Health Consultation

SOUTHSIDE HIGH SCHOOL

ELMIRA, CHEMUNG COUNTY, NEW YORK

SEPTEMBER 30, 2003

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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Health Consultation: A Note of Explanation

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In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

SOUTHSIDE HIGH SCHOOL

ELMIRA, CHEMUNG COUNTY, NEW YORK

Prepared by:

New York State Department of Health
Center of Environmental Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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SUMMARY

The Southside High School is on South Main Street on land that straddles the border of the City of Elmira and the Village of Southport in Chemung County, New York. Since the 1880's, and prior to the school's construction in the late 1970's, the property was used by various industries. In 1995, fuel oil contamination was discovered on nearby Miller Pond, which is east of Southside High School. A New York State Department of Environmental Conservation (NYS DEC) investigation found that petroleum contamination extends from underneath the high school toward Miller Pond. The NYS DEC is using a technique called bioremediation to address the fuel oil contamination.

The Elmira City School Board received a letter from parents expressing concern about a perceived unusual number of cancers among current and former students at Southside High School. In responding to community concerns, the NYS DEC collected soil samples from the school grounds and the New York State Department of Health (NYS DOH) initiated a cancer study and collected indoor and ambient air samples inside the high school and soil gas samples under the school, assisted the NYS DEC with some soil sampling and evaluated data from the soil and air samples.

Three Freon compounds and several chlorinated solvents were detected at elevated concentrations in samples collected from three soil gas points. However, the indoor and ambient air testing results did not show a problem with chemical contamination. Most compounds were either not detected or were present at low levels. Several compounds were present at concentrations slightly higher than typical background, but their presence is not unusual and exposure at the reported levels is not expected to be a health concern.

The NYS DEC collected a total of 156 soil samples, including surface and subsurface soil, from the school grounds. To characterize potential exposures, surface soil samples were collected from areas of exposed soil, paths, high traffic areas or other areas where exposures were likely. Metals and low concentrations of volatile and semivolatile organic chemicals were detected in the surface soil samples collected from all areas. None of the metals detected in the surface soil sampling exceeded their public health assessment comparison values.

The average concentration of polychlorinated biphenyls (PCBs) in surface soil is higher than the range of average soil concentrations for total PCBs reported in a national soil monitoring program. Exposure to these soils could result in a somewhat higher level of exposure to these chemicals than would be expected from typical soils. The average concentrations of PCBs are less than public health assessment comparison values.

The average concentration of polycyclic aromatic hydrocarbons (PAHs) is somewhat below what was reported as the upper end of the range for urban background (1 to 3 milligrams per kilogram or mg/kg). Exposure to these soils could result in a level of exposure to these chemicals approaching the upper end of urban soils.

Although elevated levels of arsenic, PAHs, and PCBs were detected in subsurface soil, chronic human contact to these contaminants is unlikely. Therefore, shallow subsurface soil at the Southside High School are not expected to pose a public health hazard. However, if these soils were brought to the surface and the contaminants were made available for long-term human contact, risks for adverse health effects for exposure to these contaminants could increase. Public exposures to shallow subsurface material can be minimized if precautions are taken when digging into subsurface material. These include minimizing direct contact with potentially contaminated material and not allowing subsurface soils to remain exposed at the surface.

Based on ATSDR's public health hazard category classification, the environmental conditions at Southside High School pose no apparent public health hazard. This classification is used because average levels of contaminants in surface soils do not exceed public health comparison values. Although a few samples exceed health comparison values, people are unlikely to be exposed frequently to soil at these locations and the associated health risks are unlikely to be significant. Nevertheless, because average levels of total PCBs exceed typical background levels and average levels of carcinogenic PAHs are somewhat below the upper range of background levels, exposures to these contaminants at Southside High School may be greater than those typically experienced from soil. Students, faculty, staff and the community are not currently being exposed to subsurface soil, although it contains chemicals at levels exceeding public health comparison values.

Several parents and members of the community have concerns about the incidence of cancer in the school. Several cancer types were cited, such as testicular cancer, colon cancer and leukemia. The NYS DOH investigated cancer among students attending the Southside High School from when the school opened in the Fall of 1979 to June 2000. The NYS DOH did not find an unusual pattern of cancer among current and former students, or among children living in the area served by the school. Although the number of cases is small, the study did confirm a higher than expected number of young men diagnosed with testicular cancer since 1997. The NYS DOH conducted a survey of past alumni of the school to update the study of cancer in current and former students of Southside High School. The NYS DOH plans to report on this activity in the fall of 2003.

This Health Consultation recommends that measures be taken to minimize the potential for human exposure to subsurface soils containing elevated concentrations of PCBs, PAHs, tetrachloroethene, and metals. These measures should include the development of a written soil management plan and possibly the institution of a deed notification or restriction. A soil management plan would provide protocols for the proper handling of soil during ground intrusive activities. This includes any activities that disturb material below paved areas and under buildings.

This Health Consultation also recommends that the school district review the recommendations in the indoor air investigation report to determine if additional actions may be warranted. For example, the report recommends that the school district consider instituting an indoor air quality action plan consistent with that recommended by the US EPA. The Tools for Schools Action Kit provides information and guidance for developing and implementing a plan to prevent indoor air quality problems and resolving such problems if they arise. The plan should address the possibility of contaminated soil gas being drawn into the building; one possible way of evaluating this is to include routine (e.g., seasonal) monitoring of pressure differentials between the soil gas and building interior.

BACKGROUND AND STATEMENT OF ISSUES

Under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the New York State Department of Health (NYS DOH) prepared this health consultation to evaluate the public health implications of exposures to soil at the Southside High School in the City of Elmira, Chemung County, New York. We also included information about the public health implications of indoor air samples collected at the Southside High School. The purpose of a health consultation is further outlined in the Forward.

On April 8, 2000, the Elmira City School Board received a letter from parents expressing concern about a perceived unusual number of cancers among current and former students at Southside High School. The school board asked the New York State Department of Environmental Conservation (NYS DEC) and the NYS DOH to attend a May 2, 2000 public meeting. At the meeting, the NYS DEC and NYS DOH explained what they knew about environmental conditions in the area near the school, discussed what actions they were planning to initiate and listened to concerns the community expressed. In responding to community concerns, the NYS DEC collected soil samples from the school grounds and the NYS DOH initiated a cancer study, collected indoor air samples inside the high school, assisted the NYS DEC with some soil sampling and evaluated data from the soil samples.

The Southside High School is on South Main Street on land that straddles the border of the City of Elmira and the Village of Southport in Chemung County, New York (See Figure 1, Appendix A). On the school property are the school building and grounds, including parking lots, a football/multiple use athletic field, baseball/soccer fields, tennis courts, volleyball courts, a basketball court and a playground.

Since the 1880's, and prior to the school's construction in the late 1970's, the property was used by various industrial facilities (URS Consultants, Inc., 2000). From 1887 to 1909, B.W. Payne & Sons produced high speed steam engines. Morrow Manufacturing made drill-chucks, machine parts, and a line of tools from 1909 to 1935. Remington Rand manufactured typewriter parts from 1936 until the facility closed in 1972. Westinghouse used the northern portion of the property mainly for warehousing from 1974 until 1977. Remington Rand deeded the property to the Southern Tier Economic Growth Agency in 1977. The new Southside High School was then built on the northern portion of the property.

In 1995, fuel oil contamination was discovered on nearby Miller Pond, which is east of Southside High School (Matrix Environmental Technologies, 1998). A NYS DEC investigation found that petroleum contamination extends from underneath the high school toward Miller Pond. On the school property, the petroleum contamination is at a depth of about 15 feet below the ground surface. The NYS DEC is using a technique called bioremediation to address the fuel oil contamination.

The NYS DOH and NYS DEC collected soil gas samples, ambient air and indoor air samples at the school on several occasions. Three Freon compounds and several chlorinated solvents were detected at elevated concentrations in samples collected from three soil gas points. However, the indoor and ambient air testing results did not show a problem with chemical contamination. Most compounds were either not detected or were present at low levels. Several compounds were present at concentrations slightly higher than typical background, but their presence is not unusual and exposure at the reported levels is not expected to be a health concern. The reports on the soil gas and indoor air sampling are presented in Appendix B.

The NYS DOH investigated cancer among students attending Southside High School. The results of this investigation were presented at an August 2000 public meeting and are discussed in the health outcome data section of this health consultation. A complete report on the investigation is attached in Appendix C.

The Elmira Water Board supplies drinking water to the City of Elmira and surrounding area, including the school. The Elmira Water Board routinely tests the water, which meets all state and federal requirements for drinking water quality.

A. Site Visit

From May 9 to May 11, 2000, Mr. David Napier and Ms. Dawn Hettrick of the NYS DOH were at the Southside High School assisting NYS DEC staff collect soil samples from the school grounds. During that time, the weather was mostly sunny and warm so NYS DOH staff were able to observe many school-related and recreational activities on the school grounds. Throughout the day, students use the athletic facilities for physical education classes. After school, students use the various athletic fields for sports, members of the community use the school grounds to exercise, and community-based organizations (for example, Little League baseball) use the fields for sport activities. Some of the activities NYS DOH observed were people walking or running on the track, and sitting and stretching on the grass. NYS DOH staff also observed maintenance staff cutting the grass and grooming the athletic fields.

Large portions of the school property are covered by paved areas or the school building itself. Several other buildings, bleachers and the track cover other areas of the property. The majority of the rest of the property is covered by well-established grass. However, soil is exposed on well worn paths and on two old volleyball courts. The new volleyball court is covered with sand and areas on the baseball fields are covered with a reddish soil, which is different from surface soil on the remainder of the school property.

While assisting the NYS DEC in collecting soil samples, NYS DOH staff observed subsurface soil at the site. Based on visual observation, the top foot of soil across the school property appears to be topsoil. In most of the boreholes, a three to six inch layer of cinders was found from a depth ranging from about one foot to about three feet below the ground surface. Sporadically around the property, evidence of building material (such as brick) was found in subsurface soil. Discolored soils were also found in some of the boreholes. Ms. Hettrick also assisted NYS DEC with collecting soil samples on September 12 and 13, 2000. She observed similar soil conditions to those in May 2000. In addition, Dave Napier, NYS DOH, while attending a meeting of the Southside High School Citizens Advisory Committee in Elmira in October 2002, noted no major changes in conditions on the Southside High School Property.

B. Demographics

During the school year, the school serves grades 9 through 12 for the southern portion of the Elmira City School District. About 1300 students attended the school each year over the past several years. Based on enrollment data for the Southside High School, a total of about 9000 students attended the Southside High School at its present location. Also based on these data, the student population averages about 49% male and 51% female.

The NYS DOH estimated from the 1990 Census (US Bureau of the Census 1991) that 25,935 people live on the south side of the Elmira School District (that is, south of the Chemung River). This population is 94.3% white and 4.4% black. Based on the 1990 census, 8.9% of the population is under 6 years of age, 19.4% is 6-19 years of age, 56.8% is 20-64 years of age, and 14.9% is 65 years or older. In 1990, there were 5,573 females of reproductive age (ages 15-44) in the area. The median household income for the area was approximately $25,000 in 1989, with 13% of the population living below the poverty level (US Bureau of the Census 1992). The following chart compares these demographics with statewide averages.

	New York State	Elmira School District S.
Age Distribution		
<6	8.3%	8.9%
6-19	18.4%	19.4%
20-64	60.2%	56.8%
>64	13.1%	14.9%
Race Distribution		
White	74.4%	94.3%
Black	15.9%	4.4%
Other	9.7%	1.4%
Ethnicity Distribution		
Percent Hispanic	12.3%	1.6%
1989 Median Income	$32,965	$25,000
% Below Poverty Level	13.0%	13.0%

DISCUSSION

A. Environmental Contamination

The NYS DEC collected 156 soil samples from the school grounds during five distinct sampling events from May to September 2000. Of these samples, 68 were surface soil samples and 88 were subsurface samples. The data from these samples are presented in Appendix D. Appendix D, Table 1 gives the sample location, the depth from which the sample was collected, and the date the sample was collected. Figure 1, Appendix D, shows where the sample was taken on the school grounds. The surface and subsurface soil data are summarized in Appendix E, Tables 1 and 2. This health consultation provides an evaluation of all the data presented in Appendix D. This health consultation does not evaluate data from off-site samples, for example, those collected from the adjacent American LaFrance or railroad properties. This health consultation also does not evaluate data from surface water (e.g., ponds) or groundwater samples. Likewise, data from the prior petroleum spill investigation are not evaluated in this health consultation.

Surface soil samples were collected from the ground surface to a depth of 3 inches. Based on visual evaluation of soil in each of the boreholes, soil to a depth of about one foot appears to be topsoil. The subsurface samples were collected from varying depths; most were collected from 6 inches to 12 feet with two more collected from a greater depth. Most subsurface soil samples were collected from soil that contained unusual material (cinders, stained soil, etc.). The presence of cinders and other visibly contaminated material is likely due to past industrial use of the property.

Environmental sampling data are compared to typical background levels and public health comparison values to help us determine whether contaminants should be evaluated further. When a chemical is at or below typical background levels, the chemical is generally not evaluated further. When a chemical is below health comparison values, the risks for experiencing adverse health effects are expected to be very low (cancer health effects) and minimal (non-cancer health effects) and the chemical is not evaluated further. For more information on health comparison values, please see Appendix F, *NYS DOH procedure for evaluating potential health risks for contaminants of concern.* Health comparison values are calculated for each contaminant medium and are dependent on the specific exposures appropriate to the setting. Because health comparison values are calculated for a specific exposure setting to evaluate potential health concerns from specific past, present or future exposures, they are often different from cleanup levels issued by other agencies. The specific assumptions used to calculate health comparison values are shown in the footnote to Table 1, Appendix E.

B. Exposure Pathways

To evaluate the potential exposures for students, staff, the community and visitors using the school grounds, the NYS DOH stipulated that surface soil samples should be collected from the surface to a maximum depth of three inches. Samples collected from the surface to a depth of three inches represent the zone to which the public could routinely be exposed under current site conditions. People would only be exposed to subsurface soils if they dig below the surface and if the subsurface soil is left at the surface. This section discusses surface soil (soil collected from the surface to a depth of 3 inches), shallow subsurface soil (soil collected from 6 inches below the surface to a depth of 4 feet) and deeper subsurface (soil collected from depths greater than 4 feet below the surface). The specific locations discussed in this section are shown on Figure1 (Appendix D).

Surface Soil

People using or maintaining the school property could be exposed to surface soils in all areas on the school grounds by sitting on the ground, playing, mowing the grass, landscaping, etc. Students or other members of the community using the various athletic fields could be exposed to surface soil through participating in football, track and field activities, playing baseball, soccer or other field sports, etc. Also, spectators sitting on the ground near and on these athletic areas may be exposed to surface soils. These exposures would be through direct contact with surface soil, inhalation of airborne dust generated from the surface soil or incidental ingestion of surface soil.

Since large portions of the school property are paved, the public would not be exposed to surface soil in these areas. The grass on most of the school property is thick and well-established. Well-established and maintained grass cover minimizes human exposures to soil by limiting direct contact with the soil. The only places that are not paved or covered with grass are well-worn paths near and around the athletic fields and other high traffic areas, and two areas in the rear of the school building that were used for volleyball in the past. The current volleyball court is covered with sand and infield areas on the baseball fields are covered with a reddish soil; these soils are not similar to surface soil across the rest of the site. To characterize potential exposures, surface soil samples were collected from areas of exposed soil, paths, high traffic areas or other areas where exposures were likely.

Metals and low concentrations of volatile and semivolatile organic chemicals were detected in the surface soil samples collected from all areas. The soil concentrations for each of the detected chemicals were compared to typical soil background concentrations (when available) and their public health assessment comparison values. The data for the 68 surface soil samples evaluated for this health consultation are summarized in Table 1 (Appendix E) along with relevant background concentrations and comparison values.

None of the metals detected in the surface soil sampling exceeded their typical background ranges except copper, chromium, nickel, and selenium. Nickel and selenium were detected slightly above their typical background ranges in five of 52 and 14 of 52 surface soil samples, respectively. Copper exceeded its typical background range in only one of 52 samples. Chromium was detected above its typical background range (10 to 60 milligrams per kilogram or mg/kg) (Clarke, et al., 1985; Connor et al., 1957; McGovern, 1988; Shacklette and Boerngen, 1984) in 10 of 52 surface soil samples. The highest concentration of chromium was 107 mg/kg. Although chromium was reported as total chromium in the soil data, the levels were evaluated as if all of the detected chromium were in the more toxic hexavalent form. None of the levels of copper, chromium, nickel or selenium exceed their public health assessment comparison values.

The average concentration of Aroclor 1248 and Aroclor 1260 in surface soil is 0.19 mg/kg and 0.04 mg/kg, respectively. In calculating this average, we used a concentration of 0.02 mg/kg of Aroclor 1248 and of Aroclor 1260 for samples in which the chemicals were not detected. We selected this value (0.02 mg/kg) since it is near the lowest reported concentration of the Aroclors for this data set. This average is higher than the range of average soil concentrations for total PCBs (less than 0.01 to 0.04 mg/kg) reported in a national soil monitoring program (ATSDR, 1997). Exposure to these soils could result in a somewhat higher level of exposure to these chemicals than would be expected from typical soils.

The average concentrations of Aroclor 1248 and Aroclor 1260 are less than the public health assessment comparison values of 1.2 mg/kg for Aroclor 1248 and 3.9 mg/kg for Aroclor 1260. The public health assessment comparison value for Aroclor 1248 was exceeded in 2 of 55 surface soil samples; the public health assessment comparison value for Aroclor 1260 was not exceeded in any sample. The public health assessment comparison values were calculated considering a residential setting and long-term exposure (exposure parameters are given on Table 1 in Appendix E). The average soil concentration for the school grounds is more likely to reflect long-term exposure than the concentration in one sample. People are unlikely to be exposed to soil at any specific location as described by the exposure parameters in Table 1. The concentration of Aroclor 1248 in the highest sample is about a factor of two greater than the public health assessment comparison value.

The average concentration of total carcinogenic polycyclic aromatic hydrocarbons (PAHs) in surface soil is 0.53 mg/kg. In calculating this average, we used a concentration of 0.04 mg/kg for each carcinogenic PAH for samples in which the chemicals were not detected. We selected this value (0.04 mg/kg) since it was about the lowest reported concentration for any carcinogenic PAH. This average is somewhat below what Menzie et al (1992) reported as the upper end of the range for urban background (1 to 3 mg/kg). Exposure to these soils could result in a level of exposure to these chemicals approaching the upper end of urban soils.

In a sample from the multipurpose athletic field at the northern portion of the school property, total carcinogenic PAHs were detected at 7.4 mg/kg. Two other samples, both located at the edge of the parking lot bordering the former American LaFrance site, had total carcinogenic PAHs at levels of 2.7 mg/kg and 1.6 mg/kg. These three are the only samples (out of 55) in which the levels of individual carcinogenic PAHs in surface soil exceed their public health assessment comparison value based on carcinogenic effects. Benzo(a)pyrene and dibenz(a,h)anthracene were detected in the athletic field sample at 1.4 mg/kg and 0.36 mg/kg, respectively, and benzo(a)pyrene was detected in the two samples near the American LaFrance site property at 0.45 mg/kg and 0.27 mg/kg. The comparison value for both benzo(a)pyrene and dibenz(a,h)anthracene is 0.25 mg/kg. The public health assessment comparison values were calculated considering a residential setting and long-term exposure (exposure parameters are given on Table 1 in Appendix E). The average soil concentration for the school grounds is more likely to reflect long-term exposure than the concentration in one sample. People are unlikely to be exposed to soil at any one location as much or as often as described in Table 1 (see footnote **).

Other than those discussed above, none of the concentrations of metals, volatile organic chemicals or semivolatile organic chemicals detected in surface soils at the Southside High School exceed cancer or noncancer public health assessment comparison values.

<u>Shallow Subsurface Soil</u>

Exposures to shallow subsurface soils might occur if someone (e.g., maintenance worker) digs below the surface soil, such as when planting a tree or installing a fence post. If subsurface soil is left at the surface, the public might then be exposed to soil that is currently under the surface.

The shallow subsurface soils (6 inches to 4 feet below grade surface) contained metals (i.e., antimony, arsenic, barium, chromium, cobalt, copper, lead, mercury, nickel, selenium and zinc) at concentrations that exceeded typical background ranges. A summary of the data for the shallow subsurface soil samples is included on Table 2 (Appendix E). Most of the metal concentrations in excess of typical background were isolated in a single sample collected on the Southside High School property between the east parking lot and the railroad tracks. This single sample contained arsenic at 56.2 mg/kg, which exceeds its residential public health comparison value for carcinogenic effects. The levels of seven polycyclic aromatic hydrocarbons (benz(a)anthracene (68 mg/kg), benzo(a)pyrene (57 mg/kg), benzo(b)fluoranthene (43 mg/kg), benzo(k)fluoranthene (40 mg/kg), chrysene (62 mg/kg), dibenz(a,h)anthracene (9.6 mg/kg) and indeno(1,2,3-c,d)pyrene (31 mg/kg)) detected in one shallow subsurface sample from the football field also exceed levels typically found in the environment and their residential public health comparison values for carcinogenic effects. Benzo(a)pyrene exceeded its comparison value in 19 of the 31 shallow subsurface soil samples in which it was detected. Many shallow subsurface soil samples contained elevated levels of the PCB mixture Aroclor 1248. In two shallow subsurface samples taken from the football field, Aroclor 1248 was detected at 160 mg/kg and 8.8 mg/kg. In shallow subsurface samples collected between the school and the railroad tracks, the levels of this PCB mixture were 9.4 and 8.3 mg/kg. These concentrations of Aroclor 1248 in shallow subsurface soil exceed its cancer and/or noncancer residential public health comparison values.

Since the elevated levels of arsenic, polycyclic aromatic hydrocarbons and PCBs are below the surface, chronic human contact (e.g., regular, long-term contact, the kind of exposure that forms the basis for the comparison values) to these contaminants is unlikely. Due to their location and given that exposure is unlikely, the detected levels of arsenic, polycyclic aromatic hydrocarbons and PCBs in shallow subsurface soil at the Southside High School are not expected to pose a public health hazard. However, if these soils were brought to the surface and the contaminants were made available for long-term human contact, risks for adverse health effects for exposure to these contaminants could increase. Public exposures to shallow subsurface material can be minimized if precautions are taken when digging into subsurface material. These include minimizing direct contact with potentially contaminated material and not allowing subsurface soils to remain exposed at the surface.

Deeper Subsurface Soil

Public exposures to deeper subsurface soil might occur if excavations occur on the school property, such as during construction of a building addition. The people exposed to subsurface soil in this manner should be limited to maintenance or construction workers.

Deeper subsurface soils (deeper than 4 feet) contain several metals (barium, cobalt, copper, nickel, selenium and zinc) at concentrations that exceed typical background, and low concentrations of volatile and semivolatile organic chemicals. A summary of the data for the deep subsurface soil samples is included on Table 2 (Appendix E). Except for Aroclor 1248 (detected at 74 mg/kg, 24 mg/kg and 3.3 mg/kg in separate samples), Aroclor 1260 (detected at 6.1 mg/kg), benzo(a)pyrene (detected at 1.3 mg/kg and 0.29 mg/kg in separate samples) and dibenz(a,h)anthracene (detected at 0.36 mg/kg) none of the concentrations of any metals, volatile organic chemicals or semivolatile organic chemicals detected in deeper subsurface soils at the Southside High School exceed cancer or noncancer public health comparison values for residential exposure. Long-term human exposure to these contaminants is unlikely because these contaminants are well below the surface. Public exposures to deep subsurface material can be minimized if precautions are taken when digging into subsurface soil. These precautionary measures include avoiding direct contact with potentially contaminated material and not allowing subsurface soil to remain exposed at the surface.

C. Health Outcome Data

The NYS DOH investigated cancer among students attending the Southside High School in Elmira, New York from when the school opened in the Fall of 1979 to June 2000. A report on this investigation is attached in Appendix C. This investigation was spurred by reports of an unusual number of cases of cancer among students currently attending the school and attending the school since 1997.

The NYS DOH looked at the overall time period since the opening of Southside High School, and did not find an unusual pattern of cancer among current and former students, or among children living in the area served by the school. The numbers and types of cancers diagnosed were similar to what would be expected for this age group. Perceptions of a large number of persons with cancer at the school since 1997 may be explained by a small number of persons diagnosed with cancer at the time they were attending Southside High School, combined with the presence of other students who had been diagnosed with cancer prior to entering high school, and still others who had been diagnosed with health conditions other than cancer. Although the actual number of cases is small, since 1997 an unusual number of young men were diagnosed with testicular cancer.

Compared with its incidence among adults, cancer is rare among children. However, it is the largest single cause of death from disease among children (American Cancer Society 2000). Of the various types of cancer affecting children, leukemia occurs most frequently and accounts for almost one third of all childhood cancers. Cancers of the brain and other parts of the nervous system, and lymphomas (including Hodgkin's disease and the non-Hodgkin's lymphomas) are the second and third most frequently occurring cancers in children (Miller 1996, NYS DOH 2000). Cancer occurs somewhat more frequently in young adults. Among people 20-34 years of age, lymphomas occur most frequently, followed by breast cancer in females and testicular cancer in males (NYS DOH 2000).

This study confirmed an unusual number of testicular cancer cases among young men since 1997. Although testicular cancer accounts for only about 1% of cancers in men of all ages, it is the most commonly occurring type of cancer in white males ages 20-34. It is the second most common type of cancer in white males ages 15-19 and 35-39. Testicular cancer occurs about six times as often in white males as in African-American males. Over the past twenty years, the incidence of testicular cancer has doubled in the United States, with most of the increase occurring among young men (Brown 1996, Schottenfeld 1996). The reason for this increase is unknown. The only known risk factor for testicular cancer in men under age 20 is undescended testis (Bernstein et al 1999). Evidence also suggests that a family history of testicular cancer, factors in the prenatal period such as high maternal hormone levels, viral infections and occupational exposures of the parents may also be important (Bernstein et al 1999). Among adult males, higher rates of testicular cancer have been observed among men working at a variety of different occupations (Brown 1996, Schottenfeld 1996), but few of these associations have been found consistently.

As a result of the elevated rate of testicular cancer among students at the Southside High school since 1997, NYS DOH conducted a follow up study in 2001 consisting of a medical records review and a community based study of testicular cancer in the area. A report on the follow up study is attached in Appendix C.

A medical records review was conducted of the young men who were confirmed as having testicular cancer in the previous study. The NYS DOH examined their medical records to look for any individual risk factors or any other factors that the young men had in common that may help account for their illness. Medical records were reviewed for information on the patient's growth and development, medical conditions since conception, behavior and possible exposures of the patient and his parents.

No unusual conditions or exposures were shared by all of the young men, although limited information was available regarding parental occupational history or exposures. None of the men had a family history of the testicular cancer or a history of an undescended testicle, the biggest risk factor for the disease.

NYS DOH also conducted a review of testicular cancer in the community between 1980-1998. The number of cases of testicular cancer among men ages 20-34 residing in ZIP codes 14904, 14871 and 14894 was compared with the number of cases expected based on rates in New York state among men of similar ages.

The number of men diagnosed with testicular cancer between 1980 and 1998 was not statistically significantly different than the number expected overall nor were significant excesses of cases observed within any 5 year age group or within any of the 4 time periods examined.

The NYS DOH conducted a survey of past alumni of the school to update the study of cancer in current and former students of Southside High School. The NYS DOH plans to report on this activity in the fall of 2003.

D. Community Health Concerns Evaluation

Parents of students attending Southside High School expressed concerns about the number of cancers among students at the school. Staff from the NYS DOH, NYS DEC and Chemung County Health Department attended a May 2, 2000 public meeting. The NYS DOH and the Chemung County Health Department subsequently participated in 12 meetings of a citizen advisory committee between September 2000 and August 2001. At these meetings, parents, students and the community asked questions and expressed several concerns. A draft of this health consultation was released for public review and comment on February 23, 2001. A response to the comments that the NYS DOH and ATSDR received are in Appendix G.

- **Concern**: Several parents and members of the community have concerns about the incidence of cancer in the school. Several types were cited, such as testicular cancer, colon cancer and leukemia.

- **Response:** The cancer incidence study performed for the Southside High School population found that, except for testicular cancer, the incidence of cancer is within the levels that are expected for this population. Any new cancer cases that are reported will be verified and included with the cases used in the studies. The cancer surveillance program is examining the medical records of the young men confirmed to have testicular cancer. The incidence of testicular cancer will continue being monitored. The report is included in Appendix C. The results of these activities will be provided to the public when they are completed.

- **Concern**: Several people expressed concern about the safety of drinking water.
- **Response**: The water is provided by the Elmira Water Board and meets all state and federal requirements for drinking water;
- **Concern**: Some people questioned whether staff at the school are experiencing health problems, such as cancer.
- **Response:** To date, NYS DOH staff have not heard any specific health concerns among the staff of Southside High School. Based on existing knowledge, the data evaluated in this health consultation indicate that exposure to chemicals in surface soils on the school property or air inside the school is unlikely to pose a health hazard.
- **Concern**: Parents asked if contaminants at the school may be contributing to their children's illness. Some examples were thyroid disease, autoimmune diseases, and Crohn's disease.
- **Response:** Based on existing knowledge, the data evaluated in this health consultation indicate that exposure to chemicals in surface soil and indoor air at the school does not pose a health hazard for these or other diseases.

CONCLUSIONS

1. Based on ATSDR's public health hazard category classification (Appendix H), the surface soil and indoor air data collected for the Southside High School, the environmental conditions at Southside High School pose no apparent public health hazard. This classification is used because average levels of contaminants in surface soils do not exceed public health comparison values. Although a few samples exceed health comparison values, people are unlikely to have long-term exposures to soil at any one location. Nevertheless, because average levels of total PCBs exceed typical background levels and average levels of carcinogenic PAHs are somewhat below the upper range of background levels, exposures to these contaminants at Southside High School may be greater than those typically experienced from soil.

   Students, faculty, staff and the community are not currently being exposed to subsurface soil, although it contains chemicals at levels exceeding public health comparison values.

2. Based on visual observation, the top foot of soil appears to be topsoil. There is layer of cinders at about a foot to three feet below the ground surface. Visibly contaminated soils at varying depths are likely due to past industrial use of the property. These observations are consistent with the chemical analyses of the soil samples.

3. Levels of contaminants above public health comparison values were found in shallow subsurface soil at the Southside High School. However, currently there are no known public exposures to contamination in subsurface soil and the presence of these contaminants in shallow subsurface soil poses no public health hazard. However, if the contaminants were brought to the surface and made available for human contact, exposures and the potential for health effects may increase.

4. Levels of PCBs above public health comparison values were found in deeper subsurface soil near the school building. However, currently there are no known public exposures to contamination at depth and the presence of PCBs in deeper soil poses no public health hazard. However, if soils from greater than four feet of depth are brought to the surface and made available for human contact, exposures and the potential for health effects may increase.

