead in soil concentrations exceed 1,000 mg/kg be covered with 4 to 6 inches of soil, gravel or mulch to prevent contact. Only one sample out of 28 contained lead at a concentration over 1,000 mg/kg (TP-9 at 2,860 mg/kg). Therefore, the majority of the soil at the site would meet the RIDOH standards if it was covered with grass, so the proposed two feet of clean fill would be more than adequate.

Arsenic

The source of the arsenic is unclear, since arsenic is much less likely to be present in household trash, and ATC did not report any evidence that the solid waste included industrial waste materials. It is possible that the arsenic concentrations are due to the naturally occurring arsenic in soil. Arsenic has been found at many other locations in the state at concentrations in excess of the DEM RDEC. For example, the attached Rhode Island Department of Health Advisory discusses the discovery of arsenic in soil around several public schools in Warwick.

The Massachusetts Department of Environmental Protection standard for arsenic in soil, which would apply at this site, is 30 mg/kg. Concentrations of arsenic in all except one sample (ATC-1, with concentration of 30.6 mg/kg) at this site were below 30 mg/kg. Since the Massachusetts regulations allow averaging of the soil concentrations, no remedial action would be required for the arsenic at this site if it were in Massachusetts.

Arsenic, like lead, presents a hazard only if it is ingested. Therefore, if contact with lead bearing soil is prevented, the arsenic does not present a problem. Covering the arsenic bearing soil with two feet of clean fill is an appropriate solution, provided that clean fill with a lower arsenic concentration can be located. Due to the fact that the arsenic occurs naturally, clean fill from other non-industrial parts of the state could possibly contain arsenic at concentrations above the DEM RDEC. Therefore, we recommend requiring the contractor to provide analytical data demonstrating that the fill will meet the criteria for arsenic.

Solid Waste

The buried solid waste at the site presents two possible hazards: a physical hazard from waste material protruding up through the ground surface if it becomes exposed, and the hazard of methane gas generation as the waste material decays. The two foot thick soil cap is a standard and accepted method of covering solid waste landfills to prevent contact with the waste material, and should eliminate this hazard as long as the cap is properly maintained.

ATC monitored soil gas for methane gas and found only a limited amount of methane. However, the limited amount of methane may be at least partly due to the fact that the site

is not currently capped, allowing a relatively free exchange of air through the sandy site soil. After the site is capped with clean fill, loam, grass and the two site buildings, site conditions may change such that more methane gas could be generated. The migration of the methane gas can be very unpredictable, since it may follow underground utilities, or be affected by heterogeneous subsurface soil conditions.

The proposed soil gas collection system is an appropriate method of protecting the middle school from this hazard. Although the solid waste will be removed from beneath the elementary school, we believe that a soil gas collection or monitoring system should also be installed below the elementary school because methane gas could potentially travel from nearby areas and collect beneath the elementary school. We also recommend perimeter soil gas monitoring for possible migration of methane toward houses around the site. Some other precautions should be taken, such as sealing all utilities where they enter the building to prevent them from being a pathway for migration, and monitoring of the utilities which pass through the site. The soil gas collection system design should also consider possible odor problems associated with the exhaust from the system.

A Contingency Plan should be developed for the soil gas monitoring program. The Contingency Plan should outline actions which will be taken if potential hazards are discovered by the monitoring program.

Former Gas Station Site

A gas station known as Tom and Fred's was formerly located on the northeast corner of the site. According to files reviewed at DEM by ATC, underground storage tanks were removed from this site and some soil and groundwater sampling and analysis was conducted. Based on the investigation results, DEM issued a no further action letter for the site. However, it is not clear if this site has been fully evaluated for all potential hazards. Although the registered USTs were removed, there is no indication that the site was investigated to ensure that there are no abandoned USTs on-site. The records indicate that the site was a gas station for many years, with tanks dating back to at least 1952. Some older service stations have other sources of contamination, such as buried oil change pits, drywells, hydraulic lifts, etc.

ATC's investigation of this portion of the site was limited to one groundwater sampling point. The magnetic survey did not extend to this portion of the site, and no test pits were excavated in this area.

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Summary of Recommendations

Based on our review, we agree that covering the site with two feet of soil and installing a soil venting system is an appropriate remedial measure. However, we recommend that following be considered:

- The contractor providing fill material to be used as a cover at the site should provide laboratory reports demonstrating that the soil does not contain lead or arsenic above the standards.

- The feasibility of installing a soil venting system beneath the elementary school should be considered. It would be much more cost effective to install a system during the construction than to install a system later. It is likely that much more methane gas will be generated after the site is covered, and methane is very mobile in the subsurface. It is difficult to predict the future migration pathways, and there is a possibility that the school could be impacted.

- Perimeter methane monitoring wells should be installed and monitored at regular intervals to determine if methane is migrating toward neighboring houses. A Contingency Plan outlining actions to be taken if monitoring detects methane migration.

- The soil venting system design should consider potential odors associated with the venting system emissions.

- The building design should include features to minimize potential infiltration of soil gas into the building.

- The area of the site formerly occupied by Tom and Fred's Service station should be investigated further to ensure that there are no hazards, such as abandoned USTs, buried drywells, etc.

- After construction of the school, the soil cover will have to be inspected and maintained on a regular basis. It is likely that additional soil will be required after initial settling.

- Future modifications to the property will have to be done in a manner that will be protective of users of the property and construction workers. For example construction of a community garden may not be appropriate, or may require the use of raised bed and additional fill material. Installation of light posts, goal posts, backstops, or underground utilities could results in digging through the soil cap and exposing underlying solid waste. These activities could present a potential risk to workers who could encounter pockets of methane or hydrogen sulfide gas. Care must be taken to recover the waste material with an adequate amount of fill after the cap is disturbed.

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Finally, we recommend investigating whether this site could possibly be eligible for a Brownfields grant, since it is a contaminated site being returned to productive use.

Please call me if you have any questions.

Sincerely,

Donna Holden Pallister, P.E., L.S.P., L.E.P.
Senior Engineer

RHODE ISLAND DEPARTMENT OF HEALTH

~~ Safe and Healthy Lives in Safe and Healthy Communities ~~

Public Health Advisory on Arsenic For Parents of School Children in Warwick

January 21, 1999

Arsenic recently reported in soil around schools in Warwick does not threaten children's health. This includes Pilgrim, Aldrich, Wyman and Rhodes schools. We do not expect to see health problems resulting from arsenic exposure in these areas.

The Rhode Island Department of Health looked at data on arsenic levels in the soil and checked information on other possible sources of exposure. We reviewed the guidelines from the Agency for Toxic Substances and Disease Registry (ATSDR), the expert federal agency. Based on this evaluation, children attending these schools in Warwick are safe.

Arsenic occurs naturally in soil. These background levels in soil are usually harmless. Exposure happens by eating material containing arsenic. Naturally-occurring arsenic in food accounts for most of our intake. Children can also ingest soil by playing and putting dirty hands in their mouths. Older children and adults swallow soil by eating or smoking without washing their hands.

Arsenic has no nutritional value or other health benefit. Even though contact with naturally occurring arsenic is usually harmless, exposure should be minimized.

Exposure to arsenic and other soil contaminants can be prevented by:

- Frequent hand washing, especially before eating.
- Providing sand boxes and play areas covered with sand or mulch for young children.
- Avoiding contaminated industrial areas.