

## National Model School Siting Policy

This policy was developed by the Center for Health, Environment, and Justice (CHEJ) in collaboration with school, health, and environmental organizations, engineers and health professionals. This model draws upon a site assessment process developed by the California Department of Toxic Substances Control (CDTSC) to evaluate potential contamination at proposed school sites and cleanup criteria developed by the New York State Department of Environmental Conservation (NYDEC). The original evaluation process was developed by CHEJ's Childproofing Our Communities Campaign and published in the campaign's *Poisoned Schools Invisible Threats, Visible Actions* report in 2001. This model policy can be tailored for individual state or local legislation. It is our expectation that the model will be used at various levels of government to begin the discussion of the need for such laws, laying the groundwork for protective laws in the near future.

### 1. Ensure Meaningful Public Participation in School Siting Decisions

The Public Body responsible for siting new schools is usually the local school board or a school committee. State law must require the "Public Body" (used throughout this section to mean the local school board or school district committee) to establish a school siting committee, whose job it is to recommend to the Public Body sites for building new schools, leasing space for new schools, and/or expanding existing schools. The committee shall include representatives of the Public Body as well as representatives from the following stakeholders: parents (particularly those from the schools that will comprise the new school's population), teachers, school health nurse or director, officials from local health departments, community members, local public health professionals, environmental advocacy groups, and age-appropriate students. The Public Body shall also establish a web site for the School Siting Committee, where information about candidate school sites is posted, including notices of environmental evaluations required under this model legislation, public and agency comments received on those evaluations, and key correspondence of the Public Body regarding candidate sites.

Many states already require school districts to form School Facility Planning Committees, which could also serve as a School Siting Committee. Only public bodies that have appointed School Siting Committees representing such stakeholders should be eligible to receive federal or state money for the assessment, and cleanup of school sites, or the construction of a new school. State law must also require the Public Body to notify parents, school staff, members of the local community, and parents from the "feeder" schools to the new school of the plan to build, lease space for, a new school and to solicit their participation in writing and at public meetings. This outreach effort should include prominent placement of public notices about the proposed plan in commonly read local newspapers and other publications, as well as the web site of the School Siting Committee. A notice should also be posted in a conspicuous place in every school (in multiple languages if there are a significant number of non-English speaking parents). A copy should also be delivered to each parent-teacher organization within the jurisdiction, each labor union covered by a collective bargaining agreement, and each landowner within 1,000 feet of the proposed site.

Public participation is an essential element in the environmental evaluation and remediation of candidate school sites. The process, outlined in Section 3, contains additional public participation requirements that public bodies must follow when considering school sites that may be impacted by pollution.

## **2. Categorical Exclusions for Candidate Sites**

Candidate sites for new school facilities (whether by new construction or leasing) shall exclude from consideration sites which are on top of or within 1,000 feet of a state or federal Superfund or Brownfield site, or a site where hazardous or garbage waste was land filled, or where disposal of construction and demolition materials were disposed of.

To determine whether a candidate school site has been used for these waste disposal purposes, an Initial Environmental Assessment should be undertaken, and, if necessary, a more extensive Preliminary Endangerment Assessment (see discussion below) shall be done. If either evaluation reveals that the site has been used for these purposes, or if the site is within 1,000 feet of any property used for these purposes, the site must be abandoned. For other sites impacted by on-site or off-site sources of environmental pollution, extreme care must be taken before such sites can be used for schools (see next section).

## **3. Evaluating Candidate Sites**

### **Overview**

To ensure that the Public Body selects school sites that do not present dangers to the health of students, teachers and school workers, CHEJ developed a process that ensures that candidate school sites are thoroughly investigated, evaluated and where necessary, cleaned up. The Public Body shall not proceed to acquire a site (purchase or leasing) or to prepare a site for construction of a school (including expansions), until the Public Body completes the required environmental investigations and evaluations and the state environmental regulatory agency has approved each of them. The process for evaluating candidate sites where a school might be built involves multiples steps.

The first step is an **Initial Environmental Assessment (IEA)**, often referred to as a “Phase I Assessment.” Based on the information found during this initial assessment, a more extensive investigation, a **Preliminary Endangerment Assessment (PEA)**, may be required. This second step is often referred to as a “Phase II Assessment.” The IEA and PEA proposed in this document are more comprehensive than those performed for typical Phase I and Phase II assessments, thus the use of different terminology.

The third step involves the Public Body making a decision on whether or not to proceed with building a school on a contaminated site. That decision should be based on a review of information gathered in steps 1 and 2, particularly evaluating contamination levels found during the PEA.

- The PEA might indicate that a proposed site is not contaminated and the site can be safely used for school purposes;
- The PEA may indicate that there is minor contamination at the site that needs to be cleaned up so the site can be used for a school, or;
- The PEA may reveal that the site contains amounts of contaminants at high enough levels that the Public Body should abandon the site.

If the Public Body decides to proceed with constructing a school on a contaminated site, a Site Remediation Plan needs to be developed by the Public Body with input from the public and approval by the state environmental agency. In any event, no school shall be built on any portion of a larger contaminated site unless the whole site is safely remediated.

Some sites that are abandoned due to the presence of substantial contamination identified by the PEA may be reconsidered as a "*Last Resort Site*" if the Public Body genuinely has no other choice of sites. Remediation measures for addressing Last Resort Sites are discussed in detail later in this chapter. This situation might occur in an urban setting where available sites are limited because of existing development. These sites should **only** be considered as a last resort, after all other candidate sites have been evaluated and eliminated (at least two other sites must be considered) and if specific remediation measures to clean up the site are used. Each step in this process is described in more detail below.