5 As stated in the indoor air investigations report (Appendix B), most compounds were either not detected or were present at low levels. Several compounds were present at concentrations slightly higher than typical background, but their presence is not unusual and exposure at the reported levels is not expected to be a health concern. Three Freon compounds and several chlorinated solvents were detected at elevated concentrations in samples collected from three soil gas points. Pressure differential readings between soil gas and indoor air were minimal, indicating that there were no substantial pressure gradients drawing soil gas into the school building at the time samples were collected.

6 Municipal water is provided to the school. This water meets all state and federal requirements for drinking water and is, therefore, not a public health concern.

7 The NYS DOH did not find an unusual pattern of cancer among current and former students, or among children living in the area served by the school. Although the number of cases is small, the study did confirm a higher than expected number of young men diagnosed with testicular cancer since 1997.

RECOMMENDATIONS

1. The NYS DOH, in consultation with the ATSDR, recommends, in accordance with prudent public health practice, that measures be taken to minimize the potential for human exposure to subsurface soils containing elevated concentrations of PCBs, tetrachloroethene, polycyclic aromatic hydrocarbons, and metals.

2. The school district or other appropriate governmental unit should develop a written soil management plan to minimize potential public exposures to contaminated subsurface material and may want to consider instituting a deed notification or restriction. A soil management plan would provide protocols for the proper handling of soil during ground

intrusive activities. This includes any activities that disturb material below paved areas and under buildings.

3 The school district should review the recommendations in the indoor air investigation report (Appendix B) to determine if additional actions may be warranted. For example, the report recommends that the school district consider instituting an indoor air quality action plan consistent with that recommended by the US EPA. The Tools for Schools Action Kit provides information and guidance for developing and implementing a plan to prevent indoor air quality problems and resolving such problems if they arise. The plan should address the possibility of contaminated soil gas being drawn into the building; one possible way of evaluating this is to include routine (e.g., seasonal) monitoring of pressure differentials between the soil gas and building interior.

4 If new data become available, the NYS DOH and ATSDR should update this health consultation or provide information to the public through fact sheets or other means.

5 The NYS DOH should provide the public with information about the survey of past alumni of the Southside High School.

PUBLIC HEALTH ACTION PLAN

The Public Health Action Plan (PHAP) for the Southside High School contains a description of the actions to be taken by the US EPA, ATSDR, and/or the NYS DOH at or near the site subsequent to the completion of this health consultation. The purpose of the PHAP is to ensure that this health consultation not only identifies public health hazards if they exist, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of the ATSDR/NYS DOH to follow-up on this plan to ensure that it is implemented. The public health actions implemented or to be implemented follows:

1. The NYS DOH presented the findings of this health consultation to the public at a public meeting and school board meeting. A fact sheet summarizing this information was distributed to the public.

2. The NYS DOH will continue to be available to answer any questions that students, parents, staff, and the community may have about conditions at the school and provide guidance to the school district as needed.

3. The NYS DOH conducted a survey of past alumni of the school to update the study of cancer in current and former students of Southside High School. The NYS DOH plans to report on this activity in the fall of 2003.

CERTIFICATION

The Health Consultation for Southside High School,Elmira, New York, was prepared by the New York State Department of 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 Health Consultation 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, SPS, SSAB, DHAC, ATSDR

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Appendix A
Figures

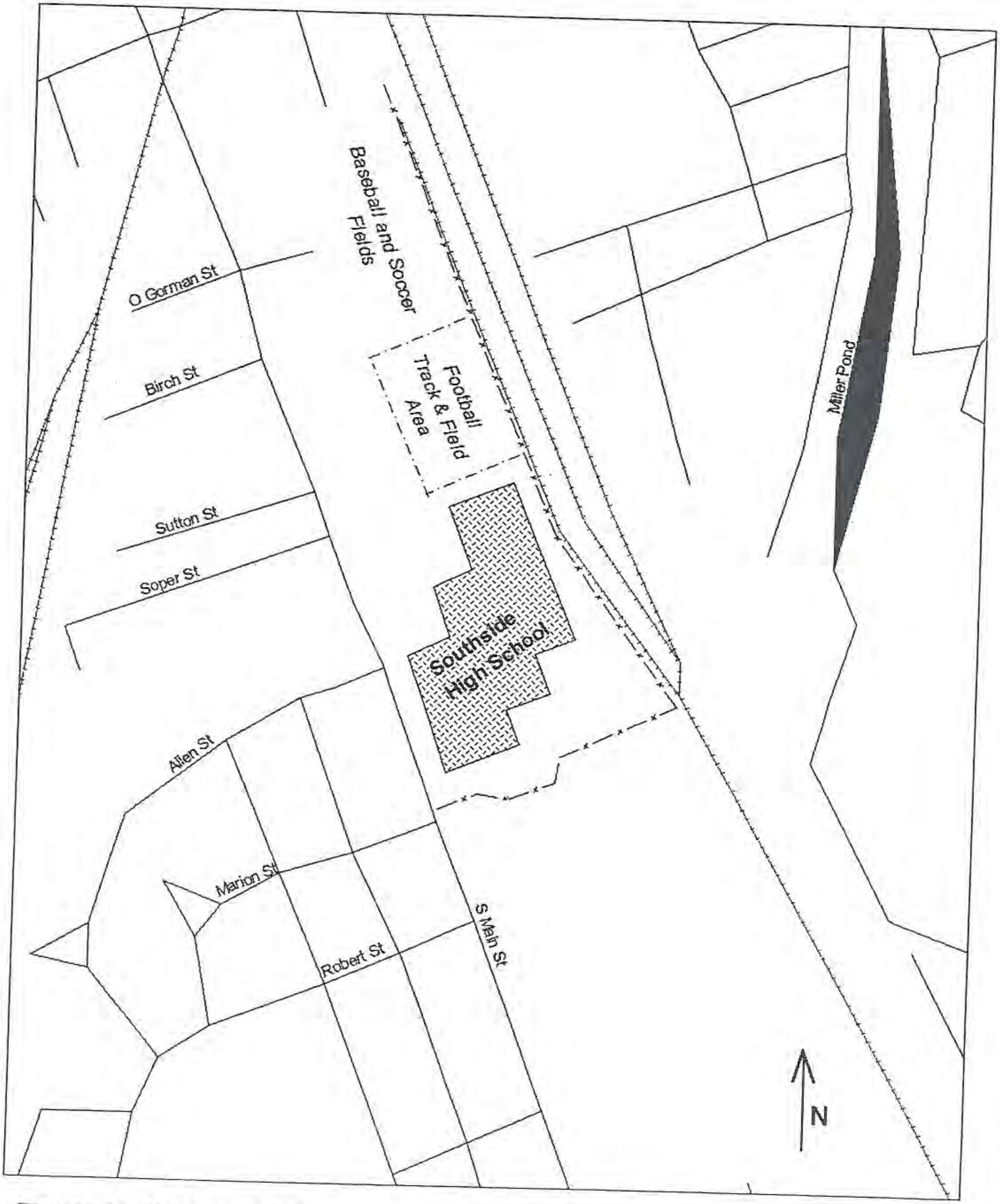


Figure 1- Site Location

Appendix B
NYS DOH Indoor Air Investigations

New York State Department of Health
July 28, 2000

Indoor Air Investigation
Southside High School
Elmira, Chemung County

Summary

This report presents the findings of the May 22 and 23, 2000 indoor air investigation at the Southside High School (SHS) in Elmira NY. An indoor air testing program was developed to evaluate whether environmental contaminants were affecting indoor air in SHS. A total of 11 air samples were collected from various locations in and around SHS including three soil gas samples from under the school's concrete floor and an outdoor air sample. For comparison, three indoor air samples and an outdoor air sample were also collected at the Elmira Free Academy (EFA), another high school in Elmira. Fourteen of the fifteen samples were analyzed for a total of 69 volatile organic chemical compounds.

The indoor air testing results do not show a problem with chemical contamination in the school air. Most compounds were either not detected or were present at low levels. Several compounds were present at concentrations slightly higher than typical background, but their presence is not unusual and exposure at the reported levels is not expected to be a health concern.

The soil gas samples from under the SHS concrete floor contained several Freon and chlorinated solvent compounds at elevated levels but did not show petroleum vapor contamination. Most petroleum-related compounds in the soil gas samples were in the range of normal background for indoor air; several petroleum hydrocarbons were just slightly elevated above typical background levels in the soil gas samples. Pressure measurements in the school show that soil gas was not being drawn into the school at the time the samples were collected.

Carbon dioxide levels in several occupied classrooms suggested that outdoor air exchange could be improved. Several of the ventilation systems in SHS could be adjusted to increase the amount of outdoor air to decrease carbon dioxide levels during occupied periods. The school should consider instituting an indoor air quality action plan consistent with that recommended by the Environmental Protection Agency (EPA).

Abbreviations:

SHS	-	Southside High School
EFA	-	Elmira Free Academy
NYSDEC	-	New York State Department of Environmental Conservation
NYSDOH	-	New York State Department of Health
PID	-	photoionization detector
eV	-	electron volts
IAQ	-	indoor air quality
psi	-	pounds per square inch
$\mu g/m^3$	-	micrograms per cubic meter
EPA	-	Environmental Protection Agency
ASHRAE	-	American Society of Heating, Refrigerating and Air Conditioning Engineers
ppm	-	parts per million

1.0 Background

In 1995, the New York State Department of Environmental Conservation (NYSDEC) investigated a report of petroleum contamination on Miller Pond in the City of Elmira. NYSDEC determined that the petroleum contamination was No. 4 fuel oil that may have been from underground petroleum storage tanks that existed on the site when it was an industrial property and that the contamination extended underneath the Southside High School about 15 feet below ground. However, investigations to date have not found any evidence of tanks on the property. NYSDEC conducted air sampling in the high school in July 1997 and in April 2000 to assess possible air quality impacts. The results of this air testing did not show an indoor air contamination problem at the school.

On April 8, 2000, the Elmira City School Board received a letter from parents expressing concern about a perceived unusual number of cancers among current and former students at SHS. The NYSDEC, the New York State Department of Health (NYSDOH) and the Chemung County Health Department attended a public meeting sponsored by the school board on May 2, 2000, and discussed concerns about cancer among students and provided information about environmental conditions in the area. The NYSDOH indicated that all available information on cancer in students at SHS will be evaluated. Characteristics of confirmed cases of cancer will be examined in order to identify any unusual patterns in the numbers and types of cancers found, and their timing and geographic distribution that might indicate the possibility of a common source will be addressed. In addition, NYSDOH and NYSDEC said they would further investigate environmental conditions in the school and the schoolyard. This report provides the findings of the indoor air investigation in the school.

2.0 Investigation and Methods

NYSDOH designed an investigation plan to determine whether subsurface contamination was present in soil gas under the SHS concrete floor and to further evaluate whether indoor air was affected. The investigation included installation and sampling of soil gas points in three areas in SHS and indoor and outdoor air testing at both SHS and EFA.

2.1 Sample Site Selection

A. Soil Gas

In late April 2000, soil gas wells were installed through the concrete floor in three rooms in the school building including the pool filter room, the boiler room and a storage area (Figure 1). These locations were selected because:

- they were located on the side of the building closest to the identified area of the underground petroleum contamination;
- they were in locations near mechanical equipment which could be a source of contamination and/or could produce a pressure difference that could draw sub-slab vapor into the school; and
- they were in areas less likely to be tampered with.

B. Indoor Air

The day prior to sample collection at SHS, NYSDOH staff toured the various areas of the school with school officials to help select sampling sites. There are a total of 14 ventilation systems in the building. Seven indoor air sample locations were selected to represent various areas of the school and different ventilation systems. One outdoor location was sampled. Sample locations are shown on Figure 1. Below is a list of the locations and selection rationale:

- Classrooms 138, 148 and 127. These classrooms are located in different wings of the building and each is served by a different ventilation system;
- Library, gymnasium and cafeteria. These large non-classroom areas are located in different wings of the building and each is served by a different ventilation system;
- Gym Store Room. This room has a soil gas monitoring point in the floor and was tested to provide a direct comparison with the co-located soil gas point; and
- An outdoor air sample was collected from the courtyard area northwest of the gymnasium exit to provide a comparison with indoor air samples and the outdoor air sample at EFA.

Three indoor samples and one outdoor sample were collected at EFA. The sample locations were from similar areas as those chosen in SHS. Indoor sample locations at EFA included the library, the gymnasium, and classroom 122, each served by a different ventilation system.

2.2 Sample Site Preparation

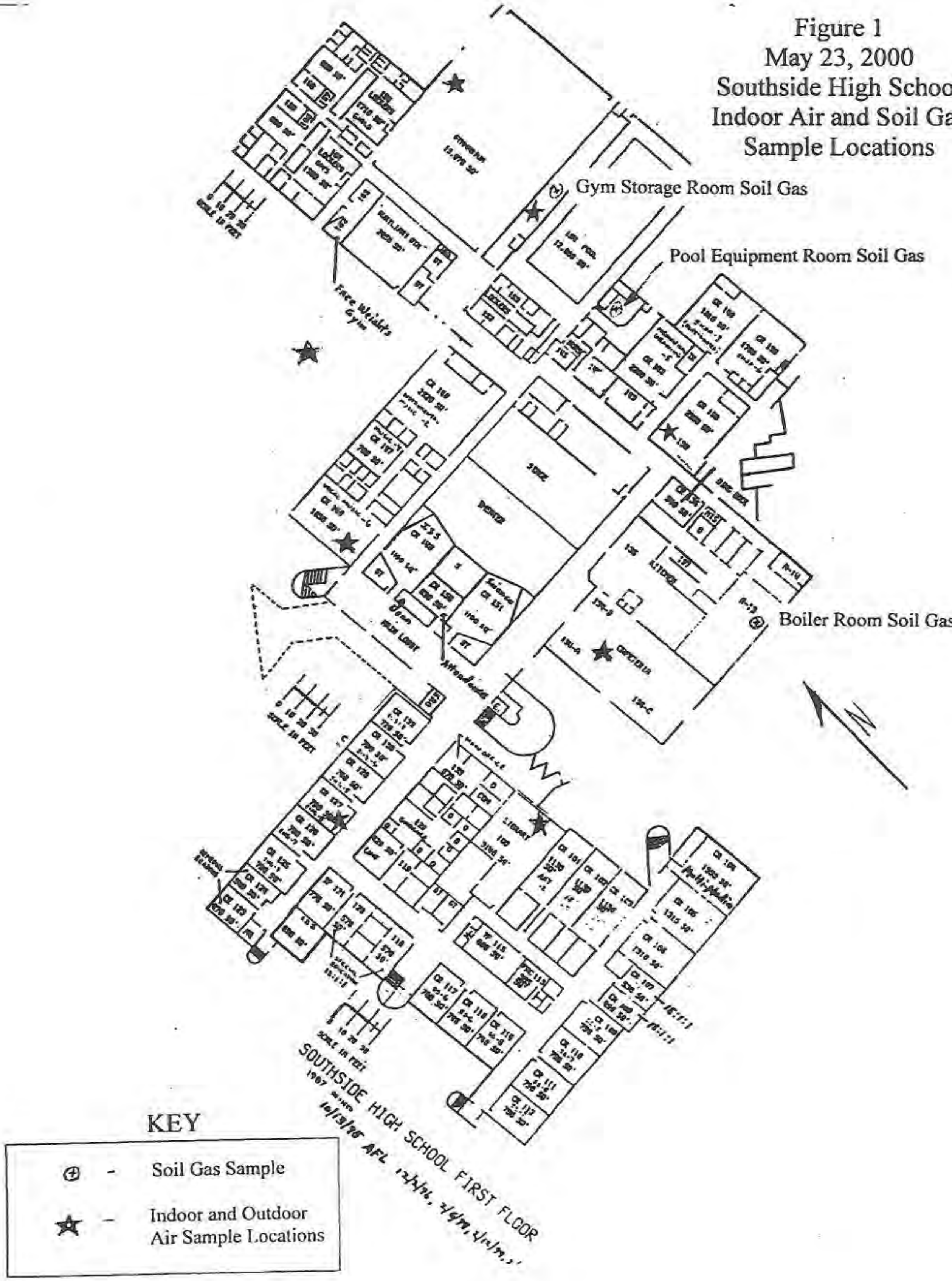
A. Soil Gas

In late April 2000, soil gas wells were installed through the concrete floor in three rooms in the SHS building including the pool filter room, the boiler room and the gym storage area. The gym storage area is located under the pool bleachers. The wells were installed by drilling a ¾-inch hole with a rotary hammer drill through the concrete and into the sub-slab aggregate material. A ¼-inch internal diameter teflon tube was inserted through the hole into the aggregate material below the concrete floor slab. Eight to fifteen inches of tubing was left above the floor to allow sampling apparatus connection and sample collection. The space between the drill-hole annulus and the tube was sealed with a bentonite slurry to prevent air exchange between the soil gas and the room.

B. Air Sampling

The selected air sampling locations were inspected the afternoon prior to sample collection to ensure there were no materials or products present that might interfere with the sample analysis. A photoionization detector (PID) was used to "screen" areas for organic vapors at the time samplers were set up.

Figure 1
May 23, 2000
Southside High School
Indoor Air and Soil Gas
Sample Locations



2.3 Sample Collection, Sampling Apparatus and Methods

A. Portable Photoionization Detector (PID)

Photovac™ 2020 portable PIDs with 10.6 eV lamp were utilized for the investigation. The PIDs provide real-time or instantaneous readings of total respondable organic vapors in parts per million (ppm). The PID responds to most petroleum compounds including benzene, toluene and xylene and some chlorinated solvents such as trichloroethene and tetrachloroethene. The PID does not respond well to methane, chloroform and Freon compounds. The instruments were calibrated with a 10-ppm isobutylene calibration gas standard and using outdoor air as the zero baseline. Water vapor that contains mineral salts can produce false positive readings on the PIDs.

Soil gas was monitored with the PID on several occasions beginning on April 28 after the soil gas wells were installed. Additional readings were obtained in two wells on May 2. All three soil gas wells were monitored on May 23 just prior to collecting samples for laboratory analysis. The PID, which draws approximately 0.3 liters per minute, was used to purge the soil gas tube prior to sample collection. The volume of a 24-inch long, ¼-inch internal diameter tube is approximately 77 cubic centimeters. Soil gas was drawn through the PID for about 1 minute (300 cubic centimeters) allowing for the purging of almost four tube volumes before each sample was collected. PID readings were recorded at the end of 1 minute before each Summa canister sample was collected.

B. Summa Canisters

Air sampling was performed in accordance with the NYSDOH Indoor Air Sampling and Analysis Protocol. Air samples were collected using 6-liter Summa canisters that were fitted with flow restrictors to collect air over a two-hour period. Samples are analyzed using the NYSDOH VOLA-CAN 3 and VOLA-CAN 4 methods for 69 volatile organic compounds (see Table 1). These methods are similar to the EPA TO-15 analytical method. The method involves direct injection of air from the Summa canister onto a gas chromatograph (GC) column with a mass spectrometer (MS) detector. Depending on the molecular weight of the compound, the reporting limits are generally 1 to 3 micrograms of chemical per cubic meter of air ($\mu g/m^3$). samples are analyzed for the 69 volatile organic compounds listed in Table 1.

Summa canisters were connected to the soil gas tubes with a stainless steel barbed fitting containing the flow restrictor. For the indoor air samples, the canisters were placed at typical breathing height at the selected locations. Outdoor samples were set to be away from likely contaminant sources such as parked cars.

C. Solomat™ IAQ Surveyor II

The Solomat™ IAQ Surveyor II indoor air quality monitor was used for several aspects of the investigation. The Solomat is capable of measuring general indoor air quality (IAQ) parameters including carbon dioxide, carbon monoxide, temperature and relative humidity. The meter can be fitted with a differential air pressure probe and can be used measure up to 7,000 pascals relative pressure difference between two points with a resolution of 0.1 pascals (1 inch water column = 263 pascals, 1 pound per square inch (psi) = 6,860 pascals). The probe has two lengths of ¼-inch tubing which can be placed in the two locations where the relative pressure is to be obtained (connected to a soil gas tubes or placed under a doorway, etc.). The meter provides the relative pressure reading and the direction of pressure gradient. Calibration involves connecting the two tubes and performing a zero adjustment.

Table 1. List of volatile organic chemical analytes by the Summa canister method.

VolCan-3	VolCan-4
Dichlorodifluoromethane (Freon-12)	Ethyl Alcohol
1, 2-Dichlorotetrafluoroethane	Isoprene
Chloromethane	Acetone
Vinyl Chloride	Methyl-tert-Butyl Ether (MTBE)
Bromomethane	n-Hexane
Chloroethane	2, 4-Dimethylpentane
Trichlorofluoromethane (Freon-11)	2-Butanone (MEK)
1, 1, 2-Trichlorotrifluoroethane (Freon 113)	2, 3-Dimethylpentane
1,1-Dichloroethene	Tetrahydrofuran
Methylene Chloride (Dichloromethane)	Cyclohexane
1, 1-Dichloroethane	Isooctane
Cis-1, 2-Dichloroethene	n-Heptane
Chloroform	Benzene
1, 1, 1-Trichloroethane	Methylcyclohexane
Carbon Tetrachloride	Methylmethacrylate
1, 2-Dichloroethane	4-Methyl-2-Pentanone (MIBK)
Trichloroethene	n-Octane
1, 2-Dichloropropane	Toluene
Cis-1, 3-Dichloropropene	Ethylmethacrylate
Trans-1, 3 - Dichloropropene	Cycloheptane
1, 1, 2-Trichloroethane	Ethylcyclohexane
Tetrachloroethene	n-Nonane
1, 2-Dibromoethane (EDB)	Ethylbenzene
Chlorobenzene	m/p-Xylene
1, 1, 2, 2 - Tetrachloroethane	o-Xylene
1, 3-Dichlorobenzene	Styrene
1, 4-Dichlorobenzene	a-Pinene
1, 2-Dichlorobenzene	Isopropylbenzene (Cumene)
1, 2, 4-Trichlorobenzene	n-Decane
Hexachlorobutadiene (C-46)	n-Propylbenzene
	1, 3, 5-Trimethylbenzene
	tert-Butylbenzene
	1, 2, 4-Trimethylbenzene
	d-Limonene
	sec-Butylbenzene
	1, 2, 3-Trimethylbenzene
	n-Undecane
	n- Butylbenzene
	n- Dodecane

General IAQ parameters were spot-checked in several areas on both May 22 and May 23 to get an indication of indoor air quality. On May 2 and again on May 23, differential pressure measurements between the building and the soil gas were obtained in soil gas wells with a Solomat IAQ Surveyor to determine whether there was a pressure gradient into the building. On May 23, the Solomat was also used to pressure map a number of areas of the SHS building.

3.0 Evaluation Criteria

A. Volatile Organic Chemicals

Results from the analysis of indoor and outdoor air and soil gas samples are compared to typical indoor and outdoor air background ranges. Background ranges are obtained from two databases. The United States Environmental Protection Agency (EPA) Volatile Organic Compounds database (March 1988 update) is a compilation of indoor and outdoor data from studies of homes and offices across the United States. The NYSDOH database is a summary of indoor and outdoor air sample results for control homes collected and analyzed by the NYSDOH from 1989 through 1996. These studies exclude sample locations where there were known spills or unusual sources of chemicals. The 25% to 75% ranges represent the middle half of the results in the databases. It is not uncommon for some results to be lower than the 25% level or higher than the 75% levels from either database.

For particular compounds where background indoor air database information was not available, outdoor air database information was used for comparison. Where background database information was not available or there were less than 10 data points comprising the statistics, the results from SHS were compared to the results from EFA.

B. General IAQ Parameters

1. Carbon Dioxide (CO_2)

One indicator used to assess indoor air quality is the level of CO_2 in rooms that have been normally occupied for an extended period. The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 62-1999 Standard indicates that "[c]omfort (odor) criteria with respect to human bioeffluents are likely to be satisfied if the ventilation results in indoor CO_2 concentrations less than 700 ppm above the outdoor air concentration. The method used most often to control the buildup of CO_2 and other contaminants is the dilution of indoor air with outdoor air. The ASHRAE 62-1999 standard recommends 15 cubic feet per minute of outside air per person for a classroom. These recommendations are consistent with those recommended by the Environmental Protection Agency's (EPA) Tools for Schools Action Kit.

2. Temperature and Relative Humidity

ASHRAE Standard 55-1992 provides detailed guidelines for thermal comfort. In general, temperatures for winter conditions should be 68°F to 74°F and summer conditions temperatures should be between 73°F to 79°F with relative humidity levels ranging between 30% and 60%.

3. Carbon Monoxide

Carbon monoxide is a combustion by-product that can cause serious short-term health problems and death at high levels. Indoor air levels are typically similar to outdoor air levels unless there is a combustion source such as gas stoves or idling car in an attached garage. The National Ambient Air Quality Standard is 9 ppm.

C. Pressure Differentials

Either natural or mechanically induced pressure gradients can cause soil gas to be drawn into a building. Measuring pressure differential can indicate the magnitude and direction of a pressure gradient between the soil gas and the building, different areas in a building and between the inside and outside of the building shell. Low level pressure differences of 0 to 4 pascals are common in a building. Ventilation systems, bathroom or other exhausts, wind, temperature changes and openings in the building shell such as doors and windows can affect pressure differentials in a building.

4.0 Results and Discussion

A. Soil Gas

1. PID Readings

PID readings of soil gas from under the SHS concrete floor through the ¼-inch teflon tubes are shown in Table 2. The readings, which were taken on the three different dates, varied slightly and were higher than ambient or general room air, indicating there may have been some type of organic vapors present in the soil gas. From the analytical results discussed below, it is notable that the pool filter room soil gas, where the PID reading was the lowest, contained higher levels of chloroform and Freon compounds. The PID does not respond well to chloroform or Freon compounds. The PID readings could be due to interference. Water vapor that contains mineral salts can produce false positive readings on the PIDs.

Table 2. PID readings (ppm) of soil gas at Southside High School.

Date	Location		
	Pool Filter Room	Boiler Room	Gym Storage Room
April 28, 2000	0	2.5	2.2
May 2, 2000	0.5	1.5	Not measured
May 23, 2000	0.8	2.3	1.8

2. Volatile Organic Chemicals

Results from analysis of soil gas samples collected in Summa canisters on May 23 are shown in Table 3. Chemicals that were not detected are not listed in the table. Several groups of chemical compounds were detected in soil gas samples at levels above typical background for indoor air.

- Four aliphatic hydrocarbon compounds (2,3-dimethylpentane, n-decane, n-undecane and n-dodecane) were present at slightly elevated concentrations about 2 to 5 times typical background for indoor air. These compounds can be associated with petroleum. No aromatic hydrocarbons or other petroleum-related compounds were reported at elevated concentrations;

Table 3. Volatile organic chemicals (VOCs) in soil gas at Southside High School, Elmira, Chemung County. All results are micrograms per cubic meter ($\mu g/m^3$).

Compound	Southside High School Soil Gas			Background EPA Database[1]		NYSDOH Database[2]	
	Pool Filter Rm	Boiler Room	Gym Store Rm	Indoor[3]	Outdoor[3]	Indoor[3]	Outdoor[3]
ethyl alcohol	6.9	8.7	2.5	NA	NA	NA	NA
isoprene	<1.0	<1.0	<1.0	NA	NA	NA	NA
acetone	9.4	16	3.8	10.7 - 27	0 - 6.6	NA	NA
n-hexane	1.0 [PL]	<1.0	1.0 [PL]	ND - 4.0	2.9 - 10	<1.0 - 3.5	<1.0 - 1.8
2-butanone	1.4	2.2	1.0 [PL]	12.2 - 42	ND	NA	NA
2,3-dimethylpentane	9.6	3.3	3.4	NA	0.6 - 4.5	NA	NA
cyclohexane	1.0 [PL]	<1.0	<1.0	1.5 - 8.0	0.6 - 2.5	NA	NA
n-heptane	1.9	1.2	<1.0	4.5 - 6.0	1.5 - 2.5	NA	NA
benzene	1.1	1.5	1.0 [PL]	3.3 - 21	2.0 - 11	1.6 - 5.0	0.9 - 4.9
4-methyl-2-pentanone	1.0 [PL]	1.0 [PL]	<1.0	NA	NA	NA	NA
toluene	1.5	1.0 [PL]	1.1	32	0.6 - 20	6.6 - 25	1.2 - 5.6
n-nonane	2.7	1.0 [PL]	1.4	0.4 - 6.3	0.7 - 3.2	NA	NA
m/p-xylene	1.1	1.0 [PL]	1.0 [PL]	6.4 - 25	2.3 - 14	2.2 - 9.5	0.8 - 5.0
o-xylene	1.0 [PL]	1.0 [PL]	1.0 [PL]	2.0 - 9.3	1.0 - 6.5	1.9 - 5.0	0.8 - 5.0
a-pinene	22	<1.0	<1.0	0.3 - 3.1	0.1 - 1.5	NA	NA
n-decane	10	5.9	10	0.5 - 4.1	0.3 - 4.0	NA	NA
1,2,4-trimethylbenzene	2.3	1.0 [PL]	1.4	0.6 - 4.0	2.8 - 7.4	2.2 - 7.0	0.5- 5.0
d-limonene	8.3	1.8	4.8	NA	NA	NA	NA
n-undecane	14	4.5	12	0.7 - 3.9	0 - 4.0	NA	NA
n-dodecane	15	9.9	5.9	0 - 2.3	0 - 2.9	NA	NA
dichlorodifluoromethane	140	450	23	NA	1.6 - 1.7	<1.0	<1.0
chloromethane	1.0 [PL]	1.5	1.0 [PL]	NA	1.3 - 1.5	0.5 - 1.0	0.5 - 1.3
bromomethane	1.0 [PL]	6.5	1.1	NA	0.2 - 12	<1.0	<1.0
trichlorofluoromethane	7.3	50	2.1	NA	1.0 - 1.2	0.5 - 3.3	<1.0
1,1,2-trichlorotrifluoroethane	>1000	16	27	NA	0.5 - 2.5	<1.0	<1.0
1,1-dichloroethene	2.6	<1.0	<1.0	ND	ND	<1.0	<1.0
methylene chloride	3.2	1.0 [PL]	<1.0	NA	1.1 - 6.3	1.5 - 5.6	0.5 - 3.7
cis-1,2-dichloroethene	1.1	<1.0	<1.0	NA	ND	0.5 - 5.0	0.5 - 5.0
chloroform	>1000	1.0 [PL]	5.4	ND - 3.4	0.1 - 0.9	0.5 - 4.4	0.5 - 2.4
1,1,1-trichchloroethane	12	2.7	55	3.0 - 30	0.2 - 3.4	2.5 - 6.7	1.0 - 2.8
trichloroethene	325	150	14	ND - 4.5	0.1 - 2.6	0.5 - 2.7	0.5 - 2.7
tetrachlorethene	14	70	3.2	1.7 - 11	0.8 - 5.9	0.8 - 5.0	0.8 - 3.4

[1] The United States Environmental Protection Agency Volatile Organic Compounds Database (EPA database) was published in March1988. This database is a compilation of indoor and outdoor data from studies across the United States.

[2] The New York State Department of Health Database (NYSDOH Database) is a summary of indoor and outdoor air sample results in control homes collected and analyzed by the NYSDOH from 1989 through 1996.

