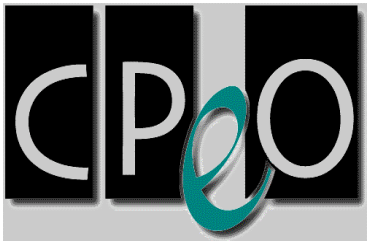

Independent Review of the Draft Site Management Plan for the Mott Haven Schools Complex Bronx, New York

Prepared For:
New York Lawyers for the Public Interest (NYLPI)
On Behalf of the Bronx Committee for Toxic Free Schools

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March 25, 2008

We are pleased to have the opportunity to comment on the January 2008 draft Site Management Plan (SMP) for the Mott Haven school campus, now under construction in the South Bronx. Before we offer our comments, we would like to repeat our observation that *the School Construction Authority cleanup of this site is robust. With proper site management, the students, teachers, and others who will occupy this site will not be at risk of unacceptable environmental exposures.* Furthermore, because there is widespread community concern that every effort be made to protect its children, we wish to assure parents and others that the risk from potential future exposures, even if site management fails, would be long-term, not immediate. That is, failures of the cleanup and associated site management would not pose immediate risks to those who use the campus.

However, even after excavation in the original Brownfields Cleanup Program area and at five additional hotspots, as recommended in CPEO's independent review, contaminants remain on site above the State's Recommended Soil Cleanup Objectives (RSCOs). Significant up-gradient groundwater contamination also still remains. *While the draft SMP contains many of the elements necessary to guide long-term site management, we find that it is incomplete.* The chronic health risks from exposure to contaminants on site must be taken seriously. The time to ensure the long-term safety of the site is now. The officials and consultants who design and oversee both cleanup and construction will be long gone in decades, but the need to manage the site will continue.

Therefore, we urge the involved agencies to accept the recommendations made within this report to ensure the long-term health and safety of current and future site occupants. We have re-listed those recommendations, in their order of appearance in the document, in the final section.

Figure 1: Aerial View of Site

Background

The New York City School Construction Authority (SCA) is constructing four schools, plus common facilities, on a 6.63-acre former rail yard property in the Bronx known as the Mott Haven site, adjacent to two existing schools, P.S. 156 and I.S. 151. The 275,000-square-foot multi-story facility, with a footprint of 147,000 square feet, will serve more than 2,200 high school and middle school students. The primary entrances will be at street level from Concourse Village West, which is 30 feet above the former rail yard property, supported by a retaining wall. Playing fields and other open space at the rail yard elevation will cover the eastern portion of the campus.

Over the past several years, a series of environmental investigations have found a range of environmental contaminants on the property. These include semi-volatile organic compounds (SVOCs) from a former manufactured gas plant, BTEX (benzene, toluene, ethylbenzene, and xylene) from gasoline leaks and spills, and chlorinated solvents such as the dry-cleaning chemical, perchloroethylene (PCE, also known as tetrachloroethylene), and trichloroethylene (TCE). Many of these contaminants originated off site, and were carried by groundwater onto the site.

In 2005, a portion of the Mott Haven site was accepted into New York's Brownfield Cleanup Program (BCP). SCA and its consultants, the Shaw Group, completed a Remedial Investigation in November 2005, and in 2005-2006 it submitted a Remedial Action Work Plan (with subsequent supplements) to state agencies. The proposed remedy included partial removal of contaminated soil and groundwater, hydraulic barriers and cover systems to reduce contaminant migration and exposures, and vapor membranes and subslab depressurization systems under each building to prevent any remaining toxic vapors from rising into buildings.

Residents of the surrounding area, as well as parents and staff at the existing schools, expressed concern that the area was not safe as a site for four new schools, and that construction was affecting existing schools. They contacted New York Lawyers for the Public Interest (NYLPI), which arranged for the New York City Department of Education (DOE) to pay for an independent review of the Remedial Plan. CPEO submitted that review on January 24, 2007. On February 2, 2007, the School Construction Authority stated that it would implement CPEO's recommendations, though at least one significant dispute remained regarding the safety of the SCA-proposed methodology for removing contaminated "hotspots" it had committed to remove. (See pages 7-8.)

We appreciate the School Construction Authority's stated acceptance of the recommendations we made in our January 2007 "Independent Review." The implementation of those recommendations will make the site cleanup even more protective. For example, the DOE, as we recommended, re-tested the indoor air at one of the adjacent existing schools, P.S. 156. The October 2007 data demonstrated that earlier elevated levels of PCE at that school were not from environmental sources beneath the school.

One of our key recommendations was that the preparation and implementation of a Site Management Plan be robust and transparent, with the opportunity for community input. In January 2008, the SCA published a draft Site Management Plan for review by the New York State Department of Environmental Conservation (DEC), as well as for public comment. Once again NYLPI asked CPEO to conduct an independent review on behalf of its clients, the Bronx Committee for Toxic Free Schools. This time the review was funded by an emergency grant provided to NYLPI by the Mertz Gilmore Foundation. This document is CPEO's review of the draft Site Management Plan.

Whenever contamination is left in place at levels that do not allow unrestricted use and unlimited access, or under conditions that may lead to increases in contamination to such unacceptable levels, long-term site management is an essential component of the remedy. That is, because unsafe levels of hazardous substances remain on site (as is the case here), or are headed toward the site (as is also the case here), protectiveness depends upon site management for the life of the contamination.

