Health Consultation

BOROUGH OF WILDWOOD CREST
DEPARTMENT OF PUBLIC WORKS FACILITY
WILDWOOD CREST, CAPE MAY COUNTY, NEW JERSEY

Prepared by the
New Jersey Department of Health and Senior Services

JUNE 23, 2009

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

BOROUGH OF WILDWOOD CREST
DEPARTMENT OF PUBLIC WORKS FACILITY
WILDWOOD CREST, CAPE MAY COUNTY, NEW JERSEY

Prepared By:

New Jersey Department of Health and Senior Services
Public Health Services Branch
Consumer and Environmental Health Services
Hazardous Site Health Evaluation Program
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

Summary

In September 2007, a concerned citizen petitioned the Agency for Toxic Substances and Disease Registry regarding potential environmental exposures to hazardous chemicals from the Borough of Wildwood Crest Department of Public Works Facility site, located in Wildwood Crest, Cape May County, New Jersey. The facility was used as a community dump in the 1950's and 1960's. The site was also used as a temporary staging area for items containing hazardous materials, and there were underground storage tanks at the facility. The primary health concern is cancer allegedly related to exposures to contaminants from the Department of Public Works Facility. The petition was accepted in October 2008.

Benzene, ethylbenzene and xylene concentrations detected in on-site subsurface soil and benzene concentration in groundwater were identified as the contaminants of concern for the site. The contaminated soils were excavated and removed from the site and the groundwater monitoring results did not identify any subsurface contaminant plume. Based on a review of all site-related information, the New Jersey Department of Environmental Protection is in the process of issuing a "No Further Action Letter and Covenant Not to Sue" decision for the site. As such, there is no current or past completed human exposure pathway associated with the site. Although past use of the site as a staging area for the disposal of hazardous substances may have exposed some residents to these chemicals (e.g., paint, solvents and gasoline), it is unlikely that the levels were high enough to result in widespread health concerns.

The New Jersey Department of Health and Senior Services and the Agency for Toxic Substances and Disease Registry were unable to identify past and current completed human exposure pathways associated with site-related contamination. As such, the health concerns (i.e., cancer) are unlikely to be associated with exposures to site-related contamination and the site posed or poses ***No Public Health Hazard***.

The New Jersey Department of Health and Senior Services and the Agency for Toxic Substances and Disease Registry do not propose any follow-up and/or recommendations for the Borough of Wildwood Crest Department of Public Works Facility site.

Statement of Issues

In September 2007, a concerned citizen petitioned the Agency for Toxic Substances and Disease Registry (ATSDR) regarding potential environmental exposures to hazardous chemicals associated with the Borough of Wildwood Crest Department of Public Works Facility site, located in Wildwood Crest, Cape May County, New Jersey.

The petitioner stated that the facility was built on an area that was used as a community dump in the 1950's and 1960's, where large items such as gas cans, kerosene cans, paint cans, old car parts and old appliances were disposed. The petitioner stated that the Department of Public Works site was also used as a temporary staging area for items containing hazardous materials, and that there were underground storage tanks (USTs) at the facility. There are residences and a school with a playground and sports fields near the facility.

The primary health concern expressed by the petitioner is cancer allegedly related to exposures to contaminants from the Department of Public Works Facility. Four cases of leukemia were reported by the petitioner in residents living within a block of the site. The petition was accepted in October 2008 and through a cooperative agreement with the ATSDR, the New Jersey Department of Health and Senior Services (NJDHSS) prepared the following health consultation for the site.

Background

The Borough of Wildwood Crest Department of Public Works Facility site is located at Newark and Railroad Avenues in the Borough of Wildwood Crest, Cape May County, New Jersey (see Figure 1). The facility is located in a residential area.

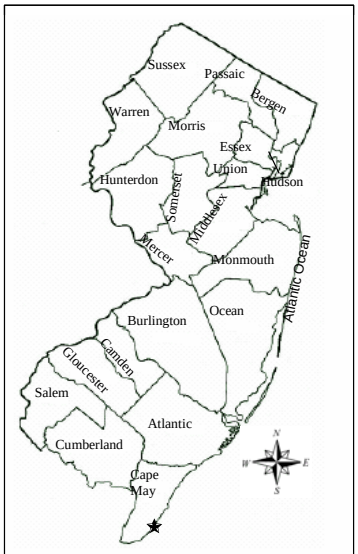

Figure 1: Location of the Borough of Wildwood CrestPublic Works Facility Site

In 1994, the New Jersey Department of Environmental Protection (NJDEP) approved an underground storage tank (UST) removal and closure investigation application by the Wildwood Crest Public Works Facility (VNHA 1995). The purpose of the application was (1) to characterize the condition of the former USTs and surrounding soil, and, (2) to identify possible groundwater and vapor migratory pathways for any contamination. The NJDEP also directed the Borough of Wildwood Crest to conduct a site investigation for the USTs and underground piping for potential contamination.