[3] The levels are the 25th percentile to 75th percentile, (middle half), of the data from the EPA and NYSDOH databases. These databases are comprised of air testing results from studies where there were no known sources of chemicals or chemical spills.

< Means "less than". The number following a "less than sign" (<) is the lowest level the laboratory test can reliably measure (detection limit). If there is a "<" before any number, then the chemical was NOT detected in your sample.

[PL] - Present, but less than the level indicated.

- Three Freon compounds [dichlorodifluromethane (Freon 12), trichloromethane (Freon 11) and trichlorotrifluromethane (Freon 113)] were detected at elevated concentrations in the three soil gas points. Freon 113 was reported at the highest concentration in soil gas from under the pool filter room. Freon compounds are typically used as refrigerants and as solvents; and

- Several chlorinated solvent compounds (chloroform; 1,1,1-trichloroethane; trichloroethene; and tetrachloroethene) were detected at elevated concentrations in the three soil gas points.

- Chloroform was reported at the highest concentration in soil gas from under the pool filter room.

3. Pressure Differentials

Pressure differential readings from the soil gas wells taken on both May 2 and May 23 were minimal (0 to 2 pascals) indicating that there were no substantial pressure gradients drawing soil gas into the building.

B. Indoor and Outdoor Air

1. PID Readings

No elevated PID readings were observed in areas of the school occupied by students. Some higher readings were observed near products in the boiler room. Readings of 5 ppm were observed directly above the fuel tank cap on a grass trimmer and up to 50 ppm near a container of floor stripper.

2. Volatile Organic Chemicals

Results from analysis of indoor and outdoor air samples collected in Summa Canisters on May 23 are shown in Table 4. Chemicals that were not detected are not listed in the table. Results are not reported for the outdoor air sample at EFA because the sampling canister was missing at the end of the sampling period, so there was no sample to analyze. Most compounds detected in both SHS and EFA were in the range of typical background. Several compounds were detected in indoor air samples at levels just slightly above typical background levels:

- 4-Methyl-2-pentanone, also known as methyl-iso-butyl-ketone or MIBK, was detected in three rooms in SHS and in the gym at EFA. Levels were slightly higher than the method detection limit and the levels in SHS were slightly higher than the level in the EFA gym. No typical background values available for this compound.

- N-decane and n-undecane, two aliphatic hydrocarbon compounds, were present at about twice background concentrations in the physics room. No aromatic or other petroleum-hydrocarbon compounds were reported at elevated concentrations in the indoor air samples.

- Dichlorodifluromethane (Freon 12) was detected in all samples from both schools including the SHS outdoor air sample. Most of the levels are similar to the outdoor background range reported in the EPA database. Levels were two to three times higher in the music room, library and in room 127 in SHS. Higher levels of this compound were found in the soil gas samples from under SHS.

- The two other Freon compounds and four chlorinated hydrocarbon compounds found in the soil gas samples were not present at levels above typical background in the indoor air.

Table 4. Volatile organic chemicals (VOCs) in indoor air at Southside High School, Elmira, Chemung County. All results are micrograms per cubic meter ($\mu g/m^3$).

Compound	Southside High School								Elmira Free Academy			Background			
	Indoor Air								Indoor Air			EPA Database[1]		NYSDOH Database[2]	
	Gym Store Room	Gym	Physics Room 138	Music Room 148	Library	Room 127	Cafeteria	Outdoor	Library	Room 122	Gym	Indoor[3]	Outdoor[3]	Indoor[3]	Outdoor[3]
ethyl alcohol	6.7	6.1	45	75	145	175	200	3.9	25	70	260	NA	NA	NA	NA
isoprene	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.3	2.7	1.0 [PL]	<1.0	1.0 [PL]	1.5	2	NA	NA	NA	NA
acetone	5.7	1.0 [PL]	8.4	12	15	15	1.0 [PL]	3.6	7.6	9.8	13	10.7 - 27	0 - 6.6	NA	NA
n-hexane	1.0 [PL]	<1.0	1.4	1.0 [PL]	1.0 [PL]	1.0 [PL]	<1.0	1.0 [PL]	1.0 [PL]	1.0 [PL]	35	ND - 4.0	2.9 - 10	<1.0 - 3.5	<1.0 - 1.8
2-butanone	<1.0	1.0 [PL]	1.3	1.0 [PL]	1.2	1.1	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.1	<1.0	12.2 - 42	ND	NA	NA
2,3-dimethylpentane	<1.0	<1.0	1.0 [PL]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0 [PL]	2.5	NA	0.6 - 4.5	NA	NA
cyclohexane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	1.5 - 8.0	0.6 - 2.5	NA	NA
n-heptane	1.0 [PL]	<1.0	1.9	1.0 [PL]	1.6	1.2	<1.0	1.0 [PL]	1.0 [PL]	2.4	6.4	4.5 - 6.0	1.5 - 2.5	NA	NA
benzene	<1.0	1.1	1.4	1.1	1.2	1.1	1.2	1.0 [PL]	1.0 [PL]	1.2	1.6	3.3 - 21	2.0 - 11	1.6 - 5.0	0.9 - 4.9
4-methyl-2-pentanone	3.8	<1.0	<1.0	1.0 [PL]	3.1	3.3	<1.0	<1.0	<1.0	<1.0	1.4	NA	NA	NA	NA
toluene	14	1.6	5.9	2.7	2.8	2.8	1.6	1.4	3.5	2.1	9.1	32	0.6 - 20	6.6 - 25	1.2 - 5.6
n-nonane	<1.0	<1.0	3.2	1.0 [PL]	<1.0	1.0 [PL]	<1.0	<1.0	<1.0	1.0 [PL]	1.0 [PL]	0.4 - 6.3	0.7 - 3.2	NA	NA
m/p-xylene	1.0 [PL]	1.0 [PL]	1.6	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.3	6.4 - 25	2.3 - 14	2.2 - 9.5	0.8 - 5.0
o-xylene	1.0 [PL]	1.0 [PL]	1.1	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	2.0 - 9.3	1.0 - 6.5	1.9 - 5.0	0.8 - 5.0
a-pinene	1.0 [PL]	<1.0	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	<1.0	<1.0	<1.0	<1.0	1.0 [PL]	0.3 - 3.1	0.1 - 1.5	NA	NA
n-decane	4.3	<1.0	7.8	1.9	4.7	2.5	1.7	<1.0	<1.0	3.4	2.9	0.5 - 4.1	0.3 - 4.0	NA	NA
1,2,4-trimethylbenzene	1.0 [PL]	1.0 [PL]	1.5	1.0 [PL]	1.1	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	0.6 - 4.0	2.8 - 7.4	2.2 - 7.0	0.5- 5.0
d-limonene	1.0 [PL]	<1.0	1.2	1.2	1.7	3.4	3.2	<1.0	1.0 [PL]	1.1	5.9	NA	NA	NA	NA
n-undecane	1.2	<1.0	5.9	1.0 [PL]	1.3	1.8	1.0 [PL]	1.6	1.0 [PL]	2.6	2.1	0.7 - 3.9	0 - 4.0	NA	NA
n-dodecane	<1.0	1.0 [PL]	1.2	<1.0	<1.0	<1.0	<1.0	2.4	<1.0	<1.0	<1.0	0 - 2.3	0 - 2.9	NA	NA
dichlorodifluoromethane	2.5	2.2	4.7	6.1	8.7	6.5	2.7	2.1	2.2	2.1	3.9	NA	1.6 - 1.7	<1.0	<1.0
chloromethane	1.0 [PL]	1.0 [PL]	1.1	1.1	1.1	1.1	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.2	NA	1.3 - 1.5	0.5 - 1.0	0.5 - 1.3
bromomethane	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	0.2 - 12	<1.0	<1.0
trichlorofluoromethane	1.0 [PL]	1.0 [PL]	4.1	2.1	1.9	1.8	1.4	1.1	1.5	1.8	8.8	NA	1.0 - 1.2	0.5 - 3.3	<1.0
1,1,2-trichlorotrifluoroethane	1.0 [PL]	1.0 [PL]	<1.0	1.1	1.0 [PL]	1.0 [PL]	<1.0	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	NA	0.5 - 2.5	<1.0	<1.0
1,1-dichloroethene	<1.0	<1.0	1.0 [PL]	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	ND	ND	<1.0	<1.0
methylene chloride	<1.0	<1.0	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	1.0 [PL]	<1.0	1.0 [PL]	NA	1.1 - 6.3	1.5 - 5.6	0.5 - 3.7
cis-1,2-dichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	1.0 [PL]	<1.0	<1.0	<1.0	<1.0	<1.0	NA	ND	0.5 - 5.0	0.5 - 5.0
chloroform	1.2	1.0 [PL]	2.6	1.6	1.0 [PL]	1.2	1.0 [PL]	<1.0	<1.0	<1.0	1.0 [PL]	ND - 3.4	0.1 - 0.9	0.5 - 4.4	0.5 - 2.4
1,1,1-trichchloroethane	1.0 [PL]	1.0 [PL]	2.1	1.0 [PL]	1.0 [PL]	1.0 [PL]	<1.0	<1.0	<1.0	<1.0	<1.0	3.0 - 30	0.2 - 3.4	2.5 - 6.7	1.0 - 2.8
trichloroethene	<1.0	<1.0	<1.0	<1.0	<1.0	1.0 [PL]	<1.0	<1.0	<1.0	<1.0	<1.0	ND - 4.5	0.1 - 2.6	0.5 - 2.7	0.5 - 2.7
tetrachlorethene	<1.5	1.5 [PL]	1.5 [PL]	1.5 [PL]	<1.5	1.5 [PL]	1.5 [PL]	<1.5	<1.5	<1.5	<1.5	1.7 - 11	0.8 - 5.9	0.8 - 5.0	0.8 - 3.4

[1] The United States Environmental Protection Agency Volatile Organic Compounds Database (EPA database) was published in March1988. This database is a compilation of indoor and outdoor data from studies across the United States.

[2] The New York State Department of Health Database (NYSDOH Database) is a summary of indoor and outdoor air sample results in control homes collected and analyzed by the NYSDOH from 1989 through 1996.

[3] The levels are the 25th percentile to 75th percentile, (middle half), of the data from the EPA and NYSDOH databases. These databases are comprised of air testing results from studies where there were no known sources of chemicals or chemical spills.

< Means "less than". The number following a "less than sign" (<) is the lowest level the laboratory test can reliably measure (detection limit). If there is a "<" before any number, then the chemical was NOT detected in your sample.

[PL] - Present, but less than the level indicated.

3. General IAQ Parameters

CO_2 readings in several occupied classrooms in SHS on the afternoon of May 22 ranged up to 1,200 ppm, slightly above the calculated ASHRAE guideline of 1,100 ppm (700 ppm above the outdoor concentration of 400 ppm). The classrooms were occupied with 14 to 20 students and are located in the southwest wing that is served by Air Handling Units (AHU) 12, AHU 13 and AHU 14. A CO_2 reading in the supply diffuser in Room 111 was 980 ppm indicating that there was minimal outdoor air in supply air at the time the measurements were taken. CO_2 readings ranged from about 400 to 650 ppm in unoccupiedclassrooms in the east wing where Rooms 137 to 147 are located. Additional readings taken on the morning of May 23 were lower. CO_2 readings in southwest wing classrooms were all less than 1,000 ppm. CO_2 readings in the gym while fully occupied ranged from 540 ppm to 600 ppm indicating adequate ventilation there.

Carbon monoxide levels were in the range of 0 to 2 ppm in SHS. Carbon monoxide levels were initially not detected and increased slightly throughout the morning. The levels were slightly higher near the kitchen. The use of gas cooking equipment there is the likely source of the carbon monoxide.

The temperature and relative humidity in the SHS classrooms ranged from 70°F to 72°F and 67% to 68% respectively. The relative humidity was slightly above that recommended by ASHRAE. Outdoor conditions at the time were humid and the heating, ventilating and air conditioning (HVAC) systems were not yet switched to air conditioning mode. In addition, there was positive air pressure from the poolroom, which can increase humidity levels. However, many of the readings were observed in the far end of the building away from the pool.

CO_2 readings in occupied classrooms in EFA were measured during the afternoon of May 23. Levels were generally below 1,100 ppm with the exception of a few locations. CO_2 readings were up to 1,250 ppm on the inside wall in Room 111 with 25 students in the room. The CO_2 readings were lower on the window side of Room 111 where the univent was located. Room 111 is a large classroom and it appears that there is less air circulation near the hallway side of the classroom. CO_2 readings up to 1,300 ppm were measured in the corridor during class change. This may be due to the short-term high occupant density during class change and the fact that ventilation is provided by individual classroom univents.

4. Pressure Mapping

Pressure differential readings between the inside and outside of the building showed that the building is slightly pressurized in most areas. Positive pressure differential minimizes the potential for drawing air from unplanned areas including soil gas. Most pressure differences between rooms and hallways and between areas served by different ventilation systems were minimal (less than 4 pascals). There were stronger pressure differences in the poolroom and the main gym into the hallway. The exterior walls of the poolroom and the main gym were on the windward side of the building and the increase in pressure differences may have been affected by the wind.

5.0 Conclusions

A. Chemicals in Indoor Air

To determine exposure to a chemical one must consider not just the presence of the chemical, but how a person might be exposed. Exposure requires direct contact with contaminated material by swallowing it (ingestion), breathing vapors (inhalation), or by absorbing it through the skin (dermal contact) following direct contact. In this situation, the most likely potential route of exposure to the petroleum present under SHS would be through inhaling petroleum vapors.

In order for indoor air in SHS to be affected by the petroleum contamination, several things would need to occur: (1) the petroleum must migrate near or under the school, (2) vapors from the petroleum must travel through the soil and then (3) be drawn into the school through openings in the foundation so people could breath the vapors. The NYSDEC determined that No. 4 fuel oil contamination extended under SHS about 15 feet below ground. The results of the soil gas testing did not show petroleum vapor contamination under the concrete floor of SHS. Most petroleum-related compounds in the soil gas samples were in the range of typical background for indoor air; several petroleum hydrocarbons were slightly elevated in the soil gas samples. Pressure differential readings between the soil gas wells and the indoor air were minimal indicating that there were no substantial pressure gradients drawing soil gas into the building. Most petroleum compounds were either not detected or were present at expected levels in the indoor air. Based on these findings, indoor air in SHS is not being affected by petroleum contamination that may be under the school. Several compounds were present in the school at concentrations slightly higher than typical background, but their presence is not unusual and exposure at the reported levels is not expected to be a health concern.

Several Freon and chlorinated solvent compounds were detected at elevated levels in the soil gas samples collected from under the SHS concrete floor. Freons are typically used as refrigerants and as cleaning solvents. Their presence may be related to their use at the school. Chloroform, which was found at the highest level under the pool filter room, may be a chlorination by-product and may be related to the swimming pool. 1,1,1-Trichloroethane; trichloroethene; and tetrachloroethene are typically used as cleaning solvents. Further investigation would be needed to identify the sources of these compounds in the soil gas.

B. General IAQ Parameters

Temperatures were generally within the thermal-comfort range considered acceptable by ASHRAE. Relative humidity was on the high end of the recommended range. The higher relative humidity may have resulted from humid outdoor conditions at the time and because the HVAC systems were not operating in air conditioning mode. In addition, the influx of air from the poolroom may increase relative humidity in adjoining areas.

Higher CO_2 readings in some classroom areas indicate there may not be adequate outdoor air exchange in some ventilation zones. The HVAC systems operate on a Variable-Air-Volume (VAV) system design. VAV systems typically provide conditioned air as necessary to individual areas to modulate temperature in accordance with a thermostat set point. The VAV systems may not be adjusted to provide minimum outdoor air to individual areas (consistent with the current ASHRAE recommended guideline of 15 cubic feet per minute per person) if there is inadequate demand for temperature modulation.

Slight increases in the levels of carbon monoxide in the school are most likely from the kitchen cooking equipment. The levels are below the National Ambient Air Quality Standard of 9 ppm and are not considered a health concern.

C. Pressure Differentials and Pressure Mapping

The school was slightly pressurized. Slight pressurization of a building minimizes unintended airflow from soil gas or other potential contaminant sources. Pressure differential readings between soil gas and indoor were minimal indicating that there were no substantial pressure gradients drawing soil gas into the building. The poolroom was pressurized and was permitting air movement into the hallway. This has the potential to increase relative humidity and chlorination by-products in air in adjoining areas. No data were collected to measure the magnitude of this potential effect.

6.0 Recommendations

1. HVAC systems should be more thoroughly evaluated to determine whether they provide outdoor air consistent with the current ASHRAE guideline of 15 cubic feet per minute per person. If necessary, adjustments could be made to increase the amount of outdoor air.

2. The school could consider instituting an indoor air quality action plan consistent with that recommended by the EPA. The Tools for Schools Action Kit provides information and guidance necessary for implementing a plan to prevent indoor air quality problems and resolve such problems if they do arise. Any school board member or school administrator can order a kit free of charge by calling 1-800-438-4318.

3. Further investigation of past and present chemical use may help to identify the sources of elevated levels of Freons and chlorinated solvents in soil gas.

Bureau of Toxic Substance Assessment
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New York State Department of Health

Air Investigation Update
Southside High School
Elmira, Chemung County
August 22, 2000

Introduction

This report provides the results of additional air sampling for PCBs conducted on July 20, 2000 in the Southside High School. Findings for the indoor air investigation conducted on May 22 and 23, 2000 are provided in the New York State Department of Health's (NYS DOH) July 28, 2000 report.

In July, the presence of PCB Aroclors 1248 and 1260 were reported in preliminary sample results from soil samples collected at the Southside High School. Concentrations of PCBs above typical background were reported in two sub-surface samples located near the north end of the school. The New York State Department of Environmental Conservation (NYSDEC) will provide the soil sample results in a separate report.

Investigation

NYS DOH staff collected a total of five air samples (three indoor and two outdoors) for PCB analysis. Below is a list of the locations and selection rationale:

C Classroom 138 and boy's locker room. These rooms are located in the north end of the building close to the area where the PCBs were detected in subsurface soils.

C Library. This large non-classroom area is in the opposite wing of the building and is served by a different ventilation system and was chosen to provide a comparison location to the other two indoor locations.

C Outdoor north end of school. This location is near where the PCBs were detected in subsurface soils.

C Outdoor courtyard. This outdoor location was in an area away from where PCBs were found in the soil.

Methods

Samples were collected using NYS DOH method 311-1, PCBs in Air. Air was drawn through florisil tubes for a four-hour period. Flow rates were measured at the beginning, middle and end of the sample period and the average flow rate was used to calculate volume. Samples were delivered to the NYS DOH Wadsworth Center for analysis. Samples were extracted with hexane and analyzed on a gas chromatograph with an electron capture detector. The samples were re-analyzed a second time after concentrating the sample to obtain a lower detection limit of 0.02 micrograms per cubic meter. The method reports results for PCB Aroclors 1221, 1016/1242, 1248, 1254, and 1260.

Evaluation Criteria

Sample results are compared to background levels of PCBs in air. The Agency for Toxic Substance Disease Registry (ATSDR) indicates the mean atmospheric (outdoor) concentration for PCBs in urban settings is 0.005 micrograms PCBs per cubic meter of air and the range as 0.001 to 0.01 micrograms per cubic meter. ATSDR also indicates that indoor air levels tend to be about 10 times higher than outdoor air levels. Therefore, typical indoor background ranges would be expected to be between 0.01 and 0.1 micrograms per cubic meter.

Results and Discussion

No PCB Aroclors were detected in the five air samples at the detection limit of 0.02 micrograms per cubic meter.

Conclusions

PCB contamination was not found in indoor or outdoor air at the Southside High School.

REFERENCES

Agnecy for Toxic Substances Disease Registry (ATSDR). 1997. Toxicological Profile for Polychlorinated Biphenyls (Update). U.S. Department of Health and Human Services. Atlanta, Georgia: U.S. Public Health Service.

NYS Department of Health. July 28, 2000. Indoor Air Investigation, Southside High School, Elmira, Chumung County.

New York State Department of Health

Air Investigation Update
Southside High School
Elmira, Chemung County
October 18, 2000

Introduction

This report provides the results of additional air sampling for volatile organic compounds (VOCs) and PCBs conducted on August 31, 2000 in the Southside High School. Findings for the indoor air investigations conducted on May 22 and 23, and July 20, 2000 are provided in the New York State Department of Health's (NYS DOH) July 28, 2000 report and subsequent August 22, 2000 update. Methods and evaluation criteria used during this additional testing were consistent with those described in the previous reports.

During the August 23 public meeting, questions about air testing in sub-grade classrooms were raised. The initial testing was performed in areas located on the first floor of the school. Unbeknownst to NYS DOH investigators, classrooms 151 and 149 and a storage area are located sub-grade under the auditorium. Floor plans and ventilation zone diagrams show classrooms 149 and 151 located on the first floor and serviced by air handling unit (AHU) No. 8. Air samples from classroom 148, another location within AHU No. 8, were collected May 23, 2000 and showed typical background range results for the chemicals tested. Nevertheless, to address the concerns about the untested basement areas, additional testing of soil gas, indoor air and outdoor air was performed. The testing methods and parameters were consistent with those performed during previous testing events.

Investigation

NYS DOH staff collected four air samples for volatile organic compounds (VOCs) (one soil gas, two indoor and one outdoor) and two air samples for PCBs, (one indoor and one outdoor). Below is a list of the locations and selection rationale:

- Basement storeroom soil gas. This room is located between and central to basement level classrooms 149 and 151. Soil gas from this location should be representative of the basement areas. The sample was analyzed for VOCs.

- Classroom 151. The basement level classroom. The samples were analyzed for VOCs and PCBs.

- Library. This large non-classroom area served by a different ventilation system (AHU No.13) was chosen to provide a comparison location to the other indoor location. This location was tested on previous occasions. The sample was analyzed for VOCs.

- Outdoor courtyard. This location represents outdoor conditions. This location was tested on previous occasions. The sample was analyzed for VOCs and PCBs.

Methods

Soil Gas

In August, Tony LaSorte, Health and Safety Coordinator for the school installed a soil gas point through the concrete floor of the basement level storeroom. The point was installed by drilling a ¾ inch hole with a rotary hammer drill through the concrete. A ¼ inch ID teflon tube was inserted through the hole into the material below the concrete floor slab. Approximately 8 inches of tubing were left sticking out of the hole. Bentonite clay was used to seal the space between the hole and the tube to prevent gasses from passing around the tube.

A photoionization detector (PID) was used to "screen" areas for organic vapors at the time samplers were set out. In addition, the soil gas well was monitored with a differential pressure meter to monitor the pressure gradient between the soil gas region under the concrete floor and the basement interior.

Soil gas samples were collected using 6-liter Summa canisters that were fitted with flow restrictors to collect air over a two-hour period. The summa canisters were analyzed using gas chromatography with a mass spectral detector (GC/MS) for a total of 69 VOCs.

Air Sampling

The indoor air sample locations were selected to represent the basement classroom area and an area that had been sampled previously. The candidate locations were not inspected prior to testing.

A photoionization detector (PID) was used to "screen" areas for organic vapors at the time samplers were set out.

Air samples were collected using 6-liter Summa canisters that were fitted with flow restrictors to collect air over a two-hour period. The summa canisters were analyzed using GC/MS for a total of 69 VOCs. Air samples for PCBs were collected using NYS DOH method 311-1, PCBs in Air. The method reports results for PCB Aroclors 1221, 1016/1242, 1248, 1254, and 1260.

Evaluation Criteria

The evaluation criteria are the same as that used to evaluate results in previous reports. Results from the analysis of VOCs in the indoor and outdoor air and soil gas samples are compared to typical indoor and outdoor air background ranges. Background ranges are obtained from two databases. The United States Environmental Protection Agency's Volatile Organic Compounds Database Update (EPA database, March 1988) is a compilation of indoor and outdoor data from studies of homes and offices across the United States. The New York State Department of Health Database (NYSDOH Database) is a summary of indoor and outdoor air sample results for control homes collected and analyzed by the NYSDOH from 1989 through 1996. PCB air sample results are compared to background levels of PCBs in air. The Agency for Toxic Substance Disease Registry (ATSDR) indicates the mean atmospheric (outdoor) concentration for PCBs in urban settings is 0.005 micrograms PCBs per cubic meter of air and the range as 0.001 to 0.01 micrograms per cubic meter. ATSDR also indicates that indoor air levels tend to be about 10 times higher than outdoor air levels. Therefore, typical indoor background ranges would be expected to be between 0.01 and 0.1 micrograms per cubic meter.

Results and Discussion

Soil Gas

The PID reading of soil gas from the tube under the basement storeroom was 0.0 ppm. The pressure gradient measured in the soil gas tube was zero with a fluctuation of less than 0.2 pascals, indicating that there were no substantial pressure gradients drawing soil gas into the building. Results from analysis of soil gas samples collected in Summa Canisters on August 31 are shown in the attached table. Several groups of chemical compounds were detected in soil gas samples at levels above background.

- Three Freon compounds including dichlorodifluromethane (Freon 12), trichlorofluoromethane (Freon 11) and trichlorotrifluromethane (F113) were detected at elevated concentrations.

- Several chlorinated solvent compounds were detected at elevated concentrations. 1,1,1-Trichloroethane and tetrachloroethene were slightly higher than the background ranges for outdoor air while trichloroethene was clearly higher than background.

These results were similar to what was found in the soil gas testing conducted in May, 2000.

Indoor Air

PID readings were not detected initially in the school ambient air in the basement storeroom and classroom 151. An increase in the PID reading to about 0.5 parts per million (ppm) was observed near the air fresheners in classroom 151, after which the meter showed a level 0.2 to 0.6 ppm. The meter was brought outdoors and the reading dropped to 0.0 ppm. Meter readings increased from 0.4 to 1.0 ppm upon entering the school and in the ambient air in the library. Inventory of the library showed a couple products that contain VOCs including correction fluid and sharpie permanent markers. No increase in PID readings was detected near these products and no direct causes for the readings were identified at that time.

Results from analysis of indoor and outdoor air samples collected in Summa Canisters on August 31 are shown in the attached table. Several groups of chemical compounds were detected in the indoor air samples at levels above background.

- Several petroleum-hydrocarbon compounds were reported at higher concentrations in the indoor air sample from the library. The levels ranged up to ten times the background range. The compounds are substituted aromatics. The occurrence of a group of chemicals that have similar chemical characteristics such as this likely indicates a product that contains an aromatic solvent such as paint or an adhesive.

- Acetone was found in both indoor air samples at a level slightly higher than the indoor background range. Acetone can be found in nail polish removers, some paint removers, some liquid or paste waxes and polishes and certain detergents and cleansers.

- Dichlorodifluromethane, also known as Freon 12, was detected in both indoor air samples and the outdoor air sample. The indoor air levels are slightly higher than the background ranges. Trichlorofluoromethane also known as Freon 11 was also found in classroom 151 at a level higher than the background range. Freons are typically used in air conditioning and refrigeration equipment.

No PCB Aroclors were detected in the indoor or outdoor air samples collected at the detection limit of 0.02 micrograms per cubic meter.

Conclusions

The results of the sampling and pressure gradient testing of the soil gas well in the basement level storeroom were consistent with the previous findings. Freon compounds and some chlorinated solvent compounds were present in soil gas, but there is no measurable pressure gradient from the soil gas into the school. This is further supported by the fact that the chlorinated solvent compounds such as trichloroethene were not detected in the indoor air.

The presence of the aromatic compounds in the library is likely from some activity in the school. On the date the samples were collected, custodial staff indicated that they had been in the process of painting some lockers. A copy of the material safety data sheet for the paint being used shows a substantial percentage of trimethylbenzenes and aromatic naphtha as hazardous ingredients. The paint is a likely source for the higher levels of aromatic compounds detected in the indoor air samples. Exposure to the aromatic hydrocarbons at the reported levels is not expected to be an acute health concern. As with any organic chemical, prudent measures should be taken to reduce exposures to the extent practicable.

Concentrations of solvent chemicals resulting from offgassing of products such as paints and polishes is expected to be highest immediately during and after application and decrease rapidly with time if ventilation is adequate. It is expected that the concentrations of chemicals associated with painting lockers would diminish with time.

PCB contamination was not found in indoor or outdoor air at the Southside High School.

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Indoor Air Investigation Southside High School, Elmira, Chemung County on August 31, 2000. All results are micrograms per cubic meter ($\mu g/m^3$)

Compound	Southside High School							
	Indoor Air		Outdoor Air	Basement Soil Gas	EPA Database[1]		NYSDOH Database[2]	
	Basement Science Rm	Library			Indoor[3]	Outdoor[3]	Indoor[3]	Outdoor[3]
ethyl alcohol	30	25	1.9	<1.0	NA	NA	NA	NA
isoprene	1.4	1.2	1.1	<1.0	NA	NA	NA	NA
acetone	32	40	6.6	3.7	10.7 - 27	0 - 6.6	NA	NA
n-heptane	<1.0	1.1	1.9	<1.0	4.5 - 6.0	1.5 - 2.5	NA	NA
toluene	6.4	3.2	1.0 [PL]	1.0 [PL]	32	0.6 - 20	6.6 - 25	1.2 - 5.6
n-nonane	1.0 [PL]	1.0 [PL]	<1.0	<1.0	0.4 - 6.3	0.7 - 3.2	NA	NA
m/p-xylene	1.8	1.5	1.0 [PL]	1.0 [PL]	6.4 - 25[B]	2.3 - 14[B]	2.2 - 9.5	0.8 - 5.0
o-xylene	1.2	2.2	1.0 [PL]	1.0 [PL]	2.0 - 9.3	1.0 - 6.5	1.9 - 5.0	0.8 - 5.0
a-pinene	1.0 [PL]	4.9	<1.0	<1.0	0.3 - 3.1	0.1 - 1.5	NA	NA
isopropylbenzene	<1.0	1.3	<1.0	<1.0	ND - 0.8	ND	<10	<10
n-decane	1.9	2.7	<1.0	<1.0	0.5 - 4.1	0.3 - 4.0	NA	NA
n-propylbenzene	1.0 [PL]	6.1	1.0 [PL]	<1.0	ND	0.4 - 1.3	<10	<10
1,3,5-trimethylbenzene	1.7	19	<1.0	<1.0	ND - 5.4	0.2 - 2.5	<5.0	<5.0
tert-butylbenzene	1.2	8.3	<1.0	<1.0	ND	ND	<10	<10
1,2,4-trimethylbenzene	9.4	75	1.0 [PL]	<1.0	0.6 - 4.0	2.8 - 7.4	2.2 - 7.0	0.5- 5.0
d-limonene	1.2	1.9	<1.0	<1.0	NA	NA	NA	NA
1,2,3-trimethylbenzene	1.1	14	<1.0	<1.0	NA	NA	NA	NA
n-undecane	1.0 [PL]	4.9	<1.0	<1.0	0.7 - 3.9	0 - 4.0	NA	NA
dichlorodifluoromethane	12	8.7	2.6	280	NA	1.6 - 1.7	<1.0	<1.0
chloromethane	1.6	<1.0	<1.0	<1.0	NA	1.3 - 1.5	0.5 - 1.0	0.5 - 1.3
trichlorofluoromethane	12	2.9	2.1	8.9	NA	1.0 - 1.2	0.5 - 3.3	<1.0
1,1,2-trichlorotrifluoroethane	1.6	1.4	<1.0	65	NA	0.5 - 2.5	<1.0	<1.0
1,1,1-trichchloroethane	1.8	1.0 [PL]	<1.0	14	3.0 - 30	0.2 - 3.4	2.5 - 6.7	1.0 - 2.8
trichloroethene	<1.0	<1.0	<1.0	170	ND - 4.5	0.1 - 2.6	0.5 - 2.7	0.5 - 2.7
tetrachlorethene	1.5 [PL]	<1.5	<1.5	25	1.7 - 11	0.8 - 5.9	0.8 - 5.0	0.8 - 3.4

1 The United States Environmental Protection Agency s Volatile Organic Compounds Database (EPA database) was published in March1988. This database is a compilation of indoor and outdoor data from studies across the United States.