We believe a detailed draft Site Management Plan should have been prepared as part of the Remedial Action Work Plan, to properly weigh the cost and challenges of long-term site management against additional treatment and removal.[1] However, it is not too late to establish engineering and institutional controls as well as procedures for monitoring, operations and maintenance, and reporting. The draft Site Management Plan contains many of the elements necessary to guide long-term site management, but we find that it is incomplete. In the remainder of this report we evaluate the draft SMP against the standard we laid out in our January 2007 recommendation.

> The SCA and regulatory agencies should establish a robust, transparent, long-term Site Management Plan (for the life of the on- and off-site contamination), with an established process for addressing emerging exposures. The plan should include procedures for maintaining engineering controls, including vapor mitigation systems and protective caps (under the existing schools as well as on the new campus); institutional controls prohibiting soil disturbance; and long-term sampling protocols. In particular, groundwater monitoring adjacent to the hydraulic barriers should be extended until upgradient sources of contamination are eliminated. Contingency plans should be in place for addressing Technical, Logistical, and Regulatory contingencies, and there should be a schedule for periodic review of the protectiveness of the remedy.

Responsibility

Site Management Plans are merely pieces of paper unless they include assurances that they will be funded and implemented for the life of the contamination. In fact, the Brownfields Cleanup statute [specifically, ECL 27-1415(7)] requires:

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[1] NYLPI filed suit in New York State Court challenging SCA's decision to omit a detailed draft SMP from the Remedial Action Work Plan. See In re Application of Bronx Committee for Toxic Free Schools v. New York City School Construction Authority, No. 13800/07 (N.Y. Sup. Ct. filed Apr. 6, 2007) (Williams, J.). The case is still pending.

> (iii) an evaluation of the reliability and viability of the long-term implementation, maintenance, monitoring, and enforcement of any proposed institutional or engineering controls and an analysis of the long-term costs of implementing, maintaining, monitoring and enforcing such controls, including costs that may be borne by state or local governments;
>
> (iv) sufficient analysis to support a conclusion that effective implementation, maintenance, monitoring and enforcement of institutional and/or engineering controls can be reasonably expected;
>
> (v) where required by the department, financial assurance to ensure the long-term implementation, maintenance, monitoring, and enforcement of any such controls; ...

The SMP should include such an evaluation and analysis, and it should address two key legal issues:

First, at a February 27, 2008 meeting at the Bronx Borough President's Office, DEC representatives explained that the agency might not have the authority to oversee site management for the entire Mott Haven project. That is, currently DEC has clear authority over one acre, in the northwest corner of the seven-acre site, which is covered by the Brownfield Cleanup Program (BCP). However, the SCA and its consultants have appropriately prepared a draft SMP and property easement addressing not only the remainder of the Mott Haven campus parcel, but also portions of the property where the existing schools (PS 151 and 156) are located. If DEC does not believe it has authority to oversee the entire project, then we recommend that it revise the Brownfield Cleanup Agreement to cover the entire site. It would be wrong for portions of the campus to be beyond the routine oversight of DEC. It is inappropriate for only one complete building and a portion of another to be subject to oversight, since the proposed response covers five new buildings, areas of the site outside the building footprints, and the existing schools to the North of the site.

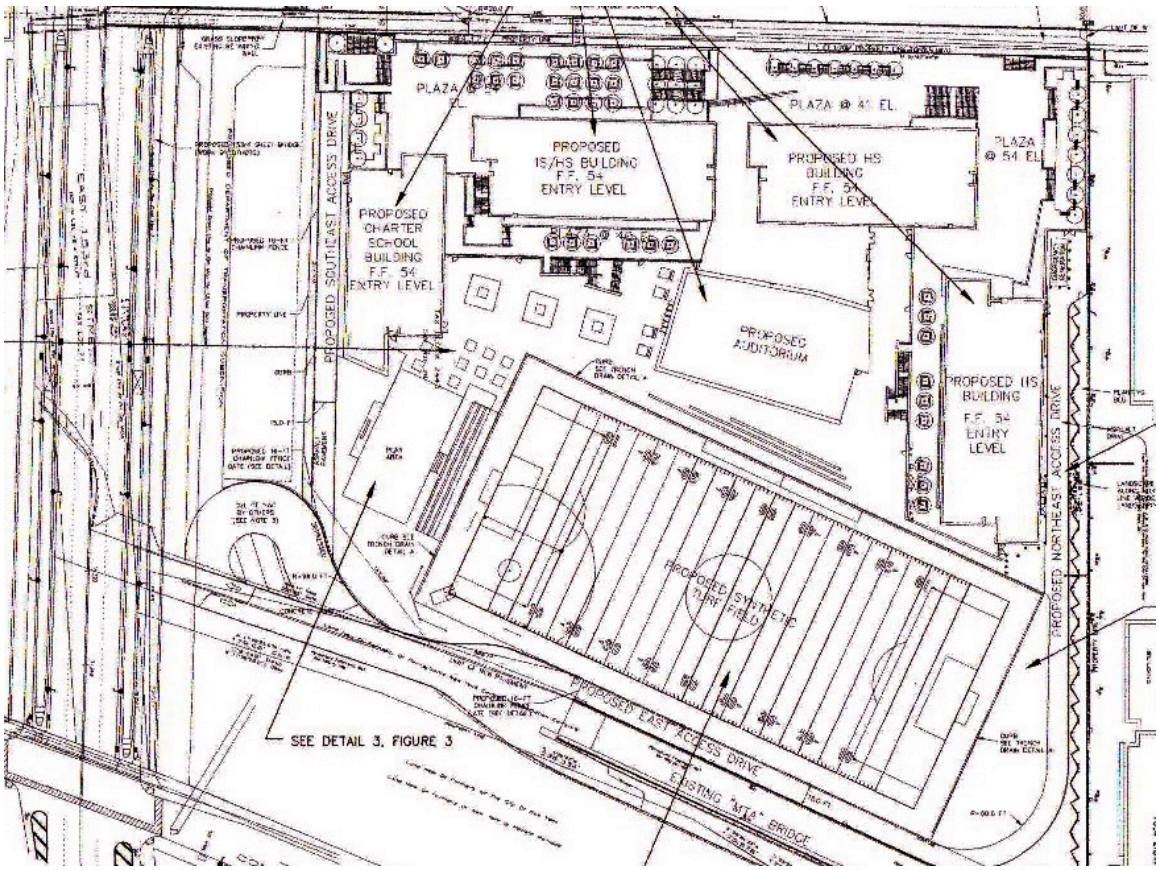
Second, the School Construction Authority is the entity responsible for developing the SMP, and it will be the grantor of the Environmental Easement on the property. However, once the schools are in operation, they will be the responsibility of the DOE. That is, it will be the DOE that implements long-term operations, maintenance, and monitoring. SCA officials have assured us that the legally binding Easement "runs with the land." That is, it will bind the DOE as well as the SCA. Nevertheless, the long-term reliability and viability of the SMP will be significantly strengthened if the DOE agrees in writing to fund and implement its responsibilities under the document being developed by a sister agency. Furthermore, in that document the DOE should identify a principal point of contact responsible for the implementation of the SMP.