### **Step 1 - Initial Environmental Assessment**

Once a candidate site is identified, the Public Body must hire a licensed environmental professional (typically a professional engineer or geologist, or an environmental health scientist with an engineering background) to conduct a three part Initial Environmental Assessment (IEA). The professional who conducts the IEA shall collect information on current and past site uses, evaluate past and/or existing site contamination, and identify potential sources of pollution located nearby and evaluate whether they might impact the candidate site. The purpose of the initial assessment is to determine whether a proposed site falls under the categorical exclusion for former waste disposal or landfill site and to determine whether the site was likely contaminated by hazardous substances and, thus, requires a more thorough investigation, referred to as a Preliminary Endangerment Assessment (PEA).

#### **Part I of IEA: Research and Review the Site's History**

An IEA starts with a review of public and private records of current and past land uses, historical aerial photographs, environmental databases, and federal, state and local regulatory agencies' files. In addition, it includes a site visit and interviews with people familiar with the site's history, including past and present owners.

#### **Part II of IEA: Identify Potential Environmental Hazards**

The IEA identifies any of the following potential sources of contamination within two miles of the candidate site:

- Any known or suspected hazardous, industrial, or municipal waste disposal site;
- Any private, commercial, industrial, military, or government facility where toxic chemicals were used, stored or disposed of;
- Refineries, mines, scrap yards, factories, dry cleaning facilities or sites where there have been chemical spills or other significant contamination;
- US EPA or state designated Brownfield site (even if remediated);
- Facilities found on EPA's Toxic Release Inventory (TRI);
- Agricultural land where pesticides and herbicides have been applied;
- Dust generators such as fertilizer or cement plants, or saw mills;
- Leaked gasoline or other products from underground storage tanks;
- Concentrated electrical magnetic fields from high intensity power lines and cellular communication towers;
- Areas of high concentrations of vehicular traffic such as freeways or highways;
- Railroad yards and beds; and
- Wastewater treatment plants.

If a candidate site was previously used for hazardous or garbage waste disposal, or for disposal of construction and demolition materials, or if it is within 1,000 feet of any property used for these purposes, the site would be abandoned.

If a candidate site is within 1,000 feet of any potential source of contamination including those listed above, a more extensive site assessment, the PEA, must be conducted. A PEA shall also be required if any data or information collected in the Initial Environmental Assessment reveal that the site, or any portion of the site, is subject to serious hazardous chemical exposures as a result of the past or current presence of any of the above sources.

### **Part III of IEA: Render Professional Judgment About Whether to Conduct a Preliminary Endangerment Assessment (PEA)**

If a PEA is not otherwise required as stated above, then all the IEA data and information identified and collected will be fully assessed. Such information might include test results from samples collected from soil, soil gases, surface water, groundwater, sediment and ambient air. Other factors that could affect candidate sites include the direction of surface or groundwater flow, wind direction and patterns, and contaminant transport processes identified in soil or sediment at the site. This evaluation shall be conducted by a licensed environmental professional (typically a professional engineer or geologist, or an environmental health scientist with an engineering background) who will use professional judgment to decide if a PEA is warranted for a candidate site. For example, a candidate site that is located downwind from stationary or mobile sources of air pollution that could impact children attending school at a candidate site might warrant a PEA in the judgment of an environmental professional.

If existing contamination is discovered as a result of previous sampling conducted at the site, the levels found should be compared to the Brownfield Cleanup Program soil cleanup standards for unrestricted use developed by the New York State Department of

Environmental Conservation (See Appendix and Remedial Program Soil Cleanup Objectives, 6 NYCRR Subpart 375.6.3 in Table 375-6.8(a) at <http://www.dec.ny.gov/regs/15507.html#15513>.<sup>1</sup>

If contaminant levels exceed any of these values, a more extensive site assessment, a PEA, must be conducted. If any portion of a candidate site is contaminated, then the entire site must undergo a PEA.

The state environmental regulatory agency must review the final draft of the Initial Environmental Assessment. Depending on the thoroughness of the assessment, the state agency shall give preliminary approval to the assessment, disapprove the assessment, or request more information.

When the final draft of the IEA assessment is complete and has received preliminary approval by the state environmental regulatory agency, the Public Body shall publish a notice in newspapers of general circulation (including foreign language newspapers if the school district has a sizable number of non-English speaking parents) and create a website where this notice is posted and includes the following information:

- A statement that an Initial Environmental Assessment has been completed;
- Prior uses of the site that were identified that might raise health and safety issues;
- Proximity of the site to environmental hazards (waste disposal sites, point sources of air pollution, etc.);
- A brief statement describing the results of the assessment such as a list of contaminants found in excess of regulatory standards;
- A brief summary of the conclusions of the assessment; the location where people can review a copy of the assessment or an executive summary written in the appropriate foreign language (if applicable); and
- An announcement of a sixty-day public comment period including an address where public comments should be sent.

A copy of this notice shall be posted in a conspicuous place in every school within the Public Body's jurisdiction (in multiple languages if there are a significant number of non-English speaking parents). A copy shall also be delivered to each parent-teacher organization within the jurisdiction, each labor union covered by a collective bargaining agreement signed by the Public Body, and each landowner within 1,000 feet of the proposed site.

The state environmental regulatory agency will review all comments received on the Initial Environmental Assessment. This agency will then accept or reject the conclusion of the assessment, determine whether the site can be used without further remediation or study, whether the site is categorically excluded for use as a school, or whether further study (i.e., a

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<sup>1</sup> New York State Department of Environmental Conservation (NYSDEC) (2006) Brownfield Remedial Program Soil Cleanup Objectives for Unrestricted Use in State Regulations 6 NYCRR Subpart 375.6.3 in Table 375-6.8(a). NYSDEC, Division of Environmental Remediation, December 14, 2006.

Preliminary Endangerment Assessment) is required. The state environmental agency shall explain in detail the reasons for accepting or rejecting the assessment.