2 The New York State Department of Health Database (NYSDOH Database) is a summary of indoor and outdoor air sample results in control homes collected and analyzed by the NYSDOH from 1989 through 1996.

3 The levels are the 25th percentile to 75th percentile, (middle half), of the data from the EPA and NYSDOH databases. These databases are comprised of air testing results from studies where there were no known sources of chemicals or chemical spills.

< Means "less than". The number following a "less than sign" (<) is the lowest level the laboratory test can reliably measure (detection limit). If there is a "<" before any number, then the chemical was NOT detected in your sample.

[PL] - Present, but less than the level indicated.

Appendix C
Investigation of Cancer Among Students at Southside High School, Elmira, NY

FACT SHEET
August 23, 2000

INVESTIGATION OF CANCER AMONG STUDENTS AT THE SOUTHSIDE HIGH SCHOOL, ELMIRA, NEW YORK

The New York State Department of Health has conducted an investigation of cancer among students attending the Southside High School in Elmira, New York. This investigation was spurred by reports of an unusual number of cases of cancer among students currently attending the school and attending the school since 1997. The community was also concerned over fuel oil contamination in the ground beneath the school, and over the adjacent former American LaFrance site, an industrial property that was the recent site of a voluntary environmental clean-up.

Cancer among current and former students

Case confirmation: Community concerns centered about reports that at least six students attending Southside High School in the spring of 2000 were diagnosed with cancer in the current school year, and at least 13 were diagnosed since 1997. To confirm these reports, information about current and former students believed to have cancer was collected from community members and compared with the various data sources available to the Department of Health. These include the New York State Cancer Registry, which collects information on all cases of cancer diagnosed in New York State, as mandated by law, and contacts with hospitals and physicians.

A total of 46 students who had ever attended Southside High School were reported to us as having cancer. We were able to confirm 25 of them as having cancer. Of the 21 students not confirmed, 10 were determined to have conditions other than a reportable cancer (the most common types of skin cancer are not required to be reported), eight had moved out of state prior to their diagnosis and could not be confirmed, and insufficient information was available to confirm a cancer diagnosis for the remaining three.

46 students reported as having cancer

35 found

25 had cancer
- 3 diagnosed before entering Southside High School
- 22 diagnosed while attending or after leaving Southside High School

10 had health conditions other than a reportable cancer

11 unable to confirm

8 moved out of state prior to reported date of diagnosis
3 not enough information to confirm diagnosis

Of the 25 current and former students confirmed as having cancer, three had been diagnosed prior to entering Southside High School. Of the remaining 22, the most common types of cancer found were leukemias and lymphomas (including Hodgkin's disease and non-Hodgkin's lymphomas). Other types of cancer found included testicular, cervical and brain cancers. (To protect patient confidentiality, if fewer than six persons were diagnosed with a particular type of cancer, we cannot provide the exact number.) Leukemia, lymphomas and brain cancer are the most common types of cancer found among children age 15-19.

Of seven students reported to have cancer while attending Southside High School in 1997 or later, fewer than six were confirmed as actually having cancer; the total number confirmed includes individuals who were diagnosed prior to entering high school. Those not confirmed as having cancer were confirmed to have other health conditions.

Among students who had ever attended Southside High School

48 cases expected 1980-2000

39 cases expected 1990-2000

22 reported and confirmed 1980-2000

<u>Comparison with expected:</u> The number of cancer cases that were confirmed was also compared with the number that would have been expected in all persons who had ever attended Southside High School. Enrollment figures from the time the school opened in the fall of 1979 were used to determine how many persons had ever attended Southside High School and how old they would be at different points in time. From this, it was calculated that 48 cases of cancer would have been expected to be diagnosed between 1980 and the first half of 2000 in all of the persons who had ever attended Southside High School. Thirty-nine of these cases would have been expected to have been diagnosed between 1990 and 2000. The total number of persons confirmed as having cancer was less than the total number of persons expected to be diagnosed with cancer in the time since the high school opened. This is also true for the most recent 10 years, when the majority of the confirmed cases were diagnosed. Looking at the most common types of cancer separately, the numbers of confirmed cases were not statistically greater than what would be expected in either time period for any particular type of cancer.

Geographic study

To account for persons with cancer who may not have been reported by community members, we also examined cancer incidence in the geographic area served by the high school based on information contained in the Cancer Registry. Children ages 0-19 who were diagnosed with cancer since 1980 and who lived in ZIP Code areas 14904 (Elmira), 14871 (Pine City) and 14894 (Wellsburg) at the time of diagnosis were identified from Cancer Registry files. These numbers were then compared with the numbers that would be expected given the population size, age and sex distribution of the ZIP Code areas, if cancer rates were the same as in all of New York State, exclusive of New York City.

Cancer cases diagnosed 1980-1998 among children living in ZIP Code areas 14904, 14871, 14894

Children ages 0-19
22 cases observed, 23 cases expected

Children ages 15-19
6 cases observed, 7 cases expected

A total of 22 children living in the area served by the high school were diagnosed with cancer from 1980 to 1998, compared with 23 expected. The most commonly observed types of cancer were leukemia, with nine cases observed (6 expected), cancers of the brain and other parts of the nervous system, and lymphomas. No particular type of cancer was statistically higher (or lower) than expected.

In the age group 15-19, which corresponds to persons attending high school or having just left school, six young people were diagnosed with cancer, compared with seven expected. There were no statistically significant differences between observed and expected numbers of cancer cases for any particular type of cancer in either males or females.

Cancer since 1997

Community members had expressed particular concern over an apparently high number of cases of cancer among students attending the high school since 1997. If information from the geographic study is combined with information from the case confirmation study for persons age 15-19 living in the geographic area served by Southside High School at the time of diagnosis, the total number of cases of cancer diagnosed is less than six, but greater than the approximately one case expected. The difference between the total number of cancer cases actually diagnosed and the number expected was not statistically significant, meaning that it could have occurred by chance. Looking at specific types of cancer, the majority of the cancer cases diagnosed in this time frame were cases of testicular cancer. The number of young men diagnosed with testicular cancer was statistically significantly greater than the number expected.

Summary

Looking at the overall time period since the opening of Southside High School, we did not find an unusual pattern of cancer among current and former students, or among children living in the area served by the school. The numbers and types of cancers diagnosed were similar to what would be expected for this age group. Perceptions of a large number of persons with cancer at the school since 1997 can be explained by a small number of persons diagnosed with cancer at the time they were attending Southside High School, combined with the presence of other students who had been diagnosed with cancer prior to entering high school, and still others who had been diagnosed with health conditions other than cancer. Although the actual number of cases is small, the study did confirm an unusual number of young men diagnosed with testicular cancer since 1997.

Next steps

The New York State Department of Health will continue to monitor cancer incidence in the area served by Southside High School. We will continue to receive and investigate reports of cancers among current and past students. We will also examine the finding of an unusual number of young men diagnosed with testicular cancer in greater depth. We will look more closely into the medical histories of these young men to determine whether they might have any known risk factors for the disease, as well as examine other possible factors.

For more information on the cancer investigation or a copy of the complete report on this investigation, please contact Aura Weinstein or Janice Rocklin of the Cancer Surveillance Program *of the New York State Department of Health at (518) 474-2354 or (800) 458-1158 (ext. 42354).*

DOH

REPORT
September 2000

INVESTIGATION OF CANCER AMONG STUDENTS AT SOUTHSIDE HIGH SCHOOL ELMIRA, NEW YORK

This report presents the results of an investigation of cancer among students attending the Southside High School in Elmira, New York. The investigation was conducted in response to community concerns over what they believed to be an unusual number of current and former students diagnosed with cancer. The investigation was conducted in two parts: confirming community reports of an unusual number of current and former students with cancer, and examining cancer incidence among young people in the geographic area served by Southside High School.

Background

In April 2000, the Elmira School Board in the City of Elmira, Chemung County, New York, received a letter from parents expressing concern about the number of current and former students of Southside High School in Elmira who had been diagnosed with cancer. (Southside is one of two high schools serving the Elmira City School District.) The letter indicated that at least six students were diagnosed with cancer while attending Southside High School during the 1999-2000 school year. It also indicated that at least 13 students had been diagnosed with cancer since 1997. At the same time, the community was concerned about fuel oil contamination in the ground beneath the school, and the nearby American LaFrance industrial site, where a voluntary environmental clean-up recently took place.

The School Board requested that representatives of the New York State Department of Health (NYSDOH) and the New York State Department of Environmental Conservation (NYSDEC) meet with the community on May 2, 2000 to hear their concerns about cancer among students and provide information about environmental conditions in the area. At this meeting, concerns were also raised about cancer incidence among individuals who ever attended Southside High School. The New York State Department of Health agreed to review and evaluate available information on cancer among current and former students at Southside High School. This included information provided by the community, as well as information available to the NYSDOH. The investigation was designed to:

- attempt to confirm the reported high incidence of cancer among students at Southside High School,
- examine the number and types of cancer among students at the high school to identify unusual patterns or characteristics that might indicate a possible common source, and

- identify all cases of cancer among children living in the geographic area served by the high school to determine if their cancer incidence was different from what would be expected.

Cancer among current and former students

Case confirmation: As indicated above, this investigation was conducted in response to community concerns over the number of current and former Southside High School students diagnosed with cancer. The first step in the investigation was to confirm the diagnosis of cancer in the students. This required identifying information on each person reported as having cancer so that they could be matched to a variety of data sources available to the Department of Health. This information (including full name, date of birth, date and type of cancer diagnosed, and name of the hospital and/or physician where they were diagnosed) was obtained from the individuals themselves, family members, or other members of the community. The information was reported to either the Chemung County Health Department (CCHD) or to the Cancer Surveillance Program of the NYSDOH.

A total of 46 people believed to have cancer who attended Southside High School were reported to the CCHD and NYSDOH. Complete information (including the name of the hospital and/or physician by whom they were treated) was available for 43 of these individuals. Of the 46 individuals reported, seven reportedly had cancer while attending Southside High School during 1997 or later. (This number differs from the 13 reported cases originally indicated in the letter from community members to the Elmira School Board.)

All 46 reported individuals were checked against the New York State Cancer Registry (NYSCR). If an individual's diagnosis could not be confirmed through the NYSCR, the two local hospitals (Arnot-Ogden Hospital and St. Joseph's Hospital) in Elmira, NY were contacted. This was to ensure that individuals who may have been diagnosed too recently to be reported to the NYSCR were included in the investigation. This step also allowed us to determine whether or not an individual had a reportable cancer. (The two most common types of skin cancer, basal and squamous cell carcinomas, are not reported to the NYSCR because of how frequently they occur and how easy they are to treat. Malignant melanoma, another type of skin cancer, is reported to the NYSCR because it occurs less frequently and is a much more serious form of cancer.) If an individual's cancer diagnosis could not be confirmed through

Technical Notes
New York State Cancer Registry

The Cancer Registry contains information on all individuals diagnosed with cancer in New York State, as required by law. Under the law, hospitals must report individuals diagnosed with cancer to the NYSCR within 180 days (6 months) of their diagnosis. While the major source of information is hospitals, information is also received from laboratories, physicians, and the NYS vital records system (death certificates). In addition, the NYSCR has reciprocal reporting agreements with many other states, including all bordering states. These agreements allow for the exchange of information about NYS residents diagnosed with cancer in hospitals outside of New York. The Cancer Registry was recently certified by the North American Association of Central Cancer Registries as over 95% complete for 1997. This means that over 95% of the New York State residents diagnosed with cancer in 1997 were reported to the Registry within the required time frame. Currently, information for residents diagnosed in 1998 is being finalized, but is available for use by Cancer Surveillance Program staff. Information on individuals diagnosed with cancer in 1999 and 2000 is also available for review, but is not complete because of the 180 day (6 month) time period hospitals and other health care providers have to file their reports.

the Cancer Registry or the local hospitals, the individual's physician (if known) was contacted to obtain information on the patient's condition.

A total of 25 of the 46 individuals reported to have cancer were confirmed through this process. Of the 21 people not confirmed, we determined that 10 had conditions other than a reportable cancer. These conditions included non-reportable skin cancers, cervical dysplasia (an abnormal growth of cells on the lower, narrow end of the uterus that may be pre-cancerous) and other non-cancerous conditions. Eight of the people reported moved out of New York State before their cancer diagnosis. (While the NYSCR has reporting agreements with many other states, they apply only to New York State residents who go out of state for diagnosis and/or treatment. Individuals who have permanently moved out of New York State at or before the time of their diagnosis are not covered by these agreements.) Therefore, we were unable to confirm the diagnosis of these eight people. Finally, for three people, we did not have enough information to identify a hospital or physician to confirm their diagnosis.

Of the 25 individuals confirmed as having a reportable cancer, three were first diagnosed with cancer prior to entering Southside High School. Among the remaining 22 people, the most frequently diagnosed types of cancer were leukemias and lymphomas, including both Hodgkin's disease and non-Hodgkin's lymphomas. Other diagnoses included testicular, cervical and brain cancers, as well as other less frequently occurring types. (To protect patient privacy, if fewer than six people were diagnosed with any particular type of cancer, we cannot provide the exact number.) The confirmed cases were diagnosed between the mid-1980's and 2000, with most diagnosed since the mid-1990's. The ages of the people diagnosed with cancer since first entering Southside High School ranged from the mid-teens to the mid-30's, with individuals diagnosed up to 15 years after they had left high school.

Of the seven students reported to have cancer while attending Southside High School since 1997, fewer than six were confirmed to have cancer, including students who were diagnosed before entering the high school. All of those not confirmed as having cancer were confirmed to have conditions other than cancer.

Comparison with expected: To determine whether cancer incidence among current and former students at Southside High School was unusual, we calculated the total number and types of cancers that would be expected to occur in this group. The calculations took into account the number of students who ever attended the high school, their ages at different points in time, and changes in the cancer rates among people of different ages.

The calculations showed that 48 students would be expected to be diagnosed with cancer between the time Southside High School opened and June 2000. The most common types of cancer expected were lymphomas (10 expected), female breast cancer (5 expected), and testicular cancer (5 expected).

The calculations also showed that 39 of these students would be expected to be diagnosed with cancer between 1990 and 2000. This is because cancer becomes more common as people age and the number of people who ever attended Southside High School continues to increase.

The 22 people confirmed as having cancer was less than the total number of people expected to be diagnosed with cancer in the time since the high school opened. This was also true for the most recent 10 years, when the majority of the confirmed cases were diagnosed. We also examined the most common types of cancer individually. The number of confirmed cases was not statistically significantly greater than what would be expected for any particular type of cancer. This was true for the entire time period and also for the 1990-2000 time period. The largest number of cases occurred in the oldest age groups, as would be expected.

As mentioned above, eight individuals had moved out of state prior to being diagnosed with cancer. Therefore, we were unable to confirm their cancer diagnoses. If we assume that all of these students were diagnosed with the type of cancer reported, the total number of students who had ever attended Southside High School who had been diagnosed with cancer (22 + 8 = 30) would still be less than the total expected. Also, the number of confirmed cases of any particular type of cancer would still not be statistically greater than expected. This would be true for the entire time period (1980-2000) and for 1990-2000.

Geographic Study

The case confirmation study was supplemented by examining cancer incidence among children living in the geographic

Technical Notes
Calculation of Expected Cases
Among Current and Former Students

Numbers of expected cases were calculated in a person-years at risk approach. Numbers of students in each grade since the school opened in fall 1979 were obtained from the NYS Education Department. For simplicity of calculation, it was assumed that all ninth graders were age 15, tenth graders age 16, eleventh graders age 17, and twelfth graders age 18. It was also assumed that handicapped students, who were not assigned to a grade but included with the enrollment figures, were equally distributed among the ages. Starting with the enrollment of the 1979-1980 school year, each student contributed one person-year at the age of that grade for that year. For each succeeding year, persons in each grade (or age level for those out of school) were aged one year and a number of persons equal to the ninth grade class for that year was added to the 15-19 year age group. Total person-years at risk were obtained for the five-year age groups 15-19 and 20-24 and the ten-year age groups 25-34 and 35-44, which is the oldest age group possible for someone graduating high school in 1980 at the age of 18. Person-years at risk in each age group were totaled for each year, and then summed over the periods 1980-1984, 1985-1989 and 1990-1999 to get total person-years at risk for each age group for each time period. The number of persons in each age group in 2000 was divided by two to obtain the person-years for this year since only cancers diagnosed in the first half of this year would have occurred yet.

To obtain numbers of cases expected for each time period, the numbers of person-years at risk in each age group were multiplied by standard cancer incidence rates for that time period and age group for New York State, exclusive of New York City. The standard rates were obtained from the New York State Cancer Registry. For the most recent time period, the standard rate for the years 1990-1997 was calculated and applied to the person-years at risk between 1990 and the first half of 2000 since Cancer Registry data for 1998 and subsequent years were not yet available to include in the calculation of the standard rates. Total numbers of cases expected in each age group and time period were then summed to get the total number of cases expected in all age groups between 1980 and 2000. These calculations were done for all types of cancer combined and for the most common types of cancer separately. Since school enrollment figures for males and females separately were only available for school years 1992-1993 and later, the calculation of expected numbers was done for males and females combined for persons attending school prior to this year, and for males and females separately for persons attending school in this school year or later.

A statistical test based on the Poisson distribution was used to determine the likelihood of any differences between observed and expected numbers of cases being due to chance (1). If the likelihood of the result occurring purely due to random variation was 5% or less, the result was considered to be statistically significant.

area served by Southside High School. Southside High School serves the part of the Elmira City School District located south of the Chemung River (see attached map). This part of the investigation was based on information from the NYSCR, allowing us to take into account people with cancer who may not have been reported by community members. Using the NYSCR, all children ages 0-19 who were diagnosed with cancer between 1980 and 1998 and who lived in ZIP Codes 14904 (Elmira), 14871 (Pine City) and 14894 (Wellsburg) at the time of diagnosis were identified. This area closely corresponds to the area served by Southside High School. The total number of children with cancer in this group, as well as the number with each type of cancer, were compared to the numbers expected. The expected numbers were calculated based on the number, age and sex of children living in the three ZIP Code areas and the rates of specific types of cancer for children in New York State, excluding New York City. Calculations were done for all types of cancer combined, and for the most common types of childhood cancer separately.

Technical Notes
Calculation of Expected Cases for Geographic Study

Numbers of males and females in the five-year age groups 0-4, 5-9, 10-14 and 15-19 were obtained from population estimates for the years 1980, 1990 and 1999 provided by Claritas, Inc., a commercial vendor. The Claritas estimates for 1980 and 1990 are quite similar to the population estimates provided by the U.S. Census for those years. The numbers of cases expected in each sex and age group were calculated for the time periods 1980-1984, 1985-1989, and 1990-1998 by applying age- and sex-specific incidence rates for total cancers in children and the most common individual types of cancer for New York State, exclusive of New York City to age- and sex-specific population estimates for the midpoint of the time interval. These midpoint population estimates were obtained by linear interpolation between the 1980, 1990 and 1999 population estimates, as appropriate. Total numbers of expected cases were obtained by summing over all age groups and time periods.

A total of 22 children, ages 0-19, living in ZIP Code areas 14904, 14871 and 14894 and diagnosed with cancer from 1980-1998 were identified through the NYSCR ("observed"). A total of 23 cases were expected. Eleven cases were observed among males (12 expected) and 11 cases were observed among females (11 expected). In examining specific types of cancer, the most commonly observed types of cancer were leukemia (9 cases observed, 6 expected), brain and other nervous system (fewer than 6 cases observed, 4 expected) and lymphomas (fewer than 6 cases observed, 4 expected). No particular type of cancer among either males or females showed a statistically significant difference between the observed and expected number of cases.

Cancer incidence in the 15-19 year age group was also examined. This age grouping closely corresponds to those attending high school or having just graduated. A total of six cases of cancer was observed, compared with 7 expected. The number of observed cases was similar to the number expected among both males and females. There were no statistically significant differences between the observed and expected number of cases for any particular type of cancer in either males or females.

Cancer incidence since 1997

At the beginning of this investigation, community members expressed particular concern over the number of cases of cancer diagnosed among students attending the high school since 1997. To address this concern, we combined information from the geographic study and the case confirmation study for people ages 15-19. This was done because the most recently diagnosed cases may not yet have been reported to the Cancer Registry. The number of cases of cancer among children 15-19 identified through the NYSCR was combined with the number of confirmed cases of cancer from the case confirmation study who lived in the three ZIP Code areas serving Southside High School. These were compared with the numbers and types of cancers expected for the three ZIP Codes.

The total number of children ages 15-19 living in the three ZIP Code area serving Southside High School who were diagnosed with cancer from 1997 through the first half of 2000 was less than six, but greater than the approximately 1 case expected. This excess was not statistically significant. The majority of the individuals diagnosed in this time frame were young men diagnosed with testicular cancer. The number of cases of testicular cancer was significantly greater than the number of cases expected. Numbers of cases for other types of cancer were not significantly different from what was expected.

Discussion

Findings: This study was conducted in response to community concerns over the number of current and former Southside High School students diagnosed with cancer. Of the 46 students who had ever attended the school and were reported to us as having cancer, only 25 were confirmed as having a reportable cancer. An additional 10 students were confirmed to have either a nonreportable (skin) cancer or a precancerous or noncancerous condition. Of the 25 students confirmed to have reportable cancers, three were diagnosed with cancer before they entered Southside High School. Their illness, therefore, could not have been caused by any exposures unique to the high school.

There were a total of 22 students diagnosed with cancer since entering Southside High School. When the number of cancer cases expected to be diagnosed among all students ever attending Southside High School was calculated, the 22 confirmed and reported cases was much less than the 48 cases expected. Even if all of the eight people who had moved out of state before being diagnosed with cancer were included, the total is still less than the number expected. The number of cancers reported to us and confirmed to be diagnosed since 1990 was also much less than the 39 cases that were expected to be diagnosed in that time period.

An important limitation to the case confirmation study was its dependence on members of the community to report information on people who may have cancer. If the community was not aware that a former student had developed cancer, and the student chose not to report their own diagnosis, the student was not included in the study. To overcome this limitation, a geographically defined study was conducted in which cancer cases were identified through the NYSCR, a source where case reporting is mandated by law. In the geographic study, the number of children of all ages and of high-school age who were diagnosed with cancer between 1980 and 1998 was very close to the number expected. The types of cancer that the children developed were similar to the types expected among children in these age groups.

Particular concern was raised by the community about the number of students attending Southside High School since 1997 who had cancer. In the case confirmation study, names were provided for only seven students attending Southside High School since 1997 who were believed to have cancer. The letter sent to the school board stated there were at least 13 Southside students diagnosed with cancer since 1997. The geographic study was based on data from the NYSCR, where reporting by hospitals, physicians and laboratories is mandated by law. The geographic study did not include cases diagnosed after 1998 since all of the case reports for the later years (1999 and 2000) may not yet have been processed into the main NYSCR files. To overcome the limitation of community knowledge to report cases in the case confirmation study and the issue of the reporting delay allowed under the NYSCR law, information from both studies was combined to examine cancer incidence among students since 1997. This allowed us to obtain as much information as possible regarding high school age children living in the area served by Southside High School who were diagnosed with cancer since 1997. When this was done, the number of cases identified was less than six, but greater than the number expected. The difference between the observed and expected numbers of all types of cancer combined was not statistically significant and could have occurred by chance. When the individual types of cancer were examined, there was a statistically significant excess in the number of testicular cancer cases among young men.

The perception that a large number of people attending or who attended Southside High School since 1997 have been diagnosed with cancer may be explained by a number of factors. First, there was an unusual number of young men diagnosed with a specific type of cancer, even though the actual number of cases was small. Second, some people attending Southside High School in 1997 or later were diagnosed with cancer before they even entered the school. Since cancer is a chronic disease, meaning that it tends to produce illness over a long period of time, a student diagnosed with cancer before entering the high school might still be undergoing treatment years later. His or her illness, therefore, might be known to classmates and others.

Third, a number of students attending the high school since 1997 were diagnosed with conditions other than (a reportable) cancer. These conditions included the most common forms of skin cancer (not reported to the NYSCR or any other cancer registry), as well as other pre-cancerous and noncancerous conditions. Although certain of these illnesses, especially skin cancers and some pre-cancerous conditions, are not as serious as other cancers, they arouse anxiety among the students and their families. The combination of a small number of students diagnosed with a reportable cancer while attending the high school, with students diagnosed with cancer prior to entering the school and students dealing with other health conditions may have led to the perception that cancer incidence among current and former students at Southside High School was unusual.

Cancer in children: Compared with its incidence among adults, cancer is rare among children. However, it is the largest single cause of death from disease among children (2). Of the various types of cancer affecting children, leukemia occurs most frequently and accounts for almost one third of all childhood cancers. Cancers of the brain and other parts of the nervous system, and lymphomas (including Hodgkin's disease and the non-Hodgkin's lymphomas) are the second and third most frequently occurring cancers in children (3,4). Cancer occurs somewhat more frequently in young adults. Among people 20-34 years of age, lymphomas occur most frequently, followed by breast cancer in females and testicular cancer in males (4).

This study confirmed an unusual number of testicular cancer cases among young men since 1997. Although testicular cancer accounts for only about 1% of cancers in men of all ages, it is the most commonly occurring type of cancer in white males ages 20-34. It is the second most common type of cancer in white males ages 15-19 and 35-39. Testicular cancer occurs about six times as often in white males as in African-American males. Over the past twenty years, the incidence of testicular cancer has doubled in the United States, with most of the increase occurring among young men (5,6). The reason for this increase is unknown. The only known risk factor for testicular cancer in men under age 20 is undescended testis (7). Evidence also suggests that a family history of testicular cancer, factors in the prenatal period such as high maternal hormone levels, viral infections and occupational exposures of the parents may also be important (7). Among adult males, higher rates of testicular cancer have been observed among men working at a variety of different occupations (5,6), but few of these associations have been found consistently.

Statistical considerations: There are a number of statistical issues that should be taken into account when interpreting the results of this study. First, the statistical tests do not take into account that the time period from 1997 on was considered separately due to reports of an unusual number of students with cancer in this time frame. This prior knowledge may have created a bias toward finding a statistically significant difference in the short time frame. When the entire twenty-year period from the opening of the school was examined as a whole, the number of testicular cancer cases was not unusual. Therefore, the finding of statistical significance for testicular cancer should be interpreted with some caution.

Another consideration is that statistical significance is a tool for detecting unusual patterns of cases. It can not tell us whether the cases truly have something in common or are linked to an environmental cause. Finally, even though the excess in the number of cases of testicular cancer was statistically significant, we need to remember that the finding was based statistically on a small number of cases. This makes the findings somewhat uncertain, as adding or subtracting one case could dramatically affect the statistical significance of the findings.

Summary and next steps

In summary, since the time Southside High School began operation, this investigation did not find an excess number of cancer cases among current and former students at the school or among children living in the area served by the school. An excess number of cases of testicular cancer among young men was found in the most recent three year time period.

To further investigate this finding, the New York State Department of Health will examine the medical records of these young men to look for any individual risk factors or other factors that may account for their illness. The NYSCR will be used to continue monitoring cancer incidence in the Southside area and the case confirmation study will be updated with any additional information supplied by members of the community. Finally, we will examine the incidence of testicular cancer among young adults in the area.

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Appendix D
Southside High School Tables of Raw Data

Introduction to Southside High School Tables of Raw Data

The following tables contain data from the laboratory that analyzed soil samples collected by the NYS DEC and the NYS DOH between May 2000 and September 2000. These samples were analyzed at Columbia Analytical Services, a commercial laboratory in Rochester, New York. Columbia Analytical Services is certified by the NYS DOH Environmental Laboratory Approval Program (ELAP). These data were evaluated for quality assurance and quality control (QA/QC) by the laboratory and by the QA Unit of the Technology Section of NYS DEC's Division of Environmental Remediation.

The tables are organized with information identifying the sample at the top of the column and the results of the analyses listed below. The chemicals for which the sample were analyzed are listed to the left of the page. Each result is indicated by a number that may or may not be followed by a letter/symbol known as a qualifier. The qualifiers, as provided by the laboratory, are shown below. A "na" indicates that the sample was not analyzed for a particular chemical.

Please note that most of the results are followed by a "U". The "U" indicates that the chemical was not detected in the sample at or above the "detection limit" indicated. The "detection limit" is the lowest level that the laboratory test can reliably measure the chemical.

Data Qualifiers used in the Southside High School Soil Sample Raw Data Table

Organic Chemicals

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. The flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data indicate the presence of a compound that meets the identification criteria but the result is less than the sample quantitation limit but greater than zero.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number on the Form I for the diluted sample, and ALL concentration values reported on that Form I are flagged with the "D" flag.

