

Public Health Assessment

**Broad Brook Mill Site
(a/k/a Millbrook Condominium Site)**

**East Windsor, Hartford County, Connecticut
CERCLIS NO. CT0002055887**

February 20, 2002

**prepared by
Connecticut Department of Public Health
Under Cooperative agreement with the
Agency for Toxic Substances and Disease Registry**

The conclusions and recommendations in this health assessment are based on the data and information made available to the Connecticut Department of Public Health and the Agency for Toxic Substances and Disease Registry. The Connecticut Department of Public Health and the Agency for Toxic Substances and Disease Registry will review additional information when received. The review of any additional data could change the conclusions and recommendations listed in this document.

A. SUMMARY

The Broad Brook Mill Site (the "Site") is located in the Broad Brook section of East Windsor, Hartford County, Connecticut. The site is bounded approximately: to the north and west by Broad Brook; to the east by Main Street; and to the south by Mill Street. Broad Brook flows west along the northern portion and south along the western portion of the property, respectively. The site was used from the early 1800s until 1986 for a variety of different manufacturing, commercial and light industry operations including wool manufacturing, electroplating and chemical etching for printed circuit board production, boron filament manufacturing, manufactured gas plant and machine shop production. In early 1986, the site was sold to a developer. In May 1986, a fire destroyed most of the buildings located on site. The former mill building is one of the original structures that survived the fire. It was subsequently renovated into a 21-unit condominium that has been occupied since 1990. The area surrounding the former mill building condominium consists of paved areas, grassed sections, overgrown brush and wooded areas. Broad Brook defines the northern and western boundary of the site. In addition to the former mill building condominium complex, other structures currently present at the site are a commercial office building, commercial retail strip mall and a vacant powerhouse building (see Figure 1 in Attachment A).

A number of environmental site assessment activities have occurred at the site between 1993 to 2000. Results of environmental sampling indicate that as a result of past operations on this site, there are numerous areas of contamination surrounding the former mill condominium building. The historic sources of contamination include above ground fuel oil storage tanks, a manufactured gas plant, cleaning solvents, plating solutions containing heavy metals, and a former coal storage area. There is the potential that ash wastes generated from the manufactured gas plant were disposed throughout the site.

The most likely route of exposure to environmental contamination at the site is through direct contact with soils. This could occur through incidental ingestion of soil that gets on hands or inhalation of soil particles that may become airborne. Other environmental pathways related to soil gas, surface water and sediment were also evaluated and none of these media contained contaminants at levels that present a health hazard.

In the past, before EPA implemented interim cleanup activities, residents had greater opportunities for exposure to surface soils at the site. CT DPH previously determined that exposures to polycyclic aromatic hydrocarbons (PAHs) in surface soils at the site represented a public health hazard to residents who may have been exposed [CT DPH 2000]. However, exposure to contaminants in surface soil in the immediate vicinity of the condominium complex

is no longer considered to pose a public health hazard because of the remedial actions completed by EPA in the spring 2001. EPA's actions minimized the potential for contact with surface soils. Without exposure, surface soils in the immediate vicinity of the condominium complex building now present no public health hazard.

Site conditions have not changed in areas of the site beyond the immediate vicinity of the condominium complex. Surface soils are contaminated with (PAHs) at concentrations representing a possible public health hazard to residents who may be exposed for a long time (greater than one year). Although the levels of contaminants do not present an acute or immediate health threat, they continue to present an ongoing threat of exposure to carcinogens. While the likelihood of a resident becoming ill as a result of exposure to the contaminated soil is low, the contaminants represent an avoidable source of carcinogenic PAHs.

CT DPH has determined that there is likely exposure to bare surface soils in an area along the top of the bank of Broad Brook, behind the condominium complex and just beyond the gravel walkway. However, more data are needed from this area in order to evaluate public health implications from exposure. Therefore, soils in this top bank are represent an indeterminate public health hazard.

Samples collected from deeper soils indicate that PAHs and arsenic are present extensively at the site at elevated levels. Under current site conditions, contaminants in soils at depth pose no public health hazard. Activities that increase the risk of exposure to soils beneath the surface (e.g., utility excavations, gardening) present an indeterminate public health hazard.

Interim cleanup measures performed by EPA in the spring 2001 should be maintained so they continue to provide an effective barrier to contaminated soils. Warning signs should be posted more visibly around the condominium building and in surrounding fields. Warnings should advise individuals to avoid digging, gardening or disturbing soils in any way and to avoid coming into contact with bare soils onsite. All doors of the vacant powerhouse building should be securely locked to prevent trespassers from entering the building.

In May 2000, CT DPH developed and distributed a fact sheet providing a summary of soil contamination at the site. A public availability session was held in May 2000 to present soil results. The May 2000 fact sheet was updated in November 2000 to include a summary of soil gas data. CT DPH was present at the availability session to respond to citizens' health concerns. Many of the concerns focused on the potential for indoor air contamination from the site and medical conditions experienced by residents.

B. PURPOSE AND HEALTH ISSUES

The purpose of this public health assessment is to review available environmental sampling data and current site conditions to evaluate whether living or working at the Broad Brook Mill site presents a public health hazard. This public health assessment builds upon results of the two health consultations previously prepared by CT DPH for this site (included as Attachment B). Information contained in the previously prepared health consultations has been updated with current site data and conditions. Pathways by which people may be exposed to environmental contamination that were not evaluated previously have been identified and are evaluated in this public health assessment. New community health concerns not addressed previously are discussed here. Conclusions and recommendations made previously for this site have been updated as needed to reflect current site conditions.

This public health assessment is different from an EPA risk assessment. Under Superfund, the U.S. Environmental Protection Agency (EPA) conducts a risk assessment that will evaluate the need for environmental clean-up based on established regulatory criteria; whereas, an ATSDR public health assessment evaluates exposures at a site and determines the need for follow-up health actions. The Broad Brook Mill site was proposed to EPA's National Priorities List (NPL), or Superfund, in December, 2000. This report fulfills ATSDR's Congressional Mandate for preparing a public health assessment within one year of EPA's proposing a site to the NPL. In May 1998, a Site Investigation Report was completed which indicated that, as a result of past operations on the site, there are numerous areas of contamination surrounding the former mill condominium building [Loureiro, 1998]. EPA has recently completed some interim cleanup activities at the site. Friable asbestos was removed from an abandoned boiler building located near the condominium complex. Exposed soils in foundation planting beds around the footprint of the condominium building and along the pathway at the rear of the building have been covered with geotextile fabric and bark mulch or stone to reduce the likelihood of contact with the soils and to follow-up on recommendations made by CT DPH in previous health consultations prepared for the site.