After the state environmental agency has approved the Initial Environmental Assessment, the local School Siting Committee must also review the assessment and public comments received. The purpose of this review is for the School Siting Committee to make a recommendation to either abandon the site or continue evaluating the impact of environmental hazards at the site with a Preliminary Endangerment Assessment. If no environmental hazards were identified on the property, if no identified sources of pollution located nearby were considered likely to impact the candidate site, and if no concerns were raised during the data and information evaluation step, then the property would be considered suitable for school site development.

If a PEA is required, the School Siting Committee should recommend to the Public Body whether to abandon the site or proceed with a PEA. Alternative sites and options should be considered at this point. An IEA should be completed for any alternative site being considered. Then, the Public Body must vote whether to abandon the site originally investigated, conduct an IEA for the alternative sites, or proceed with a PEA for the candidate site.

## **Step 2 - Preliminary Endangerment Assessment (PEA)**

A Preliminary Endangerment Assessment (PEA) is an in-depth assessment of the environmental contamination present at a site. A licensed environmental professional must do this assessment. As with the IEA, this will typically be a professional engineer or geologist, or an environmental health scientist with an engineering background. The state environmental regulatory agency shall oversee the PEA process and issue regulations that prescribe the precise contents of the PEA.

A model for such regulations can be found in California, where the assessment must meet the California Department of Toxic Substances Control Preliminary Environmental Assessment Guidance Manual requirements.<sup>2</sup> The PEA must also be approved by the state environmental regulatory agency before the Public Body may acquire or lease a proposed site for school purposes or start construction of a school.

The Public Body must perform a Preliminary Endangerment Assessment if the results of the Initial Environmental Assessment indicate one or more of the following:

- The proposed site is likely to have been contaminated by hazardous substances as a result of the past or current use of the site or adjoining properties;

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<sup>2</sup> California Health and Human Services Agency (CHHS) (1999) *Changes in the Population of Persons with Autism and Pervasive Developmental Disorders in California's Developmental Services System: 1987 through 1998, A Report to the Legislature*, CHHSA, Department of Developmental Services, Sacramento, CA, March.

- The proposed school site was found to be within 1,000 feet of any of the potential sources of contamination listed above (Step 1, Part II); or
- The proposed school site was likely to be impacted by potential sources of contamination that are more than 1,000 feet away, based on the professional judgment of a licensed environmental professional.

Before any work is done on the PEA, the Public Body must develop a public participation plan that ensures public and community involvement in the PEA process. The plan shall indicate what mechanisms the Public Body will use to establish open lines of communication with the public about the potential construction of a school on a candidate site. Activities such as public meetings, workshops, fact-sheets, and websites are all appropriate ways to notify the public about the proposed PEA investigation activities, such as taking soil, groundwater or air samples, holding public meetings, a comment period and releasing the results of the PEA. The state environmental regulatory agency must approve the public participation plan before the Public Body can begin PEA-related activities.

The primary objective of the PEA is to determine if there has been a release or if there is a potential for a release of a hazardous substance that could pose a health threat to children, staff, or community members. The PEA will include full-scale grid sampling and analysis of soil, soil gases (if any), surface water, groundwater, sediment, and air in order to accurately define the type and extent of hazardous material contamination present on the candidate site.

Before any sampling is conducted as part of the PEA, a work plan must be prepared that defines the goals of the sampling; the rationale for the sampling strategy including the number and location of sampling sites and what substances to test for; the sampling methods and procedures that will be used and the analytical methods and procedures.

The public will be involved in the development of the work plan and be given the opportunity to review the final draft and prepare comments. The work plan will be approved by the state environmental regulatory agency.

The PEA will also include an evaluation of the risks posed to children's health, public health, or the environment based on the contamination found. This evaluation shall include:

- A description of all possible pathways of exposure to those substances by children as well as adults using a school on the candidate site;
- The identification of which pathways will more likely result in children being exposed to those substances; and
- A description of health consequences of long-term exposure to any hazardous substances found on the site.

The state environmental regulatory agency must review the final draft of the PEA. Depending on the thoroughness of the assessment, the state agency must give preliminary approval to the assessment, disapprove the assessment, or request more information.

When the final draft of the PEA is completed and has received preliminary approval by the state environmental regulatory agency, the Public Body shall publish a notice in newspapers of general circulation (including foreign language newspapers if the school district has a sizable number of non-English speaking parents) and create a website where this notice is posted, and includes the same information released for the Initial Environmental Assessment:

- A statement that a PEA of the site has been completed;
- A brief statement describing the results of the PEA, such as a list of contaminants found in excess of regulatory standards, prior uses of the site that might raise health and safety issues, the proximity of site to environmental hazards (waste disposal sites, point sources of air pollution, etc.);
- A brief summary of the conclusions of the PEA;
- The location where people can review a copy of the PEA or an executive summary written in the appropriate local language(s); and
- An announcement of a sixty-day public comment period, including an address where public comments should be sent.

As described for the IEA, a copy of this notice shall be posted in a conspicuous place in every school within the Public Body's jurisdiction (in multiple languages if there are a significant number of non-English speaking parents). A copy shall also be delivered to each parent-teacher organization within the jurisdiction, each labor union covered by a collective bargaining agreement signed by the Public Body, and each landowner within 1,000 feet of the proposed site.

The state environmental regulatory agency will review all comments received on the PEA. The state environmental agency shall then either accept or reject the conclusion of the PEA, determine whether the candidate site can be used without further remediation or study, whether the site is categorically excluded for use as a school, or whether a Site Remediation Plan is required. The state environmental agency shall explain in detail the reasons for accepting or rejecting the PEA.

### **Step 3 - Decide Whether to Clean Up or Abandon a Contaminated Site**

After the state environmental agency has approved the PEA, the local School Siting Committee must also review the assessment and public comments received. The purpose of this review is for the School Siting Committee to make a recommendation to either abandon the site or consider remediation. Alternative sites and options should be considered at this point. Then, the Public Body must vote whether to abandon the site, consider an alternative site or option, or proceed with a remediation plan.