Inorganic Chemicals

U - Indicates compound was analyzed for but not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

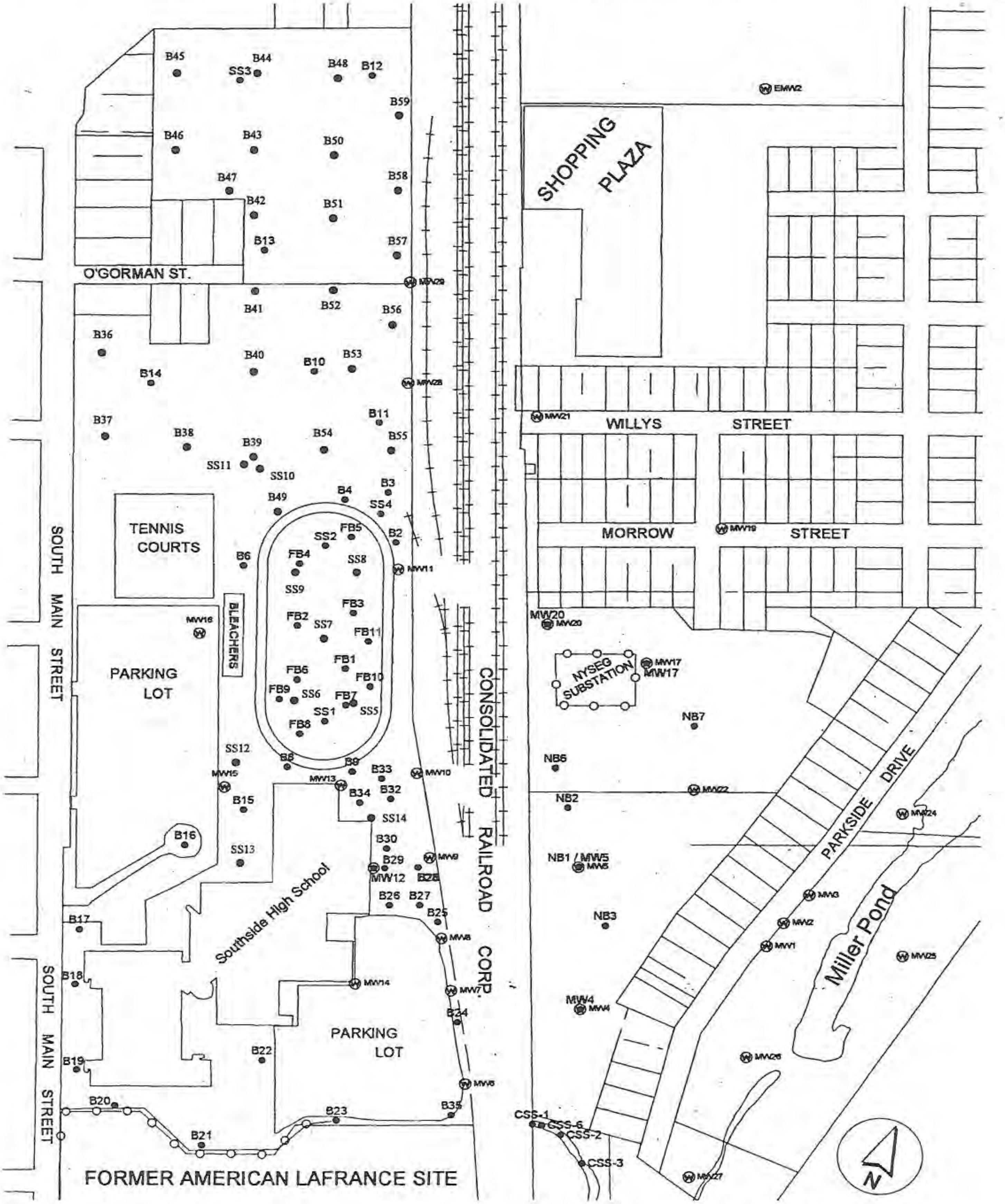
N - Spiked sample recovery not within control limits.

W - Post-digestion spike for Furnace AA Analysis is out of control limits (85-115), while sample absorbance is less than 50% of spike absorbance.

* - Duplicate analysis not within control limits.

Figure 1

Location of Soil Samples Collected by NYS DEC & NYS DOH at Southside High School



From the NYS DEC, February 2000

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B36 0.5-2.5 ft B23401 09/12/00	B37 0.5-2.5 ft B23402 09/12/00	B37 8-10 ft B23403 09/12/00	B38 1 & 4.5 ft B23404 09/12/00	B39 0.5-2.5 ft B23405 09/12/00	B40 0.5-2.5 ft B23406 09/12/00	SS5 surface B23407 09/12/00	SS6 surface B23408 09/12/00	SS7 surface B23409 09/12/00	SS8 surface B23410 09/12/00	SS9 surface B23411 09/12/00
ACENAPHTHENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
ACENAPHTHYLENE	UG/KG	350 U	340 U	350 U	1800 U	220 J	1900 U	450 U	470 U	440 U	470 U	450 U
ANTHRACENE	UG/KG	350 U	340 U	350 U	2200	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
BENZO(A)ANTHRACENE	UG/KG	350 U	340 U	350 U	4800	360 J	1900 U	450 U	470 U	440 U	470 U	450 U
BENZO(A)PYRENE	UG/KG	350 U	340 U	350 U	4200	460 J	1900 U	450 U	470 U	440 U	470 U	450 U
BENZO(B)FLUORANTHENE	UG/KG	350 U	340 U	350 U	2700	400 J	1900 U	450 U	470 U	48 J	470 U	450 U
BENZO(G,H,I)PERYLENE	UG/KG	350 U	340 U	350 U	2300	620 J	1900 U	450 U	470 U	440 U	470 U	450 U
BENZO(K)FLUORANTHENE	UG/KG	350 U	340 U	350 U	3300	370 J	1900 U	450 U	470 U	440 U	470 U	450 U
BENZYL ALCOHOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
BUTYL BENZYL PHTHALATE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
DI-N-BUTYLPHTHALATE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
CARBAZOLE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
INDENO(1,2,3-CD)PYRENE	UG/KG	350 U	340 U	350 U	2400	420 J	1900 U	450 U	470 U	440 U	470 U	450 U
4-CHLOROANILINE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
BIS(-2-CHLOROETHOXY)METHANE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
BIS(2-CHLOROETHYL)ETHER	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2-CHLORONAPHTHALENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2-CHLOROPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
CHRYSENE	UG/KG	350 U	340 U	350 U	4000	390 J	1900 U	450 U	470 U	45 J	470 U	450 U
DIBENZO(A,H)ANTHRACENE	UG/KG	350 U	340 U	350 U	1800 U	190 J	1900 U	450 U	470 U	440 U	470 U	450 U
DIBENZOFURAN	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
1,3-DICHLOROBENZENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
1,2-DICHLOROBENZENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
1,4-DICHLOROBENZENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
3,3'-DICHLOROBENZIDINE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,4-DICHLOROPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
DIETHYLPHTHALATE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
DIMETHYL PHTHALATE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,4-DIMETHYLPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,4-DINITROPHENOL	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U
2,4-DINITROTOLUENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,6-DINITROTOLUENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	50 J	470 U	450 U
FLUORANTHENE	UG/KG	350 U	500	350 U	11000	650 J	1900 U	450 U	470 U	71 J	470 U	450 U
FLUORENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
HEXACHLOROBENZENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
HEXACHLOROBUTADIENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
HEXACHLOROETHANE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
ISOPHORONE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2-METHYLNAPHTHALENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U
4-CHLORO-3-METHYLPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2-METHYLPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
4-METHYLPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
NAPHTHALENE	UG/KG	350 U	340 U	350 U	1800 U	270 J	1900 U	450 U	470 U	440 U	470 U	450 U
2-NITROANILINE	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U
3-NITROANILINE	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U
4-NITROANILINE	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B36 0.5-2.5 ft B23401 09/12/00	B37 0.5-2.5 ft B23402 09/12/00	B37 8-10 ft B23403 09/12/00	B38 1 & 4.5 ft B23404 09/12/00	B39 0.5-2.5 ft B23405 09/12/00	B40 0.5-2.5 ft B23406 09/12/00	SS5 surface B23407 09/12/00	SS6 surface B23408 09/12/00	SS7 surface B23409 09/12/00	SS8 surface B23410 09/12/00	SS9 surface B23411 09/12/00
NITROBENZENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2-NITROPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
4-NITROPHENOL	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U
N-NITROSODIMETHYLAMINE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
N-NITROSODIPHENYLAMINE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
DI-N-OCTYL PHTHALATE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
PENTACHLOROPHENOL	UG/KG	1800 U	1800 U	1800 U	9500 U	9200 U	9500 U	2300 U	2400 U	2300 U	2400 U	2300 U
PHENANTHRENE	UG/KG	350 U	410	350 U	5700	380 J	1900 U	450 U	470 U	440 U	470 U	450 U
PHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
4-BROMOPHENYL-PHENYLETHER	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
4-CHLOROPHENYL-PHENYLETHER	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
PYRENE	UG/KG	350 U	430	370	8400	530 J	1900 U	450 U	470 U	56 J	470 U	450 U
1,2,4-TRICHLOROBENZENE	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,4,6-TRICHLOROPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
2,4,5-TRICHLOROPHENOL	UG/KG	350 U	340 U	350 U	1800 U	1800 U	1900 U	450 U	470 U	440 U	470 U	450 U
ALDRIN	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
ALPHA-BHC	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
BETA-BHC	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
DELTA-BHC	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
GAMMA-BHC (LINDANE)	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
ALPHA-CHLORDANE	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
GAMMA-CHLORDANE	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
4,4'-DDD	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
4,4'-DDE	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
4,4'-DDT	UG/KG	3.5 U	3.4 U	3.5 U	3.7 U	3.6 U	3.7 U	4.5 U	4.7 U	4.4 U	4.7 U	4.5 U
DIELDRIN	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
ALPHA-ENDOSULFAN	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
BETA-ENDOSULFAN	UG/KG	3.5 U	3.4 U	3.5 U	3.7 U	3.6 U	3.7 U	4.5 U	4.7 U	4.4 U	4.7 U	4.5 U
ENDOSULFAN SULFATE	UG/KG	3.5 U	3.4 U	3.5 U	3.7 U	3.6 U	3.7 U	4.5 U	4.7 U	4.4 U	4.7 U	4.5 U
ENDRIN	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
ENDRIN ALDEHYDE	UG/KG	3.5 U	3.4 U	3.5 U	3.7 U	3.6 U	3.7 U	4.5 U	4.7 U	4.4 U	4.7 U	4.5 U
ENDRIN KETONE	UG/KG	3.5 U	3.4 U	3.5 U	3.7 U	3.6 U	3.7 U	4.5 U	4.7 U	4.4 U	4.7 U	4.5 U
HEPTACHLOR	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
HEPTACHLOR EPOXIDE	UG/KG	1.8 U	1.8 U	1.8 U	1.9 U	1.8 U	1.9 U	2.3 U	2.4 U	2.3 U	2.4 U	2.3 U
METHOXYCHLOR	UG/KG	7.0 U	6.9 U	7.0 U	7.4 U	7.2 U	7.4 U	9.0 U	9.3 U	8.8 U	9.4 U	9.0 U
TOXAPHENE	UG/KG	35 U	34 U	35 U	37 U	36 U	37 U	45 U	47 U	44 U	47 U	45 U
PCB 1016	UG/KG	35 U	34 U	35 U	37 U	36 U	37 U	45 U	47 U	44 U	47 U	45 U
PCB 1221	UG/KG	35 U	34 U	35 U	37 U	36 U	37 U	45 U	47 U	44 U	47 U	45 U
PCB 1232	UG/KG	35 U	34 U	35 U	37 U	36 U	37 U	45 U	47 U	44 U	47 U	45 U
PCB 1242	UG/KG	35 U	34 U	35 U	37 U	36 U	37 U	45 U	47 U	44 U	47 U	45 U
PCB 1248	UG/KG	280 D	34 U	46	740 D	36 U	1200 D	53	47 U	44 U	47 U	220
PCB 1254	UG/KG	35 U	34 U	35 U	37 U	36 U	37 U	45 U	47 U	44 U	47 U	45 U
PCB 1260	UG/KG	100	34 U	35 U	130	36 U	110	45 U	47 U	44 U	47 U	45 U
ANTIMONY	MG/KG	1.06 U	1.04 U	1.06 U	1.11 U	1.09 U	1.12 U	1.36 U	1.42 U	1.31 UN	1.43 U	1.36 U
BARIUM	MG/KG	50.9	39.1	42.2	87.2	83.8	91.4	97.4	95.8	93.4 *	105	102
BERYLLIUM	MG/KG	0.532 U	0.521 U	0.530 U	0.557 U	0.544 U	0.561 U	0.682 U	0.708 U	0.66 U	0.714 U	0.682 U
CADMIUM	MG/KG	0.532 U	0.521 U	0.530 U	0.557 U	0.544 U	0.561 U	0.682 U	0.708 U	0.72	0.714 U	0.745
CHROMIUM	MG/KG	8.74	6.24	7.49	11.6	10.1	14.0	89.5	103	73.9	74.6	106
COPPER	MG/KG	24.9	18.4	15.9	26.5	34.4	43.0	28.2	26.6	25.8 *N	24.4	27.6

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B36 0.5-2.5 ft B23401 09/12/00	B37 0.5-2.5 ft B23402 09/12/00	B37 8-10 ft B23403 09/12/00	B38 1 & 4.5 ft B23404 09/12/00	B39 0.5-2.5 ft B23405 09/12/00	B40 0.5-2.5 ft B23406 09/12/00	SS5 surface B23407 09/12/00	SS6 surface B23408 09/12/00	SS7 surface B23409 09/12/00	SS8 surface B23410 09/12/00	SS9 surface B23411 09/12/00
LEAD	MG/KG	14.3	5.49	6.02	29.4	56.0	50.2	20.5	21.5	59.1	21.0	22.8
NICKEL	MG/KG	13.4	11.3	13.9	18.2	22.6	25.7	21.1	21.5	20.5	22.4	23.3
SELENIUM	MG/KG	0.930	1.43	1.32	0.721	1.57	1.68	1.58	1.44	0.67 U	1.07	1.43
SILVER	MG/KG	1.06 U	1.04 U	1.06 U	1.11 U	1.09 U	1.12 U	1.36 U	1.42 U	1.3 U	1.43 U	1.36 U
THALLIUM	MG/KG	1.06 U	1.04 U	1.06 U	1.11 U	1.09 U	1.12 U	1.36 U	1.42 U	1.3 U	1.43 U	1.36 U
ZINC	MG/KG	55.2	58.3	44.8	77.4	70.9	81.5	83.2	85.6	81.5	77.0	86.5
VANADIUM	MG/KG	14.5	10.1	11.3	16.7	16.3	16.7	17.2	17.0	15.5	17.4	18.6
COBALT	MG/KG	6.32	5.21 U	5.87	7.03	7.07	7.16	9.22	9.35	9	9.67	9.86
TIN	MG/KG	53.2 U	52.1 U	53.0 U	55.7 U	54.4 U	56.1 U	68.2 U	70.8 U	65.6 U	71.4 U	68.2 U
MERCURY	MG/KG	0.0532 U	0.0521 U	0.0530 U	0.0764	1.98	0.245	0.158	0.0812	0.0934	0.164	0.142
ARSENIC	MG/KG	8.98	2.56	3.55	5.76	5.16	5.82	5.28	5.58	7	4.01	4.62
ACETONE	UG/KG	21 U	21 U	21 U	22 U	22 U	22 U	27 U	28 U	11 J	29 U	27 U
BENZENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
BROMODICHLOROMETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
BROMOFORM	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
BROMOMETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
2-BUTANONE (MEK)	UG/KG	11 U	10 U	11 U	11 U	11 U	11 U	14 U	14 U	13 U	14 U	14 U
CARBON DISULFIDE	UG/KG	11 U	10 U	11 U	11 U	11 U	11 U	14 U	14 U	13 U	14 U	14 U
CARBON TETRACHLORIDE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
CHLOROBENZENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
CHLOROETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
CHLOROFORM	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
CHLOROMETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
DIBROMOCHLOROMETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
DICHLORODIFLUOROMETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,1-DICHLOROETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,2-DICHLOROETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,1-DICHLOROETHENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
CIS-1,2-DICHLOROETHENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
TRANS-1,2-DICHLOROETHENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,2-DICHLOROPROPANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
CIS-1,3-DICHLOROPROPENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
ETHYLBENZENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
FREON 113	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
2-HEXANONE	UG/KG	11 U	10 U	11 U	11 U	11 U	11 U	14 U	14 U	13 U	14 U	14 U
METHYLENE CHLORIDE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
4-METHYL-2-PENTANONE (MIBK)	UG/KG	11 U	10 U	11 U	11 U	11 U	11 U	14 U	14 U	13 U	14 U	14 U
STYRENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
TETRACHLOROETHENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	7.9	7.1 U	36	10	37
TOLUENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,1,1-TRICHLOROETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
1,1,2-TRICHLOROETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
TRICHLOROETHENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	6.3	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
TRICHLOROFLUOROMETHANE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
VINYL CHLORIDE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
O-XYLENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
M+P-XYLENE	UG/KG	5.3 U	5.2 U	5.3 U	5.6 U	5.4 U	5.6 U	6.8 U	7.1 U	6.7 U	7.1 U	6.8 U
TOTAL CYANIDE	MG/KG	1.06 U	1.04 U	1.06 U	1.11 U	1.78	1.12 U	1.36 U	1.42 U	1.34 U	1.43 U	1.36 U

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		SS10 surface B23412 09/12/00	SS11 surface B23413 09/12/00	SS12 surface B23414 09/12/00	SS13 surface B23415 09/12/00	SS14 surface B23416 09/12/00	B36 surface B23417 09/12/00	B37 surface B23418 09/12/00	B38 surface B23419 09/12/00	B39 surface B23420 09/12/00	B40 surface B23421 09/12/00	B41 surface B23422 09/12/00
ACENAPHTHENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
ACENAPHTHYLENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
ANTHRACENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BENZO(A)ANTHRACENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BENZO(A)PYRENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BENZO(B)FLUORANTHENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BENZO(G,H,I)PERYLENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BENZO(K)FLUORANTHENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BENZYL ALCOHOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BUTYL BENZYL PHTHALATE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
DI-N-BUTYLPHTHALATE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
CARBAZOLE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
INDENO(1,2,3-CD)PYRENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
4-CHLOROANILINE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BIS(-2-CHLOROETHOXY)METHANE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BIS(2-CHLOROETHYL)ETHER	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2-CHLORONAPHTHALENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2-CHLOROPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
CHRYSENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
DIBENZO(A,H)ANTHRACENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
DIBENZOFURAN	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
1,3-DICHLOROBENZENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
1,2-DICHLOROBENZENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
1,4-DICHLOROBENZENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
3,3'-DICHLOROBENZIDINE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,4-DICHLOROPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
DIETHYLPHTHALATE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
DIMETHYL PHTHALATE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,4-DIMETHYLPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,4-DINITROPHENOL	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U
2,4-DINITROTOLUENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,6-DINITROTOLUENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
FLUORANTHENE	UG/KG	560	380	400 U	600	410 U	370 U	45 J	380 U	420 U	410 U	390 U
FLUORENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
HEXACHLOROBENZENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
HEXACHLOROBUTADIENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
HEXACHLOROETHANE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
ISOPHORONE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2-METHYLNAPHTHALENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U
4-CHLORO-3-METHYLPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2-METHYLPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
4-METHYLPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
NAPHTHALENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2-NITROANILINE	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U
3-NITROANILINE	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U
4-NITROANILINE	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		SS10 surface B23412 09/12/00	SS11 surface B23413 09/12/00	SS12 surface B23414 09/12/00	SS13 surface B23415 09/12/00	SS14 surface B23416 09/12/00	B36 surface B23417 09/12/00	B37 surface B23418 09/12/00	B38 surface B23419 09/12/00	B39 surface B23420 09/12/00	B40 surface B23421 09/12/00	B41 surface B23422 09/12/00
NITROBENZENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2-NITROPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
4-NITROPHENOL	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U
N-NITROSODIMETHYLAMINE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
N-NITROSODIPHENYLAMINE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
DI-N-OCTYL PHTHALATE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
PENTACHLOROPHENOL	UG/KG	1900 U	1900 U	2000 U	2000 U	2100 U	1900 U	1900 U	2000 U	2100 U	2100 U	2000 U
PHENANTHRENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
PHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
4-BROMOPHENYL-PHENYLETHER	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
4-CHLOROPHENYL-PHENYLETHER	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
PYRENE	UG/KG	440	370 U	400 U	410	410 U	370 U	370 U	380 U	420 U	410 U	390 U
1,2,4-TRICHLOROBENZENE	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,4,6-TRICHLOROPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
2,4,5-TRICHLOROPHENOL	UG/KG	370 U	370 U	400 U	390 U	410 U	370 U	370 U	380 U	420 U	410 U	390 U
ALDRIN	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
ALPHA-BHC	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
BETA-BHC	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
DELTA-BHC	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
GAMMA-BHC (LINDANE)	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
ALPHA-CHLORDANE	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
GAMMA-CHLORDANE	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
4,4'-DDD	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
4,4'-DDE	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
4,4'-DDT	UG/KG	3.7 U	3.7 U	4.0 U	3.9 U	41 U	37 U	3.7 U	38 U	42 U	41 U	3.9 U
DIELDRIN	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
ALPHA-ENDOSULFAN	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
BETA-ENDOSULFAN	UG/KG	3.7 U	3.7 U	4.0 U	3.9 U	41 U	37 U	3.7 U	38 U	42 U	41 U	3.9 U
ENDOSULFAN SULFATE	UG/KG	3.7 U	3.7 U	4.0 U	3.9 U	41 U	37 U	3.7 U	38 U	42 U	41 U	3.9 U
ENDRIN	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
ENDRIN ALDEHYDE	UG/KG	3.7 U	3.7 U	4.0 U	3.9 U	41 U	37 U	3.7 U	38 U	42 U	41 U	3.9 U
ENDRIN KETONE	UG/KG	3.7 U	3.7 U	4.0 U	3.9 U	41 U	37 U	3.7 U	38 U	42 U	41 U	3.9 U
HEPTACHLOR	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
HEPTACHLOR EPOXIDE	UG/KG	1.9 U	1.9 U	2.0 U	2.0 U	21 U	19 U	1.9 U	20 U	21 U	21 U	2.0 U
METHOXYCHLOR	UG/KG	7.4 U	7.3 U	7.9 U	7.9 U	83 U	75 U	7.3 U	76 U	83 U	82 U	7.8 U
TOXAPHENE	UG/KG	37 U	37 U	40 U	39 U	410 U	370 U	37 U	380 U	420 U	410 U	39 U
PCB 1016	UG/KG	37 U	37 U	40 U	39 U	41 U	37 U	37 U	38 U	42 U	41 U	39 U
PCB 1221	UG/KG	37 U	37 U	40 U	39 U	41 U	37 U	37 U	38 U	42 U	41 U	39 U
PCB 1232	UG/KG	37 U	37 U	40 U	39 U	41 U	37 U	37 U	38 U	42 U	41 U	39 U
PCB 1242	UG/KG	37 U	37 U	40 U	39 U	41 U	37 U	37 U	38 U	42 U	41 U	39 U
PCB 1248	UG/KG	630 D	580 D	2800 D	190	110	79	37 U	38 U	42 U	160	39 U
PCB 1254	UG/KG	37 U	37 U	40 U	39 U	41 U	37 U	37 U	38 U	42 U	41 U	39 U
PCB 1260	UG/KG	100	150	240	39 U	41 U	37 U	37 U	38 U	42 U	41 U	39 U
ANTIMONY	MG/KG	1.12 U	1.11 U	1.20 U	1.19 U	1.26 U	1.13 U	1.1 UN	1.16 U	1.26 U	1.24 U	1.18 U
BARIUM	MG/KG	92.7	99.6	119	63.1	110	80.4	59.4 *	108	89.3	111	101
BERYLLIUM	MG/KG	0.559 U	0.554 U	0.601 U	0.595 U	0.628 U	0.566 U	0.54 U	0.588	0.631 U	0.620 U	0.619
CADMIUM	MG/KG	0.559 U	0.554 U	0.601 U	0.864	0.628 U	0.566 U	0.54 U	0.578 U	0.631 U	0.620 U	0.591 U
CHROMIUM	MG/KG	11.6	12.2	14.5	12.7	16.2	10.9	5.8	20.7	21.5	73.1	32.0
COPPER	MG/KG	19.4	20.1	18.0	14.6	862	15.6	6.8 *N	18.8	14.8	22.8	14.3

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Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		SS10 surface B23412 09/12/00	SS11 surface B23413 09/12/00	SS12 surface B23414 09/12/00	SS13 surface B23415 09/12/00	SS14 surface B23416 09/12/00	B36 surface B23417 09/12/00	B37 surface B23418 09/12/00	B38 surface B23419 09/12/00	B39 surface B23420 09/12/00	B40 surface B23421 09/12/00	B41 surface B23422 09/12/00
LEAD	MG/KG	23.4	25.8	22.1	24.6	78.6	24.2	9.7	23.2	15.3	26.3	19.4
NICKEL	MG/KG	18.1	19.2	21.0	15.0	31.4	14.3	7.6	21.0	17.6	28.6	18.9
SELENIUM	MG/KG	1.02	0.732	1.06	1.26	1.22	0.908	0.54 U	1.64	0.871	1.15	0.591 U
SILVER	MG/KG	1.12 U	1.11 U	1.20 U	1.19 U	1.26 U	1.13 U	1.1 U	1.16 U	1.26 U	1.24 U	1.18 U
THALLIUM	MG/KG	1.12 U	1.11 U	1.20 U	1.19 U	1.26 U	1.13 U	1.1 U	1.16 U	1.26 U	1.24 U	1.18 U
ZINC	MG/KG	72.6	70.1	64.4	58.3	151	59.1	27.7	70.5	56.3	77.7	71.6
VANADIUM	MG/KG	15.4	16.6	15.6	11.6	16.5	12.3	6.6	17.2	17.0	17.2	16.3
COBALT	MG/KG	7.86	8.19	8.87	6.93	9.36	6.43	8.3	9.66	8.11	8.98	9.17
TIN	MG/KG	55.9 U	55.4 U	60.1 U	59.5 U	62.8 U	56.6 U	53.9 U	57.8 U	63.1 U	62.0 U	59.1 U
MERCURY	MG/KG	0.147	0.113	0.0601 U	0.0998	0.157	0.0618	0.05 U	0.0578 U	0.0631 U	0.0757	0.227
ARSENIC	MG/KG	5.91	6.63	5.25	4.08	5.35	5.91	3.5	5.16	5.03	5.01	5.50
ACETONE	UG/KG	22 U	22 U	24 U	24 U	25 U	23 U	6.9 J	23 U	25 U	25 U	24 U
BENZENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
BROMODICHLOROMETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
BROMOFORM	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
BROMOMETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
2-BUTANONE (MEK)	UG/KG	11 U	11 U	12 U	12 U	13 U	11 U	11 U	12 U	13 U	12 U	12 U
CARBON DISULFIDE	UG/KG	11 U	11 U	12 U	12 U	13 U	11 U	11 U	12 U	13 U	12 U	12 U
CARBON TETRACHLORIDE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
CHLOROBENZENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
CHLOROETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
CHLOROFORM	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
CHLOROMETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
DIBROMOCHLOROMETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
DICHLORODIFLUOROMETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,1-DICHLOROETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,2-DICHLOROETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,1-DICHLOROETHENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
CIS-1,2-DICHLOROETHENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
TRANS-1,2-DICHLOROETHENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,2-DICHLOROPROPANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
CIS-1,3-DICHLOROPROPENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
ETHYLBENZENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
FREON 113	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	2.7 J	5.8 U	6.3 U	6.2 U	5.9 U
2-HEXANONE	UG/KG	11 U	11 U	12 U	12 U	13 U	11 U	11 U	12 U	13 U	12 U	12 U
METHYLENE CHLORIDE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
4-METHYL-2-PENTANONE (MIBK)	UG/KG	11 U	11 U	12 U	12 U	13 U	11 U	11 U	12 U	13 U	12 U	12 U
STYRENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
TETRACHLOROETHENE	UG/KG	27	5.5 U	13	6.0 U	21	11	16	5.8 U	6.3 U	6.2 U	5.9 U
TOLUENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,1,1-TRICHLOROETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
1,1,2-TRICHLOROETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
TRICHLOROETHENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
TRICHLOROFLUOROMETHANE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
VINYL CHLORIDE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
O-XYLENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
M+P-XYLENE	UG/KG	5.6 U	5.5 U	6.0 U	6.0 U	6.3 U	5.7 U	5.6 U	5.8 U	6.3 U	6.2 U	5.9 U
TOTAL CYANIDE	MG/KG	1.12 U	1.11 U	1.20 U	1.19 U	1.26 U	1.13 U	1.11 U	1.16 U	1.26 U	1.24 U	1.18 U