We anticipate that the property will be operated indefinitely as a school campus, but in even if it is not, the proposed Environmental Easement—appended to the SMP—will restrict future uses and require that protective measures remain in place no matter who owns the property. That is, in that event, proper enforcement of the Easement should prevent a return to the state of unprotective abandonment that characterized the site for years.

Open Areas and "Hotspot" Removal

A majority of the Mott Haven campus will consist of open areas, including landscaped areas, paving, and an artificial turf athletic field. Even after excavation in the original Brownfields Cleanup Program area and five additional hotspots, as recommended in CPEO's independent review, contaminants—primarily semi-volatile organic compounds (SVOCs)—will remain on site above the State's Recommended Soil Cleanup Objectives (RSCOs). Thus, engineering controls are necessary, not only to prevent human contact with contaminated soil, but also to prevent flooding and other scenarios from causing the release of, and exposure to, contamination. The draft SMP proposes a Surface Cover System consisting of asphalt roads, two feet of clean fill in landscaped areas, and artificial turf made of blended polyethylene over an infill system of sand, rubber, and inert materials as protection and containment of contaminants. It also proposes restrictions on soil disturbance.

Figure 2: Site Plan



The draft SMP describes the soil outside the BCP area as "characteristic of historic urban fill," which DEC defines as "non-indigenous or non-native material, historically deposited or disposed in the general area of, or on, a site to create useable land by filling water bodies, wetlands or topographical depressions, which is in no way connected with the subsequent operations at the location of the emplacement, and which

was contaminated prior to emplacement." The SCA's consultant has explained more than once that the soil, prior to construction, looked and felt like historic fill. Although we have seen evidence that off-site soil was emplaced on the site in three debris mounds and over some parts of the site, there is no evidence that the existing contaminated soil was ever removed. The depths of fill significantly vary across the site, and most of the cross sections included in the SMP target the footprint of the buildings and not the open areas of the site. The operation of the site as a rail yard, complete with industrial operations (i.e., a machine shop, carpenters shop, paint shop, and storage areas, all which were likely to have used, leaked, and disposed of contaminants haphazardly) for at least 84 years strongly suggests that many of the various contaminants on the property were generated on site. In fact, it is possible that fill was placed over parts of the site prior to the construction and operation of the rail yard.

During an earlier investigation of the site by URS (Phase II Environmental Site Investigation Report, January 2005), railroad ties were found buried at the site (with a creosote odor), surface soil was found to be "5 to 10 times the New York State Department of Environmental Conservation (NYSDEC) Recommended Soil Cleanup Objectives" for semi-volatile organic compounds (SVOCs), and subsurface soils contained concentrations of both SVOCs and volatile organic compounds (VOCs) that were in some cases "an order of magnitude greater than the RSCOs." The VOCs in soil and groundwater were found primarily in the northwest corner of the site, which became the BCP area. This report added that for the site to be suitable for a New York City public school facility, "the installation of a clean soil cap, a minimum of 12 inches thick, over approximately 6 acres of the site not otherwise covered by Site structures" was recommended.

We question the "historic fill" explanation because it seems to justify leaving contamination in place, or even allowing continuing exposures, because this land is like the rest of New York City. Thus, by labeling the property historic fill SCA and its consultants appear to be deeming exposures acceptable. We believe the opposite may be true. Because New Yorkers may routinely be exposed to levels of contamination unusual elsewhere in the state or the nation, they may need more protection.

In its original plan, SCA proposed not to excavate "historic fill" areas, even though they were above the RSCOs. In response to CPEO's Independent Review, SCA agreed to excavate hotspots outside the BCP area. Ultimately, the SCA removed five hotspots, one under a building and four in open areas, where SVOC concentrations exceeded an average "background" concentration that its consultants established. That is, much of the contamination that exceeded health-based standards was not removed because, according to SCA, those levels are found throughout the site and much of New York City. However, the SCA's background calculation permitted levels of contamination for some compounds to remain on the property at levels that *significantly* exceed the RSCO standards. At this point, we are not recommending additional excavation, but we raise the issue because it heightens the importance of reliable long-term site management.