To help decide whether to abandon a site or proceed with cleanup of a contaminated site, the Public Body should carefully evaluate the levels of contamination found on the site in the PEA and pay close attention to how widely dispersed contaminants are across the site (both laterally and depth-wise).

The Public Body shall use the Brownfield Cleanup Program soil cleanup standards for unrestricted use developed by the New York State Department of Environmental Conservation. Calculated values for the protection of public health, groundwater and ecological resources were considered in developing these unrestricted use soil cleanup standards for Brownfield and other contaminated sites in the state. A complete listing of all 85 soil standards can be found in the Appendix or at: <http://www.dec.ny.gov/regs/15507.html#15513>.

The results of soil samples collected during the PEA should be specifically compared to the NYS Brownfield Soil Cleanup Objectives for Unrestricted Use (See Appendix). If these or other results from the PEA sampling effort indicate that some contamination of the candidate site exists, and that some minor cleanup will be needed, then the PEA will provide recommendations on cleanup levels that are at least as stringent as the NYS Brownfield Soil Cleanup Objectives. A Site Remediation Plan (see Step 4 below) shall be developed to reduce contaminant levels to the applicable safety standard for each contaminant before the site could be used.

If the PEA indicates that the site has substantial contamination, the Public Body must abandon the site and consider alternative sites. At this time, specific criteria for defining when a site has a substantial contamination problem is not included. Information in the PEA, such as the types of contaminants found on the site, whether the levels of contamination exceed the NYS Brownfield Program soil cleanup standards and the number of locations on the site where contaminants were found should help inform this determination. Additionally, the health effects of the contaminants found on the site and the age of students that will use the site should be additional considerations in making this decision.

The Public Body may choose to consider alternative sites at this point. At least two other sites must be considered. At a minimum, an Initial Environmental Assessment (IEA) should be completed for any alternative site being considered. If, however, no alternative sites to a substantially contaminated site exist, the Public Body could reconsider this site by agreeing to adopt the Last Resort remediation measures outlined in Step 5 below. These engineering measures are intended to reduce risk to the maximum extent by cutting off all potential routes of exposure. Adopting these measures at a candidate site should only be considered as a last resort, after all other potential sites have been evaluated, and eliminated and if the specific remediation guidelines outlined in Step 4 below are followed. The Public Body has no choice but to abandon the candidate site if the PEA reveals that the site was previously used for hazardous or garbage waste disposal, for disposal of construction and demolition materials, or is within 1,000 feet of any property used for these purposes.

#### **Step 4 – Develop a Cleanup Plan for Contaminated Site**

If the Public Body decides to proceed with the cleanup of a contaminated site, a Site Remediation Plan must be developed. This plan must:

- Identify methods for cleaning up the entire site to contaminant levels that meet the New York State Brownfield Cleanup Program unrestricted use soil standards;
- Contain a financial analysis that compares estimated costs for the identified cleanup methods that will bring the site into compliance with applicable safety standards;
- Recommend a cleanup plan from the alternatives identified;
- Explain how the recommended cleanup option will prevent children from being exposed to the hazardous substances found at the site; and
- Evaluate the suitability of the site in light of available alternative sites and alternative cleanup plans.

### **Remediation Goals and Objectives**

For any site where the PEA requires remediation, the following cleanup goals will need to be achieved:

- Cut off and eliminate all exposure pathways. This will prevent people from coming into contact with contaminated soil and with contaminants present in the soil, water, or air.
- Avoid mixing clean and contaminated soil. A multi-layered engineered barrier must be part of any effort to achieve this goal (see Step 5).
- Include as much redundancy as possible in the remedial work plan in order to eliminate or cut off the exposure pathways. This approach compensates for uncertainties in information about the site.
- Establish a plan to monitor the on-going integrity of the cleanup efforts.

### **Site Characterization and Identification of Exposure Hazards**

In order to achieve these goals, the preliminary Endangerment Assessment (PEA) must properly characterize the site and identify all existing and potential exposure pathways. Exposure pathways show how contaminants move through a medium such as groundwater, and from one medium to another, such as occurs when volatile organic compounds (VOCs) evaporate from soil into the air. Unless the site is completely characterized, it will not be possible to identify all the exposure pathways.

The PEA must include sufficient testing of all media – soil, groundwater, surface water, and air – across the site to be reasonably confident that you have an accurate assessment of the extent and severity of the contamination existing at the site. This testing must be done using a grid or similarly consistent pattern for determining sample locations as described in the discussion of the PEA (see Step 2).

For any site where the PEA requires remediation, cleanup levels will be at least as stringent as the NYS Brownfield Program unrestricted use soil cleanup standards. Soil with contaminant levels that exceed these guidelines must be completely removed to a depth below which there is no anticipated excavation at any time in the future.

The PEA must also determine the highest seasonal level of the groundwater table and incorporate remedial measures that take this factor must be taken into consideration as part of the Site Remediation Plan. This will ensure that if groundwater levels at a candidate site rise at any time during the year to a level that is above any proposed barrier or other underground remedial measure that would be installed at the site, it will be addressed as part of the Site Remediation Plan.

The Site Remediation Plan should also provide requirements for the final site sampling to be conducted after the cleanup has been completed to ensure that all the contamination has been removed and the soil meets the NYS Brownfield soil cleanup standards.