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Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B42 surface B23423 09/12/00	B43 surface B23424 09/12/00	B41 0.5-2.5 ft B23425 09/12/00	B42 0.5-2.5 ft B23426 09/12/00	B43 0.5-2.5 ft B23427 09/12/00	B44 0.5-2.5 ft B23428 09/13/00	B45 0.5-2.5 ft B23429 ########	B46 0.5-2.5 ft B23430 ########	B44 surface B23431 ########	B45 surface B23432 09/13/00	B46 surface B23433 ########
ACENAPHTHENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
ACENAPHTHYLENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
ANTHRACENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BENZO(A)ANTHRACENE	UG/KG	110 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BENZO(A)PYRENE	UG/KG	130 J	370 U	370 U	810	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BENZO(B)FLUORANTHENE	UG/KG	120 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BENZO(G,H,I)PERYLENE	UG/KG	110 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BENZO(K)FLUORANTHENE	UG/KG	130 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BENZYL ALCOHOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BUTYL BENZYL PHTHALATE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
DI-N-BUTYLPHTHALATE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
CARBAZOLE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
INDENO(1,2,3-CD)PYRENE	UG/KG	110 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
4-CHLOROANILINE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BIS(-2-CHLOROETHOXY)METHANE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BIS(2-CHLOROETHYL)ETHER	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2-CHLORONAPHTHALENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2-CHLOROPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
CHRYSENE	UG/KG	130 J	370 U	370 U	1100	400 U	360 U	370 U	370 U	420 U	47 J	430 U
DIBENZO(A,H)ANTHRACENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
DIBENZOFURAN	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
1,3-DICHLOROBENZENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
1,2-DICHLOROBENZENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
1,4-DICHLOROBENZENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
3,3'-DICHLOROBENZIDINE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,4-DICHLOROPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
DIETHYLPHTHALATE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
DIMETHYL PHTHALATE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,4-DIMETHYLPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,4-DINITROPHENOL	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U
2,4-DINITROTOLUENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,6-DINITROTOLUENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
FLUORANTHENE	UG/KG	170 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	57 J	430 U
FLUORENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
HEXACHLOROBENZENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
HEXACHLOROBUTADIENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
HEXACHLOROETHANE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
ISOPHORONE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2-METHYLNAPHTHALENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U
4-CHLORO-3-METHYLPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2-METHYLPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
4-METHYLPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
NAPHTHALENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2-NITROANILINE	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U
3-NITROANILINE	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U
4-NITROANILINE	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B42 surface B23423 09/12/00	B43 surface B23424 09/12/00	B41 0.5-2.5 ft B23425 09/12/00	B42 0.5-2.5 ft B23426 09/12/00	B43 0.5-2.5 ft B23427 09/12/00	B44 0.5-2.5 ft B23428 09/13/00	B45 0.5-2.5 ft B23429 ########	B46 0.5-2.5 ft B23430 ########	B44 surface B23431 ########	B45 surface B23432 09/13/00	B46 surface B23433 ########
NITROBENZENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2-NITROPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
4-NITROPHENOL	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U
N-NITROSODIMETHYLAMINE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
N-NITROSODIPHENYLAMINE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
DI-N-OCTYL PHTHALATE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
PENTACHLOROPHENOL	UG/KG	2100 U	1900 U	1900 U	3800 U	2000 U	1900 U	1900 U	1900 U	2200 U	2200 U	2200 U
PHENANTHRENE	UG/KG	66 J	370 U	370 U	2000	400 U	360 U	370 U	370 U	420 U	430 U	430 U
PHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
4-BROMOPHENYL-PHENYLETHER	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
4-CHLOROPHENYL-PHENYLETHER	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
PYRENE	UG/KG	200 J	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	59 J	430 U
1,2,4-TRICHLOROBENZENE	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,4,6-TRICHLOROPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
2,4,5-TRICHLOROPHENOL	UG/KG	410 U	370 U	370 U	750 U	400 U	360 U	370 U	370 U	420 U	430 U	430 U
ALDRIN	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
ALPHA-BHC	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
BETA-BHC	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
DELTA-BHC	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
GAMMA-BHC (LINDANE)	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
ALPHA-CHLORDANE	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
GAMMA-CHLORDANE	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
4,4'-DDD	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
4,4'-DDE	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
4,4'-DDT	UG/KG	4.1 U	37 U	37 U	37 U	4.0 U	3.6 U	3.7 U	3.7 U	42 U	4.3 U	43 U
DIELDRIN	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
ALPHA-ENDOSULFAN	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
BETA-ENDOSULFAN	UG/KG	4.1 U	37 U	37 U	37 U	4.0 U	3.6 U	3.7 U	3.7 U	42 U	4.3 U	43 U
ENDOSULFAN SULFATE	UG/KG	4.1 U	37 U	37 U	37 U	4.0 U	3.6 U	3.7 U	3.7 U	42 U	4.3 U	43 U
ENDRIN	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
ENDRIN ALDEHYDE	UG/KG	4.1 U	37 U	37 U	37 U	4.0 U	3.6 U	3.7 U	3.7 U	42 U	4.3 U	43 U
ENDRIN KETONE	UG/KG	4.1 U	37 U	37 U	37 U	4.0 U	3.6 U	3.7 U	3.7 U	42 U	4.3 U	43 U
HEPTACHLOR	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
HEPTACHLOR EPOXIDE	UG/KG	2.1 U	19 U	19 U	19 U	2.0 U	1.9 U	1.9 U	1.9 U	22 U	2.2 U	22 U
METHOXYCHLOR	UG/KG	8.1 U	73 U	74 U	75 U	7.9 U	7.3 U	7.4 U	7.3 U	84 U	8.6 U	87 U
TOXAPHENE	UG/KG	41 U	370 U	370 U	370 U	40 U	36 U	37 U	37 U	420 U	43 U	430 U
PCB 1016	UG/KG	41 U	37 U	37 U	37 U	40 U	36 U	37 U	37 U	42 U	43 U	43 U
PCB 1221	UG/KG	41 U	37 U	37 U	37 U	40 U	36 U	37 U	37 U	42 U	43 U	43 U
PCB 1232	UG/KG	41 U	37 U	37 U	37 U	40 U	36 U	37 U	37 U	42 U	43 U	43 U
PCB 1242	UG/KG	41 U	37 U	37 U	37 U	40 U	36 U	37 U	37 U	42 U	43 U	43 U
PCB 1248	UG/KG	56	37 U	37 U	37 U	390	36 U	37 U	320	42 U	43 U	1700 D
PCB 1254	UG/KG	41 U	37 U	37 U	37 U	40 U	36 U	37 U	37 U	42 U	43 U	43 U
PCB 1260	UG/KG	41 U	37 U	37 U	37 U	40 U	36 U	37 U	37 U	42 U	43 U	130
ANTIMONY	MG/KG	1.2 UN	1.11 U	1.12 U	3.93	1.20 U	1.10 U	1.11 U	1.11 U	1.28 U	1.31 UN	1.31 U
BARIUM	MG/KG	113 *	64.5	146	153	241	81.5	62.4	103	101	106 *	110
BERYLLIUM	MG/KG	0.61 U	0.554 U	0.601	1.12	0.600 U	0.550 U	0.557 U	0.568	0.679	0.65 U	0.656 U
CADMIUM	MG/KG	0.61 U	0.554 U	0.562 U	0.612	0.600 U	0.550 U	0.557 U	0.555 U	0.639 U	0.65 U	0.656 U
CHROMIUM	MG/KG	28.9	8.82	16.5	74.1	10.5	10.0	8.36	8.88	16.1	15	14.3
COPPER	MG/KG	21.4 *N	9.50	60.1	4080	36.5	22.2	23.1	19.4	14.2	17.4 *N	13.5

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Table 4; Soil Samples Collected in September

sample location / depth / sample # / sample collected		B42 surface B23423 09/12/00	B43 surface B23424 09/12/00	B41 0.5-2.5 ft B23425 09/12/00	B42 0.5-2.5 ft B23426 09/12/00	B43 0.5-2.5 ft B23427 09/12/00	B44 0.5-2.5 ft B23428 09/13/00	B45 0.5-2.5 ft B23429 ########	B46 0.5-2.5 ft B23430 ########	B44 surface B23431 ########	B45 surface B23432 09/13/00	B46 surface B23433 ########
LEAD	MG/KG	23.4	11.2	110	783	2210	23.8	26.1	29.9	15.1	19.3	16.1
NICKEL	MG/KG	23.7	13.1	22.0	517	16.0	14.7	13.5	13.3	20.7	20.8	17.6
SELENIUM	MG/KG	0.59 U	0.879	1.73	3.43	0.600 U	1.43	0.994	1.33	0.810	0.63 U	0.656 U
SILVER	MG/KG	1.2 U	1.11 U	1.12 U	1.13 U	1.20 U	1.10 U	1.11 U	1.11 U	1.28 U	1.3 U	1.31 U
THALLIUM	MG/KG	1.2 U	1.11 U	1.12 U	1.13 U	1.20 U	1.10 U	1.11 U	1.11 U	1.28 U	1.3 U	1.31 U
ZINC	MG/KG	70.4	48.1	138	844	70.0	53.5	53.0	45.9	62.6	63.1	57.1
VANADIUM	MG/KG	16.5	11.8	19.3	35.9	16.1	16.9	16.1	17.1	18.9	17.5	16.0
COBALT	MG/KG	9.4	6.43	7.11	14.6	6.82	7.18	6.67	7.20	9.95	9.8	8.66
TIN	MG/KG	60.9 U	55.4 U	56.2 U	137	60.0 U	55.0 U	55.7 U	55.5 U	63.9 U	65.3 U	65.6 U
MERCURY	MG/KG	0.06 U	0.0554 U	0.124	0.103	0.0617	0.0636	0.0557 U	0.0555 U	0.0639 U	0.06 U	0.0656 U
ARSENIC	MG/KG	5.4	4.54	8.93	32.1	7.02	5.06	7.28	6.63	5.40	6.5	5.84
ACETONE	UG/KG	25 U	22 U	22 U	23 U	24 U	22 U	22 U	22 U	26 U	26 U	26 U
BENZENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
BROMODICHLOROMETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
BROMOFORM	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
BROMOMETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
2-BUTANONE (MEK)	UG/KG	12 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	13 U	13 U	13 U
CARBON DISULFIDE	UG/KG	12 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	13 U	1.4 J	13 U
CARBON TETRACHLORIDE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
CHLOROBENZENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
CHLOROETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
CHLOROFORM	UG/KG	1.5 J	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
CHLOROMETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
DIBROMOCHLOROMETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
DICHLORODIFLUOROMETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,1-DICHLOROETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,2-DICHLOROETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,1-DICHLOROETHENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
CIS-1,2-DICHLOROETHENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TRANS-1,2-DICHLOROETHENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,2-DICHLOROPROPANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
CIS-1,3-DICHLOROPROPENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
ETHYLBENZENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
FREON 113	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
2-HEXANONE	UG/KG	12 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	13 U	13 U	13 U
METHYLENE CHLORIDE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
4-METHYL-2-PENTANONE (MIBK)	UG/KG	12 U	11 U	11 U	11 U	12 U	11 U	11 U	11 U	13 U	13 U	13 U
STYRENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TETRACHLOROETHENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TOLUENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,1,1-TRICHLOROETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
1,1,2-TRICHLOROETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TRICHLOROETHENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TRICHLOROFLUOROMETHANE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
VINYL CHLORIDE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
O-XYLENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
M+P-XYLENE	UG/KG	6.2 U	5.5 U	5.6 U	5.7 U	6.0 U	5.5 U	5.6 U	5.5 U	6.4 U	6.5 U	6.6 U
TOTAL CYANIDE	MG/KG	1.23 U	1.11 U	1.12 U	1.13 U	1.20 U	1.10 U	1.11 U	1.11 U	1.28 U	1.31 U	1.31 U

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Table 4: Soil Samples Collected in September

sample location		B47	B48	B49	B46	B47	B48	B49	B50	B50	B51	B52
depth		surface	surface	surface	8-10 ft	3-5 ft	0.5-2.5 ft	0.5-2.5 ft	0.5-2.5 ft	4-7 ft	0.5-2.5 ft	0.5-2.5 ft
sample #			B23435	B23436	B23437	B23438	B23439	B23440	B23441	B23442	B23443	B23444
sample collected		09/13/00	########	########	########	########	########	########	09/13/00	########	########	########
ACENAPHTHENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
ACENAPHTHYLENE	UG/KG	440	440 U	410 U	340 U	360 U	380 U	630	370 U	370 U	2800	360 U
ANTHRACENE	UG/KG	370 J	440 U	410 U	340 U	360 U	380 U	530	370 U	370 U	1800 U	360 U
BENZO(A)ANTHRACENE	UG/KG	1100	440 U	410 U	340 U	360 U	380 U	1300	370 U	370 U	4400	360 U
BENZO(A)PYRENE	UG/KG	1400	440 U	410 U	340 U	360 U	380 U	1600	370 U	370 U	5400	360 U
BENZO(B)FLUORANTHENE	UG/KG	1100	440 U	410 U	340 U	360 U	380 U	1300	370 U	370 U	5200	360 U
BENZO(G,H,I)PERYLENE	UG/KG	1200	440 U	410 U	340 U	360 U	380 U	2000	370 U	370 U	4900	360 U
BENZO(K)FLUORANTHENE	UG/KG	1100	440 U	410 U	340 U	360 U	380 U	1500	370 U	370 U	4600	360 U
BENZYL ALCOHOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
BUTYL BENZYL PHTHALATE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
DI-N-BUTYLPHTHALATE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
CARBAZOLE	UG/KG	54 J	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
INDENO(1,2,3-CD)PYRENE	UG/KG	1000	440 U	410 U	340 U	360 U	380 U	1500	370 U	370 U	4000	360 U
4-CHLOROANILINE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
BIS(-2-CHLOROETHOXY)METHANE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
BIS(2-CHLOROETHYL)ETHER	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2-CHLORONAPHTHALENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2-CHLOROPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
CHRYSENE	UG/KG	1300	440 U	410 U	340 U	360 U	380 U	1300	370 U	370 U	5100	360 U
DIBENZO(A,H)ANTHRACENE	UG/KG	360 J	440 U	410 U	340 U	360 U	380 U	480	370 U	370 U	1800 U	360 U
DIBENZOFURAN	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
1,3-DICHLOROBENZENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
1,2-DICHLOROBENZENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
1,4-DICHLOROBENZENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
3,3'-DICHLOROBENZIDINE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,4-DICHLOROPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
DIETHYLPHTHALATE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
DIMETHYL PHTHALATE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,4-DIMETHYLPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,4-DINITROPHENOL	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U
2,4-DINITROTOLUENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,6-DINITROTOLUENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
FLUORANTHENE	UG/KG	1300	440 U	410 U	340 U	360 U	380 U	2500	370 U	370 U	5900	360 U
FLUORENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
HEXACHLOROBENZENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
HEXACHLOROBUTADIENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
HEXACHLOROETHANE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
ISOPHORONE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2-METHYLNAPHTHALENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U
4-CHLORO-3-METHYLPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2-METHYLPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
4-METHYLPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
NAPHTHALENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	610	370 U	370 U	1800 U	360 U
2-NITROANILINE	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U
3-NITROANILINE	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U
4-NITROANILINE	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B47 surface 09/13/00	B48 surface B23435 ########	B49 surface B23436 ########	B46 8-10 ft B23437 ########	B47 3-5 ft B23438 ########	B48 0.5-2.5 ft B23439 ########	B49 0.5-2.5 ft B23440 ########	B50 0.5-2.5 ft B23441 09/13/00	B50 4-7 ft B23442 ########	B51 0.5-2.5 ft B23443 ########	B52 0.5-2.5 ft B23444 ########
NITROBENZENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2-NITROPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
4-NITROPHENOL	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U
N-NITROSODIMETHYLAMINE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
N-NITROSODIPHENYLAMINE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
DI-N-OCTYL PHTHALATE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
PENTACHLOROPHENOL	UG/KG	2200 U	2300 U	2100 U	1800 U	1800 U	2000 U	1900 U	1900 U	1900 U	9300 U	1800 U
PHENANTHRENE	UG/KG	280 J	440 U	410 U	340 U	360 U	380 U	1200	370 U	370 U	1800 U	360 U
PHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
4-BROMOPHENYL-PHENYLETHER	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
4-CHLOROPHENYL-PHENYLETHER	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
PYRENE	UG/KG	1600	440 U	410 U	340 U	360 U	380 U	1900	370 U	370 U	8600	360 U
1,2,4-TRICHLOROBENZENE	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,4,6-TRICHLOROPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
2,4,5-TRICHLOROPHENOL	UG/KG	430 U	440 U	410 U	340 U	360 U	380 U	380 U	370 U	370 U	1800 U	360 U
ALDRIN	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
ALPHA-BHC	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
BETA-BHC	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
DELTA-BHC	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
GAMMA-BHC (LINDANE)	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
ALPHA-CHLORDANE	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
GAMMA-CHLORDANE	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
4,4'-DDD	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
4,4'-DDE	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
4,4'-DDT	UG/KG	4.3 U	44 U	41 U	3.4 U	3.6 U	38 U	38 U	3.7 U	3.7 U	36 U	36 U
DIELDRIN	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
ALPHA-ENDOSULFAN	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
BETA-ENDOSULFAN	UG/KG	4.3 U	44 U	41 U	3.4 U	3.6 U	38 U	38 U	3.7 U	3.7 U	36 U	36 U
ENDOSULFAN SULFATE	UG/KG	4.3 U	44 U	41 U	3.4 U	3.6 U	38 U	38 U	3.7 U	3.7 U	36 U	36 U
ENDRIN	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
ENDRIN ALDEHYDE	UG/KG	4.3 U	44 U	41 U	3.4 U	3.6 U	38 U	38 U	3.7 U	3.7 U	36 U	36 U
ENDRIN KETONE	UG/KG	4.3 U	44 U	41 U	3.4 U	3.6 U	38 U	38 U	3.7 U	3.7 U	36 U	36 U
HEPTACHLOR	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
HEPTACHLOR EPOXIDE	UG/KG	2.2 U	23 U	21 U	1.8 U	1.8 U	20 U	19 U	1.9 U	1.9 U	19 U	18 U
METHOXYCHLOR	UG/KG	8.7 U	88 U	82 U	6.8 U	7.1 U	76 U	76 U	7.5 U	7.5 U	72 U	72 U
TOXAPHENE	UG/KG	43 U	440 U	410 U	34 U	36 U	380 U	380 U	37 U	37 U	360 U	360 U
PCB 1016	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
PCB 1221	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
PCB 1232	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
PCB 1242	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
PCB 1248	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
PCB 1254	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
PCB 1260	UG/KG	43 U	44 U	41 U	34 U	36 U	38 U	38 U	37 U	37 U	36 U	36 U
ANTIMONY	MG/KG	1.3 IN	1.33 U	1.25 U	1.04 U	1.08 U	1.16 U	1.15 U	1.1 UN	1.13 U	1.09 U	1.08 U
BARIUM	MG/KG	125 *	115	106	34.1	26.8	58.5	213	112 *	65.9	98.9	61.2
BERYLLIUM	MG/KG	0.65 U	0.664 U	0.688	0.518 U	0.539 U	0.578 U	1.03	0.57 U	0.566 U	0.545 U	0.542 U
CADMIUM	MG/KG	0.65 U	0.664 U	0.624 U	0.518 U	0.539 U	0.578 U	0.573 U	0.57 U	0.566 U	0.545 U	0.542 U
CHROMIUM	MG/KG	16.6	14.6	16.9	6.26	6.70	8.02	11.8	13.9	9.17	10.1	12.1
COPPER	MG/KG	16.3 *N	13.8	17.4	16.5	16.8	8.18	39.1	42.7 *N	24.5	28.6	30.3

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Table 4: Soil Samples Collected in September

sample location		B47	B48	B49	B46	B47	B48	B49	B50	B50	B51	B52
depth		surface	surface	surface	8-10 ft	3-5 ft	0.5-2.5 ft	0.5-2.5 ft	0.5-2.5 ft	4-7 ft	0.5-2.5 ft	0.5-2.5 ft
sample #			B23435	B23436	B23437	B23438	B23439	B23440	B23441	B23442	B23443	B23444
sample collected		09/13/00	########	########	########	########	########	########	09/13/00	########	########	########
LEAD	MG/KG	18.3	17.5	18.6	9.84	6.15	8.15	179	22.2	7.97	14.8	10.5
NICKEL	MG/KG	20.1	18.6	21.8	12.0	12.9	12.0	24.1	20.6	15.4	17.2	19.6
SELENIUM	MG/KG	0.63 U	0.883	0.840	0.518 U	0.539 U	0.578 U	0.647	0.57 U	0.680	0.618	0.777
SILVER	MG/KG	1.3 U	1.33 U	1.25 U	1.04 U	1.08 U	1.16 U	1.15 U	1.1 U	1.13 U	1.09 U	1.08 U
THALLIUM	MG/KG	1.3 U	1.33 U	1.25 U	1.04 U	1.08 U	1.16 U	1.15 U	1.1 U	1.13 U	1.09 U	1.08 U
ZINC	MG/KG	63	55.8	70.8	41.5	98.8	39.4	164	63.2	61.5	69.7	61.8
VANADIUM	MG/KG	16	18.1	19.4	11.1	11.6	14.2	22.9	16.9	14.3	16.1	17.4
COBALT	MG/KG	9.1	9.16	10.3	5.78	5.59	5.78 U	10.6	9.5	6.48	7.79	9.08
TIN	MG/KG	65.1 U	66.4 U	62.4 U	51.8 U	53.9 U	57.8 U	57.3 U	56.8 U	56.6 U	54.5 U	54.2 U
MERCURY	MG/KG	0.06 U	0.0664 U	0.132	0.0518 U	0.0539 U	0.0578 U	0.294	0.05 U	0.0566 U	0.0545 U	0.0542 U
ARSENIC	MG/KG	5.7	5.83	5.62	4.51	5.22	4.07	5.22	6.1	6.46	7.76	8.28
ACETONE	UG/KG	26 U	27 U	25	21 U	22 U	23 U	23 U	8.7 J	23 U	22 U	22 U
BENZENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
BROMODICHLOROMETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
BROMOFORM	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
BROMOMETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
2-BUTANONE (MEK)	UG/KG	13 U	13 U	12 U	10 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
CARBON DISULFIDE	UG/KG	13 U	13 U	12 U	10 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
CARBON TETRACHLORIDE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
CHLOROBENZENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
CHLOROETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
CHLOROFORM	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
CHLOROMETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
DIBROMOCHLOROMETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
DICHLORODIFLUOROMETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,1-DICHLOROETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,2-DICHLOROETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,1-DICHLOROETHENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
CIS-1,2-DICHLOROETHENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TRANS-1,2-DICHLOROETHENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,2-DICHLOROPROPANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
CIS-1,3-DICHLOROPROPENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
ETHYLBENZENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
FREON 113	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
2-HEXANONE	UG/KG	13 U	13 U	12 U	10 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
METHYLENE CHLORIDE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
4-METHYL-2-PENTANONE (MIBK)	UG/KG	13 U	13 U	12 U	10 U	11 U	12 U	11 U	11 U	11 U	11 U	11 U
STYRENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TETRACHLOROETHENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TOLUENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,1,1-TRICHLOROETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
1,1,2-TRICHLOROETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TRICHLOROETHENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TRICHLOROFLUOROMETHANE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	32	5.4 U
VINYL CHLORIDE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
O-XYLENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
M+P-XYLENE	UG/KG	6.6 U	6.6 U	6.2 U	5.2 U	5.4 U	5.8 U	5.7 U	5.7 U	5.7 U	5.5 U	5.4 U
TOTAL CYANIDE	MG/KG	1.32 U	1.33 U	1.25 U	1.04 U	1.08 U	1.16 U	1.15 U	1.14 U	1.13 U	1.09 U	1.08 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B52 4-6 ft B23445 ########	B50 surface B23446 ########	B51 surface B23447 ########	B52 surface B23448 09/13/00	B53 surface B23449 ########	B54 surface B23450 ########	B55 surface B23451 09/13/00	B53 0.5-2.5 ft B23452 ########	B54 0.5-2.5 ft B23453 ########	B54 4-6 ft B23454 ########	B55 0.5-2.5 ft B23455 ########
ACENAPHTHENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
ACENAPHTHYLENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
ANTHRACENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
BENZO(A)ANTHRACENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	780
BENZO(A)PYRENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	880
BENZO(B)FLUORANTHENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	800
BENZO(G,H,I)PERYLENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	710
BENZO(K)FLUORANTHENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	720
BENZYL ALCOHOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
BUTYL BENZYL PHTHALATE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
DI-N-BUTYLPHTHALATE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
CARBAZOLE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
INDENO(1,2,3-CD)PYRENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	650
4-CHLOROANILINE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
BIS(-2-CHLOROETHOXY)METHANE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
BIS(2-CHLOROETHYL)ETHER	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2-CHLORONAPHTHALENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2-CHLOROPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
CHRYSENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	56 J	360 U	2100	380 U	940
DIBENZO(A,H)ANTHRACENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
DIBENZOFURAN	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
1,3-DICHLOROBENZENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
1,2-DICHLOROBENZENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
1,4-DICHLOROBENZENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
3,3'-DICHLOROBENZIDINE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,4-DICHLOROPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
DIETHYLPHTHALATE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
DIMETHYL PHTHALATE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,4-DIMETHYLPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,4-DINITROPHENOL	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U
2,4-DINITROTOLUENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,6-DINITROTOLUENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	910
FLUORANTHENE	UG/KG	360 U	420 U	370 U	49 J	440 U	440 U	67 J	360 U	2900	380 U	1800
FLUORENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
HEXACHLOROBENZENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
HEXACHLOROBUTADIENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
HEXACHLOROETHANE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
ISOPHORONE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2-METHYLNAPHTHALENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U
4-CHLORO-3-METHYLPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2-METHYLPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
4-METHYLPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
NAPHTHALENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2-NITROANILINE	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U
3-NITROANILINE	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U
4-NITROANILINE	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B52 4-6 ft B23445 ########	B50 surface B23446 ########	B51 surface B23447 ########	B52 surface B23448 09/13/00	B53 surface B23449 ########	B54 surface B23450 ########	B55 surface B23451 09/13/00	B53 0.5-2.5 ft B23452 ########	B54 0.5-2.5 ft B23453 ########	B54 4-6 ft B23454 ########	B55 0.5-2.5 ft B23455 ########
NITROBENZENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2-NITROPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
4-NITROPHENOL	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U
N-NITROSODIMETHYLAMINE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
N-NITROSODIPHENYLAMINE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
DI-N-OCTYL PHTHALATE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
PENTACHLOROPHENOL	UG/KG	1800 U	2200 U	1900 U	2400 U	2300 U	2300 U	2400 U	1900 U	10000 U	2000 U	1900 U
PHENANTHRENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	3200	380 U	500
PHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
4-BROMOPHENYL-PHENYLETHER	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
4-CHLOROPHENYL-PHENYLETHER	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
PYRENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	61 J	360 U	2100	380 U	1500
1,2,4-TRICHLOROBENZENE	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,4,6-TRICHLOROPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
2,4,5-TRICHLOROPHENOL	UG/KG	360 U	420 U	370 U	460 U	440 U	440 U	460 U	360 U	1900 U	380 U	380 U
ALDRIN	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
ALPHA-BHC	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
BETA-BHC	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
DELTA-BHC	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
GAMMA-BHC (LINDANE)	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
ALPHA-CHLORDANE	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
GAMMA-CHLORDANE	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
4,4'-DDD	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
4,4'-DDE	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
4,4'-DDT	UG/KG	3.6 U	42 U	3.7 U	4.6 U	4.4 U	4.4 U	4.6 U	3.6 U	3.9 U	3.8 U	3.8 U
DIELDRIN	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
ALPHA-ENDOSULFAN	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
BETA-ENDOSULFAN	UG/KG	3.6 U	42 U	3.7 U	4.6 U	4.4 U	4.4 U	4.6 U	3.6 U	3.9 U	3.8 U	3.8 U
ENDOSULFAN SULFATE	UG/KG	3.6 U	42 U	3.7 U	4.6 U	4.4 U	4.4 U	4.6 U	3.6 U	3.9 U	3.8 U	3.8 U
ENDRIN	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
ENDRIN ALDEHYDE	UG/KG	3.6 U	42 U	3.7 U	4.6 U	4.4 U	4.4 U	4.6 U	3.6 U	3.9 U	3.8 U	3.8 U
ENDRIN KETONE	UG/KG	3.6 U	42 U	3.7 U	4.6 U	4.4 U	4.4 U	4.6 U	3.6 U	3.9 U	3.8 U	3.8 U
HEPTACHLOR	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
HEPTACHLOR EPOXIDE	UG/KG	1.8 U	22 U	1.9 U	2.4 U	2.3 U	2.3 U	2.4 U	1.9 U	2.0 U	2.0 U	1.9 U
METHOXYCHLOR	UG/KG	7.1 U	84 U	7.4 U	9.1 U	8.8 U	8.9 U	9.2 U	7.2 U	7.7 U	7.6 U	7.5 U
TOXAPHENE	UG/KG	36 U	420 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1016	UG/KG	36 U	42 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1221	UG/KG	36 U	42 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1232	UG/KG	36 U	42 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1242	UG/KG	36 U	42 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1248	UG/KG	36 U	150	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1254	UG/KG	36 U	42 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
PCB 1260	UG/KG	36 U	42 U	37 U	46 U	44 U	44 U	46 U	36 U	39 U	38 U	38 U
ANTIMONY	MG/KG	1.08 U	1.27 U	1.12 U	1.3 UN	1.33 U	1.35 U	1.3 UN	1.10 U	1.17 U	1.15 U	1.14 U
BARIUM	MG/KG	24.3	121	36.8	144 *	92.3	133	124 *	51.3	112	47.1	94.4
BERYLLIUM	MG/KG	0.538 U	0.635 U	0.558 U	0.66 U	0.666 U	0.673 U	0.67 U	0.549 U	0.587 U	0.575 U	0.570 U
CADMIUM	MG/KG	0.538 U	0.635 U	0.558 U	0.66 U	0.770	0.907	0.67 U	0.549 U	0.587 U	0.575 U	0.570 U
CHROMIUM	MG/KG	4.63	16.9	13.2	37.9	58.2	91.4	39.5	6.77	11.0	7.77	8.30
COPPER	MG/KG	12.6	18.7	7.38	19.2 *N	22.4	23.1	19.8 *N	12.1	12.8	16.1	27.7

Table 4: Soil Samples Collected in September

sample location		B52	B50	B51	B52	B53	B54	B55	B53	B54	B54	B55
depth		4-6 ft	surface	surface	surface	surface	surface	surface	0.5-2.5 ft	0.5-2.5 ft	4-6 ft	0.5-2.5 ft
sample #		B23445	B23446	B23447	B23448	B23449	B23450	B23451	B23452	B23453	B23454	B23455
sample collected		########	########	########	09/13/00	########	########	09/13/00	########	########	########	########
LEAD	MG/KG	3.27	16.6	5.51	17.3	16.0	20.2	34	11.2	16.2	8.90	174
NICKEL	MG/KG	8.39	22.2	5.27	21.9	22.8	27.6	21.9	9.78	14.0	14.6	13.9
SELENIUM	MG/KG	1.40	1.57	0.558 U	0.66 U	1.62	1.47	0.7 U	0.67	0.68	1.56	1.60
SILVER	MG/KG	1.08 U	1.27 U	1.12 U	1.3 U	1.33 U	1.35 U	1.3 U	1.10 U	1.17 U	1.15 U	1.14 U
THALLIUM	MG/KG	1.08 U	1.27 U	1.12 U	1.3 U	1.33 U	1.35 U	1.4 U	1.10 U	1.17 U	1.15 U	1.14 U
ZINC	MG/KG	27.3	64.1	26.6	67.9	68.7	84.4	77.3	39.8	46.6	72.2	86.1
VANADIUM	MG/KG	7.84	17.9	27.6	17.6	16.6	19.9	16.5	10.7	16.4	11.7	14.7
COBALT	MG/KG	5.38 U	10.3	5.58 U	10.2	10.2	10.9	9.9	5.49 U	6.44	6.28	6.36
TIN	MG/KG	53.8 U	63.5 U	55.8 U	66.5 U	66.6 U	67.3 U	67.2 U	54.9 U	58.7 U	57.5 U	57.0 U
MERCURY	MG/KG	0.0538 U	0.0635 U	0.0558 U	0.07 U	0.0666 U	0.0673 U	0.236	0.0549 U	0.111	0.0575 U	0.112
ARSENIC	MG/KG	2.33	5.67	3.90	5.8	4.78	5.72	5.8	3.38	2.35	3.82	7.07
ACETONE	UG/KG	22 U	25 U	22 U	28 U	27 U	27 U	28 U	22 U	23 U	23 U	23 U
BENZENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
BROMODICHLOROMETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
BROMOFORM	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
BROMOMETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
2-BUTANONE (MEK)	UG/KG	11 U	13 U	11 U	14 U	13 U	13 U	14 U	11 U	12 U	11 U	11 U
CARBON DISULFIDE	UG/KG	11 U	13 U	11 U	14 U	13 U	13 U	14 U	11 U	12 U	11 U	11 U
CARBON TETRACHLORIDE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
CHLOROBENZENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
CHLOROETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
CHLOROFORM	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	8.3	5.5 U	5.9 U	5.7 U	5.7 U
CHLOROMETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
DIBROMOCHLOROMETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
DICHLORODIFLUOROMETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,1-DICHLOROETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,2-DICHLOROETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,1-DICHLOROETHENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
CIS-1,2-DICHLOROETHENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TRANS-1,2-DICHLOROETHENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,2-DICHLOROPROPANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
CIS-1,3-DICHLOROPROPENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
ETHYLBENZENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
FREON 113	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	1.7 J	5.5 U	5.9 U	5.7 U	5.7 U
2-HEXANONE	UG/KG	11 U	13 U	11 U	14 U	13 U	13 U	14 U	11 U	12 U	11 U	11 U
METHYLENE CHLORIDE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
4-METHYL-2-PENTANONE (MIBK)	UG/KG	11 U	13 U	11 U	14 U	13 U	13 U	14 U	11 U	12 U	11 U	11 U
STYRENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TETRACHLOROETHENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TOLUENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,1,1-TRICHLOROETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
1,1,2-TRICHLOROETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TRICHLOROETHENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TRICHLOROFLUOROMETHANE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
VINYL CHLORIDE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
O-XYLENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
M+P-XYLENE	UG/KG	5.4 U	6.3 U	5.6 U	6.9 U	6.7 U	6.7 U	7 U	5.5 U	5.9 U	5.7 U	5.7 U
TOTAL CYANIDE	MG/KG	1.08 U	1.27 U	1.12 U	1.38 U	1.33 U	1.35 U	1.4 U	1.10 U	1.17 U	1.15 U	1.14 U