Residents living on the site have expressed a number of health concerns. These have included: concern about indoor air quality in the former mill building and about illnesses experienced by residents in the former mill building.

C. BACKGROUND

The Broad Brook Mill Site (the "Site") is located in the Broad Brook section of East Windsor, Hartford County, Connecticut. The site is bounded approximately: to the north and west by Broad Brook; to the east by Main Street; and to the south by Mill Street. Broad Brook flows west along the northern portion and south along the western portion of the property, respectively. The Site consists of two contiguous parcels of land identified as Block 37 (Lots 8 and 8A), and a section of land on Block 37 (Lot 18) [Loureiro, 1998]. The property currently consists of the following: a 21 unit condominium complex, commercial office building, commercial retail strip mall, and a vacant powerhouse building. The former mill building is one of the original structures to have survived a fire in May of 1986, which destroyed several other buildings in the

complex at that time. The former mill building was renovated into 21 condominium units that have been occupied since 1990. The condominium building and the surrounding land areas constitute the focus of this public health assessment. Townhouses located on Church Street, The area surrounding the former mill condominium building consists of pavement, grassed sections, overgrown brush, and wooded areas. Broad Brook defines the northern and western boundary of the site.

The site history is summarized in the following Table [Loureiro, 1998].

Date(s)	Facility Name	Facility Type	Operations
1835 to 1849	Phelps Manufacturing Company.	wool mill	unspecified
1849 to 1954	Broad Brook Company	wool mill and manufacturing facility	carding, dressing, carbonizing, dyeing, napping, picking, scouring, shearing, and spinning.
1954 to 1967	Hamilton Standard Division of United Technologies Corporation	printed circuit board production	assembly, chemical etching, electroplating, photographic development, potting, soldering, and testing.
1954 to 1967	Hamilton Standard Division of United Technologies Corporation	Ancillary Operations	-Coil winding for low-voltage transformers -Machine shop -Parts cleaners containing chlorinated solvents -Spray painting -Boiler house for steam -Water treatment plant
1968 to 1974	Hamilton Standard Division of United Technologies Corporation	boron filament manufacturing	unspecified
1974 to 1977	Composite Material, Inc. (subsidiary of Alcoa) operations purchased from Hamilton Standard	boron filament manufacturing	unspecified
1977 to 1986	Broad Brook Center Inc., James R. Testa, John Bartus, and Broad Brook Center Associates	Site owners with new tenants	-AVCO (formerly Composite Technologies) shipped hazardous waste containing: activated carbon, flammable liquids, freon, mercury, methyl ethyl ketone, paint liquids, sodium hydroxide, and waste oil. -Light industry
1986 to present	Connecticut Building Corporation	Fire May 22, 1986, destroyed most buildings	-Residential condominiums -Commercial strip mall

A number of environmental site assessment activities have occurred at the site between 1993 to 2000. Results of environmental sampling indicate that as a result of past operations on this site, there are numerous areas of contamination surrounding the former mill condominium building. The historic sources of contamination include above ground fuel oil storage tanks, a manufactured gas plant, cleaning solvents, plating solutions containing heavy metals, and a former coal storage area. There is the potential that ash wastes generated from the manufactured gas plant were disposed throughout the site.

Sampling data show that soils onsite are contaminated with volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), petroleum hydrocarbons and metals. Data also

indicate that groundwater and soil gas are contaminated with VOCs and sediments are minimally contaminated with SVOCs.

On June 19, 1998, CT DPH conducted a preliminary analysis of surface and subsurface soil data for the site [CT DPH 1998]. The preliminary analysis was conducted to determine what immediate public health risks may be present for residents currently living in the former mill condominium building. The review recommended that the contaminated soils be remediated, and residents be relocated prior to initiating any large scale remedial activities. The CT DPH also recommended that children not play on the grounds of the condominium complex based primarily on surface soil results showing elevated concentrations of carcinogenic polynuclear aromatic hydrocarbons (PAHs). After that report was issued, the unit owners were given the option to have their properties purchased by the State of Connecticut. However, an agreement acceptable by all parties was not reached.

Because relocation of residents of the condominiums failed to occur, CT DPH was asked by DEP to review the public health implications of ongoing potential exposures at the site. In April 2000, CT DPH completed a Health Consultation examining surface soil data [CT DPH 2000, Attachment B]. Surface soil was determined to be contaminated with PAHs at concentrations representing a Public Health Hazard to residents who may be exposed. In the Health Consultation, CT DPH again recommended that contaminated soils be remediated in a timely manner, that parents should prevent children from playing outdoors on-site and that digging in onsite soils not occur. CT DPH also recommended that warning signs be more visibly posted around the condominium building and in surrounding fields, that existing grass cover be actively maintained to reduce direct contact with soil, and physical barriers such as fencing be considered in areas without good grass cover.

In September 2000, CT DPH completed another Health Consultation for the Broad Brook Condominium site [CT DPH 2000a, Attachment B]. The consultation focused on soil gas data collected by EPA in June 2000. Soil gas is a term describing gas that fills the tiny voids between soil particles. Usually, the voids between soil particles are filled with water. However, when groundwater is contaminated with volatile organic chemicals, the chemicals can separate into the gas phase and move into the soil particle voids. Contaminants in soil gas can enter confined building spaces such as basements through crawl spaces, plumbing holes, other floor holes such as sumps and foundation cracks and can contaminate indoor air. EPA's soil gas sampling characterized VOCs in soil gas close to the foundation of the condominium units. CT DPH reviewed the data and concluded that the soil gas levels present no apparent public health hazard based on the low potential for soil gas infiltration and the effects of dilution and other factors on any small amounts of infiltrating gases.

EPA has conducted two interim cleanup activities at the site. In May/June 2001, friable asbestos was removed from the abandoned powerhouse building. In addition, exposed soils in foundation planting beds around the footprint of the condominium building and along the pathway at the rear of the building were covered with geotextile fabric and bark mulch/stone to

to reduce the likelihood of contact with the soils and to follow-up on recommendations made by CT DPH in previous health consultations prepared for the site.