To establish a background comparison for SVOC contaminants, the SCA consultants averaged the total contaminant levels from ten boreholes. That is, all contaminants were treated equally, as if they had the same toxicity or RSCO. But that is not the case. Some contaminants have much more stringent requirements than others, and the averaging method groups together "apples and oranges." For example, one contaminant (benzo(a)pyrene) has a RSCO of 61 micrograms per kilogram (µg/kg), while other contaminants have RSCOs of 50,000 µg/kg. Under the proposed background calculated by SCA, a contaminant such as benzo(a)pyrene could be an order of magnitude higher than the RSCO and still be acceptable. Furthermore, the methodology to establish background was flawed in several ways: outliers were not excluded, and a mean was used instead of a median. The background for total SVOCs was established at 7,197 µg/kg; if the median had been used and outliers were removed, the background would have been 3,359 µg/kg. If any future construction or excavation disturbs contaminated historic fill, it is important that this latter number be used as "background."

Whether or not the property is historic fill, the cover systems must be reliable in the long run because a number of compounds remain on site at concentrations exceeding the health-based RSCOs. We conclude that the proposed Surface Cover System, with its accompanying management system, is sufficient to prevent human contact with buried contamination. However, we seek additional demonstration that the various covers will prevent contamination from mobilizing and making its way to the surface when surface water infiltrates or floods the land. At sites we are familiar with, groundwater levels have risen rapidly during heavy rains, saturating and mobilizing contaminants in the underlying surface. Because groundwater is relatively shallow at the site, and because the Bronx Committee for Toxic Free Schools and other community members report a history of flooding of Concourse Village West and the rail yard, it is not apparent to us that 4.5 inches of paving is sufficient to prevent migration of contaminants from the subsurface to the surface via the inevitable cracks and fissures that form in pavement and roadways. In fact, over the course of time, the proposed two feet of clean fill in the landscaped areas will possibly be saturated, eroded, and could bring contaminants to the surface. It is important that the SMP demonstrate that the proposed cover system is sufficient to ensure that no pathway for human exposure will exist when it is constructed or into the future. (See pages 14-15.)

In particular, we requested, but did not receive, additional detail on the proposed artificial turf and its underlying fill. It appears from drawings in the SMP that this surface will be elevated 5 feet above the grade from the eastern roadway. If this elevation is due to the emplacement of clean fill, this would provide adequate protection from contaminants which may occur approximately 6 feet below the field. However, the drawings in the SMP do not paint a full picture. It is not clear whether this elevation occurs in the three other directions, and the SMP does not specify the depth of cover and gravel before surface soil is reached. We request that these additional drawings and information be added to the SMP, and that in any case at least two feet of clean fill—soil or gravel—be placed below the artificial turf. We also request that the SMP provide details about the permeability of the artificial turf surface.

An additional concern is that normal athletic activity may perforate the surface. There may be a need to establish restrictions or maintenance requirement to prevent perforation or degradation of the surface. (e.g., prohibiting use of metal cleats) Regardless, this type of surface will have to be replaced periodically due to normal wear and tear. The SMP should specify when and how the artificial turf will be replaced.

Furthermore, members of the local community, along with others in New York City, have expressed concern that certain forms of artificial turf may contain toxic materials. We have reviewed some of the existing research and although none are conclusive, there are legitimate concerns about whether the type of surface proposed (i.e., blended polyethylene over an infill system of sand, synthetic rubber [crumbs made from recycled tires], and inert materials) represents an added exposure pathway. One report noted that exposures may potentially occur by ingestion of tire crumbs, inhalation of the dust, or skin contact. Excessive temperatures have led to injury, and potential volatilization of materials that make up the "turf". Currently there is no information in the SMP regarding the specific manufacturer of the surface; it is incumbent upon the SCA to demonstrate that any proposed field surface is indeed safe and non-toxic. If it cannot do so, we recommend that an alternative be designed, including natural turf or a different type of artificial turf. If natural turf is proposed, we recommend that at least two feet of clean fill and a layer of gravel for drainage be installed, and that a rigorous maintenance plan be followed to prevent exposure of contaminated soils. [2]

Vapor Intrusion Pathway

Vapor intrusion is the migration of toxic vapors from the soil or groundwater beneath a building directly into the building. It is a potential problem anywhere volatile organic compounds are found in the shallow subsurface, but it can be prevented or reduced through building design and ventilation. The negative relative air pressure normally found in buildings essentially pulls contamination inside. Thus, it is a major potential concern at the Mott Haven campus.

The highest levels of contamination on the campus, in the one-acre BCP area, were removed through excavation and dewatering. But some contamination remains elsewhere on the property. Soil gas sampling, the best method of predicting vapor intrusion potential, shows elevated levels of BTEX petroleum hydrocarbons after excavation, as well as lower levels of chlorinated volatile organic compounds such as PCE. The SCA's consultant concluded that "some residual groundwater from the south and east of the BCP [flowed] back into the BCP area." The draft SMP contains no analysis of whether such soil gas levels will increase further, but we consider it a possibility, particularly if there is a failure of the hydraulic barriers discussed below (page 11-13). No soil gas testing was reported outside the BCP area after excavation.

[2]Natural turf comes with its own set of environmental issues, namely those associated with the use of pesticides, herbicides, and fertilizer. If this option is chosen, we recommend the use of these chemicals be severely limited.