### **Site Remediation Plan**

The Public Body shall submit the Site Remediation Plan to the state environmental regulatory agency for approval. Before submitting this plan, a draft remediation plan shall be given to the School Siting Committee for review and comment. If the agency has a Technical Assistance Grant program, the Committee should be encouraged to obtain a grant so they may hire a technical consultant to review the plan and ensure that it meets public health protection goals. Once the remediation plan is submitted to the state agency for approval, the Public Body shall proceed with a public notification and outreach plan similar to that conducted for the Initial Environmental Assessment and the Preliminary Endangerment Assessment. This will include publishing a notice in newspapers of general circulation (including foreign language newspapers if the school district has a sizable number of non-English speaking parents) and creating a website where this notice is posted that includes the following information:

- A statement that a Site Remediation Plan has been submitted to the state environmental agency for approval;
- A brief statement describing the Site Remediation Plan, including a list of contaminants found in excess of regulatory standards and a description of how the plan will reduce the level of contamination to meet those regulatory standards;
- The location where people can review a copy of the Remediation Plan or an executive summary written in the appropriate local language(s); and
- An announcement of a sixty-day public comment period and the address of the state environmental agency where public comments should be sent.

A copy of this notice shall be posted in a conspicuous place in every school within the Public Body's jurisdiction (in multiple languages if there are a significant number of non-English speaking parents). A copy shall also be delivered to each parent-teacher organization within the jurisdiction, to each labor union covered by a collective bargaining

agreement signed by the Public Body, and each landowner within 1,000 feet of the proposed site.

At least thirty days after the conclusion of the public comment period the state environmental regulatory agency shall conduct a public hearing on the remediation plan in the neighborhood or jurisdiction where the candidate site is located.

The state environmental agency shall publish a notice of the hearing in newspapers of general circulation (including foreign language newspapers if the school district has a sizable number of non-English speaking parents) and post this notice on their website stating the date, time and location of the hearing. The state environmental regulatory agency shall provide translators at the public hearing if the school district has a sizable number of non-English speaking parents.

After the public hearing and after reviewing any comments received during the public comment period, the state environmental regulatory agency shall either approve the Site Remediation Plan, disapprove the Site Remediation Plan, or request additional information from the Public Body. If the state agency requires additional information, a copy of the letter requesting additional information shall be sent to the School Siting Committee. Any additional information submitted by the Public Body to the state environmental regulatory agency shall also be given to the School Siting Committee. After reviewing any additional information, the state environmental regulatory agency must approve or reject the Site Remediation Plan. The state environmental agency shall explain in detail the reasons for accepting or rejecting the Site Remediation Plan.

After the state environmental regulatory agency approves the Site Remediation Plan, the local School Siting Committee must also review the plan and recommend to the Public Body whether to abandon the candidate site or proceed with acquiring the site and implementing the remediation plan. Alternative sites or options should be considered at this point. The Public Body must then vote whether to abandon the site or to acquire the site and implement the remediation plan. Only upon voting to acquire the site and implement the remediation plan may the Public Body take any action to acquire the site and prepare the site for remediation and eventually construction of a school.

Prior to the onset of any school construction on the candidate site, the remediation effort must be completed, including demonstration that the cleanup goals have been achieved. This will be verified by a final sampling effort in accordance with the guidelines established in the PEA, though perhaps modified by the Remediation Plan. Documentation regarding the implementation of the plan and all final sampling results will be subject to review by the state environmental agency who may require additional sampling and/or remediation efforts as they deem appropriate. Any modifications to the Remediation Plan will also have to go through the appropriate public review processes. Only after the state has agreed that remediation is complete may any school construction begin.

## **Step 5 - The Last Resort – Develop a Cleanup Plan with Engineering and Institutional Controls for a Last Resort Site that is Highly Contaminated**

There are times when the Public Body may be forced to reconsider a site that would have been abandoned during the Preliminary Environmental Assessment (PEA) process because of the presence of substantial contamination. This situation might occur in an urban setting where the number of undeveloped sites is limited because of existing development. There may be other times when the Public Body will be left with no other choice of sites. These sites should only be considered as a last resort after all other potential sites have been evaluated and eliminated. A minimum of two other sites must be considered before a Last Resort site would be considered.

In these situations, extra precautions need to be taken to ensure to the maximum extent possible that students, teachers, parents, administrative staff or workers will not be at risk from exposure to toxic chemicals. These precautions include a number of redundant cleanup measures and engineering controls that go beyond meeting standard requirements. This redundancy is needed to provide the necessary level of safety and public confidence to permit the construction and operation of a school on a contaminated site.

### **Remediation Goals and Objectives**

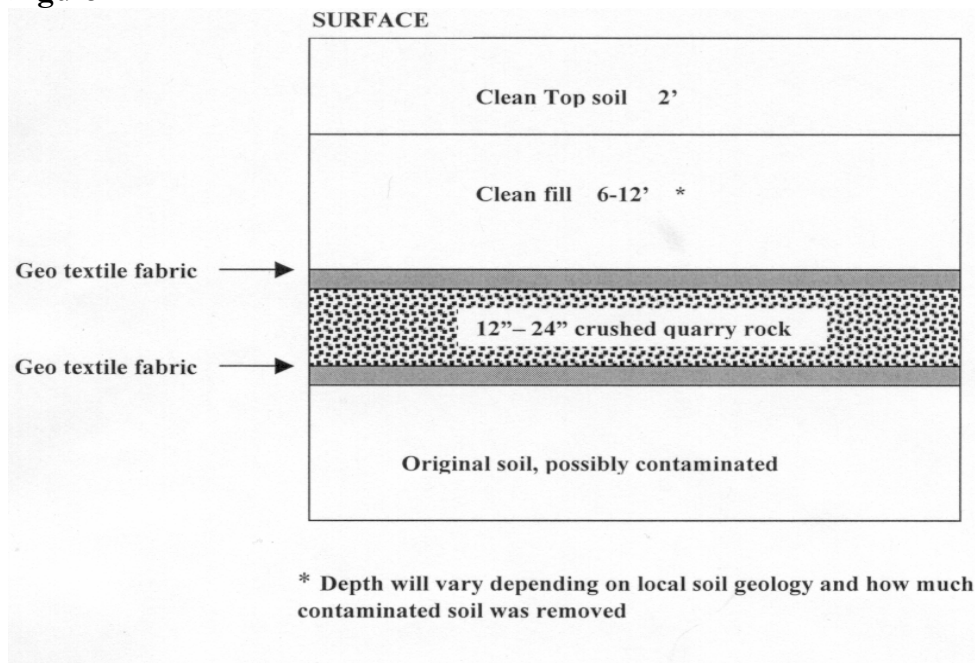
The Remediation Goals and Objectives for a Last Resort Site are the same as those described in Step 4. Achieving these goals will identify potential exposure pathways and to eliminate to the maximum extent possible exposure of any users of the site to toxic chemicals. These steps would be taken at a site that would have been abandoned during the PEA site evaluation and was not categorically excluded from consideration, such as a site located on top of, or within 1,000 feet of land where hazardous or household garbage waste was landfilled, or where disposal of construction and demolition materials occurred.