In May 2000, CT DPH developed and distributed a fact sheet providing a summary of soil contamination at the site (see Attachment C). A public availability session was held in May 2000 to present soil results. The May 2000 fact sheet was updated in November 2000 to include a summary of soil gas data.

On August 3, 2001 CT DPH conducted a site visit of the Broad Brook Mill site. Grass cover adjacent to the condominium complex and associated buildings was observed to be good. No patches of bare dirt were observed. Landscaped areas along the foundation of the buildings were well covered with mulch. The walkway area along the back of the condominium complex has a raised bed filled with gravel. Between the gravel and the bank of Broad Brook, there is a zone of bare soil and sediment.

A path was observed around the vacant powerhouse building. Behind the building there are numerous piles of debris such as wood, shingles, brick and glass. On the south side of the building, one of the two sets of doors was unlocked, providing access into the building. Inside the building, numerous physical hazards were noted such as holes in the floor, glass, electrical wires and other debris. Graffiti was present on several of the interior walls indicating that trespassers have been present inside the building. Other areas south of the condominium complex, along both sides of the access road (Brookside Drive), were noted to be very overgrown with weeds and brush. No obvious trails or paths through the brush were noted.

Only one sign was observed which warns people about hazardous contaminants in soil. That sign was observed at the intersection of Brookside Drive and Mill Road.

As stated previously, EPA proposed the Broad Brook Mill site to the NPL in December 2000. EPA and CT DEP are currently proposing to defer consideration of the site to CT DEP for cleanup, rather than finalize its listing on the NPL. Under a deferral agreement, CT DEP would take the lead on ensuring cleanup of the site and would enter into a legally enforceable agreement with Potentially Responsible Parties (PRPs) to develop and implement a cleanup plan for the site. PRPs, the Town of East Windsor and the 21-unit condominium association would also enter into an agreement that would allow for the purchase of the residential units and relocation of residents off the site. EPA, CT DEP and the Town of East Windsor outlined the initial steps for deferral consideration at a public meeting on September 10, 2001. Additional public meetings will be scheduled as the process progresses.

Currently, approximately 36 people work onsite in the commercial buildings in Lot 8A. [EPA 2000] and approximately 80 people live in the condominium complex [CT DPH 2000a]. Twenty of these residents may be young children under age 6.

D. DISCUSSION

The public health implications of exposure to hazardous contaminants at this site were determined by evaluating whether people at the site have been or are being exposed to environmental contamination that may result in adverse health effects. Where people are being exposed or are likely to be exposed, environmental contaminant levels were evaluated in relation to health-based comparison values. When contaminant levels are below comparison values, it has been concluded that health impacts from exposure to those levels are unlikely. When contaminant levels exceed comparison values, exposures have been evaluated further in the public health implications section.

CT DPH previously evaluated the public health implications of exposure to contaminants in surface soils and soil vapor. The evaluation of these pathways has been updated as needed to reflect current data and site conditions. Exposure pathways not previously evaluated by CT DPH have also been evaluated.

1. Environmental Sampling Data

a. Summary of Historic Sampling

A number of environmental sampling activities have occurred at the site between 1993 and 2000. The major investigations are summarized here. In 1993, a Phase I and Phase II Environmental Site Assessment was conducted. Results indicated the presence of VOCs, SVOCs, metals and petroleum hydrocarbons in soil and detectable concentrations of VOCs in groundwater [EPA 2000a].

In May 1998, a final Site Investigation Report was completed by Hamilton Standard Division, a former owner of the site [Loureiro, 1998]. The report investigated the nature and extent of soil, groundwater, surface water and sediment contamination at the site. The report indicates that soils onsite are contaminated by VOCs, SVOCs, petroleum hydrocarbons and metals; groundwater and soil gas are contaminated by VOCs; and sediments are minimally contaminated by SVOCs.

In February 2000, EPA's Removal Program completed a Preliminary Assessment/Site Investigation Report for the site [EPA 2000a]. As part of that investigation, EPA collected surface and subsurface soil, asbestos and soil gas samples. Results indicated the presence of VOCs in soil gas and polycyclic aromatic hydrocarbons (PAHs) in soil. The surface soil dataset was not evaluated as part of the health consultation prepared by CT DPH in April 2000 but has been evaluated in this Public Health Assessment.

b. Surface Soil Data Summary

Surface soil samples (0-3", 0-4" or 0-6") were collected in 1997-1999 from approximately 60 locations within the Broad Brook Mill site. Samples were collected from areas in the immediate vicinity of the condominium complex and from areas that begin approximately 200 feet to the south and west of the building. The total list of compounds analyzed for in soil can be found in Attachment D. However, not every soil sample was analyzed for the full list of compounds in Attachment D.

Table 1 summarizes contaminants and their concentrations in surface soils from areas beyond the immediate vicinity of the condominium building. Only contaminants present above health-based comparison values are presented. Maximum PAH and mercury concentrations shown in Table 1 were found in samples taken from an area behind the former powerhouse building. This is a rather remote area with dense brush and is not easily accessible from the condominium complex. Table 1 includes data from samples collected by EPA in December 1999 that were not evaluated as part of the previous CT DPH health consultation on surface soil.

c. Subsurface Soil Data Summary

There have been approximately 330 subsurface soil samples collected from 200 different locations across the site. Samples were collected for various site investigations in 1994-2000. Soil was sampled as deep as 16 feet below ground surface. Most samples were analyzed for metals. Approximately 110 samples were analyzed for SVOCs. The total list of compounds analyzed for in soil can be found in Attachment D. Not every soil sample was analyzed for the full list of compounds in Attachment D.

In subsurface soils, metals (arsenic, chromium and lead) were more frequently detected at levels above health comparison values than in surface soils. Maximum concentrations of arsenic, total chromium and lead were 283 ppm, 5320 ppm and 2280 ppm, respectively. Maximum concentrations of PAHs were ten times lower in soils at depth than in surface soils.