The USTs were located on two separate sides of the building but a single excavation was used to remove the four tanks. The removal of the USTs was completed on October 31, 1994. The UST closure (i.e., removal and cleaning) activities were

completed by Ten Hove Brothers, Inc., Carlstadt, New Jersey, under the oversight of Borough of Wildwood Crest consultants. Post-UST removal soil and groundwater samples collected around the excavation indicated contaminant concentrations exceeding the NJDEP Soil Cleanup Criteria and Groundwater Quality Standards, and the NJDEP was then notified (VNHA 1996). The NJDEP directed the Borough of Wildwood Crest to collect additional soil and groundwater samples to investigate the extent of contamination. Monitoring wells and piezometers[a] were installed in and around the former excavation to determine if groundwater contamination was present. No contaminants were detected in the surrounding piezometers but samples taken from the monitoring well located at the former excavation revealed the presence of benzene, exceeding the NJDEP Groundwater Quality Standard of 1 microgram per liter (µg/l).

In 1999, natural attenuation was selected as the groundwater remedy and pursuant to the NJDEP's requirements, the Borough of Wildwood Crest established a Classification Exception Area[b] (CEA) at the facility (VNHA 1999). It was expected that the benzene concentration would decrease below the Groundwater Quality Standard within 200 days. In 2008, the Borough of Wildwood Crest collected a final round of groundwater samples from the facility (Project Manager, Personal Communication, Van-Note Harvey Associates, 2008); the groundwater quality was found to be in compliance with the NJDEP Groundwater Quality Standards. Based on a review of all site-related information, the NJDEP is in the process of issuing a "No Further Action Letter and Covenant Not to Sue" decision for the site.

Site Visit

On May 20, 2008 a site visit was conducted at the Borough of Wildwood Crest Department of Public Works Facility site. Participants included representatives from the NJDHSS, Public Works Facility office and Cape May County Health Department. The group was led on a tour of the facility by the Public Works Facility office representative who explained its history, layout and operations.

This site visit was followed by a meeting with the petitioner and his wife at the petitioner's residence. They expressed concern about the past and current potential contamination of area properties by the former dump and facility contaminants.

Demography

Using 2000 United States Census data, the ATSDR estimates that there are about 2,249 individuals residing within a one mile radius of the site (see Figure 2).

[a]A piezometer is a small diameter water well used to measure the hydraulic head of groundwater in aquifers.

[b]Groundwater aquifers where contamination from a site has been identified and the aquifer is placed under institutional controls.

Community Concerns

Besides those expressed by the petitioner, the NJDHSS and ATSDR are unaware of any other concerns from the community.

Environmental Contamination

An evaluation of site-related environmental contamination consists of a two tiered approach: 1) a screening analysis; and 2) a more in-depth analysis to determine public health implications of site-specific exposures. First, maximum concentrations of detected substances are compared to media-specific environmental guideline comparison values (CVs). If concentrations exceed the environmental guideline CV, these substances, referred to as Contaminants of Concern (COC), are selected for further evaluation. Contaminant levels above environmental guideline CVs do not mean that adverse health effects are likely, but that a health guideline comparison is necessary to evaluate site-specific exposures. Once exposure doses are estimated, they are compared with health guideline CVs to determine the likelihood of adverse health effects.

Environmental Guideline Comparison

There are a number of CVs available for the screening of environmental contaminants to identify COCs. These include ATSDR Environmental Media Evaluation Guides (EMEGs) and Reference Media Evaluation Guides (RMEGs). EMEGs are estimated contaminant concentrations that are not expected to result in adverse noncarcinogenic health effects. RMEGs represent the concentration in water or soil at which daily human exposure is unlikely to result in adverse noncarcinogenic effects. If the substance is a known or a probable carcinogen, ATSDR's Cancer Risk Evaluation Guides (CREGs) were also considered as comparison values. CREGs are estimated contaminant concentrations that would be expected to cause no more than one excess cancer in a million (10^{-6}) persons exposed during their lifetime (70 years). In the absence of an ATSDR CV, other comparison values may be used to evaluate contaminant levels in environmental media. These include New Jersey Maximum Contaminant Levels (NJMCLs) for drinking water, and USEPA Region 3 Risk-Based Concentrations (RBCs). RBCs are contaminant concentrations corresponding to a fixed level of risk (i.e., a Hazard Quotient[c] of 1, or lifetime excess cancer risk of one in one million, whichever results in a lower contaminant concentration) in water, air, biota, and soil. For soils and sediments, other CVs include the NJDEP Residential and Non-Residential Direct Contact Soil Cleanup Criteria (RDCSCC, NRDCSCC). Based primarily on human health impacts, these criteria also take into account natural background concentrations, analytical detection limits, and ecological effects.

