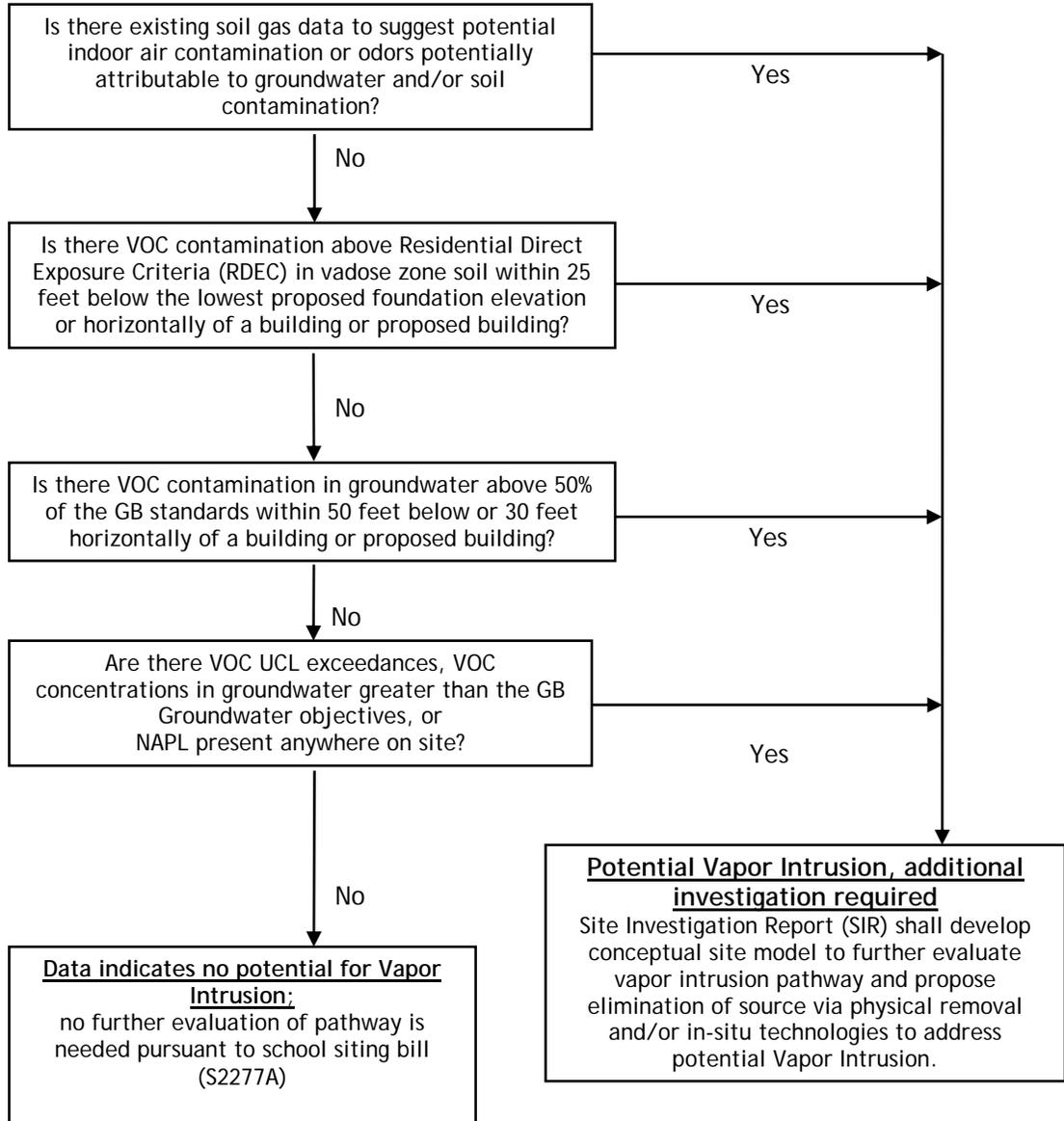


## Evaluation of Vapor Intrusion Potential for Proposed RI School Sites

- Initial site screening must include soil, groundwater, and soil gas sampling and laboratory analysis for Volatile Organic Compounds (VOCs) for any proposed School locations.



\*While indoor air sampling is not a required part of this evaluation, indoor air sampling may be warranted prior to use of an existing building as a school in order to evaluate for structural contamination, radon, mold, ventilation issues, etc.

9/19/12

**RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF WASTE MANAGEMENT**

**SCHOOL SITING GUIDANCE  
FOR THE EVALUATION OF VAPOR INTRUSION POTENTIAL  
IN PROPOSED RHODE ISLAND SCHOOL SITES**

On June 6, 2012, a new law took effect that impacts the siting, leasing, and construction of school buildings (public, private, or charter) on contaminated sites in Rhode Island. The RI Department of Environmental Management (RIDEM) regulates the cleanup and re-use of contaminated sites under the authority of [RIGL Chapter 23-19.14](#) entitled "Industrial Property Remediation and Reuse Act" and other related Chapters. This law applies specifically to school **buildings**, and does not affect the current processes in place to construct components related to school complexes, located outside of buildings, such as outdoor recreation areas, parking lots, gardens, and other landscaped areas.