**Table 1.
Summary of Contaminants in Surface Soils (0-3", 0-4" or 0-6")
Detected Above Comparison Values at the Broad Brook Mill Site.
Samples were collected during 1997-1999 from areas beyond the immediate vicinity
of the Condominium Building**

Contaminant	Maximum Concentration (mg/kg)	Average Concentration (mg/kg)	Comparison Value(s) (mg/kg)	Comparison Value Source	Frequency of Detection Above Comparison Value
Arsenic	39	5.4	0.5 10	CREG CT RSR	18/26 4/25
Mercury	372	15	20	CT RSR	1/26
Benzo(a)anthracene	440	15.9	1.0	CT RSR	24/31
Benzo(a)pyrene	400	14.7	0.1 1.0	CREG CT RSR	31/31 20/31
Benzo(b)fluoranthene	370	13.6	1.0	CT RSR	20/31
Benzo(k)fluoranthene	300	10.8	8.4	CT RSR	2/31
Chrysene	440	16	84	CT RSR	1/31
Dibenzo(a,h)anthracene	54	2.1	1.0	CT RSR	4/31
Indeno(1,2,3,-c,d)pyrene	180	6.8	1.0	CT RSR	12/31

CREG - Cancer Risk Evaluation Guide - ATSDR soil screening risk-based concentration for 1×10^{-6} cancer risk based on lifetime exposure.

CT RSR - CT DEP Residential Remediation Standard Regulation for direct soil exposure, protective for long-term exposure 365 days/year for 30 years.

d. Soil Gas Data Summary

In June 2000, EPA conducted a soil gas survey to characterize VOCs inside the soil pore areas as close to the foundation of the condominium units as possible [EPA 2000b]. CT DPH has already evaluated data from EPA's soil gas survey in a health consultation dated September 22, 2000. The health consultation is included in Attachment B and should be referred to for a complete summary of soil gas data.

e. Groundwater Data Summary

Groundwater samples were collected from 48 locations at the site. Samples were collected from 1994-1998 and were analyzed for metals, VOCs, SVOCs and TPH. Results indicate that a variety of VOCs are present in groundwater.

f. Surface Water Data Summary

Surface water samples were collected from 5 locations in Broad Brook during 1996. Samples were analyzed for metals, SVOCs, VOCs and TPH. Results indicate that contaminants from the site are not present in surface water.

g. Sediment Data Summary

A total of 15 sediment samples were collected from 12 locations in Broad Brook. Samples were collected in 1996 and 1998. Results indicate the presence of low levels of several PAH compounds at 3 locations in Broad Brook. Concentrations of PAHs are in the range of non-detect to 2.3 pm. These levels are consistent with background levels of PAHs in reported for sediments (ATSDR 1995).

2. Exposure Pathways and Public Health Implications for Children and Adults

In this section, CT DPH has determined, for each possible exposure pathway, whether exposure to hazardous contaminants from the site is likely. If exposure is likely (i.e., a complete exposure pathway), CT DPH compares contaminant concentrations to which someone could be exposed with health-protective comparison values. If contaminant concentrations exceed comparison values, exposures are evaluated further to determine whether the exposures could result in adverse health effects to children or adults. Exposure pathways that were evaluated in the two previous health consultations for this site have been updated as needed to reflect current data and site conditions.

Exposure to hazardous contaminants at a site can occur through such routes as ingestion of soil or water, inhalation of air or direct contact with soil or surface water. Whether these exposures will make a person sick depends on the type of contaminant, the amount or concentration of the contaminant, the duration of exposure and the frequency of exposure. If exposure to environmental contamination does not occur, then the contamination does not present a threat to public health. The population potentially exposed at the Broad Brook Mill site consists of

current and former residents of the 21-unit condominium building and workers in commercial buildings located in lot 8A, to the east of the residential portion of the site.

Indoor Air-Inhalation Pathway:

CT DPH previously evaluated the public health implications of exposure to contaminants that could migrate from groundwater into soil gas and then into indoor air. CT DPH's health consultation on soil gas data is included in Attachment B. That health consultation concluded that chemicals detected in soil gas at the site do not pose a public health concern. There are no new data or site conditions that would change the results or conclusions of that health consultation so the indoor air inhalation pathway will not be evaluated further here.

Drinking Water - Ingestion Pathway:

Both the condominium complex and commercial buildings at the site are served by a public water supply. This water is regulated and is monitored routinely. While the piping and water distribution system may lie in soil that is contaminated, it is unlikely that contamination could enter the system because the positive pressure that is maintained in the public water system would make it very difficult for contamination to enter the pipes. During repair work on the water system, there is the potential for contamination to enter the water pipes if proper precautions are not taken.

There are several private drinking water wells located near the site. These private wells have been sampled on multiple occasions by CT DEP and no site-related contaminants have been found [personal communication between M. Harvey (CT DPH) and M. Hamel (CT DEP), August 15, 2001].

Groundwater data indicates that the presence of VOCs is not widespread and there is no evidence of a contaminant plume. This means that it is very unlikely that in the future, site-related contaminants would be present in private wells.

Based on the existing data, exposure to contaminants via the drinking water ingestion pathway is not likely and this pathway will not be evaluated further.

Sediment-Direct Contact/Incidental Ingestion Pathway:

Of the 15 sediment samples collected in Broad Brook, results indicate that in 3 samples, PAHs are present at levels that exceed health-based comparison values for soil. The PAHs detected above comparison values for soil are benzo(a)pyrene, benzo(b)fluoranthene and benzo(a)anthracene. The highest concentrations detected were in the range of 1.5 mg/kg to 2.3 mg/kg, which are above the CT RSR for soil of 1 mg/kg for these three PAH compounds and the ATSDR CREG value of 0.1 mg/kg for benz(a)pyrene. These health-based comparison values are based on very conservative estimates about the amount of soil one would ingest (200 mg/day for children and 100 mg/day for adults) and the frequency and duration of exposure (365 days per year for 30 years). The exposures assumed in developing the comparison values are not likely to occur at the site. Exposures to sediment at the Broad Brook Mill site are likely to be much less. Only one of the three sediment samples with elevated PAHs is close to the

condominium complex. The other two samples are in a portion of Broad Brook where access is more difficult. Direct contact with brook sediments would be expected to occur only during the warmer months of the year; not 365 days per year. In addition, elevated PAH concentrations were found in only 3 out of 15 samples. The majority of sediment samples did not have concentrations above health-based comparison values. Given all of these considerations, CT DPH concludes that exposure to PAHs in sediments at the site are very unlikely to cause adverse health effects for adults or children. It is worthwhile to note that PAH concentrations found in sediments at the site are within the range of typical background for PAHs in sediments in various locations across the U.S. (ATSDR 1995).