Substances exceeding applicable environmental guideline CVs were identified as COCs and evaluated further to determine whether these contaminants pose a health threat

[c]The ratio of estimated site-specific exposure to a single chemical from a site over a specified period to the estimated daily exposure level at which no adverse health effects are likely to occur.

to exposed or potentially exposed receptor populations. In instances where an environmental guideline CV was unavailable, the substance may be retained for further evaluation.

Site Conditions

The site is located in a residential area (see Figure 3) and currently consists of several buildings (for office, and vehicle maintenance and storage), parking areas and above ground fuel storage tanks. A large portion of on-site areas are paved with asphalt. The groundwater depth varies from three to six feet below ground surface (bgs).

Hydrogeologically, the site is in the Atlantic Coastal Plain Physiographic Province. The site is on a barrier island, adjacent to inundated areas of tidal marshes and bays.

UST Removal and Sampling

In 1994, the Borough of Wildwood Crest removed four USTs from the Department of Public Works Facility (see Figure 4):

Tank[1] #	Capacity (gallons)	Age (Years)	Installation Depth (ft)	Contents	Remedial Action Taken
1	500	20 ±	6	#2 Heating Oil	Removed
2	1,000		6	Gasoline	Removed
3	1,000		6	Gasoline	Removed
4	1,000		6	Diesel Fuel	Removed

[1]Type of Construction: Single Wall Steel

The excavation area and the USTs were inspected by the consultant (VNHA 1995). The excavation area was inspected with a HNu portable photoionization detector (PID) to detect organic chemical vapors. Elevated readings were obtained in nearly every section of the excavation. The USTs were found to be free of significant corrosion damage and in excellent condition; no indication of tank failure was observed. However, visual and vapor observations indicated significant spillage from the heating oil tank during tank filling in the past. Improper installation of the gasoline tank #2 also adversely impacted the site.

Due to the elevated readings and visually identified soil contamination, additional soil was excavated and removed for disposal. Physical constraints determined the final extent of excavation. The excavation was backfilled and left to settle before surface restoration was completed.

After soil excavation, soil samples were collected from the perimeter of each UST, at depths ranging from 5 to 6.5 feet below grade, directly above the observed water table at that time. The locations of soil samples were selected based on visual and vapor

observations. A total of eight soil samples were collected for the 500 gallon #2 heating oil UST and the 1,000 gallon diesel fuel UST and analyzed for Total Petroleum Hydrocarbons (TPHCs). The samples were found to contain petroleum compounds ranging from less than 13 milligrams per kilogram of soil (mg/kg) to 6,200 mg/kg (see Table 1). Since the maximum concentrations of TPH detected in soil were less than the environmental guideline CV (10,000 mg/kg), TPH was not identified as a chemical of concern (COC) for the site.

Eight additional soil samples were collected for the two gasoline tanks and were analyzed for VO's+10[d], xylenes and lead (see Table 2). The lead concentration ranged from 3 mg/kg to 20 mg/kg. Benzene, ethylbenzene and xylene were identified as COCs for the site.

One groundwater sample was collected from the center of the excavation and analyzed for BTEX[e] compounds (see Table 3). The concentration of benzene (630 μg/l) in the groundwater exceeded its environmental guideline CV (0.6 μg/l).

Post UST Removal Environmental Monitoring

August 1996

In 1996, the NJDEP directed the Borough of Wildwood Crest to remediate the contaminated soil and to collect and analyze post-remedial samples. In response, the Borough of Wildwood Crest collected one soil sample at the same location and depth of original sample WCD-5, in order to assess the contamination indicated by previous analysis (VNHA 1996, 1997a). One additional soil sample was collected at the location of sample WCD-2; since the groundwater level at this location was found to be higher, sample collection depth was 2.6 to 3.1 feet below grade. The samples were analyzed for VO+10; the results showed no contaminants exceeding the NJDEP residential direct contact soil cleanup criteria (RDCSCC). Based on soil sampling results, the NJDEP indicated that no further action was required regarding soil contamination.