To prevent such vapors from intruding into the buildings in the BCP area or the other 3 ½ buildings, SCA has built three engineering controls into the design of all five Mott Haven buildings. These include:

1. A rubberized vapor barrier, the integrity of which is tested with a "smoke test" after installation but before the laying of the overlying concrete slab.
2. An active sub-slab depressurization system (SSDS), consisting of PVC piping distributed under each building, connected to blowers that vent treated air above the roof of each building. Each SSDS will run continuously and be monitored by an automated Building Maintenance System.
3. A positive-pressure heating, ventilation, and air conditioning (HVAC) system which "forces air out of the buildings and prevents vapors from entering the buildings." SCA has told us that the HVAC systems are designed to complement the other two engineering controls, but that they technically are not part of the site remedy. At other sites, we have learned that there is disagreement whether HVAC systems help prevent vapor intrusion because they exchange air or because they maintain positive pressure. However, their effectiveness is not in dispute. Though the SCA considers the HVAC systems to be an addition to the site remedy, we believe they are engineering controls that should be maintained and monitored as part of the remedy.

All three forms of engineering control are proven to prevent vapor intrusion, but they work only as long as they work. And vapor intrusion mitigation is a new field. There is no data showing that these controls will remain viable over the life of the school. That does not mean they are inappropriate, but it does necessitate that they should be maintained and monitored for the life of the contamination.

The draft SMP says that the vapor barrier shall carry a warranty of 50 years. Though it says that it requires no monitoring or maintenance, the school custodian is supposed to regularly inspect the basement slab in each building. Yet degradation or perforation of the barrier is possible over the life of the contamination and the life of the school. Slabs are subject to cracking due to settling and other earth movement, and in many circumstances holes are drilled for wires, pipes, etc. If the slab is intentionally perforated to attach either a pipe (e.g., for plumbing) or electrical conduits, openings should be re-sealed below the slab, where practical, using a similar product to Liquid Boot, and sealed above the slab. These seals should be routinely checked. To determine whether such seals are effective, as well as to determine whether unintentional perforation or degradation has occurred, we believe that at least one of two methods below should be used periodically to test the viability of the barrier—at least once after construction is completed but before building occupation. Recurring testing should take place at least once in every five-year period.

One method is to reverse the airflow in the SSDS and inject tracer gases when the building is unoccupied. If the gases show up inside the building, that shows the barrier is breached.

The other method is indoor air sampling, in conjunction with ambient and subslab sampling to determine whether vapor intrusion is indeed the source of any contamination.

Though indoor sources, such as dry-cleaned clothes, solvents from boiler-cleaning, or cans of chemicals might create false positives, those false positives would warn of exposures caused by those sources. Hopefully the Department of Education would seek to eliminate all sources of hazardous chemicals, not just those rising from the subsurface.

The SCA's consultants say that pressure tests in distal portions of each building will demonstrate that the SSDS system is working, but we were unable to find a description of this in the SMP. We requested clarification, but we have not yet heard back. The plan for pressure-testing should be explained in the SMP and the frequency of these tests should be identified. Pressure-testing can be re-assuring, but we consider periodic indoor air testing to be a more reliable demonstration of the level of exposure—hopefully none.

The HVAC system is considered an extra level of protection. We believe it should be treated as part of the remedy and be required to ventilate either around the clock or from two hours before school opening to two hours after the last non-maintenance employee finishes work for the day/evening.

In light of the topology of the site, the vents on the roof may be below some of the buildings to the west and north of the site, and there is concern among neighbors that the SSDS may add to the levels of toxic vapors in the air that they breathe. There appears to be no provision to run the SSDS emissions through a filter of vapor-phase granulated activated carbon. Furthermore, the SMP does not appear to contain a requirement to test emissions. We recommend periodic testing, with a contingency plan for adding filters if any emissions above background—that is, ambient air—are detected. Alternatively, vapor-phase treatment could be specified in the system design.

We also note that the Section 2.2.2.2 suggests that the active SSDS could be shut down in the future. The SMP must clearly state under what conditions this may occur and what criteria will be used to eliminate this critical part of the remedy. In our opinion, the SSDS should operate for the life of the facility due to the possibilities that recontamination of the subsurface may occur.

Finally, we have seen elsewhere SSDS systems designed with drip-legs to prevent condensation and freezing. We do not know whether that would help in the Mott Haven environment, but we suggest that it be considered.

Hydraulic Barriers and Groundwater Monitoring

To protect the Mott Haven campus from the future migration of contaminated groundwater from the west and north, the SCA has installed a grout barrier beneath the retaining wall to the west of the BCP area and a grout/metal "Waterloo Barrier" along approximately one-half of the property line with the existing schools. These barriers are a reasonable response to the existence of off-site contamination that is not yet undergoing a remedial investigation, let alone remediation.

Figure 3: Existing Schools and New Campus

The draft SMP states that neither barrier requires maintenance nor monitoring, yet there is no evidence presented to demonstrate that the barriers will remain impermeable to groundwater for the life of the schools and the life of the contamination. This is exactly the type of condition that calls for long-term monitoring and contingency planning. That is, the remedy is good, but no one knows for how long.

The logical tool for assuring that the barriers are preventing inward migration is groundwater monitoring. The draft SMP states that groundwater sampling will continue quarterly for the first year and semi-annually until school construction is complete, at which time it will be determined whether future sampling is necessary. Yet there is no reason given to link sampling to construction. We believe sampling should continue semi-annually until it is shown that there is no serious threat of inward contaminant migration, either through (or around) the barriers or from any other direction—that is, until off-site sources are remediated. Not until that time should the site operator re-assess continued operation of the monitoring wells. Factors to take into consideration are potential rebound and mobilization of contaminants, as well as changing environmental factors such as changes in groundwater flow or gradient. For example, while we recognize that many of the SVOCs found in the subsurface are relatively immobile, changing environmental conditions such as changes in groundwater flow may cause them to move. We note that Appendix P indicates that some BTEX and PCE (dry cleaning solvent) re-contamination has already occurred (as well as soil gas due to the creation of preferential pathways during construction). Therefore, during the life of the facility, we consider the shut down of the monitoring wells to be a remote possibility.