The following is a step-by-step process of evaluating the potential for vapor intrusion to migrate from the subsurface into an existing or proposed building to be used as a school:

- Prior to going through the steps in the flow chart, an initial screening of a property proposed to be a school must (instead of "should") include soil, groundwater, and soil gas sampling for laboratory analysis for Volatile Organic Compounds (VOCs). The Department strongly recommends that a meeting be held prior to sampling to discuss the approach/strategy proposed for the investigation to determine if the locations and number of samples is sufficient to validly support the decisions required in this analysis.

**STEPS IN THE FLOW CHART:**

**STEP 1:** The first step in the flow chart asks the question: **"Is there existing soil gas data to suggest potential indoor air contamination or odors potentially attributable to groundwater and / or soil contamination?"** This step requires comparing any contaminants found in the initial soil, groundwater and soil gas samples to each other to see if there are any similarities in the contaminants found relative to the other media. That is to say that if VOCs are detected in soil gas, are the same contaminants found in nearby soil or groundwater? If the answer to this question is **"NO,"** move on to **STEP 2.** If the answer to this question is **"YES,"** the rest of the steps in the flow chart shall be skipped, and the Performing Party shall be required to complete a Site Investigation Report (SIR) which includes a Conceptual Site Model to further evaluate the vapor intrusion pathway. The SIR shall also propose the elimination of the source via physical removal and/or in-situ technologies to eradicate the potential for Vapor Intrusion into Indoor Air. This requirement will be discussed in further detail at the end of the step process in the flow chart.

**STEP 2:** The second step in the flow chart asks the question: **“Is there VOC contamination above Residential Direct Exposure Criteria (RDEC) in vadose zone soil within 25 feet below the lowest proposed foundation elevation or horizontally of a building or proposed building?”** The vadose zone is the unsaturated zone between the ground surface and the top of the water table through which soil gas can move throughout the pores in the soil. In this step, the analytical results of the soil samples collected from the vadose zone for VOCs are compared to the Residential Direct Exposure Criteria (RDEC) found in Table 1 of the Remediation Regulations. If the results of samples collected within 25 feet below the existing or proposed building foundation or within 25 feet of the side of the existing or proposed building, are greater than any of the RDECs for VOCs, the Performing Party is required to complete an SIR with a Conceptual Site Model (CSM) because the potential for vapor intrusion exists. If the analytical results are less than the RDECs for VOCs, the Performing Party may move to the next step.

**STEP 3:** The third step in the flow chart asks the question: **“Is there VOC contamination in groundwater above 50% of the GB standards within 50 feet below or 30 feet horizontally of a building or proposed building?”** Groundwater classified ‘GB’ is defined by RIDEM’s Groundwater Quality Rules as “those groundwater resources designated by the Director which may not be suitable for public or private drinking water use without treatment due to known or presumed degradation.” The GB Groundwater Objectives in the Remediation Regulations were developed based upon the consideration of the potential for volatilization of groundwater into indoor air (i.e. vapor intrusion). This step requires the groundwater analytical results collected within 50 feet below the existing or proposed building foundation or within 30 feet of the side of the existing or proposed building be compared to fifty percent (50%) of the GB Groundwater Objectives. If the analytical results are greater than 50% of the GB Objectives for any constituents, the Performing Party is required to complete an SIR with a Conceptual Site Model (CSM) because the potential for vapor intrusion exists. If the analytical results are less than 50% of the GB Objectives for all constituents, the Performing Party may move to the next step of the flow chart.

**STEP 4:** The fourth and final step of the flow chart asks the question: **“Are there VOC UCL exceedances, VOC concentrations in groundwater greater than the GB Objectives, or NAPL present anywhere on site?”** In the Remediation Regulations, the acronym “UCL” stands for Upper Concentration Limit, and is applied to soil, sediments and water that have concentrations of Hazardous Substances, or petroleum, which if exceeded, may demarcate a transition between contaminated environmental media and waste in the environment. “NAPL” is an acronym for Non-Aqueous Phase Liquids and is considered a condition that exceeds UCLs in any environmental medium. The goal of this question is to determine whether or not there are high levels of VOCs in soil and / or groundwater on a potential school property that falls outside the boundaries established in Steps 2 and 3. The first part of the question asks the Performing Party to compare the soil and groundwater analytical results to the UCLs as defined in Section 8.07 of the Remediation Regulations and determine if there are any exceedances. The second part of the question is looking for a comparison of the groundwater analytical results to the GB Groundwater Objectives to determine if the GB Objectives are exceeded. The final part of this step is a determination of whether or not NAPL exists in any environmental medium on the property. If the answer to all of the requirements in **STEP 4** is “NO,” the determination can be

made that the Data Indicates That There is No Potential for Vapor Intrusion and that no further evaluation of the vapor intrusion pathway is needed pursuant to the school siting bill.

If the answer to any of the questions in the four steps above is “YES,” the determination is made that the Potential for Vapor Intrusion exists and that additional investigation and remediation is required if the reuse of the property is to be a school. A Conceptual Site Model (CSM) must be developed to further evaluate the Vapor Intrusion Pathway, and a complete Site Investigation Report that includes Remedial Alternatives, such as source removal and groundwater treatment, must be written. These two documents must be submitted for review and approval by the Department and must explain why the proposed remedy(s), once implemented, will eliminate the potential for vapor intrusion. If the Department does approve the proposed remedy(s), the approval to put a school on the property is still conditional on the final outcome resulting in the removal of the ongoing potential for vapors or gases to migrate into the building from the subsurface. After the implementation of the DEM approved remedial action, the Performing Party must collect new samples and re-evaluate the Vapor Intrusion Potential using the attached flow chart.