The Borough of Wildwood Crest also installed one groundwater monitoring well (see Figure 5). The water level measured in the monitoring well was approximately 3 feet below grade. The soil samples collected during monitoring well installation were screened for organic vapors. The results indicated no organic vapors in the vadose zone[f], and vapors at levels ranging from 0 to 50 parts per million (ppm) in the saturated zone. At 8.5 to 10 feet below grade, clay and decaying vegetation material (marsh mat) were observed, as well as a strong odor of hydrogen sulfide indicating anaerobic decomposition. The presence of organic vapor readings were attributed to the presence

[d]Volatile organics plus a Gas Chromatography/Mass Spectrometry library search of up to 10 non-target compounds

[e]Benzene, Toluene, Ethylbenzene and Xylene

[f] The vadose zone, also termed the unsaturated zone, is the portion of Earth between the land surface and the zone of saturation ("vadose" is Latin for "shallow"). It extends from the top of the ground surface to the water table.

of naturally occurring gases resulting from the decomposition of organic matter present in the marsh mat.

The sample collected from the monitoring well was analyzed for BTEX compounds and lead. The results indicated the presence of benzene at a concentration exceeding the environmental guideline CV (see Table 4).

December 1996

On December 31, 1996, the Borough of Wildwood Crest collected one groundwater sample from monitoring well MW-1 (VNHA 1997a). Four additional groundwater samples were also collected from ¾ inch diameter temporary well points (WP1, WP3, WP4 and WP5) to assess the horizontal extent of groundwater contamination (see Figure 5). The depths to groundwater in these wells were 3.5 to 4.5 feet below grade.

The results from MW-1 showed that with the exception of benzene, which was detected at 9.7 μg/L (see Table 4), the concentrations of all analytes were well below the NJDEP Groundwater Quality Standards. Samples from temporary well points were all below the detection limit and environmental guideline CVs.

Based on groundwater level measurements, the groundwater flow direction was determined to be towards the southwest.

February 1997

In 1997, the Borough of Wildwood Crest conducted a receptor evaluation to identify potentially sensitive receptors in the area surrounding the site, including public and private wells, surface water bodies and subsurface structures, which may be affected by groundwater contamination (VNHA 1997b).

The nearest public supply well is located on Raleigh Avenue, approximately one quarter mile southwest of the site. The records indicate that the well is screened in the Cohansey formation, which is well below the shallow soil/groundwater affected by the discharge at the site. According to the Cape May County Health Department, potable wells are not permitted within the area which includes the one mile radius (from the site) and all potable water is supplied by the City of Wildwood. The Borough of Wildwood Crest engineer stated that the building construction in the area surrounding the site is almost exclusively above grade, and to his knowledge no basements or similar subsurface structures exist.

July 1997

On July 24, 1997, the Borough of Wildwood Crest collected one groundwater sample from the monitoring well MW-1 (VNHA 1997c). The results showed that the benzene concentration (11 μg/L) exceeded the environmental guideline CV (see Table 4).

November 1998

On November 11, 1998, the Borough of Wildwood Crest collected one groundwater sample from the monitoring well MW-1 and one sample from a temporary well point WP-6 (VNHA 1998) (see Figure 5). Both samples were analyzed for BTEX compounds, methyl tertiary butyl ether (MTBE), and tertiary butyl alcohol (TBA). Benzene was detected at a concentration of 4 μg/L (see Table 4) in the MW-1 sample. BTEX compounds, MTBE or TBA were either not detected or below the environmental guideline CVs in the WP-6 sample.

April 1999

In 1999, the Borough of Wildwood Crest established a CEA at the facility (VNHA 1999). As noted above, the benzene concentration at MW-1 was expected to decrease below the Groundwater Quality Standard within 200 days.

November 2008

In 2008, a final round of groundwater samples were collected from the facility; the groundwater quality was found to be in compliance with the NJDEP Groundwater Quality Standards.

2009

The NJDEP is in the process of issuing a "No Further Action Letter and Covenant Not to Sue" decision for the site.

Contaminants of Concern: Summary

Benzene, ethylbenzene and xylene in subsurface soil, and benzene in groundwater were identified as the COCs for the site.

A brief discussion of the toxicologic characteristics of the COCs is presented in Appendix A.

Discussion

Assessment Methodology

An exposure pathway is a series of steps starting with the release of a contaminant in environmental media and ending at the interface with the human body. A completed exposure pathway consists of five elements:

1. source of contamination;
2. environmental media and transport mechanisms;
3. point of exposure;
4. route of exposure; and
5. receptor population.