1. Fully cut off and eliminate all exposure pathways. This will prevent people from coming into contact with contaminated soil and with contaminants present in the soil, water, or air.
2. Prevent mixing of clean and contaminated soil. A multi-layered engineered barrier must be part of any effort to achieve this goal.
3. Include as much redundancy as possible into the remedial work plan, in order to eliminate or cut off the exposure pathways. This approach compensates for uncertainties in information about the site and will minimize risks associated with building on a contaminated site.
4. Establish an on-going monitoring plan to monitor the integrity of the cleanup efforts.

### **Properly Characterize the Site and Identify Exposure Hazards**

- The site must be completely characterized. There must be sufficient testing of all media – soil, groundwater, surface water, and air – across the site to be reasonably confident that you have an accurate assessment of the extent and severity of the contamination existing at the site. This testing must be done using a grid or similarly consistent pattern for determining sample locations. An evaluation consistent with a Preliminary Endangerment Assessment (PEA) would be appropriate (see Step 2).
- Identify all existing and potential exposure pathways. Exposure pathways describe the ways that people who use a site might come into contact with toxic substances at the site. They also show how those substances move through a medium such as groundwater, and from one medium to another, such as occurs, when volatile organic compounds (VOCs) evaporate from soil into the air. Unless the site is completely characterized, it will not be possible to identify all the exposure pathways.
- Identify all areas that exceed the NYS Brownfield Soil Cleanup Objectives for Unrestricted Use. The testing done at the site should identify all contaminants present in soil and other media. Soil with contaminant levels that exceed the NYS Soil Cleanup Objectives, as described in the Appendix, must be completely removed to a depth below which there is no anticipated excavation (see Figure 1).

**Figure 1**



- Determine the highest seasonal level of the groundwater table. Evaluate whether the groundwater at a candidate site rises at any time during the year to a level that is above any proposed barrier or other underground remedial measure that would be installed at the site. If this occurs, then this factor must be taken into consideration as part of the Site Remediation Plan.

## Required Remediation Steps

- **Remove all contaminated soil on the proposed site that exceeds the NYS Brownfield Soil Cleanup Objectives up to the “excavation depth.”** Soil containing levels of contaminants in excess of these standards must be removed to at least a depth below which there is no anticipated excavation, such as might result from the installation of utility lines and connections, or construction of footers to support a building. This is referred to as the “excavation depth” and might reasonably range from 8 to 14 feet, depending on local site geology. The Site Remediation Plan must include provisions for covering any residual soil contamination with clean topsoil and fill (see Figure 1).
- **Install a multi-layered barrier over any contaminated soil left in place at the site.** This multi-layered barrier will separate clean soil from any residual contamination left in place. Starting at the surface and moving downward, this barrier shall consist of the following layers (see Figure 1). First, there is a minimum of 2 feet of certifiably clean topsoil. Second, is a layer of 6-12 feet of certified clean fill to replace contaminated soil removed to the excavation depth (this depth will vary depending on how much contaminated soil was removed). Third, is a layer of 12 to 24 inches of sharp, angular crushed rock (quarry rock, not crushed cement or some other stone that will disintegrate with high acidity) surrounded on both sides by a brightly colored orange Geotextile fabric (see Figure 1). The cover soil and fill shall be underlain by a continuous layer of an orange-colored geo textile material designed to provide a long-term future warning to others who might disturb or excavate to below this level. This multi-layered barrier will separate clean soil and fill from any residual contamination left in place. This colored fabric serves as a “marker layer” to warn anyone who might dig into the soil that below this marker is contaminated soil. The crushed stone layer provides a “capillary break” that limits the upward and downward movement of water or leachate. This layer will also prevent burrowing animals and worms from transporting contaminated soil into the clean fill and potentially to the surface.
- **If volatile gases are present in the soil, this can result in soil vapor intrusion.** Vapor intrusion occurs when volatile organic compounds (VOCs) evaporate from contaminated groundwater through soil and into buildings. These gases can be intercepted by the crushed stone layer of the multi-layer barrier and will then need to be captured and vented to ensure that they do not reach buildings on or near the school property. A "chimney" system to capture and vent volatile gases before they enter the school building will be needed if VOCs are detected in the soil or groundwater in excess of the NYS Brownfield Program soil cleanup standards or any guidance values provided in the NYS Department of Health Guidance for Evaluating Soil Vapor Intrusion (See [http://www.health.state.ny.us/environmental/investigations/soil\\_gas/svi\\_guidance/index.htm](http://www.health.state.ny.us/environmental/investigations/soil_gas/svi_guidance/index.htm)).

In much the same way that venting systems are used to intercept radon gas before it enters a home, a similar venting system with a crushed stone layer and perforated pipes under and around a school building could be installed to intercept any VOCs that might be present in residual contaminated soil. Solid pipes would then transport the gases up and out of the school building. A filter may well have to be installed to capture these

toxic gases rather than release them directly into the ambient air. This system may not always be necessary and could be considered in addition to a multi-layer barrier, based on sampling results. Similarly, if methane gases are present in the soil, these gases will need to be vented and captured, and a methane gas extraction technology may need to be installed to ensure that these gases do not reach buildings on or near the school property.