The western hydraulic barrier is not monitored save for one monitoring well south of the end of the barrier. It was originally thought that a cleaner (Morgan Steam Cleaners) located across Concourse Village West was a source of contamination, as well as a leaking fuel tank at a gas station. Therefore at least one well should be installed immediately east of the western hydraulic barrier to monitor its performance and to determine if there is a rebound of contaminants. In addition, the groundwater flow direction is towards the southeast. The area that had the highest levels of groundwater contamination at the site from both naphthalene and benzene was in the northwest corner of the site. A groundwater-monitoring well should be installed there (on site) to monitor the performance of the barriers and to determine if there is a rebound of contaminants.

There are no groundwater monitoring wells north of the Waterloo Barrier (on the existing school sites). This barrier acts as a dam, preventing contaminated groundwater from carrying contamination into the clean fill. We expect that groundwater elevations to the north of the property will rise and back up. The land north of the northern barrier under the existing schools is contaminated. Elevating the groundwater level could bring with it more mobile contaminants heretofore "locked" in the capillary fringes of the unsaturated soil. This could have consequences for the existing schools by increasing the likelihood for vapor diffusion under the existing schools. Although this area will be covered by asphalt, we recommend that groundwater elevations and contaminant movement under the existing schools be monitored and that an air-monitoring program be established.

Finally, it's important to recognize that the hydraulic barriers are stopgap measures. It is essential that DEC take aggressive action to identify and prevent contaminants from migrating onto the new and existing campuses. DEC has committed to providing a written update on the progress of off-site investigation and remediation. We have not received this yet. Though the off-site sources are not the responsibility of the SCA or DOE, each Annual Site Management Report should provide an update on relevant off-site activity.

Inspection and Training

The draft SMP requires the school custodian to conduct monthly walk-throughs to ensure that the Surface Cover System is not compromised. Having heard repeatedly from members of the community that New York City schools are not always well maintained, we believe the inspection protocol should be strengthened in three ways:

1. The SMP should include a detailed checklist for each monthly inspection, detailing what must be inspected and what conditions should be noted, as well as the specific notification required for each change in site conditions. A list of maintenance activities during the preceding month should be attached to the form. Anticipated maintenance activities should also be recorded. A separate inspection should take place after any severe condition (e.g., erosion or flooding). The Annual Inspection Form (Appendix M) should include a section describing any repairs to the SSDS and the Cover Systems, as well as future repairs that are needed.

2. Each custodian responsible for conducting inspections should be trained upon hiring, with annual refreshers. Training should not only explain how to inspect but why, so they can better recognize conditions that might lead to exposures or contaminant migration. The custodian should be responsible for reporting conditions to his/her supervisor, but supervisory personnel should retain responsibility for broader notification. The SMP should identify which maintenance and monitoring tasks will be performed by contractors and which will be conducted by DOE personnel. For those tasks performed by contractors, the SMP should describe what types of expertise the contractors should have (*e.g.*, engineers, analytical chemists, etc.). For those tasks performed by Department of School Facilities (DSF) personnel, SMP should specify what type of training will be provided to qualify them for performing those tasks.
3. Inspection should include all of the visible engineering controls at the Mott Haven campus.

Figure 4: Site Construction (View from Northwest)

Contingency Planning

This is perhaps the weakest element in the draft SMP. There is no examination of possible events or circumstances that could occur, and there is no description of proposed responses. In the CPEO Independent Review, we recommended that a contingency plan be developed that would include technical (e.g., failure of the hydraulic barriers, flooding), logistical (e.g., labor strikes, failure to inspect satisfactorily), and regulatory (e.g., changes in standards for indoor air) contingencies. SCA agreed to develop such a plan.

The SMP should identify a range of scenarios that may lead to unacceptable contaminant migration or exposures, and outline what the response should be to each. Furthermore, the SMP should specify timelines for the implementation of such responses.

We have identified several types of contingencies, although this list is not exhaustive:

1. Sampling results showing unexpected levels of contamination in groundwater in monitoring wells or toxic vapors in air, if indoor air sampling is conducted periodically as we recommend. The contingency response may be additional monitoring, the restoration of engineering controls, or new remedial activity.
2. Inspections showing failures in engineering controls, such as cracks in the basement, rodent tunneling in landscaped areas, broken vent piping, digging on-site, or damage to the artificial turf. In addition, what will be done if the SSDS is not working properly over a period of time? Again, the contingency response may be additional monitoring, the restoration of engineering controls, or new remedial activity.
3. Flooding (including the pooling of water in open areas), fire, or other emergencies. The draft SMP requires that such events be reported, but it does not adequately specify what follow-up actions will be required. Community members have reported that the Mott Haven campus is in a flood zone, and since it lies in a natural depression, that seems likely. The SMP should document the status of the property and consider the impact of future sea-level rise on the potential for flooding from either surface or ground water.
4. We also note that Section 3.2.5.1 of the SMP states that unscheduled inspections and or sampling "may take place when suspected failure of the SSDS or in an emergency." This statement should be included in the contingency plan and a definition of triggers which would initiate such a response should be defined.
5. During the course of routine repairs to the cover, if hazardous materials are encountered, the Contingency Plan should propose how this material will be handled and safely stored so that students and staff are not exposed. Additionally, if the soil is above the "background" levels we computed above (i.e., 3,359 µg/kg), the Plan should describe additional confirmatory sampling and excavation procedures that would take place at the location of the hazardous soil.