Generally, the ATSDR considers three exposure categories: 1) completed exposure pathways, that is, all five elements of a pathway are present; 2) potential exposure pathways, that is, one or more of the elements may not be present, but information is insufficient to eliminate or exclude the element; and 3) eliminated exposure pathways, that is, one or more of the elements is absent. Exposure pathways are used to evaluate specific ways in which people were, are, or will be exposed to environmental contamination in the past, present, and future.

Exposure Pathways

Although there was localized soil and groundwater contamination at the facility, the NJDHSS and the ATSDR did not identify completed human exposure pathways related to the site. The contaminated soil associated with USTs was excavated and removed from the site and the groundwater monitoring results did not identify any subsurface contaminant plume. The flow direction of shallow groundwater was determined to be toward the southwest, i.e., opposite to the residential homes. As such, there are no current or past completed human exposure pathways associated with the release of heating oil and petroleum products.

Past use of the site as household and commercial hazardous waste disposal staging area may have exposed some residents to chemicals (e.g., solvents and gasoline). However, it is unlikely that the levels were high enough to result in widespread health concerns.

It is possible that the facility area had been used as a dump for disposal of large items (such as fuel containers, paint cans, car parts and old appliances) in the 1950s and 1960s. However, the groundwater monitoring results did not show any contamination; the organic vapor measurements during monitoring well installation were attributed to natural sources.

Child Health Considerations

The NJDHSS and ATSDR recognize that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing

body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

Although benzene, ethylbenzene and xylene concentrations detected in on-site subsurface soil and benzene concentration in groundwater exceeded the environmental guideline CV, it is unlikely that children were exposed to contaminated soil or groundwater. Thus, there were no completed exposure pathways or health risks to children.

Public Comment

The public comment period for this health consultation was from March 20 to April 20, 2009. No comments were received during this period.

Conclusions

The NJDHSS and ATSDR were unable to identify past or current completed human exposure pathways associated with site-related contamination. As such, the health concerns (i.e., cancer) are unlikely to be associated with exposures to site-related contamination and the site posed or poses ***No Public Health Hazard***.

Recommendations

The NJDHSS and ATSDR do not propose any follow-up and/or recommendations for the Borough of Wildwood Crest Department of Public Works Facility site.

Public Health Action Plan (PHAP)

The purpose of a PHAP is to ensure that this Health Consultation not only identifies public health hazards, but also 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 and the NJDHSS to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by the ATSDR and NJDHSS are as follows:

Public Health Actions Taken

1. Contamination data collected from on-site areas were evaluated by the NJDHSS and ATSDR.

2. Representatives of the NJDHSS and ATSDR conducted a site visit on May 20, 2008.

3. The health consultation was released for public comment.

Public Health Actions Planned

1. Representatives of the ATSDR and NJDHSS will be available to discuss the results of this report with concerned residents.

References

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CERTIFICATION

The health consultation for the Public Works Facility site, Wildwood Crest, Cape May County, New Jersey was prepared by the New Jersey Department of Health and Senior Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

Gregory V. Ulirsch, MS, PhD
Technical Project Officer, CAT, CAPEB, DHAC
Agency for Toxic Substances and Disease Registry

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

Alan Yarbrough
Team Leader, CAT, CAPEB, DHAC
Agency for Toxic Substances and Disease Registry

Table 1: Concentration[a] of Total Petroleum Hydrocarbon in soils collected (October 1994) from the excavation of the heating oli and diesel fuel USTs.

Contaminant	Sample Location								Environmental Guideline CV[b] (mg/kg)	COC[c]
	500 Gallon #2 Heating Oil Tank				1,000 Gallon Diesel Fuel Tank					
	WCD-1 (mg/kg)	WCD-2 (mg/kg)	WCD-3 (mg/kg)	WCD-4 (mg/kg)	WCD-13 (mg/kg)	WCD-14 (mg/kg)	WCD-15 (mg/kg)	WCD-16 (mg/kg)		
TPHC	18	6,200	2,900	36	<13	110	77	100	10,000[d]	No

[a]concentrations are in milligrams per kilogram (mg/kg); [b]Comparison Value; [c]Contaminants of Concern; [d](Sugihara 1996)

Table 2: Concentration of contaminants in soils collected from the excavation of the gasoline UST