Surface Water-Direct Contact/Incidental Ingestion Pathway:

Based on a fairly limited number of samples, site-related contaminants are not present in surface water of Broad Brook. Without exposure to contamination, the surface water pathway is not complete and will not be evaluated further.

Surface Soil-Direct Contact/Incidental Ingestion Pathway:

Exposure to contaminated surface soils through direct contact and/or incidental ingestion is the most likely exposure associated with the site. Surface soils present the most significant potential for exposure because soils in the top several inches are the most accessible.

CT DPH previously evaluated the public health implications of exposure to surface soils at the site in a health consultation dated April 19, 2000. Since that health consultation was prepared, new data are available and site conditions near the condominium complex have changed. Therefore, the surface soil exposure pathway will be reevaluated with consideration of new data and current site conditions.

Surface Soils Near Condominium Complex

During the spring 2001, EPA covered bare soil areas immediately adjacent to the building foundation with a geotextile fabric and a thick layer of bark mulch. EPA also installed a gravel walkway immediately behind the condominium building. EPA's actions were done in response to recommendations contained in CT DPH's April 2000 health consultation. These actions appear to have effectively eliminated direct contact with contaminants in areas that were previously bare soil. Observations CT DPH made during its August 2001 site visit confirmed that there are no visible areas of bare soil around the condominium building foundation or in grassed lawn areas near the building. Because of the actions EPA has taken, exposure to contaminants in surface soils near the condominium complex is not likely to occur.

During the August 2001 site visit, CT DPH noticed an area along the top of the bank of Broad Brook, behind the condominium complex and just beyond the gravel walkway where soil is bare and access is not restricted by dense vegetation. The area appears inviting, especially for children, because one can easily walk from behind the condominium building, down a very gentle slope to a flat bank area along the Brook. It is CT DPH's view that direct contact with surface soils in this area is likely. There are a limited amount of soil data from this area. Limited data indicate that most surface soils along the top of the bank do not have PAH

concentrations above 3 mg/kg. There is one sample to the northeast of the condominium complex with PAHs as high as 16 mg/kg. However, this sample was taken from a more densely vegetated portion of the bank. Without additional data from this area, it is not possible to reach a conclusion about public health implications from exposure.

Surface Soils Beyond Condominium Complex

Table 1 provides a summary of surface soil data from areas to the south and west of the condominium complex (about 1/4 mile from the complex). As Table 1 shows, maximum and average PAH concentrations exceed comparison values. CT DPH previously evaluated surface soils in areas beyond the condominium complex in the April 2000 health consultation. There are some additional surface soil results available now that were not evaluated at the time the previous health consultation was prepared. The new data are included in Table 1. However, the new data do not significantly change the maximum and average concentrations calculated in the April 2001 health consultation. Site conditions have not changed either.

Therefore, CT DPH's previous evaluation of public health implications of exposure to soils beyond the condominium complex do not need to be updated in this public health assessment.

Commercial Complex

In the eastern portion of the site, a fence separates the residential portion of the site from the commercial complex. There are only a limited number of soil samples within, or near the commercial area and all are from the 0-2" depth interval. Results of these soil samples indicate the presence of low levels of PAHs. Although these samples are not representative of the most accessible layer of surface soil, they do indicate that soils in the commercial area do not appear to have been impacted by site contaminants to the extent that other portions of the site have. Workers and other individuals visiting the commercial area would not be likely to come into contact with soils in this area on a regular and continuing basis. This minimal exposure potential along with the presence of fairly low levels of PAHs means that soil contaminants in the commercial complex are unlikely to pose a public health concern to workers and other individuals who may be exposed there.

Deeper Soil-Direct Contact/Incidental Ingestion Pathway:

Subsurface soil data indicates that there is contamination with PAHs, arsenic, chromium and lead at levels above comparison values. Unless there are invasive soil activities such as gardening or other activities that would require digging in the soil, there will be no exposure to contaminants in soils at depth. Residents of the condominium complex have been informed, primarily through the posting of signs, not to dig into soils. CT DPH has concluded that it is unlikely that adult and children residents of the condominium complex would be exposed to contaminants at depth. Without exposure, this pathway is not complete and need not be evaluated further.

It should be noted that workers who must disturb soil to work on underground utilities may be at increased risk of exposure if proper precautions are not taken.

3. Evaluation of Community Concerns:

Since issuance of the April and September 2000 health consultations, no new community concerns have been provided to CT DPH. Previously addressed community concerns will not be repeated here. Refer to the health consultations in Attachment B for an evaluation of community concerns from the site.

E. CONCLUSIONS

CT DPH previously evaluated the public health implications of exposure to contaminants in soil gas and surface soils at this site (refer to health consultations included in Attachment B). In this public health assessment, CT DPH has reevaluated these two pathways considering new data and new site conditions. Exposure pathways not previously considered are also evaluated in this document.

With regard to soil gas, there are no new data or site conditions to change CT DPH's previously stated conclusion that contaminants in soil gas pose no public health hazard.

Exposure to contaminants in surface soil in the immediate vicinity of the condominium complex is no longer considered to pose a public health hazard because of the remedial actions completed by EPA in the spring 2001. EPA's actions minimized the potential for contact with surface soils. Without exposure, surface soils in the immediate vicinity of the condominium complex building now present no public health hazard.

Site conditions have not changed in areas of the site beyond the immediate vicinity of the condominium complex. Surface soils are contaminated with PAHs at concentrations representing a public health hazard to residents who may be exposed. Although the levels of contaminants do not present an acute or immediate health threat, they continue to present an ongoing threat of exposure to carcinogens. While the likelihood of a resident becoming ill as a result of exposure to the contaminated soil is low, the contaminants represent an avoidable source of carcinogenic PAHs.

CT DPH has determined that there is likely exposure to bare surface soils in an area along the top of the bank of Broad Brook, behind the condominium complex and just beyond the gravel walkway. However, more data are needed from this area in order to evaluate public health implications from exposure. Therefore, soils in this top bank are represent an indeterminate public health hazard.