- **Construct a two-foot concrete slab built on top of a polyethylene vapor barrier if a new foundation is needed for a school building built on contaminated soil.** The plastic vapor barrier will provide another means to reduce vapor infiltration from soil under the building.

### **Institutional Controls and Monitoring**

Institutional controls should be implemented to provide notice and information for future users of the school, or in the event future users of the site ever tear down the building. They should include notice of where the residual contamination is located, what contaminants are present, and how to monitor the integrity of barriers or other steps taken to prevent exposures at a site. These procedures are needed because contaminated soil remains at the site below the engineered multi-layered barrier.

- Install a metal or stone plaque in the school lobby or other prominent place that includes a warning in English and any other language appropriate for the school community that describes the contamination beneath the school and/or school property and directs the readers to the “Due Care Plan.” Ideally, the lettering should be raised or cut into the metal.
- Prepare a “Due Care Plan” that includes a history of the uses at the site, a summary of the environmental evaluation, a summary of the remedial work done at the site, and a list of the steps needed to maintain monitoring of the site in perpetuity. This Plan would also list activities that are prohibited at the site in order to maintain the integrity of the remedial work completed at the site. The Due Care Plan is to be permanently kept at the school in a location that is accessible to parents.
- Create a position within the school facilities department for a technically knowledgeable worker who will be trained and responsible for environmental oversight of the school and the grounds. This person should provide a report at least annually to the school staff, the School Board, parent groups, central district, and other applicable parties that summarizes the Due Care Plan and includes the results of any environmental monitoring completed in the past year.
- Require training of school personnel responsible for managing the school building and grounds. Such training will cover techniques for monitoring cracks in the foundation and breaches of the topsoil, procedures on how to handle equipment malfunctions or other problems with remedial systems that might occur, and how to

serve as a contact for complaints or suggestions about environmental conditions at the school.

- Provide funding for monitoring cracks in the foundation and breaches of the topsoil, repairing and maintaining equipment and remedial system integrity.
- Each year, the school facilities department will hire an environmental professional to conduct tests to assess the presence of contaminants in the soil, soil gas, indoor air, and groundwater on the school grounds. Surface soil will only need to be tested if it were disrupted. The results of the testing must be included in a report prepared by an environmental professional that describes the purpose of the testing, the sample location and collection procedures, and the analytical methods used. This report should be made available to school staff, the School Board, parent groups, the central district, and other interested parties. A brief summary of the report must be translated into foreign languages as appropriate. This information should also be posted online by the regulating agency and the website of the school or Public Body.
- Each year, health complaints among the students and teachers/staff should be monitored. Illnesses such as headaches, lethargy, recurring upper respiratory illness, and asthma should be routinely monitored and if the rate that these illnesses are reported exceeds seasonal averages by 25%, then a more thorough investigation of these illnesses should be conducted.
- If VOCs were identified in the soil or groundwater, install soil gas and groundwater monitoring wells around the proposed school building and develop a long term monitoring plan designed to detect VOCs or other gases that move through the soil and subsurface. The gas wells should be installed under the building or as close to the building as is feasible if the structure already exists. Samples should be taken from the wells and analyzed for a full range of VOCs every 6 months following completion of the remedial work and construction of the school building. Testing could continue annually if no VOCs are found in the first year following construction. If VOCs are detected in the soil or groundwater in excess of the NYS soil standards or any guidance values provided in the NYS Department of Health Guidance for Evaluating Soil Vapor Intrusion (See [http://www.health.state.ny.us/environmental/investigations/soil\\_gas/svi\\_guidance/index.htm](http://www.health.state.ny.us/environmental/investigations/soil_gas/svi_guidance/index.htm)), a vapor extraction technology will need to be installed as noted above.
- Consider using radon as a natural tracer as part of the soil gas monitoring plan to evaluate the integrity of a foundation or a cap/barrier installed between clean fill and contaminated soil. Radon gas is found naturally in soil in many areas and can be used as a surrogate for VOCs in evaluating whether VOCs are entering the school building. Radon concentrations would be measured simultaneously in the building and in the soil gas. The ratio of the soil gas concentration to the indoor air concentration represents an attenuation factor between soil gas and indoor air that directly measures the rate at which soil gas enters the building. To determine if VOCs are entering the building, the soil gas concentrations of VOCs measured in the soil monitoring wells are divided by the attenuation factor. Soil gas monitoring

wells need to be installed under the school or as close to the building as is feasible. Radon detectors should be installed in the soil gas wells and monitored at least every 6 months following completion of the remedial work and construction of the school building. Testing could continue annually if no VOCs are found in the first year following construction.

- No plants or trees that have extensive root systems should be planted on top of the multi-layered barrier. Shrubs whose root systems that don't extend more than a couple of feet down are acceptable, but tap rooted varieties of plants that penetrate deep into the soil are not. Frequent mowing of school grounds will reduce the likelihood that burrowing animals will penetrate the top layer of the engineered barrier.
- If cement is used in the crushed stone layer of the multi-layered barrier, lime the soil above the geotextile layer as often as possible to maintain neutral to basic conditions in the topsoil. This will help to neutralize acid rain before it reaches the crushed stone layer of the multi-layered barrier. Acid rain will hasten the degradation and dissolution of the cement in this layer. This is not necessary if hard quarry rock is used.
- If it is absolutely necessary to dig through an installed multi-layered barrier, such as to install utility lines or connections or to construct footers to support a new building, then the appropriate Occupational Safety and Health Administration (OSHA) safety requirements must be used and any soil removed must be taken off site for proper disposal and be replaced with clean fill. Upon completion of the work, the multi-layered barrier must be put back in place. Footers should be installed so that they do not penetrate the barrier.