Contaminant	WCD – 5 (mg/kg)	WCD – 6 (mg/kg)	WCD – 7 (mg/kg)	WCD – 8 (mg/kg)	Environmental Guideline CV[a] (mg/kg)	COC[b]
Benzene	3,800	ND[c]	910	ND	200 (RMEG[d])	**Yes**
Ethylbenzene	12,000	ND	360	ND	5,000 (RMEG)	**Yes**
Toluene	2,900	ND	670	ND	4,000 (RMEG)	No
Xylene, total	130,000	290	2,900	ND	30,000 (EMEG[e])	**Yes**
Lead	20	3.1	4.7	3	400 (RDCSCC[f])	No

[a]Comparison Value; [b]Contaminants of Concern; [c]Not Detected; [d]Reference Media Evaluation Guide for child exposure; [e]Environmental Media Evaluation Guide for child exposure; [f]New Jersey Residential Direct Contact Soil Screening Criteria

Table 3: Concentration of contaminants in the groundwater sample collected from the center of the excavation

Contaminant	Concentration (µg/l [b])	Environmental Guideline CV[a] (µg/l)	Contaminant of Concern
Benzene	630	0.6 (CREG[c])	**Yes**
Ethylbenzene	510	1,000 (RMEG[d])	No
Toluene	510	800 (RMEG)	No
Xylene	3,000	6,000 (EMEG[e])	No

[a]Comparison Value; [b]micrograms per liter; [c]Cancer Risk Evaluation Guide; [d]Reference Media Evaluation Guide for child exposure; [e]Environmental Media Evaluation Guide for child exposure

Table 4: Groundwater monitoring results for the well MW-1

Contaminant	Concentration (µg/l [a])				Environmental Guideline CV[b]s (µg/l)	Contaminant of Concern
	8/15/96	12/31/96	7/24/97	11/11/98		
Benzene	19	9.7	11	4	0.6 (CREG[c])	**Yes**
Ethylbenzene	3.7	1.4	3.1	2.3	1,000 (RMEG[d])	No
Toluene	7.4	1.7	2.3	1.9	800 (RMEG)	No
Xylene	16	4.5	13	12.7	6,000 (EMEG[e])	No
Lead	2.1	-[f]	-	-	15 (AL[g])	No
Methyl Tertiary Butyl Ether	-	-	-	ND[h]	20,000 (Int. EMEG[i])	No
Tertiary Butyl Alcohol	-	-	-	ND	8,000[j]	No

[a]micrograms per liter; [b]Comparison Value; [c]Cancer Risk Evaluation Guide; [d]Reference Media Evaluation Guide for child exposure; [e]Environmental Media Evaluation Guide for child exposure; [f]Not Measured; [g]New Jersey Action Level for remedial action; [h]Not Detected; [i]Environmental Media Evaluation Guide for intermediate exposures for child exposure; [j]American Petroleum Institute

Public Works Facility
Wildwood Crest, NJ

EPA Facility ID: UNAVAILABLE

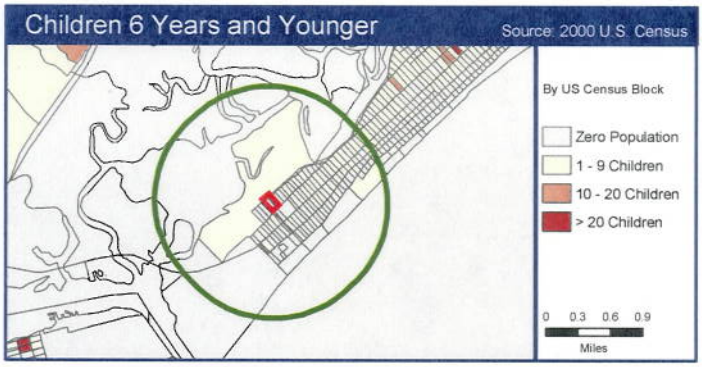
Site Location: Cape May County, NJ

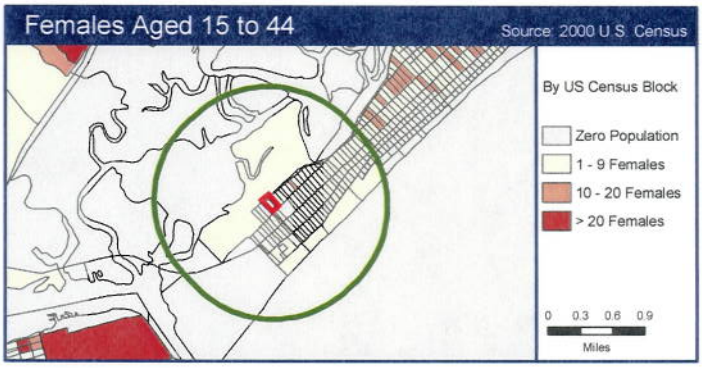
Demographic Statistics
Within One Mile of Site*