With regard to contamination present in deeper soils, CT DPH has concluded that it is unlikely that adult and children residents of the condominium complex would be exposed to contaminants at depth because they are not digging in the soil. Without exposure, contaminants in soils at depth present no public health hazard. Likewise, exposure to sediments, groundwater and surface water at the site does not present a public health hazard.

F. RECOMMENDATIONS

1. Grass cover should continue to be maintained using good lawn management practices (fertilizer usage, re-seeding bare areas).
2. If the grass cover becomes disturbed or degraded, physical barriers (e.g., fencing) should be considered to make sure direct contact with underlying soils is avoided.
3. Interim measures performed by EPA (gravel walkway and geotextile and mulch in foundation areas) should be maintained so that they continue to provide a barrier to contaminated soils beneath.
4. Warnings should be posted more visibly around the condominium building and in surrounding fields. Only one sign was observed by CT DPH; at the far end of the access road. This one sign does not appear to be sufficient to provide adequate warning. Warnings should advise individuals to avoid digging, gardening or disturbing soils in any way and to avoid coming into contact with bare soils onsite.
5. On August 3, 2001, the vacant powerhouse building was observed by CT DPH to be unsecured. Numerous physical hazard inside the building were noted. All doors of the building should be securely locked to prevent trespassers from entering the building.
6. Additional surface soil data should be collected in the top bank area located just beyond the gravel walkway behind the condominium complex. The additional data are needed to determine whether exposure to soils is likely to result in adverse health impacts.

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan for the Broad Brook Mill Site contains a description of the actions completed and to be taken by the Agency for Toxic Substances and Disease Registry, the Connecticut Department of Public Health, and the Connecticut Department of Environmental Protection. Included in this plan is a commitment on the part of the Agency for Toxic Substances and Disease Registry and the Connecticut Department of Public Health to follow up on this plan to ensure that there is implementation.

The public health actions implemented include:

- 1) The Connecticut Department of Public Health and the CT DEP have advised residents of the 21-unit condominium complex that children should not play on the grounds of the former mill building property, as well as areas near the residential condominium building.

- 2) The Connecticut Department of Public Health and the CT DEP have advised residents of the 21-unit condominium complex that children and adults should not engage in digging or gardening activities throughout the site and should keep their pets from disturbing the top layer of soil.
- 3) The Environmental Protection Agency has placed geotextile fabric and a layer of woodchips on bare soil areas around the foundation of the condominium complex building. Additionally, EPA built a raised bed gravel walkway behind the condominium building in an area that was previously bare soil. EPA's actions were completed in the spring 2001 and serve to reduce residents' contact with contaminants in bare surface soil. EPA's actions were conducted in response to recommendations made by CT DPH in its April 2000 health consultation.

The public health actions to be implemented include:

- 1) The Connecticut Department of Public Health and the CT DEP will review and summarize additional environmental sampling data.
- 2) The Connecticut Department of Public Health will work with appropriate agencies to assure the proper signage is placed around the site.
- 3) The Connecticut Department of Public Health will provide information as needed to current and/or future residents at the site.

References

American Cancer Society 1999. American Cancer Society (1999) Cancer Facts & Figures-1999. U.S. Department of Health and Human Services, Atlanta, Georgia. 1999.

ATSDR 1995. ATSDR Toxicological Profile for Polycyclic Aromatic Hydrocarbons, August 1995.

CT DPH 1998. Correspondence from: Mary Lou Fleissner (Director, Environmental Epidemiology and Occupational Health Division, CT DPH) to: Michael J. Harder (Director, Permitting, Enforcement & Remediation Division, PERD, CT DEP), June 19, 1998.

CT DPH 2000. Assessment of Surface Soil Sampling Data at the Millbrook Condominiums Site, East Windsor, CT, April 19, 2000.

CT DPH 2000a. Assessment of Soil Gas Sampling Data at the Millbrook Condominiums Site, September 22, 2000.

EPA 2000. Final Hazard Ranking System Package for Broad Brook Mill, East Windsor, CT, October 2000.

EPA 2000a. Removal Program Preliminary Assessment/Site Investigation Report for the Millbrook Condominiums Site, East Windsor, CT. Prepared by Roy F. Weston on behalf of the U.S. EPA, Region I Emergency Planning and Response Branch, February 2000.

EPA 2000b. U. S. Environmental Protection Agency New England Regional Laboratory Office of Environmental Measurements and Evaluation. June 2000. Soil Gas Survey final report Mill Brook Condominiums East Windsor, Connecticut.

EPA 2000c. EPA Region 3. April 2000 Update. *Risk-Based Concentration Table*. Available at: <http://www.epa.gov/reg3hwmd/risk/riskmenu.htm>.

Loureiro 1998. Final Site Investigation Report, Property of Millbrook Owner's Association, Inc., Block 37 Lots 8 and 8A, East Windsor, CT. Prepared by Loureiro Engineering Associates, Inc. on behalf of United Technologies Corporation Hamilton Standard Division, May 1, 1998.

CERTIFICATION

The public health assessment for the Broad Brook Mill Site was prepared by the Connecticut Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the public health assessment was initiated.

Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation(DHAC), ATSDR, has reviewed this Health Consultation and concurs with its findings.

Chief, SSAB, DHAC, ATSDR

ATTACHMENT A

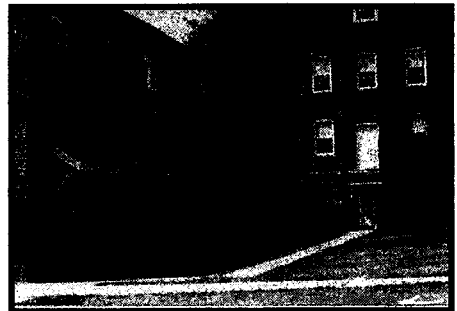
Figure 1

PUBLIC HEALTH ASSESSMENT SUMMARY

BROAD BROOK MILL SITE (MILLBROOK CONDOMINIUMS)

BACKGROUND

The Broad Brook Mill (also called Millbrook) Site is located in the Broad Brook section of East Windsor, Connecticut. The site includes a 21-unit condominium complex, a commercial office building, a commercial retail strip mall, and a vacant powerhouse building. Various past industrial activities on this site caused contamination of soil. Portions of the former mill buildings were converted to condominiums in the late 1980s. A number of environmental site assessment activities have occurred at the site between 1993 to 2000. Results of environmental sampling indicate that due to past operations on this site, there are numerous areas of soil contamination surrounding the former mill condominium building. The historic sources of contamination include above-ground fuel oil storage tanks, cleaning solvents, plating solutions containing heavy metals, and a former coal storage area. A Public Health Assessment document has been developed by the Connecticut Department of Public Health (CT DPH) to review available environmental sampling data and current site conditions to evaluate whether living or working at the Broad Brook Mill site presents a public health hazard. **This fact sheet summarizes the findings of the Public Health Assessment. Public comments on the Public Health Assessment document will be taken between February 25 and March 30, 2002. Please call (860) 509-7742 if you are interested in a copy of the full document.**



WHAT ARE THE MAIN FINDINGS?