Existing Schools

SCA has agreed to certain voluntary remedial activities at the adjacent school property, including the grouting of the Supplemental Remedial Area at the southwest corner of the existing campus, asphalt paving under the existing campus, and the installation of air conditioners on school windows. To protect occupants of the existing schools, the grout area and asphalt should be subject to the monthly and annual inspections, as described above, and there should be assurances that the filter systems on the window air conditioners are operating during school occupancy.[3] Air quality should

[3]Members of the P.S. 156 Parent Teacher Association–a participating organization in the Bronx Committee for Toxic Free Schools–have reported that at least one air unit within P.S. 156, put in place at CPEO's suggestion, was unplugged and not in use.

monitored periodically. In addition, as mentioned above, there should be groundwater monitoring north of the Waterloo barrier with contingency plans in place for changes in groundwater levels or contamination. The entire monitoring system for the existing schools should be described in the SMP.

Figure 5: Entrance to Existing School

Community Notification and Oversight

There is serious concern among neighborhood residents, teachers and parents at the existing schools, and public officials about the potential health impacts of contamination at the Mott Haven site. That's why we've been asked to review both the Remedial Action Work Plan and the draft Site Management Plan.

Furthermore, at any site where residual contamination requires continuing operation and maintenance, monitoring, engineering controls, and activity and use limitations, there is a need to establish an institutional memory of the reasons for the original project as well as the site management plan. The officials who design and oversee both cleanup and construction will be long gone in decades, but the need to manage the site will continue.

Fortunately, there are positive models for community oversight that utilize community concern to enhance long-term site stewardship. We believe that the Site Management Reporting plan should be upgraded to the equivalent of a community involvement plan. This plan should be robust enough to remain effective for the life of the school and the life of the contamination, but it should be flexible enough to accommodate changes in public interest as well as institutional arrangements. (For

example, we have been told that the existing schools will be closed later this year and replaced with other New York City schools.)

A good community involvement plan not only helps resolve differences between those with site responsibility and the neighboring community, but it enlists the community in efforts to assure project success. We suggest the following components of the community involvement plan:

1. The SCA should create and the DOE should maintain a contact list of interested individuals and organizations. Either in electronic of paper form, these contacts should receive summaries of each Annual Site Management Report, along with information about how to obtain the full report if interested. Those parties which request it—such as New York Lawyers for the Public Interest, Bronx Community Board 4, the Bronx Borough President's Office, and the local City Council member—should receive the complete annual report.

   In addition, the contact list should be notified of any site conditions requiring contingency responses, as described in the contingency plans. Since occupants of the existing schools as well as nearby housing are keenly aware of any remedial or construction activity on the Mott Haven campus, we also suggest that they receive advance notification of any construction or soil disturbance activity. We recognize that such notification is not required, but we believe that advance explanation will resolve questions that are likely to emerge when people notice water hoses in the street, piles of dirt, or jackhammer noise, to give a few examples. DOE, not the custodial staff (as the SMP suggests), should take responsibility for notifying the community of any intrusive activity at the site.

2. All site documents should be available in the repositories listed in the draft SMP, and part of the annual review process should be to assure that those documents remain present, accessible, and in proper condition and organization. In addition, site documents, including sampling data, should be made available on the Web (or its successor system) as soon as possible. Community members should not have to file Freedom of Information requests to obtain information.

3. Plaques or signs at all entrances to the property should notify the public that the site is subject to a site management plan. The signs should be clearly visible, but non-obtrusive. They should be designed to direct people to the repositories or a web address, in such as way that they may request to be added to the contact list described above. They should be worded carefully to avoid causing unnecessary fear. We suggest language such as, "This property is subject to an environmental site management plan. For more information…"

4. There should be a process through which members of the public can ask questions about the site and report conditions that may indicate a failure of engineering or institutional controls. The Department of Education or Department of Environmental Conservation should respond to each query or report in a timely fashion.

5. If requested by an official body (such as Bronx Community Board 4 or the Bronx Borough President's Office) or a minimum number of people (perhaps 10) from the community, SCA, DOE, or DEC should convene a public meeting to explain recent developments or new plans for the site.

6. One way to retain and expand knowledge about the site is to establish a high school curriculum, whereby students will continually learn about the history of the site and examine the institutional and engineering controls. There is also a nearby Community College that may be interested in studying the site. This curriculum may include involvement in the monitoring program and site inspections.

There is a fundamental principle underlying our recommendations, not only for community involvement, but for the entire process. *The community—neighbors, teachers, students, community organizations, and public officials—must be seen as a partner in the environmental protection venture.* At times community members may demand more of those legally responsible for cleanup, but in the long run those in charge will appreciate the ideas and support of the public.

Finally, for the SMP to successfully promote long-term oversight by the community, as well as by the various agencies with responsibility for the site, it is important that each requirement or deadline, be it for training, inspection, reporting, maintenance, or consultation, be *specified* in the Site Management Plan. As much as possible, informal understandings and assumptions should be anchored in writing, to prevent misunderstandings when the baton or responsibility is passed on.

Recommendations

1. The Site Management Plan must evaluate the reliability and viability of the Plan (as required by the Brownfields Cleanup Program) and provide analysis showing that it will be implemented for the life of the contamination or the life of the multi-school campus.