Total Population	2,249
White Alone	2,179
Black Alone	20
Am. Indian & Alaska Native Alone	1
Asian Alone	13
Native Hawaiian & Other Pacific Islander Alone	0
Some Other Race Alone	9
Two or More Races	28
Hispanic or Latino**	38
Children Aged 6 and Younger	129
Adults Aged 65 and Older	628
Females Aged 15 to 44	341
Total Housing Units	3,752

Base Map Source: Geographic Data Technology, May 2005.
Site Boundary Data Source: ATSDR Geospatial Research, Analysis, and Services Program, Current as of Generate Date (bottom left-hand corner).
Coordinate System (All Panels): NAD 1983 UTM Zone 18N

Demographics Statistics Source: 2000 U.S. Census
* Calculated using an area-proportion spatial analysis technique
** People who identify their origin as Hispanic or Latino may be of any race.





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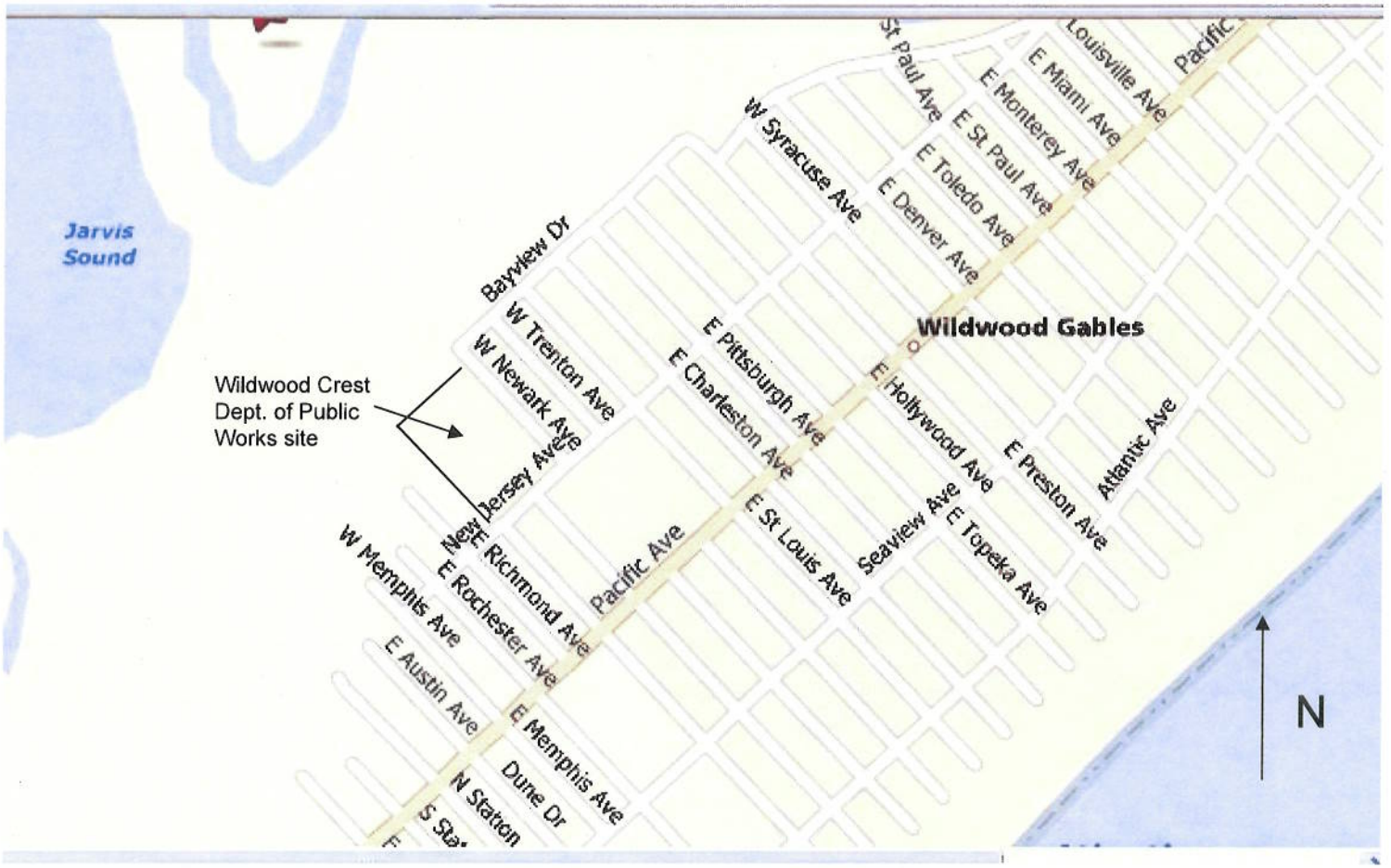