- In 1998, CT DPH determined that exposures to polycyclic aromatic hydrocarbons (PAHs) in surface soils at the site represented a public health hazard to residents. At that time, we issued a warning that children and pets should not be allowed to play on the land surrounding the condominium.
- Since that time, interim clean-up actions were taken by EPA that prevent exposure to surface soil contaminants. Soil around the condominium building and along the pathway at the rear of the building was covered with geotextile fabric and bark mulch/stone. Asbestos was removed from the powerhouse building after it was discovered in 2001.
- In 2000, the EPA tested soil gas near the buildings to determine if chemicals in the groundwater might enter the basements and indoor air of the buildings. CT DPH reviewed the EPA test results and determined that soil gas did *not* present an exposure risk to condominium residents.
- Although immediate threats to residents have been reduced or eliminated by remedial actions, contamination still exists at deeper soil levels near the buildings and near the surface in some locations away from the buildings. Therefore, further steps need to be taken to control possible future exposures.

RECOMMENDATIONS

- Grass cover should continue to be maintained using good lawn management practices (fertilizer usage, re-seeding bare areas).
- If the grass cover becomes disturbed or degraded, physical barriers (such as fencing) should be considered to make sure direct contact with underlying soils is avoided.
- Interim measures performed by EPA (gravel walkway and geotextile and mulch in foundation areas) should be maintained so that they continue to provide a barrier to contaminated soils beneath.
- Warnings should be posted more visibly and maintained around the condominium building and in surrounding fields.
- All doors and windows of the vacant powerhouse building should be secured to prevent any trespassers from entering the building.
- Parents should make sure that children do not dig or play in any areas where grass covering may become bare. Parents should also make sure children are aware of areas posted with warning signs.

WHAT FURTHER ACTIONS WILL BE TAKEN?

- The Connecticut Department of Public Health and the CT Department of Environmental Protection will review and summarize additional environmental sampling data.
- The Connecticut Department of Public Health will work with appropriate agencies to make sure proper warning signs are placed around the site.
- A plan for remediation is expected for public comment in January 2003, with the majority of the clean-up activities being completed by the end of 2003.
- DEP/EPA and former site owners and operators will continue efforts to acquire the property as part of the site-wide remediation program.

FOR MORE INFORMATION:



Brian Toal
CT Dept of Public Health
Division of Environmental Epi-
demiology & Occupational
Health
PO Box 340308, MS # 11CHA
410 Capitol Ave
Hartford, CT 06134-0308
(860) 509-7742
<http://www.dph.state.ct.us/>

William Blitz
North Central Health Dis-
trict
47 North Main St.
P.O. Box 1222
Enfield, CT 06083
(860) 745-0383

Anni Loughlin
Environmental Protection
Agency
1 Congress Street, St. 1100
Mail Code HBT
Boston, MA 02114-2023
Phone (617) 918-1273

Maurice Hamel
CT Dept of Environmental
Protection
Permitting, Enforcement &
Remediation Division
79 Elm St
Hartford, CT 06106
(860) 424-3705

This fact sheet is funded in part by funds from the Comprehensive Environmental Response, Compensation, and Liability Act trust fund through a cooperative agreement with the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services.

ATTACHMENT C

Site Fact Sheets

ATTACHMENT B

Health Consultations

WHAT IS ATSDR?

ATSDR is the **Agency for Toxic Substances and Disease Registry**, a federal public health agency. ATSDR is part of the Public Health Service in the U.S. Department of Health and Human Services. ATSDR is not a regulatory agency like the U.S. Environmental Protection Agency. Created by Superfund legislation in 1980, ATSDR's mission is to **prevent exposure and adverse human health effects and diminished quality of life associated with exposure to hazardous substances from waste sites, unplanned releases, and other sources of pollution present in the environment.** Through its programs—including surveillance, registries, health studies, environmental health education, and applied substance-specific research—and by working with other federal, state, and local government agencies, ATSDR acts to protect public health.

WHAT IS A PUBLIC HEALTH ASSESSMENT?

An ATSDR Public Health Assessment reviews available information about hazardous substances at a site and evaluates whether exposure to them might cause any harm to people. ATSDR conducts a Public Health Assessment for every site on or proposed for the National Priorities List (the NPL, also known as the Superfund list). A Public Health Assessment is **not** the same thing as a medical exam or a community health study. It can sometimes lead to those things, as well as to other public health activities.

Public Health Assessments consider—

- what the levels (or “concentrations”) of hazardous substances are
- whether people might be exposed to contamination and how (through “exposure pathways” such as breathing air, drinking or contacting water, contacting or eating soil, or eating food)
- what harm the substances might cause to people (or the contaminants’ toxicity)
- whether working or living nearby might affect people’s health
- other dangers to people, such as unsafe buildings, abandoned mine shafts, or other physical hazards

To make those determinations, ATSDR looks at three primary sources of information—

- **environmental data**, such as information about the contaminants and how people could come in contact with them
- **health data**, including available information on communitywide rates of illness, disease, and death compared with national and state rates
- **community concerns**, such as reports from the public about how the site affects their health or quality of life

HOW ARE PUBLIC HEALTH ASSESSMENTS USED?

ATSDR's Public Health Assessments identify health studies or other public health actions—such as community environmental health education—that might be needed. They advise federal, state, and local agencies on actions to prevent or reduce people's exposure to hazardous substances.

HOW IS THE COMMUNITY INVOLVED IN A PUBLIC HEALTH ASSESSMENT?