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Table 4: Soil Samples Collected in September

sample location		B56	B57	B56	B57	B58	B58	B59	B59
depth		0.5-2.5 ft	0.5-2.5 ft	surface	surface	surface	0.5-2.5	surface	0.5-2.5
sample #		B23456	B23457	B23458	B23459	B23460	B23461	B23462	B23463
sample collected		########	########	########	09/13/00	########	########	########	########
ACENAPHTHENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
ACENAPHTHYLENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
ANTHRACENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BENZO(A)ANTHRACENE	UG/KG	350 U	400	420 U	400 U	380 U	380 U	390 U	360 U
BENZO(A)PYRENE	UG/KG	350 U	410	420 U	400 U	380 U	380 U	390 U	360 U
BENZO(B)FLUORANTHENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BENZO(G,H,I)PERYLENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BENZO(K)FLUORANTHENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BENZYL ALCOHOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BUTYL BENZYL PHTHALATE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
DI-N-BUTYLPHTHALATE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
CARBAZOLE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
INDENO(1,2,3-CD)PYRENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
4-CHLOROANILINE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BIS(-2-CHLOROETHOXY)METHANE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BIS(2-CHLOROETHYL)ETHER	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2-CHLORONAPHTHALENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2-CHLOROPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,2'-OXYBIS(1-CHLOROPROPANE)	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
CHRYSENE	UG/KG	350 U	390	420 U	400 U	380 U	380 U	390 U	360 U
DIBENZO(A,H)ANTHRACENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
DIBENZOFURAN	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
1,3-DICHLOROBENZENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
1,2-DICHLOROBENZENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
1,4-DICHLOROBENZENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
3,3'-DICHLOROBENZIDINE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,4-DICHLOROPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
DIETHYLPHTHALATE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
DIMETHYL PHTHALATE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,4-DIMETHYLPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,4-DINITROPHENOL	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U
2,4-DINITROTOLUENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,6-DINITROTOLUENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
BIS(2-ETHYLHEXYL)PHTHALATE	UG/KG	350 U	350 U	44 J	400 U	380 U	380 U	390 U	360 U
FLUORANTHENE	UG/KG	350 U	630	420 U	630	380 U	380 U	390 U	360 U
FLUORENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
HEXACHLOROBENZENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
HEXACHLOROBUTADIENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
HEXACHLOROCYCLOPENTADIENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
HEXACHLOROETHANE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
ISOPHORONE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2-METHYLNAPHTHALENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
4,6-DINITRO-2-METHYLPHENOL	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U
4-CHLORO-3-METHYLPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2-METHYLPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
4-METHYLPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
NAPHTHALENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2-NITROANILINE	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U
3-NITROANILINE	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U
4-NITROANILINE	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U

Southside High School Raw Data

Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B56 0.5-2.5 ft B23456 ########	B57 0.5-2.5 ft B23457 ########	B56 surface B23458 ########	B57 surface B23459 09/13/00	B58 surface B23460 ########	B58 0.5-2.5 B23461 ########	B59 surface B23462 ########	B59 0.5-2.5 B23463 ########
NITROBENZENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2-NITROPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
4-NITROPHENOL	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U
N-NITROSODIMETHYLAMINE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
N-NITROSODIPHENYLAMINE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
DI-N-OCTYL PHTHALATE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
PENTACHLOROPHENOL	UG/KG	1800 U	1800 U	2200 U	2100 U	1900 U	1900 U	2000 U	1800 U
PHENANTHRENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
PHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
4-BROMOPHENYL-PHENYLETHER	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
4-CHLOROPHENYL-PHENYLETHER	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
N-NITROSO-DI-N-PROPYLAMINE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
PYRENE	UG/KG	350 U	620	420 U	430	380 U	380 U	390 U	360 U
1,2,4-TRICHLOROBENZENE	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,4,6-TRICHLOROPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
2,4,5-TRICHLOROPHENOL	UG/KG	350 U	350 U	420 U	400 U	380 U	380 U	390 U	360 U
ALDRIN	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
ALPHA-BHC	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
BETA-BHC	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
DELTA-BHC	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
GAMMA-BHC (LINDANE)	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
ALPHA-CHLORDANE	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
GAMMA-CHLORDANE	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
4,4'-DDD	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
4,4'-DDE	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
4,4'-DDT	UG/KG	3.5 U	3.5 U	4.2 U	4 U	3.8 U	3.8 U	39 U	3.6 U
DIELDRIN	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
ALPHA-ENDOSULFAN	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
BETA-ENDOSULFAN	UG/KG	3.5 U	3.5 U	4.2 U	4 U	3.8 U	3.8 U	39 U	3.6 U
ENDOSULFAN SULFATE	UG/KG	3.5 U	3.5 U	4.2 U	4 U	3.8 U	3.8 U	39 U	3.6 U
ENDRIN	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
ENDRIN ALDEHYDE	UG/KG	3.5 U	3.5 U	4.2 U	4 U	3.8 U	3.8 U	39 U	3.6 U
ENDRIN KETONE	UG/KG	3.5 U	3.5 U	4.2 U	4 U	3.8 U	3.8 U	39 U	3.6 U
HEPTACHLOR	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
HEPTACHLOR EPOXIDE	UG/KG	1.8 U	1.8 U	2.2 U	2.1 U	1.9 U	1.9 U	20 U	1.8 U
METHOXYCHLOR	UG/KG	6.9 U	6.9 U	8.5 U	8 U	7.5 U	7.5 U	79 U	7.2 U
TOXAPHENE	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	390 U	36 U
PCB 1016	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	39 U	36 U
PCB 1221	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	39 U	36 U
PCB 1232	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	39 U	36 U
PCB 1242	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	39 U	36 U
PCB 1248	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	39 U	36 U
PCB 1254	UG/KG	35 U	35 U	42 U	40 U	38 U	38 U	39 U	36 U
PCB 1260	UG/KG	35 U	53	42 U	78	38 U	38 U	39 U	36 U
ANTIMONY	MG/KG	1.05 U	1.05 U	1.29 U	1.2 UN	1.14 U	1.14 U	1.19 U	1.09 U
BARIUM	MG/KG	39.2	32.4	112	84.2 *	43.4	98.9	109	68.8
BERYLLIUM	MG/KG	0.524 U	0.526 U	0.644 U	0.58 U	0.571 U	0.569 U	0.652	0.544 U
CADMIUM	MG/KG	0.524 U	0.526 U	0.654	0.58	0.630	0.569 U	0.597 U	0.544 U
CHROMIUM	MG/KG	7.01	7.45	51.2	39.1	15.9	10.4	19.2	9.71
COPPER	MG/KG	20.2	26.6	18.3	19.3 *N	8.07	28.4	19.3	21.8

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Table 4: Soil Samples Collected in September

sample location depth sample # sample collected		B56 0.5-2.5 ft B23456 ########	B57 0.5-2.5 ft B23457 ########	B56 surface B23458 ########	B57 surface B23459 09/13/00	B58 surface B23460 ########	B58 0.5-2.5 B23461 ########	B59 surface B23462 ########	B59 0.5-2.5 B23463 ########
LEAD	MG/KG	5.79	13.3	17.0	20.2	5.06	16.6	16.2	9.82
NICKEL	MG/KG	12.6	13.7	20.1	21.6	5.62	14.7	24.8	17.6
SELENIUM	MG/KG	0.717	0.526 U	1.18	0.59 U	0.967	1.22	0.962	0.959
SILVER	MG/KG	1.05 U	1.05 U	1.29 U	1.2 U	1.14 U	1.14 U	1.19 U	1.09 U
THALLIUM	MG/KG	1.05 U	1.05 U	1.29 U	1.2 U	1.14 U	1.14 U	1.19 U	1.09 U
ZINC	MG/KG	66.0	76.7	67.4	66	25.5	72.1	67.5	62.5
VANADIUM	MG/KG	11.0	11.1	14.7	17	33.4	19.2	20.5	18.6
COBALT	MG/KG	5.51	5.99	9.06	9.2	6.32	6.94	10.0	7.88
TIN	MG/KG	52.4 U	52.6 U	64.4 U	58.1 U	57.1 U	56.9 U	59.7 U	54.4 U
MERCURY	MG/KG	0.0524 U	0.0526 U	0.0644 U	0.06 U	0.0571 U	0.0658	0.0597 U	0.0544 U
ARSENIC	MG/KG	3.86	3.05	4.76	5.3	5.23	4.91	5.36	6.76
ACETONE	UG/KG	21 U	21 U	26 U	24 U	23 U	23 U	24 U	22 U
BENZENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
BROMODICHLOROMETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
BROMOFORM	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
BROMOMETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
2-BUTANONE (MEK)	UG/KG	10 U	11 U	13 U	12 U	11 U	11 U	12 U	11 U
CARBON DISULFIDE	UG/KG	10 U	11 U	13 U	12 U	11 U	11 U	12 U	11 U
CARBON TETRACHLORIDE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
CHLOROBENZENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
CHLOROETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
CHLOROFORM	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
CHLOROMETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
DIBROMOCHLOROMETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
DICHLORODIFLUOROMETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,1-DICHLOROETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,2-DICHLOROETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,1-DICHLOROETHENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
CIS-1,2-DICHLOROETHENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
TRANS-1,2-DICHLOROETHENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,2-DICHLOROPROPANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
CIS-1,3-DICHLOROPROPENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
TRANS-1,3-DICHLOROPROPENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
ETHYLBENZENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
FREON 113	UG/KG	5.2 U	5.3 U	6.4 U	2.3 J	5.7 U	5.7 U	6.0 U	5.4 U
2-HEXANONE	UG/KG	10 U	11 U	13 U	12 U	11 U	11 U	12 U	11 U
METHYLENE CHLORIDE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
4-METHYL-2-PENTANONE (MIBK)	UG/KG	10 U	11 U	13 U	12 U	11 U	11 U	12 U	11 U
STYRENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,1,2,2-TETRACHLOROETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
TETRACHLOROETHENE	UG/KG	5.2 U	5.3 U	6.4 U	1.8 J	5.7 U	5.7 U	6.0 U	5.4 U
TOLUENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,1,1-TRICHLOROETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
1,1,2-TRICHLOROETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
TRICHLOROETHENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
TRICHLOROFLUOROMETHANE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
VINYL CHLORIDE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
O-XYLENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
M+P-XYLENE	UG/KG	5.2 U	5.3 U	6.4 U	6 U	5.7 U	5.7 U	6.0 U	5.4 U
TOTAL CYANIDE	MG/KG	1.05 U	1.05 U	1.29 U	1.21 U	1.14 U	1.14 U	1.19 U	1.09 U

Appendix E
Tables

Table 1

Sampling Results, Typical Background Levels and Public Health Assessment Comparison Values for Chemicals Detected in Surface Soil at the Southside High School Property

[All values in milligrams per kilogram (mg/kg)]

Chemicals	Range of Detection	Frequency of Detection	Typical Background Level*	Comparison Values**			
				Noncancer	Basis***	Cancer	Basis***
Metals							
antimony	1.16 - 1.7	4/52	< 1 - 2	77	EPA RfD	none	none
arsenic	3.2 - 7.0	52/52	2 - 20	58	EPA RfD	1.65	EPA CPF
barium	36.8 - 144	52/52	200 - 400	14,000	EPA RfD	none	none
beryllium	0.59 - 0.69	5/52	< 1 - 1.5	390	EPA RfD	none	none
cadmium	0.58 - 0.91	8/52	< 0.5 - 1.5	140	NYS RfG	none	none
chromium	5.8 - 107	52/52	10 - 60	580	EPA RfD	none	none
cobalt	6.3 - 10.9	51/52	3 - 15	12,000	EPA PV	none	none
copper	6.8 - 862	52/52	2 - 40	7,700	HEAST	none	none
lead	5.1 - 78.6	52/52	10 - 300	400	NYS RfG	none	none
mercury	0.062 - 0.24	14/52	0.01- 0 1.0	58	EPA RfD	none	none
nickel	5.3 - 31.4	52/52	<5 - 25	3,900	EPA RfD	none	none
selenium	0.73 - 1.64	23/52	< 0.1 - 1	970	EPA RfD	none	none
vanadium	6.6 - 33.4	52/52	30 - 70	1,400	HEAST	none	none
zinc	25.5 - 151	52/52	20 - 200	58,000	EPA	none	none

Table 1 (continued) Chemicals	Range of Detection	Frequency of Detection	Typical Background Level*	Comparison Values**			
				Noncancer	Basis***	Cancer	Basis***
Volatile Organic Chemicals							
acetone	0.0066 - 0.025	4/66	not available	19,000	EPA	none	none
carbon disulfide	0.0014	1/66	not available	19,000	EPA	none	none
chloroform	0.0013 - 0.0083	12/66	not available	1,900	EPA RfD	405	EPA CPF
freon 113	0.0014 - 0.0027	4/48	not available	58,000	EPA RfD	none	none
methylene chloride	0.0032	1/66	not available	12,000	EPA RfD	330	EPA CPF
tetrachloroethene	0.0011 - 0.082	26/66	not available	1,900	EPA RfD	47.6	EPA PV
trichloroethene	0.0016 - 0.0019	2/66	not available	1,900	EPA RfD	225	EPA PV
Semivolatile Organic Chemicals/Pesticides/Polychlorinated Biphenyls							
acenaphthylene	0.044 - 0.44	2/55	--[a]	12,000	--[b]	none	none
anthracene	0.093 - 0.37	2/55	--[a]	58,000	EPA RfD	none	none
Aroclor 1248	0.023 - 2.8	23/55	< 0.01 - 0.04[c]	3.9	--[d]	1.2	US EPA
Aroclor 1260	0.054 - 0.25	11/55	< 0.01 - 0.04[c]	3.9	--[d]	5.0	US EPA
benz(a)anthracene	0.059 - 1.1	7/55	--[e]	5,800	--[f]	2.5	--[g]
benzo(a)pyrene	0.041 - 1.4	11/55	--[e]	5,800	--[f]	0.25	NYS CPF
benzo(b)fluoranthene	0.041 - 1.1	12/55	--[e]	5,800	--[f]	2.5	--[g]
benzo(g,h,i)perylene	0.04 - 1.2	11/55	--[a]	5,800	--[f]	none	none
benzo(k)fluoranthene	0.039 - 1.1	10/55	--[e]	5,800	--[f]	25	--[g]
bis(2-ethylhexyl)phthalate	0.04 - 0.92	12/55	not available	3,900	EPA RfD	177	EPA CPF

Table 1 (continued) Chemicals	Range of Detection	Frequency of Detection	Typical Background Level*	Comparison Values**			
				Noncancer	Basis***	Cancer	Basis***
carbazole	0.054	1/55	not available	none	none	120	HEAST
chrysene	0.045 - 1.3	16/55	--[e]	5,800	--[f]	25	--[g]
dibenz(a,h)anthracene	0.043 - 0.36	4/55	--[e]	5,800	--[f]	0.25	--[g]
dibenzofuran	0.66	1/55	not available	770	EPA PV	none	none
di-n-butylphthalate	0.044 - 0.12	3/55	not available	19,000	EPA RfD	none	none
dieldrin	0.029	1/54	0.001 - 0.05[h]	10	EPA RfD	0.065	NYS CPF
fluoranthene	0.045 - 1.3	24/55	--[a]	7,700	EPA RfD	none	none
indeno(1,2,3-cd)pyrene	0.061 - 1.0	8/55	--[e]	5,800	--[f]	2.5	--[g]
2-methylnaphthalene	1.9	1/55	not available	3,900	--[i]	none	none
naphthalene	1.8	1/55	not available	3,900	EPA RfD	none	none
phenanthrene	0.048 - 1.4	8/55	--[a]	5,800	--[f]	none	none
pyrene	0.042 - 1.6	21/55	--[a]	5,800	EPA RfD	none	none
total PAHs (calculated)	0.042 - 12.6	25/55	1 - 13[a]	not deter.	not deter.	not deter.	not deter.
total carcinogenic PAHs (calculated)	0.046 - 7.4	16/55	1 - 3[e]	not deter.	not deter.	not deter.	not deter.

Data based upon soil samples collected by New York State Department of Environmental Conservation in May through September, 2000.

Table 1 (continued)

* **References:**

Clarke, L., C. Hudson, G. Lacetti, W. Stone and B. Ungerman. 1985. Study of metal concentrations in soil and surface sand of seven New York counties. Albany: New York State Department of Health, Bureau of Toxic Substance Assessment. September, 1985.

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** Noncancer comparison values assume a 13.2 kg child ingests 80 milligrams of soil per day, 5 days per week, 6 months per year and 40 milligrams of indoor dust with an outdoor soil source per day, 7 days per week, 12 months per year. Cancer comparison values assume an average body weight of 47.7 kg for the first 30 years of a 70 year lifetime and an average lifetime soil ingestion rate of 19.3 milligrams per day.

*** EPA CPF:	United States Environmental Protection Agency Cancer Potency Factor
EPA HEAST:	United States Environmental Protection Agency Health Effects Assessment Summary Tables
EPA PV:	Provisional value from United States Environmental Protection Agency Superfund Technical Support Center. National Center for Environmental Assessment
EPA RfD:	United States Environmental Protection Agency Reference Dose
NYS CPF:	New York State Department of Health Cancer Potency Factor
NYS RfG:	New York State Department of Health Risk Reference Guideline
US EPA:	United States Environmental Protection Agency. 1996. PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures. National Center for Environmental Assessment. Office of Research and development. Washington, DC

Table 1 (continued)

[a] No information available for individual PAHs. Refer to reported background level for total PAHs of 1-13 mg/kg (Edwards, 1983).

[b] Based on acenaphthene RfD.

[c] Total PCBs; Agency for Toxic Substances and Disease Registry (ATSDR), 1997.

[d] Based on Aroclor 1254 RfD.

[e] No information available for individual PAHs. Refer to reported background level for total carcinogenic PAHs of 1-3 mg/kg (Menzie, et al., 1992).

[f] The oral reference dose for pyrene may be used as a possible surrogate for polycyclic aromatic hydrocarbons (PAHs) that do not have a chemical specific reference dose.

[g] The relative potency factors applied to carcinogenic PAHs other than benzo(a)pyrene are: 0.1 for benz(a)anthracene, 0.1 for benzo(b)fluoranthene, 0.01 for benzo(k)fluoranthene, 0.01 for chrysene, 1.0 for dibenz(a,h)anthracene and 0.1 for indeno(1,2,3-cd)pyrene.

[h] Agency for Toxic Substances and Disease Registry. 1993. Toxicological Profile for Aldrin/Dieldrin. US Department of Health and Human Services. Public Health Service. Atlanta, Georgia.

[i] Based on naphthalene RfD.

Table 2
Sampling Results for Chemicals Detected in Shallow and Deep Subsurface Soil at the Southside High School Property
[All values in milligrams per kilogram (mg/kg)]

	Shallow Subsurface (< 4 ft)		Deep Subsurface (> 4 ft)	
Chemicals	Range of Detection	Frequency of Detection	Range of Detection	Frequency of Detection
Metals				
antimony	1.4 - 4.5	6/60	1.2	1/23
arsenic	2.4 - 56.2	60/60	2.3 - 13	23/23
barium	26.8 - 486	60/60	21.6 - 611	23/23
beryllium	0.57 - 1.12	9/60	0.95	1/23
cadmium	0.61 - 1.1	3/60	not detected	
chromium	6.2 - 134	60/60	4.6 - 23.5	23/23
cobalt	5.5 - 19	52/60	5.5 - 15.8	18/23
copper	8.2 - 4080	60/60	12.4 - 243	23/23
lead	5.5 - 3940	60/60	3.3 - 286	23/23
mercury	0.06 - 2.7	31/60	0.11 - 0.74	4/23
nickel	7.3 - 761	60/60	8.4 - 255	23/23
selenium	0.6 - 3.43	36/60	0.67 - 1.6	8/23
thallium	1.2	1/60	not detected	
tin	137	1/60	not detected	
vanadium	10.1 - 51.8	60/60	7.8 - 26.4	23/23
zinc	8.5 - 844	60/60	27.3 - 205	23/23

Table 2 (continued)	Shallow Subsurface (< 4 ft)		Deep Subsurface (> 4 ft)	
Chemicals	**Range of Detection**	**Frequency of Detection**	**Range of Detection**	**Frequency of Detection**
Volatile Organic Chemicals				
acetone	0.0064 - 0.17	6/63	0.0064 - 0.83	7/23
benzene	0.0013	1/63	not detected	
2-butanone	0.035	1/63	0.0018 - 0.19	6/23
carbon disulfide	0.0016 - 0.0036	5/63	0.0012 - 0.0034	3/23
chloroform	0.0013 - 0.0072	13/63	0.0012 - 0.006	7/23
1,2-dichloroethane	0.014	1/63	not detected	
cis-1,2-dichloroethene	0.0032 - 0.02	2/63	not detected	
2-hexanone	not detected		0.0038	1/23
methylene chloride	0.0011 - 0.0043	8/63	0.0012 - 0.0014	2/23
4-methyl-2-pentanone	not detected		0.0025	1/23
styrene	not detected		0.0013	1/23
tetrachloroethene	0.0016 - 0.075	26/63	0.0015 - 0.15	12/23
toluene	0.0014 - 0.01	3/63	not detected	
1,1,1-trichloroethane	0.0017 - 0.011	2/63	not detected	
1,1,2-trichloroethane	not detected		0.0037	1/23
trichloroethene	0.0014 - 110	24/63	0.0014 - 11	5/23
m+p-xylene	0.0013 - 0.0015	3/63	0.0096	1/23
o-xylene	0.0014	1/63	not detected	
total cyanide	1.78 - 13	3/58	1.35 - 47.5	7/23

Table 2 (continued)	Shallow Subsurface (< 4 ft)		Deep Subsurface (> 4 ft)	
Chemicals	Range of Detection	Frequency of Detection	Range of Detection	Frequency of Detection
Semivolatile Organic Chemicals/Pesticides/Polychlorinated Biphenyls				
acenaphthene	0.044 - 5.3	9/63	not detected	
acenaphthylene	0.039 - 26	14/63	0.06 - 0.22	2/23
anthracene	0.042 - 69	17/63	0.06 - 0.26	4/23
Aroclor 1248	0.015 - 160	31/62	0.046 - 74	6/23
Aroclor 1260	0.053 - 4.2	23/62	0.083 - 6.1	4/23
benz(a)anthracene	0.039 - 68	33/63	0.041 - 0.96	6/23
benzo(a)pyrene	0.051 - 57	31/63	0.042 - 1.3	5/23
benzo(b)fluoranthene	0.045 - 43	30/63	0.044 - 1.9	5/23
benzo(g,h,i)perylene	0.041 - 29	28/63	0.1 - 0.96	4/23
benzo(k)fluoranthene	0.039 - 40	29/63	0.043 - 1.2	5/23
beta-BHC	0.0068	1/60	not detected	
bis(2-ethylhexyl)phthalate	0.04 - 0.91	11/63	0.048 - 0.59	6/23
carbazole	0.042 - 7.3	9/63	0.18	1/23
chrysene	0.043 - 62	37/63	0.052 - 1.5	7/23
dibenz(a,h)anthracene	0.053 - 9.6	16/63	0.047 - 0.36	4/23
dibenzofuran	0.053 - 23	7/63	0.062	1/23
di-n-butylphthalate	0.037 - 0.11	6/63	0.053 - 0.14	5/23
1,2-dichlorobenzene	0.73	1/63	not detected	
dieldrin	0.019	1/60	not detected	
fluoranthene	0.045 - 190	38/63	0.042 - 1.1	6/23

Appendix F
New York State Department of Health Procedure
for Evaluating Potential Health Risks
for Contaminants of Concern

NYS DOH PROCEDURE FOR EVALUATING POTENTIAL HEALTH RISKS FOR CONTAMINANTS OF CONCERN

To evaluate the potential health risks from contaminants of concern associated with the Southside High School, the New York State Department of Health assessed the risks for cancer and noncancer health effects. The NYS DOH calculated health comparison values for these health effects, for each contaminant and exposure pathway of concern.

Increased cancer risks were estimated by using site-specific information on exposure levels for the contaminant of concern and interpreting them using cancer potency estimates derived for that contaminant by the US EPA or, in some cases, by the NYS DOH. The following qualitative ranking of cancer risk estimates, developed by the NYS DOH, was then used to rank the risk from very low to very high. For example, if the qualitative descriptor was "low", then the excess lifetime cancer risk from that exposure is in the range of greater than one per million to less than one per ten thousand. Other qualitative descriptors are listed below:

Excess Lifetime Cancer Risk

Risk Ratio	Qualitative Descriptor
equal to or less than one per million	very low
greater than one per million to less than one per ten thousand	low
one per ten thousand to less than one per thousand	moderate
one per thousand to less than one per ten	high
equal to or greater than one per ten	very high

An estimated increased excess lifetime cancer risk is not a specific estimate of expected cancers. Rather, it is a plausible upper bound estimate of the probability that a person may develop cancer sometime in his or her lifetime following exposure to that contaminant.

There is insufficient knowledge of cancer mechanisms to decide if there exists a level of exposure to a cancer-causing agent below which there is no risk of getting cancer, namely, a threshold level. Therefore, every exposure, no matter how low, to a cancer-causing compound is assumed to be associated with some increased risk. As the dose of a carcinogen decreases, the chance of developing cancer decreases, but each exposure is accompanied by some increased risk.

There is general consensus among the scientific and regulatory communities on what level of estimated excess cancer risk is acceptable. An increased lifetime cancer risk of one in one million or less is generally not considered a significant public health concern. Health comparison values for cancer health effects are set at this level of risk. Cancer risks greater than one per ten thousand usually trigger actions to lower exposures.

For noncarcinogenic health risks, the contaminant intake was estimated using exposure assumptions for the site conditions. This dose was then compared to a risk reference dose (estimated daily intake of a chemical that is likely to be without an appreciable risk of health effects) developed by the US EPA, ATSDR and/or NYS DOH. The resulting ratio was then compared to the following qualitative scale of health risk:

Qualitative Descriptions for
Noncarcinogenic Health Risks

Ratio of Estimated Contaminant Intake to Risk Reference Dose	Qualitative Descriptor
equal to or less than the risk reference dose	minimal
greater than one to five times the risk reference dose	low
greater than five to ten times the risk reference dose	moderate
greater than ten times the risk reference dose	high

Noncarcinogenic effects unlike carcinogenic effects are believed to have a threshold, that is, a dose below which adverse effects will not occur. As a result, the current practice is to identify, usually from animal toxicology experiments, a no-observed-effect-level (NOEL). This is the experimental exposure level in animals at which no adverse toxic effect is observed. The NOEL is then divided by an uncertainty factor to yield the risk reference dose. The uncertainty factor is a number which reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the general human population. The magnitude of the uncertainty factor takes into consideration various factors such as sensitive subpopulations (for example, children or the elderly), extrapolation from animals to humans, and the incompleteness of available data. Thus, the risk reference dose is not expected to cause health effects because it is selected to be much lower than dosages that do not cause adverse health effects in laboratory animals.

The measure used to describe the potential for noncancer health effects to occur in an individual is expressed as a ratio of estimated contaminant intake to the risk reference dose. A ratio equal to or less than one is generally not considered a significant public health concern. Health comparison values for noncancer health effects are set at this level. If exposure to the contaminant exceeds the risk reference dose, there may be concern for potential noncancer health effects because the margin of protection is less than that afforded by the reference dose. As a rule, the greater the ratio of the estimated contaminant intake to the risk reference dose, the greater the level of concern. This level of concern depends upon an evaluation of a number of factors such as the actual potential for exposure, background exposure, and the strength of the toxicologic data.

Appendix G
Summary of Public Comments and Responses

Summary of Public Comments and Responses
Southside High School Health Consultation

This summary was prepared to address comments and questions on the public comment draft of the Southside High School Health Consultation. The public was invited to review the draft during the public comment period which ran from February 23, 2001 to April 16, 2001. We received two sets of written comments. Similar comments may be consolidated or grouped together and some statements reworded to clarify the comment. If you have any questions about this summary, you may contact Mr. Mark VanValkenburg of the New York State Department of Health (NYS DOH) at the toll-free number: 1-800-458-1158.

Comment 1: This health consultation cannot be fully evaluated without a comprehensive report on the New York State Department of Environmental Conservation (NYS DEC) investigation. A comprehensive report should include a data validation report, boring logs and field notes, operational history of the site, discussion of the demolition of the facility, preparation of the site and construction of the school and summary of environmental conditions at adjacent sites.

Response 1: NYS DOH staff worked closely with the NYS DEC to develop a sampling plan for the property and were present during much of the sampling. NYS DEC contracted-out analyses of the samples to a NYS DOH Environmental Laboratory Approval Program (ELAP)-certified laboratory. The NYS DEC provided the analytical results for the samples to NYS DOH. These data were evaluated and provided in Appendix G of the draft document (see Appendix D in this final document). NYS DEC staff reviewed the quality of the data and determined that they were properly validated. We believe the amount and quality of the data presented in the health consultation are sufficient to evaluate the public health implications of environmental contamination. The NYS DEC finalized a report in September of 2001 on the investigations that were used in preparing this health consultation.

Comment 2: This health consultation should look at off-site contamination at the adjacent American LaFrance site and Miller Pond.

Response 2: Health consultations focus on a specific health concern related to environmental issues at a specific location. This health consultation evaluated the public health implications of chemicals in surface and subsurface soils at the Southside High School. The adjacent American LaFrance site is fenced and has been remediated by the current owner. Students, staff and the general community are not currently being exposed to contaminants at the former American LaFrance site from their activities at the Southside High School. Although exposure to chemicals from the American LaFrance property may have occurred in the past, exposures through trespassing by Southside students, staff or the general community would likely have been limited. Assessing these potential past exposures is beyond the scope of this health consultation.

Comment 3: A site model/exposure route model should be provided. These types of models are necessary to understand the relationships between the data for the different media, the levels of contaminants in a particular media and specific exposure pathways. Contaminant sources, exposure pathways, and potential receptors must be included in this model.

Response 3: Health consultations are intended to identify some or all, depending on the objectives of the health consultation, potential and completed exposure pathways associated with past, present and future uses of the subject property. An exposure pathway is the process by which an individual may be exposed to contaminants originating from a site. An exposure pathway has five elements: (1) a contaminant source; (2) environmental media and transport mechanisms; (3) a point of exposure; (4) a route of exposure; and (5) a receptor population.

The source of contamination is the source of contaminant release to the environment (any waste disposal area or point of discharge). If the original source is unknown, the contaminant source is considered to be the environmental media (soil, air, biota, water) which are contaminated at the point of exposure. Environmental media and transport mechanisms carry contaminants from the source to points where people may be exposed. The exposure point is a location where actual or potential human contact with a contaminated medium may occur. The route of exposure is the manner in which a contaminant actually enters or contacts the body (i.e., ingestion, inhalation, dermal absorption). The receptor population is the persons who are exposed or may be exposed to contaminants at a point of exposure.