Source: Center for Health, Environment, and Justice, Updated June, 2007.  
PO Box 6806, Fall Church, VA 22046; (703) 237-2249; [chej@chej.org](mailto:chej@chej.org); [www.chej.org](http://www.chej.org).

## APPENDIX

### New York State Department of Environmental Conservation (NYSDEC) Brownfield Remedial Program Soil Cleanup Objectives (SCOs) for Unrestricted Use.

*Lists contaminant and unrestricted use in parts per million (ppm).*

1,1,1-Trichloroethane <sup>f</sup>	0.68	Chlorobenzene	1.1
1,1-Dichloroethane <sup>f</sup>	0.27	Chloroform	0.37
1,1-Dichloroethene <sup>f</sup>	0.33	Chromium, hexavalent <sup>e</sup>	1 <sup>b</sup>
1,2,4-Trimethylbenzene <sup>f</sup>	3.6	Chromium, trivalent <sup>e</sup>	30 <sup>e</sup>
1,2-Dichlorobenzene <sup>f</sup>	1.1	Chrysene <sup>f</sup>	1 <sup>c</sup>
1,2-Dichloroethane	0.02 <sup>c</sup>	cis -1,2-Dichloroethene <sup>f</sup>	0.25
1,3,5-Trimethylbenzene <sup>f</sup>	8.4	Copper	50
1,3-Dichlorobenzene <sup>f</sup>	2.4	delta-BHC <sup>g</sup>	0.04
1,4-Dichlorobenzene	1.8	Dibenz(a,h)anthracene <sup>f</sup>	0.33 <sup>b</sup>
1,4-Dioxane	0.1 <sup>b</sup>	Dibenzofuran <sup>f</sup>	7
2,4,5-TP Acid (Silvex) <sup>f</sup>	3.8	Dieldrin	0.005 <sup>c</sup>
4,4'-DDD	0.0033 <sup>b</sup>	Endosulfan I <sup>d, f</sup>	2.4
4,4'-DDE	0.0033 <sup>b</sup>	Endosulfan II <sup>d, f</sup>	2.4
4,4'-DDT	0.0033 <sup>b</sup>	Endosulfan sulfate <sup>d, f</sup>	2.4
Acenaphthene	20	Endrin	0.014
Acenaphthylene <sup>f</sup>	100 <sup>a</sup>	Ethylbenzene <sup>f</sup>	1
Acetone	0.05	Fluoranthene <sup>f</sup>	100 <sup>a</sup>
Aldrin	0.005 <sup>c</sup>	Fluorene	30
Alpha-BHC	0.02	Heptachlor	0.042
Anthracene <sup>f</sup>	100 <sup>a</sup>	Hexachlorobenzene <sup>f</sup>	0.33 <sup>b</sup>
Arsenic	13 <sup>c</sup>	Indeno(1,2,3-cd)pyrene <sup>f</sup>	0.5 <sup>c</sup>
Barium	350 <sup>c</sup>	Lead	63 <sup>c</sup>
Benz(a)anthracene <sup>f</sup>	1 <sup>c</sup>	Lindane	0.1
Benzene	0.06	Manganese	1600 <sup>c</sup>
Benzo(a)pyrene	1 <sup>c</sup>	m-Cresol <sup>f</sup>	0.33 <sup>b</sup>
Benzo(b)fluoranthene <sup>f</sup>	1 <sup>c</sup>	Methyl ethyl ketone	0.12
Benzo(g,h,i)perylene <sup>f</sup>	100	Methyl tert-butyl ether <sup>f</sup>	0.93
Benzo(k)fluoranthene <sup>f</sup>	0.8 <sup>c</sup>	Methylene chloride	0.05
Beryllium	7.2	Naphthalene <sup>f</sup>	12
beta-BHC	0.036	n-Butylbenzene <sup>f</sup>	12
Cadmium	2.5 <sup>c</sup>	Nickel	30
Carbon tetrachloride <sup>f</sup>	0.76	n-Propylbenzene <sup>f</sup>	3.9
Chlordane (alpha)	0.094	o-Cresol <sup>f</sup>	0.33 <sup>b</sup>

p-Cresol <sup>f</sup>	0.33 <sup>b</sup>	Tetrachloroethene	1.3
Pentachlorophenol	0.8 <sup>b</sup>	Toluene	0.7
Phenanthrene <sup>f</sup>	100	Total Cyanide <sup>c, f</sup>	27
Phenol	0.33 <sup>b</sup>	Total Mercury	0.18 <sup>c</sup>
Polychlorinated biphenyls	0.1	Trans-1,2-Dichloroethene <sup>f</sup>	0.19
Pyrene <sup>f</sup>	100	Trichloroethene	0.47
sec-Butylbenzene <sup>f</sup>	11	Vinyl chloride <sup>f</sup>	0.02
Selenium	3.9 <sup>c</sup>	Xylene (mixed)	0.26
Silver	2	Zinc	109 <sup>c</sup>
tert-Butylbenzene <sup>f</sup>	5.9		

### Footnotes:

<sup>a</sup> The SCOs for unrestricted use were capped at a maximum value of 100 ppm. See Technical Support Document (TSD), section 9.3.

<sup>b</sup> For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.

<sup>c</sup> For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.

<sup>d</sup> SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.

<sup>e</sup> The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

<sup>f</sup> Protection of ecological resources SCOs were not developed for contaminants identified in Table 375-6.8(b) with "NS". Where such contaminants appear in Table 375-6.8(a), the applicant may be required by the Department to calculate a protection of ecological resources SCO according to the TSD.

From State Regulations 6 NYCRR Subpart 375.6.3 in Table 375-6.8(a). NYSDEC, Division of Environmental Remediation, December 14, 2006.

<http://www.dec.ny.gov/regs/15507.html#15513>.