The community plays a key role in a Public Health Assessment and any activity that may follow. Throughout the Public Health Assessment, ATSDR talks with people living or working near the site—action groups, local leaders, and health professionals, among other community members—about what they know about the site and their site-related health concerns.

Community health concerns are addressed in every Public Health Assessment for every site.

Two-way communication between the public and ATSDR is vital to every Public Health Assessment. For that reason, ATSDR has many ways to give and receive information and involve the community in its activities, such as—

- **Public Availability Sessions** where community members can meet individually with ATSDR staff.
- **Public Meetings** so community members can express ideas in a larger forum.
- **Community Assistance Panels**, or CAPs, which work to inform ATSDR about community concerns and health information and, in turn, to inform the community about ATSDR activities and the status of the Public Health Assessment.
- Other **communication channels**, such as contact with local community groups, political leaders, and health professionals, as well as articles in local newspapers and stories on television and radio.
- Before the Public Health Assessment is finished, it is available in the community during the **Public Comment Period**. The Public Comment Period lets the community tell ATSDR how well the Public Health Assessment addresses their concerns. ATSDR responds to the public's comments in the final Public Health Assessment.

Fact sheets are available on Public Health Advisories, Health Consultations, Community Assistance Panels, and other ATSDR activities. If you want to know more about ATSDR, or if you have health concerns or information to share about ways people might have been or might now be exposed to hazardous substances, please contact the ATSDR Community Involvement Team, visit the ATSDR web site, or call the ATSDR toll-free information line.

Community Involvement Team
ATSDR - Division of Health Assessment and Consultation
1600 Clifton Road, NE (E56)
Atlanta, Georgia 30333

ATSDR web site at <http://atsdr1.atsdr.cdc.gov:8080/>

ATSDR information line (800) 447-1544

ATTACHMENT D - List of Chemicals Analyzed in Soil

Chemical		
Acenaphthene	Di-n-octyl Phthalate	Methyl-2-pentanone,4-
Acenaphthylene	Dibenzo[a,h]acridine	Methyl-tert-butyl Ether
Acetone	Dibenzo[a,h]anthracene	Methylcholanthrene,3-
Acrolein	Dibenzo[a,j]acridine	Methylene Chloride
Acrylonitrile	Dibenzo[c,g]carbazole,7H-	Naphthalene
Anthracene	Dibromo-3-chloropropane,1,2-	Nickel
Arsenic	Dibromomethane	Nitrate (as N)
Barium	Dichlorobenzene,1,2-	Nitrobenzene
Benzene	Dichlorobenzene,1,3-	Nitrophenol,2-
Benzidine	Dichlorobenzene,1,4-	Nitrophenol,4-
Benzo[a]anthracene	Dichlorobenzidine,3,3'-	Nitroso-n-propylamine,n-
Benzo[a]pyrene	Dichlorobromomethane	Nitrosodimethylamine,n-
Benzo[b]fluoranthene	Dichlorodifluoromethane	Nitrosodiphenylamine,n-
Benzo[ghi]perylene	Dichloroethane,1,1-	PCB 1016
Benzo[j]fluoranthene	Dichloroethane,1,2-	PCB 1221
Benzo[k]fluoranthene	Dichloroethylene,1,1-	PCB 1232
Benzyl Chloride	Dichloroethylene,1,2-cis-	PCB 1242
Bis(2-chloroethoxy)methane	Dichloroethylene,1,2-trans-	PCB 1248
Bis(2-chloroethyl)ether	Dichlorophenol,2,4-	PCB 1254
Bis(2-chloroisopropyl)ether	Dichloropropane,1,2-	PCB 1260
Bis(2-ethylhexyl)phthalate	Dichloropropylene,1,3-cis-	PCB, Total
Boron	Dichloropropylene,1,3-trans-	Pentachlorophenol
Bromobenzene	Diesel, TFH	Phenanthrene
Bromoform	Diethyl Phthalate	Phenol
Bromophenyl Phenyl Ether,4-	Dimethyl Phthalate	Potassium
Butyl Benzyl Phthalate	Dimethylphenol,2,4-	Propane),2,2'-oxybis(2-chloro-
Butylbenzene,n-	Dinitro-o-cresol,4,6-	Propylbenzene,n-
Cadmium	Dinitrophenol,2,4-	Pyrene
Calcium	Dinitrotoluene,2,4-	Rhodium
Carbon Disulfide	Dinitrotoluene,2,6-	Selenium
Carbon Tetrachloride	Diphenylhydrazine,1,2-	Silver
Chloro-m-cresol,p-	Ethylbenzene	Sodium
Chloroacetaldehyde	Ethylene Dibromide	Styrene
Chlorobenzene	Fluoranthene	Sulfate
Chlorodibromomethane	Fluorene	Tetrachloroethane,1,1,1,2-
Chloroethane	Fluoride	Tetrachloroethane,1,1,2,2-
Chloroethyl Vinyl Ether,2-	Gasoline, Unleaded	Tetrachloroethylene
Chloroform	Hexachlorobenzene	Tetrahydrofuran
Chlorohexane,1-	Hexachlorobutadiene	Toluene
Chloromethyl Methyl Ether	Hexachlorocyclopentadiene	Trichloro-1,2,2-trifluoroethane,1,1,2-
Chloronaphthalene,2-	Hexachloroethane	Trichlorobenzene,1,2,3-
Chlorophenol,2-	Hexanone,2-	Trichlorobenzene,1,2,4-
Chlorophenyl Phenyl Ether,4-	Indeno(1,2,3-cd)pyrene	Trichloroethane,1,1,1-
Chlorotoluene	Iron	Trichloroethane,1,1,2-
Chlorotoluene,o-	Isophorone	Trichloroethylene
Chlorotoluene,p-	Isopropanol	Trichloromonofluoromethane
Chromium	Isopropyltoluene,4-	Trichlorophenol,2,4,6-
Chromium(VI)	Lead	Trichloropropane,1,2,3-
Chrysene	Magnesium	Trimethylbenzene,1,2,4-
Copper	Manganese	Trimethylbenzene,1,3,5-
Cumene	Mercury	Vinyl Acetate
Cyanide	Methyl Bromide	Vinyl Chloride
Cyanide (Total)	Methyl Chloride	Xylenes (Total)
Di-n-butyl Phthalate	Methyl Ethyl Ketone	Zinc