2. The Department of Environmental Conservation should commit to oversight of site management for the entire seven acres, as well as portions of the adjacent schools addressed as part of the Mott Haven project. If necessary, the Brownfield Cleanup Agreement between DEC and the School Construction Authority should be modified to provide for such oversight.

3. The Department of Education should agree in writing to fund and implement its responsibilities under the SMP, and it should identify a principal point of contact responsible for the implementation of the SMP.

4. The School Construction Authority's "background" calculation has permitted levels of contamination for some compounds to remain on the property at levels that *significantly* exceed Recommended Soil Cleanup Objective standards. If any future

construction or excavation disturbs contaminated historic fill, it is important that cleanup objectives be compared against more protective, properly calculated "background" levels.

5. The SMP should contain additional detail on the proposed cover system and demonstrate that it will ensure that no pathway for human exposure will exist. In particular, it should evaluate the impact of recurring flooding or show that such flooding is unlikely to occur.

6. The SMP should demonstrate that the proposed artificial turf will prevent exposure to contamination. It should specify when and how the artificial turf will be replaced.

7. The SCA should demonstrate that any proposed field surface is safe and non-toxic.

8. For either a natural or artificial surface, we recommend that at least two feet of clean fill and a layer of gravel for drainage be installed, and that a rigorous maintenance plan be included in the SMP and followed to prevent exposure of contaminated soils.

9. As long as there is evidence of contamination in the subsurface, the effectiveness of the engineering controls designed to prevent vapor intrusion should be confirmed periodically, either through indoor air testing (coupled with ambient and subslab sampling) or reverse-flow tracer tests. Testing should take place at least once after construction is completed but before building occupation, and recurring testing should take place at least once in every five-year period.

10. The proposed pressure-testing of the subslab depressurization system should be described in the SMP.

11. The heating, ventilation, and air conditioning systems should be treated as an engineering control under the SMP and be required to ventilate either around the clock or from two hours before school opening to two hours after building closure.

12. The SMP should mandate the periodic testing or treatment of emissions from the sub-slab depressurization systems.

13. The SSDS should operate in active mode for the life of the facility—unless there is a clear demonstration that subsurface contamination has been permanently removed or treated.

14. Groundwater sampling should continue semi-annually until it is shown that there is no serious threat of inward contaminant migration, either through (or around) the barriers or from any other direction.

15. At least one well should be installed immediately east of the western hydraulic barrier to monitor its performance and to determine if there is a rebound of contaminants.

16. A groundwater-monitoring well should be installed in the northwest corner of the site, inside the grout wall and Waterloo Barrier.

17. Groundwater contamination and elevations should be monitored annually beneath the existing schools. The contingency plan should address changes in groundwater levels or contamination under the existing schools.

18. Each Annual Site Management Report should provide an update on relevant off-site investigation and remediation.

19. The SMP should include a detailed checklist for each monthly inspection, and the Annual inspection Form should include a section describing any repairs to engineering-control systems that are needed or completed.

20. Each custodian responsible for conducting inspections should be trained upon hiring, with annual refreshers, and the training program (or an outline of it) and any associated materials should be included in the SMP. The SMP should identify which maintenance and monitoring tasks will be performed by contractors and which will be conducted by DOE personnel. For those tasks performed by contractors, the SMP should describe what types of expertise the contractors should have (*e.g.*, engineers, analytical chemists, etc.). For those tasks performed by Department of School Facilities (DSF) personnel, SMP should specify what type of training will be provided to qualify them for performing those tasks. The SMP should also specify the level of expertise for each person conducting maintenance and monitoring.

21. Inspection should include all of the visible engineering controls at the Mott Haven campus.

22. The SMP should identify a range of scenarios that may lead to unacceptable contaminant migration or exposures. These scenarios should include, but are not limited to, unexpected sampling results, failures of engineering controls, and flooding and other emergencies.

23. Contingency plans should describe expected responses to each scenario, and may include additional monitoring, the restoration of engineering controls, or new remedial activity. There should be timelines for the implementation of each such response.

24. The SMP should document the status of the property, with regard to potential flooding, and consider the impact of future sea-level rise on the potential for flooding from either surface or ground water.

25. The Contingency Plan should explain how hazardous materials encountered during maintenance or repair will be handled and safely stored.

26. There should be assurances that the filter systems on the window air conditioners at the existing schools are operating during school occupancy.

27. The Site Management Reporting Plan should be upgraded into a community involvement plan, which should include the creation of a community contact list for site management summaries and reports.

28. Community members should be notified of any site conditions requiring contingency responses, as well as advance notification of any construction or soil disturbance activity. Notification should be the responsibility of the New York City Department of Education, not the sole responsibility of the custodial staff.

29. The monitoring and inspection of the existing schools, including the evaluation of air quality, should be described in the SMP.

30. The annual review of the SMP should include assurances that repository documents—including reports and data—are accessible and properly organized, both in hardcopy and via the Internet.

31. Plaques or signs at all entrances to the property should notify the public that the site is subject to a site management plan.

32. There should be a process through which members of the public can ask questions about the site and report conditions that may indicate a failure of engineering or institutional controls.

33. Upon public request, the responsible agencies should be prepared to convene public meetings to explain recent developments or new plans for the site.

34. The Department of Education should consider creating a high school curriculum that involves students in site oversight while providing hands-on environmental education.

35. Each requirement or deadline, be it for training, inspection, reporting, maintenance, or consultation, should be *specified* in writing in the Site Management Plan.