Two types of exposure pathways are evaluated in the health consultation. A completed exposure pathway exists when the criteria for all five elements of an exposure pathway are documented. A potential exposure pathway exists when the criterion for any one of the five elements comprising a exposure pathway is not met. An exposure pathway is considered to be eliminated when any one of the five elements comprising an exposure pathway has not existed in the past, does not exist in the present, and will never exist in the future.

For Southside High School, the source of the contamination is the subsurface soil and groundwater contaminated by industrial disposal practices and spills at the site before the school was built. The environmental media affected are the shallow subsurface and the deeper subsurface soil and groundwater. Contamination can be transported from the soil by vapor movement in the air space in the soil (often called the soil gas) and human activities (e.g,. excavation, hauling). Typically, contamination moves with the groundwater in the direction of groundwater flow, but often at a rate slower than groundwater flow (depending on the chemical). Although groundwater is not used at the school, it can also be a source of contamination in soil gas. A summary of the exposure pathways is shown on the following table:

Contaminated media	Transport mechanism	Exposure point	Route of exposure	Potential receptor population
Shallow subsurface soil	human activity	soil exposed by human activity *	accidental ingestion **	students, faculty, and neighbors using school grounds ***
Deeper subsurface soil	soil gas	indoor air potentially affected by soil gas	inhalation	students and faculty
Deeper subsurface soil	human activity	soil exposed by human activity	accidental ingestion**	students, faculty and neighbors using school grounds ***
Groundwater	soil gas	indoor air affected by soil gas	inhalation	students and faculty

*e.g. construction or work on buried utilities

* Primary exposure through accidental ingestion, minor contribution through inhalation and dermal contact.

** In addition, maintenance workers or contractors involved in ground intrusive work may be exposed to contaminants.

Comment 4: Provide a more detailed explanation how the ATSDR definition of "no apparent public health hazard" category was concluded for the Southside High School.

Response 4: The Health Consultation states in the *Conclusions* that: ". . . the Southside High School poses no apparent public health hazard . . . because average levels of contaminants in surface soils do not exceed public health comparison values." Appendix H contains ATSDR's definitions of the public health hazard categories. Category D is "No Apparent Public Health Hazard" and the definition for this category is given as "This category is used for sites where human exposure to contaminated media may be occurring, may have occurred in the past and/or may occur in the future, but the exposure is not expected to cause any adverse health effects". At Southside High School, the average concentrations of contaminants in surface soil are below health comparison values. Health comparison values are the amount of a chemical in a media, such as soil, that, upon exposure, represents a very low risk for cancer health effects or a minimal risk for noncancer health effects (see response number 18 for more information on health comparison values). Therefore, exposures to contaminants in soil at the school are not expected to cause adverse health effects. Although contaminants were present at concentrations above the respective health comparison values in a few samples, the average concentration of surface soil is more likely to reflect the long-term exposure of people using the high school than the highest concentrations. Also, short-term exposure to the highest levels of any of the contaminants found in surface soil at the Southside High School is very unlikely to result in acute adverse health effects.

Comment 5: What is the basis for the "typical background surface soil".

Response 5: References for the typical background concentrations are in the footnotes of Table 1. These background concentration ranges were obtained through a review of the documents cited in these footnotes, not through direct analysis of soil samples in the area near the high school.

Comment 6: The 'ranges of detection' and "frequency of detection" do not provide sufficient information.

Response 6: For a more complete presentation of the data, see Appendix D which shows all data for all of the samples collected during the NYS DEC investigation in 2000.

Comment 7: What is considered surface soil?

Response 7: For this investigation, we defined surface soil as the soil that is below any vegetative cover (e.g., grass) to a depth of three inches.

Comment 8: Exposed soil areas may be pathways for exposure. The consultation should discuss, quantify and analyze the exposed surface areas.

Response 8: Exposed soil is areas where no grass or other material covers the soil. People can be exposed to soil where there is no cover. To examine potential exposures to surface soils, we looked at locations where the highest exposures were likely, such as exposed soil or where we anticipated frequent student activity. The only places that were not paved or covered with grass, and, therefore, exposed, were well-worn foot paths near and around the athletic fields and other high traffic areas, and two areas in the rear of the school building that were used for volleyball in the past. Samples representing these areas were collected and the data from the exposed soil were included in the surface soil data.

The surface soil data were examined as a group to determine the average and the range of the entire set. The data were also examined individually to evaluate any unusual contamination. All surface soil samples were evaluated for human exposures as if the soil was exposed and available for contact.

We concluded that average levels of contaminants in surface soils do not exceed public health comparison values. Although a few samples exceed health comparison values, people are unlikely to be exposed frequently to soil at these locations. Nevertheless, because average levels of total PCBs exceed typical background levels and average levels of carcinogenic PAHs are somewhat below the upper range of background levels, exposures to these contaminants at Southside High School may be greater than those typically experienced from soil.

Comment 9: The health consultation indicates that cinders were found in most boreholes in the surface soil zone. What is the significance of cinders in surface soil?

Response 9: Cinders were not found in surface soil (defined as 0 to 3 inches below surface) but rather in a layer, varying in thickness from 3" to 6", about one to three feet below the surface. The cinders are a layer of material that is not natural soil and indicate the boundary between imported top soil and existing material influenced by previous land use.

Comment 10: Why was the PCB data averaged when the highest levels were not included in August 2000 draft of the health consultation.

Response 10: The two samples that contained Aroclor 1248 (a PCB) at levels in excess of the health comparison value were collected in September 2000, after the first draft of the health consultation was released. Aroclor 1248 was not discussed in the August 2000 draft health consultation because the samples collected previously did not contain PCBs above health comparison values. Contaminants that are below health comparison values are not evaluated further in health consultations. The two samples that were collected in September 2000 exceeded public health comparison values for PCBs; therefore, we discussed them further in the February 2001 revised health consultation. As part of this discussion, we calculated an average of PCBs, which is likely to reflect the long-term exposure of people using the high school.

Comment 11: Disposal of hexavalent and trivalent chromium on the site has been documented. The known impacts of chromium contamination and related health risks should be discussed.

Response 11: We are unaware of any "disposal" of hexavalent or trivalent chromium on the school property. The health consultation states that chromium is present above "typical" background concentrations. None of the levels found in surface soil exceed the health comparison value for chromium, which assumes that all the chromium found in the soil is in the more toxic hexavalent form. Since none of the levels of chromium are above the health comparison value, no health effects are expected.

Comment 12: Inhalation of chromium contaminated dust was not considered.

Response 12: Chromium was detected above its typical background range (10 to 60 milligrams per kilogram (mg/kg)) in 10 of 52 surface soil samples. The highest concentration of chromium was 107 mg/kg. The areas where chromium was detected in surface soil above typical background levels are heavily vegetated (the multiple use athletic area, a baseball outfield); therefore, exposures to significant amounts of chromium contaminated dust are unlikely.

Although chromium was reported as total chromium in the soil data, the levels were evaluated as if all of the detected chromium was in the more toxic hexavalent form. None of the levels of chromium exceed their public health assessment comparison values. Incidental ingestion is the primary exposure route considered for soil when a health comparison value is calculated, and constitutes the bulk of the contaminant dose. The contribution of inhaled dust to the total contaminant dose is minimal (less than one percent of the contaminant dose from ingestion).

Comment 13: Locations of discolored soil should be indicated.

Response 13: Since discolored soil was only encountered in subsurface soil, exposure to contaminants in discolored soil is unlikely. Therefore, we did not note discolored soil locations on maps included in this health consultation. The school district may wish to consider mapping these locations during the development of its soil management plan.

Comment 14: One subsurface sample contained lead at a concentration of 3490 milligrams per kilogram. Based on the experience of the person who commented, this sample would fail Toxicity Characteristic Leaching Procedure (TCLP), would be considered hazardous waste by the NYS DEC and would need to be remediated.

Response 14: This sample was not analyzed for TCLP; therefore, we do not know if it would have failed TCLP. Other samples collected nearby did not contain high concentrations of lead. NYS DEC would not necessarily consider one sample failing TCLP to be an indication of hazardous waste and would not necessarily require remediation given the lower levels of lead detected in nearby soil samples.

Since this is a subsurface sample, exposure is unlikely except for disturbance caused by maintenance or construction work. Therefore, ATSDR and NYS DOH recommend in this health consultation that the school district or other appropriate governmental unit develop a written soil management plan to minimize potential public exposures to contaminated subsurface materials.

Comment 15: Why doesn't NYS DOH recommend removing hot-spots?

Response 15: Sample results from surface soil do not indicate a need to remove any soil. Sample results from subsurface soil indicated contaminant levels high enough for us to recommend that the school develop a soil management plan to help avoid bringing contaminated subsurface soil to the surface and leaving it on the surface where exposures are more likely. A soil management plan should be an integral part of school property maintenance.

Comment 16: Indoor air at the school should be periodically monitored for VOCs.

Response 16: The NYS DOH sampled soil gas and indoor air several times; the results did not indicate a need for further indoor air sampling. However, as indicated in the indoor air investigation report, either natural or mechanically induced pressure gradients can cause soil gas to be drawn into a building. Measuring pressure differentials can indicate the magnitude and direction of a pressure gradient between the soil gas and the building. Ventilation systems, bathroom or other exhausts, wind, temperature changes and openings in the building shell (such as doors and windows) can affect pressure differentials in a building.

The ATSDR and NYS DOH recommend that the school district should review the recommendations in the indoor air investigation report to determine if additional actions may be warranted. For example, the report recommends that the school district consider instituting an indoor air quality action plan consistent with that recommended by the US EPA. The Tools for Schools Action Kit provides information and guidance for developing and implementing a plan to prevent indoor air quality problems and resolving such problems if they arise. The plan should address the possibility of contaminated soil gas being drawn into the building; one possible way of evaluating this is to include routine (e.g., seasonal) monitoring of pressure differentials between the soil gas and building interior.

Comment 17: The health consultation does not use an exposure scenario for student athletes to evaluate risks. These are the people who are likely to use the athletic fields. Instead a residential scenario is used. Why was a residential exposure scenario used to evaluate risks for the school property?

Response 17: We assumed that potential exposures at the high school were similar to a residential scenario. The residential exposure scenario was chosen because on average, the long-term intake of soil under this scenario is expected to be greater than for a high school scenario. This is primarily related to the approximate 4-fold difference in body weight between toddlers (considered in the residential scenario) and high school students, which results in a greater, long-term soil dose (expressed in milligrams of soil per kilogram of body weight) in the residential scenario and should compensate for short-term increases in soil ingestion rates for high school students that might occur through athletic activities. The potential exposures to contaminants in soil are well below exposure levels known to cause health effects for the contaminants detected in surface soil at the Southside High School. If additional information on this question would be useful, please call the New York State Department of Health at the toll-free number 1-800-458-1158.

Comment 18: The document does not provide an adequate explanation of the comparison values. NYS DOH should include an explanation for the comparison values, how they are derived, justification for the exposure assumptions, and an explanation for how the comparison values are used to evaluate the soil levels at the Southside High School.

Response 18: The exposure assumptions for the comparison values were included in the footnotes of Table 1 of the health consultation.

The noncancer comparison values assume a 13.2 kilogram child (i.e., a 29-pound toddler) ingests 80 milligrams of soil per day, 5 days per week, 6 months per year and 40 milligrams of soil-derived indoor dust per day, 7 days per week, 12 months per year. The body weight is taken from the US EPA Exposure Factors Handbook (US EPA, 1999). The exposure duration and frequency are selected to reflect a reasonably conservative, yet typical, estimate of these parameters for children at a residential property in New York State. The soil ingestion rates for children are based on studies by Calabrese et al. (1989) and Davis et al. (1990).

The cancer comparison values assume a time-weighted average body weight of 47.7 kilograms based on nine different stages up to age 30. The body weights for each stage were taken from the US EPA Exposure Factors Handbook (1999). The average soil ingestion rate over the period of exposure of 19.3 milligrams per day is also a weighted average for nine life stages. Children through age five are assumed to be exposed as described for the noncancer comparison values. For ages six through adulthood, the soil ingestion rate is 82 mg/day (based on Hawley (1985) and Calabrese et al. (1990)) for two days per week, for five months per year.

For both the noncancer and cancer evaluations, we assumed that one-half of the soil and dust ingested indoors originates from an outdoor source (Allott et al., 1992; Chaney et al., 1986). Additional details are presented below.

Method for Calculating Health Comparison Values and Potential Health Risks

Noncancer Soil Comparison Values

A noncancer soil comparison value is defined as the concentration of a chemical in soil (expressed in milligrams of contaminant per kilogram of soil (mg/kg_{soil}) that provides a contaminant intake equivalent to the chemical's reference dose. Reference doses are derived by the United States Environmental Protection Agency (US EPA) and other health organizations. The reference dose (expressed in milligrams of contaminant per kilogram body weight per day (mg/kg/day)) is an estimate of a daily intake of a chemical that is likely to be without an appreciable risk of noncancer health effects. Reference doses are usually derived by dividing no-observed-effect-levels (NOELs) or lowest-observed-effect levels (LOELs) by uncertainty or "safety" factors. A NOEL is an exposure level (dose) for a specific chemical in an animal or human study at which there are no statistically or biologically significant increases in the frequency or severity of health effects between an exposed group and an unexposed group. A LOEL is the lowest exposure level (dose) at which a statistically or biologically significant effect is observed in an exposed group compared to an unexposed group. Uncertainty factors, which typically are in multiples of 10 and range from 100 to 1000 are used to account for

- Variations in sensitivity among the members of the human population
- The uncertainty in extrapolating animal data to humans

- The uncertainty in extrapolating from data obtained in a study with less-than-lifetime exposure to lifetime exposure
- The uncertainty using a LOEL rather than a NOEL to derive the reference dose
- The uncertainty associated with the lack of complete toxicological information on the chemical

The actual uncertainty factors used depends on the quality and quantity of the toxicological information for the specific chemical. Since the comparison values are derived from reference doses, they are typically set at a level corresponding to exposures 100 to 1000 times lower than the NOEL or LOEL.

We calculate noncancer soil comparison values from reference doses using specific exposure assumptions. For residential exposure, we assumed that a 13.2 kg child ingests 80 mg of soil per day, five days per week for six months of the year, and 40 mg per day of indoor dust with an outdoor soil source everyday.

A time-weighted soil/dust ingestion rate is calculated as follows:

$$80\frac{mg_{soil}}{day} \times \frac{5\frac{days}{week}}{7\frac{days}{week}} \times \frac{180\frac{days}{year}}{365\frac{days}{year}} + 40\frac{mg_{soil}}{day} \times \frac{7\frac{days}{week}}{7\frac{days}{week}} \times \frac{365\frac{days}{year}}{365\frac{days}{year}} = 68.2\frac{mg_{soil}}{day}$$

The comparison value for dieldrin, for example, which has a reference dose of 0.00005 mg/kg/day, may be calculated as follows:

$$0.00005\frac{mg}{kg/day} \times 13.2kg \times \frac{day}{68.2mg_{soil}} \times 10^6\frac{mg_{soil}}{kg_{soil}} = 10\frac{mg}{kg_{soil}}$$

In summary, a noncancer soil comparison value is equivalent to an expression of the reference dose as a soil concentration that takes into account specific exposure conditions and assumptions. Chemicals having a high degree of noncancer chemical toxicity (as expressed by the reference dose) have relatively low comparison values compared to chemicals with a lesser degree of noncancer toxicity.

Cancer Soil Comparison Values

A cancer comparison value is the concentration of a chemical that has caused cancer in animals or humans in soil that provides a contaminant intake equivalent to the dose (intake) of the chemical that is associated with an increased lifetime cancer risk of one-in-one million. This dose is usually estimated from studies of animals exposed to carcinogenic chemicals. Less frequently, the one-in-one-million dose is estimated from studies of humans exposed to the chemical. Estimates of this dose for various carcinogenic chemicals are made by the US EPA and health organizations.

The calculation of cancer comparison values is similar to that of noncancer comparison values, except that the one-in-one-million risk dose is used instead of the reference dose, and the exposure parameters are adjusted to reflect exposure over the first 30 years of a person's life. For the residential exposure scenario, we assumed that a person's average body weight for the first 30 years of a 70-year lifetime is 47.7 kg, and that he/she ingests an average of 19.3 mg per day. The cancer comparison value for Aroclor 1248, for example, is calculated from its one-in-one-million risk dose (0.0000005 mg/kg/day) as follows:

$$5\times10^{-7}\frac{mg}{kg-day} \times 47.7kg \times \frac{day}{19.3mg_{soil}} \times 10^{6}\frac{mg_{soil}}{kg_{soil}} = 1.2\frac{mg}{kg_{soil}}$$

In summary, a cancer soil comparison value is equivalent to an expression of the one-in-one-million risk dose as a soil concentration that takes into account specific exposure conditions and assumptions. Chemicals having a high degree of carcinogenic potency (as expressed by the one-in-one million risk dose) have relatively low comparison values compared to chemicals with a low degree of carcinogenic potency.

How Soil Comparison Values are Used

Soil comparison values are not remedial goals ("clean-up levels"), nor are they meant to represent a bright line between soil concentrations that cause health effects and those that do not. Rather, they are used primarily as screening tools to evaluate soil sampling results. Since the comparison values express the reference dose or the one-in-one million dose as a soil concentration, they can be directly compared with soil sampling results. Soil sampling results less than noncancer or cancer comparison values are generally not considered a health concern. Sampling results that exceed a noncancer or cancer comparison value are not necessarily a health concern, but indicate a need for further evaluation. The degree of concern (i.e., whether or not actions to reduce exposures should be taken) when a noncancer or cancer comparison value is exceeded depends on an evaluation of several factors, including (among others) the margins of exposure, actual potential for exposure, levels of the chemical we would typically expect to find in the environment, other sources of exposure to the chemical, and the strength and quality of the available toxicological information on the chemical.

Evaluating Noncancer Risks with Soil Comparison Values

To evaluate the noncancer risks, a ratio of the soil sampling result to the comparison value is calculated for each chemical. This process is equivalent to calculating a hazard index, or the ratio of the estimated contaminant dose to the reference dose. The value of the hazard index is then given a qualitative descriptor for noncancer risk, as described in Appendix F of the health consultation.

For example, if dieldrin is detected in surface soil at a concentration of 20 mg/kg (and this result is likely to reflect the potential exposure), the hazard index is calculated as follows:

$$Hazard\ Index = \frac{Soil\ Concentration}{Comparison\ Value} = \frac{20\frac{mg}{kg}}{10\frac{mg}{kg}} = 2$$

Based on the categories in Appendix F of the health consultation, the qualitative descriptor for noncancer risk would be low.

When the comparison value is exceeded (as in this example), the estimated exposure is further evaluated by calculating the margin of exposure. The margin of exposure is the difference between the estimated exposure (contaminant dose) for a chemical and the exposure level known to cause health effects (e.g., the LOEL). The margin of exposure based on the LOEL may be calculated by the following equation:

$$Margin\ of\ Exposure = \frac{LOEL}{Estimated\ Exposure}$$

A margin of exposure can also be calculated based on the NOEL. This margin of exposure is the difference between the estimated exposure (contaminant dose) for a chemical and the exposure level at which no health effects are known to occur (e.g., the NOEL):

$$Margin\ of\ Exposure = \frac{NOEL}{Estimated\ Exposure}$$

A large margin of exposure means that the estimated exposure to the chemical (e.g., from soil at a hazardous waste site) is much lower than the NOEL or LOEL. A small margin of exposure means that the estimated exposure is similar to the NOEL or LOEL.

In this example with dieldrin, the measured soil concentration is twice the comparison value, which means that the estimated exposure is twice that of the reference dose. Although the reference dose and comparison value are exceeded, the margin of exposure based on the LOEL is 500:

$$\textit{Margin of Exposure} = \frac{LOEL}{\textit{Estimated Exposure}} = \frac{0.05\frac{mg}{kg-day}}{0.0001\frac{mg}{kg-day}} = 500$$

This margin of exposure based on the LOEL means that the estimated exposure to dieldrin at a soil level of 20 mg/kg_{soil} is 500 times smaller than the lowest dose of dieldrin known to cause health effects in animals or humans. This also assumes that the exposure takes place according to the assumptions used to derive the comparison value. Thus, we would not expect the exposure to result in adverse noncancer health effects.

<u>Estimating Cancer Risks with Soil Comparison Values</u>

For carcinogenic contaminants, an estimate of the increased lifetime cancer risk is made using the chemical's cancer comparison value. The increase in cancer risk is then given a qualitative descriptor as described in Appendix F of the health consultation. In our example, if Aroclor 1248 is detected in surface soil at a concentration of 10 mg/kg, and this is judged to be representative of long-term exposure, the estimated increased lifetime cancer risk is calculated as follows:

$$\textit{Estimated Cancer Risk} = \frac{\textit{Soil Concentration}}{\textit{Comparison Value}} \times 10^{-6} = \frac{10\frac{mg}{kg}}{1.2\frac{mg}{kg}} \times 10^{-6} = 8 \times 10^{-6}$$

An estimated lifetime increased risk of 8×10^{-6} is equivalent to a risk (or probability) of eight-in-one million, and based on the categories in Appendix F of the health consultation, the qualitative descriptor for this estimated cancer risk would be low.

Sampling results that exceed a cancer comparison value are also not necessarily a health concern, but indicate a need for further evaluation because the estimated exposure may result in an increased lifetime cancer risk greater than one-in-one million. Cancer risks of one-in-one million or less usually are not considered a public health concern, while cancer risks greater than one-in-ten thousand usually trigger actions to reduce exposures.

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US EPA (United States Environmental Protection Agency). 1999. Exposure Factors Handbook. Washington DC: Office of Research and Development. EPA/600/C-99/001. February 1999.

Comment 19: Soil comparison values for volatile organic chemicals based on soil ingestion alone are not appropriate because they do not account for inhalation exposure.

Response 19: The comment is correct in stating that the comparison values take into account exposure by the soil ingestion pathway and do not take into account inhalation exposure. We use the comparison values as a means to evaluate contaminants in soil and generally soil ingestion will lead to a larger dose than inhalation. We agree that other exposure routes, such as inhalation, should also be evaluated if they are likely to contribute significantly to the potential health risks. There are two ways people could potentially be exposed to soil contaminants by inhalation. One is inhalation of soil particulates that have contaminants bound to them. The other is inhalation of volatile chemicals that are released from the soil matrix into the air.

There is limited chemical-specific information on the relative contribution of the inhalation of suspended soil particulates to the total contaminant dose from soil. However, the available estimates indicate that the soil ingestion pathway dominates over the pathway for inhalation of particulates. For example, an estimate of the contaminant dose from inhalation of suspended particulates can be made assuming that at a soil contaminant concentration of 1 milligrams per kilogram of soil (mg/kg),

- The concentration of particulate matter in air is equal to the current annual PM_{10} (particulate matter less than 10 micrometers in diameter) standard (50 micrograms per cubic meter (mcg/m^3)) and this concentration is in the breathing zone (the annual average PM_{10} concentrations in Elmira ranged from 15 to 25 mcg/m^3 from 1990 to 1996 (NYS DEC, 2003).
- A 13.2 kg child (about 29 pounds) inhales 10 cubic meters of air per day.
- One half of the suspended particulate matter is from soil and 75% of this is retained in the lungs (Hawley, 1985).
- The retained fraction is completely absorbed (Hawley, 1985).

The contaminant dose from inhalation of suspended particulates estimated in this manner is about 800 times smaller than the contaminant dose from ingestion at the same soil concentration. Thus, the contribution of inhaled suspended soil particulates to the total contaminant dose would be minimal.

The relative contribution for the contaminant dose from direct inhalation of vapors released from soil can be estimated using a mathematical model. This model estimates an air concentration which is converted to a contaminant dose using several exposure assumptions. We can estimate the contaminant concentration in the air in two different ways (US EPA, 1992). One way is by assuming tetrachloroethene (as an example) is present in soil gas (the air spaces in the soil) near the ground surface at 70 mcg/m^3 (the highest sub-slab soil gas level found on the school property during the indoor air monitoring study), and the gas is emitted into the air above the ground. Another way is to assume that tetrachloroethene is uniformly present in the soil itself at 0.082 mg/kg (the highest detected level of this volatile organic chemical at the school property), and that the chemical is transferred to the soil gas and emitted into the air above the ground. For each estimate, we also assumed that:

- A 13.2 kg (29 pounds) child plays in an area of 400 square feet (roughly the area of a baseball pitcher's mound).
- The contaminant is released from the soil into a "box of air" above the play area. Air passes through this box at an average wind speed of 11 miles per hour.
- The child plays in the area of contaminated soil at a moderate activity level for three hours per day (US EPA, 1999), five days per week, six months per year.

- The child's inhalation rate during moderate activity is 1.2 cubic meters/hour (US EPA, 1999).

The contaminant dose from direct inhalation estimated using these methods is about six to 50 times smaller than the contaminant dose estimated from soil ingestion at the same soil concentration (0.082 mg/kg).[1] Thus, the contribution of directly inhaled volatile soil contaminants to the total contaminant dose is estimated to be small. Regardless of the route of exposure, all of the estimated exposures for the volatile organic contaminants found in surface soil at the Southside High School are well below levels associated with adverse health effects.

Exposure to volatile contaminants in the subsurface soil, via soil gas infiltration into the school, was evaluated by the Department's indoor air study. The indoor and ambient air testing results did not show a problem with chemical contamination. Most compounds were either not detected or were present at low levels. Several compounds were present at concentrations slightly higher than typical background, but their presence is not unusual and exposure at the reported levels is not expected to be a health concern.

Footnote:

[1] The model used to estimate the contaminant level in air that is available for direct inhalation has limitations. For example, the estimate of the contaminant level in air due to volatilization from the soil assumes that the contaminant concentration is uniform throughout the play area. Based on the available data, contaminant levels in soil vary throughout the site. This approach also considers only volatilization from soil and not from groundwater, however no tetrachloroethene was detected in the groundwater at the Southside High School property. The model where we estimated contaminant levels in air from soil gas measurements would account for both volatilazation from soil and groundwater. Both methods assume a constant source of contamination available for volatilization to a small, fixed volume of air, and both methods are likely to over-estimate the contaminant dose by inhalation of volatile organic compounds.

Comment 20: The source of the oral cancer potency factor for benzo(a)pyrene is not referenced.

Response 20: The benzo(a)pyrene cancer potency factor, which serves at the basis for the cancer comparison value, was derived by the New York State Department of Health (NYS DOH). It is based on the incidence of forestomach tumors in male rats in a study by Brune et al. (1981) and was derived using methods consistent with the US EPA's guidance on cancer risk assessment (US EPA (1996)). The value (10 $(mg/kg/day)^{-1}$) is higher than the current potency factor listed by the US EPA on the Integrated Risk Information System (US EPA (2001)) by a factor of about 1.4. Use of the NYS DOH cancer potency factor results in comparison values 25 percent lower than those derived from the current US EPA value. Cancer risk estimates using the NYS DOH potency factor are about 1.4 times higher than those estimated using the current US EPA value. For additional information on the derivation of the NYS DOH cancer potency factor, please contact Dr. Thomas Johnson of the NYS DOH at 1-800-458-1158.

Comment 21: The document uses comparison values to evaluate the health risks rather than TAGM 4046 values. Why aren't the TAGM values used?

Response 21: The TAGM 4046 values refer to recommended soil clean-up objectives in the NYS DEC Technical and Administrative Guidance Memorandum 4046 (HRA-94-4046, 1/24/94 (Revised)). This guidance document was developed to assist NYS DEC staff in carrying out regulatory programs with respect to inactive hazardous waste sites. The recommended soil clean-up objectives in TAGM 4046 were not intended to be final and universal remedial goals, but, according to the guidance memorandum, "should be utilized in the development of final cleanup levels through the feasibility study process."

The basis for the recommended soil clean-up objectives in TAGM 4046 is not the same for every contaminant, and do not, in all cases, estimate human health risks from ingesting contaminated soil. As such, they were not used in the health consultation. For most metals, the recommended soil clean-up objectives are presented as typical background levels for the contaminant.

For organic chemicals the recommended soil clean-up objective (TAGM 4046) is the lowest value of several options, including values based on protection of groundwater quality, cancer health effects, noncancer health effects, background levels and detection limits. For the majority of the organic contaminants (roughly two-thirds) the recommended soil clean-up objectives are based on protection of groundwater quality. Most of the remaining recommended soil clean-up objectives for organic contaminants are based on cancer health effects derived from generic exposure parameters for ingesting soil that include no site-specific information. Since the time these values were derived in 1994, several toxicity values (which provided the basis of the comparison values) have been revised and updated, and additional studies on the soil ingestion patterns of adults and children have become available. Information from these studies, as well as site-specific exposure information (e.g., exposure for six months of the year to account for frozen soil and snow cover) were incorporated into the comparison values used in the health consultation. We used the most recently available toxicity and exposure information to calculate comparison values for each chemical of concern, and evaluated the potential health risks for the levels of these chemicals detected in surface and subsurface soil at the Southside High School.

Appendix H
Public Health Hazard Categories

INTERIM PUBLIC HEALTH HAZARD CATEGORIES

CATEGORY / DEFINITION	DATA SUFFICIENCY	CRITERIA
A. Urgent Public Health Hazard This category is used for sites where short-term exposures (< 1 yr) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.	This determination represents a professional judgement based on critical data which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.	Evaluation of available relevant information* indicates that site-specific conditions or likely exposures have had, are having, or are likely to have in the future, an adverse impact on human health that requires immediate action or intervention. Such site-specific conditions or exposures may include the presence of serious physical or safety hazards.
B. Public Health Hazard This category is used for sites that pose a public health hazard due to the existence of long-term exposures (> 1 yr) to hazardous substance or conditions that could result in adverse health effects.	This determination represents a professional judgement based on critical data which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.	Evaluation of available relevant information* suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants (including radionuclides) have had, are having, or are likely to have in the future, an adverse impact on human health that requires one or more public health interventions. Such site-specific exposures may include the presence of serious physical or safety hazards.
C. Indeterminate Public Health Hazard This category is used for sites in which "*critical*" data are *insufficient* with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.	This determination represents a professional judgement that critical data are missing and ATSDR has judged the data are insufficient to support a decision. This does not necessarily imply all data are incomplete; but that some additional data are required to support a decision.	The health assessor must determine, using professional judgement, the "criticality" of such data and the likelihood that the data can be obtained and will be obtained in a timely manner. Where some data are available, even limited data, the health assessor is encouraged to the extent possible to select other hazard categories and to support their decision with clear narrative that explains the limits of the data and the rationale for the decision.
D. No Apparent Public Health Hazard This category is used for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.	This determination represents a professional judgement based on critical data which ATSDR considers sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.	Evaluation of available relevant information* indicates that, under site-specific conditions of exposure, exposures to site-specific contaminants in the past, present, or future are not likely to result in any adverse impact on human health.
E: No Public Health Hazard This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.	Sufficient evidence indicates that no human exposures to contaminated media have occurred, none are now occurring, and none are likely to occur in the future	

**Such as environmental and demographic data; health outcome data; exposure data; community health concerns information; toxicologic, medical, and epidemiologic data; monitoring and management plans.*