Figure 3: Location of Wildwood Crest Department of Public Works site

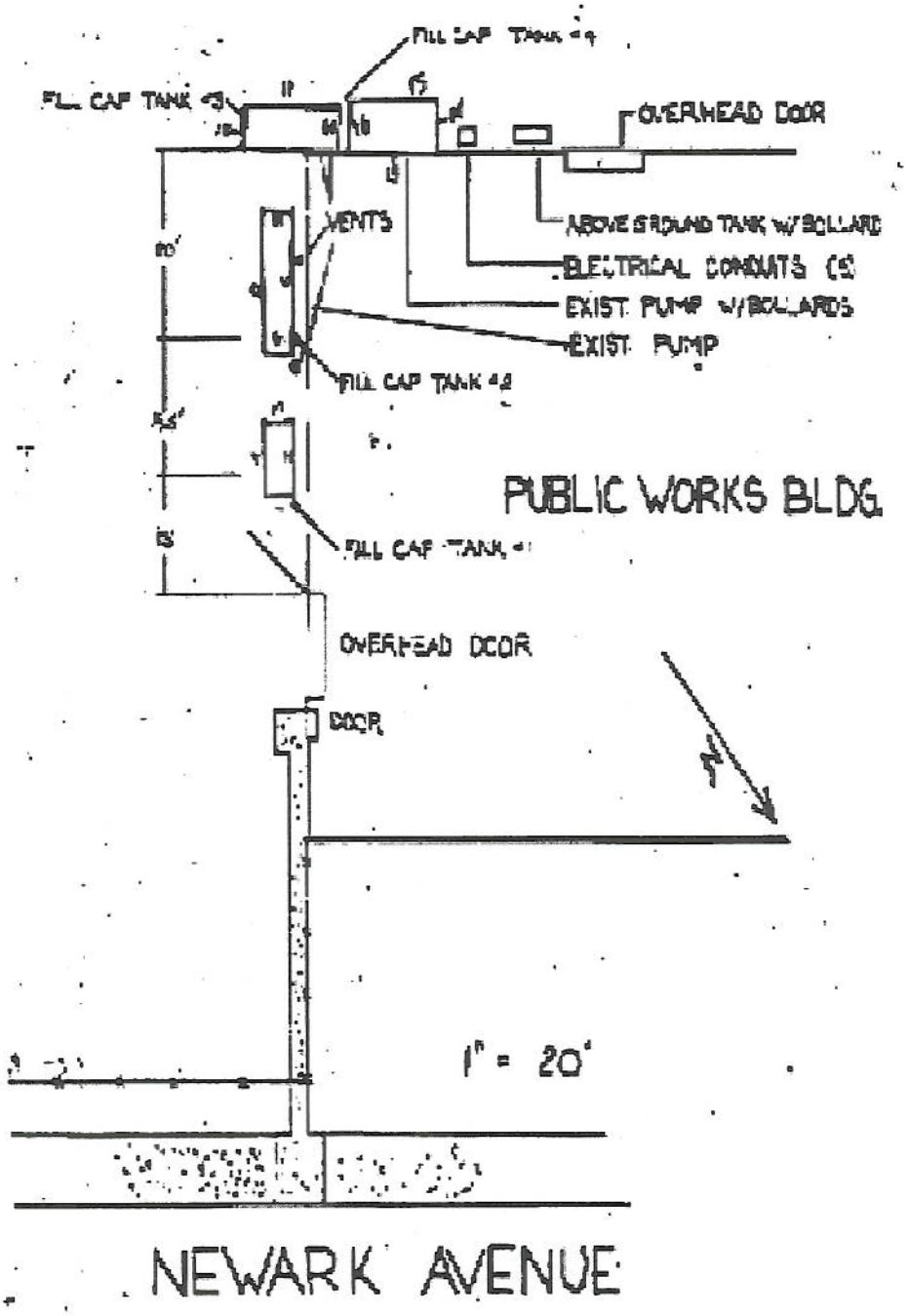

Figure 4: Location of USTs and post UST removal soil samples

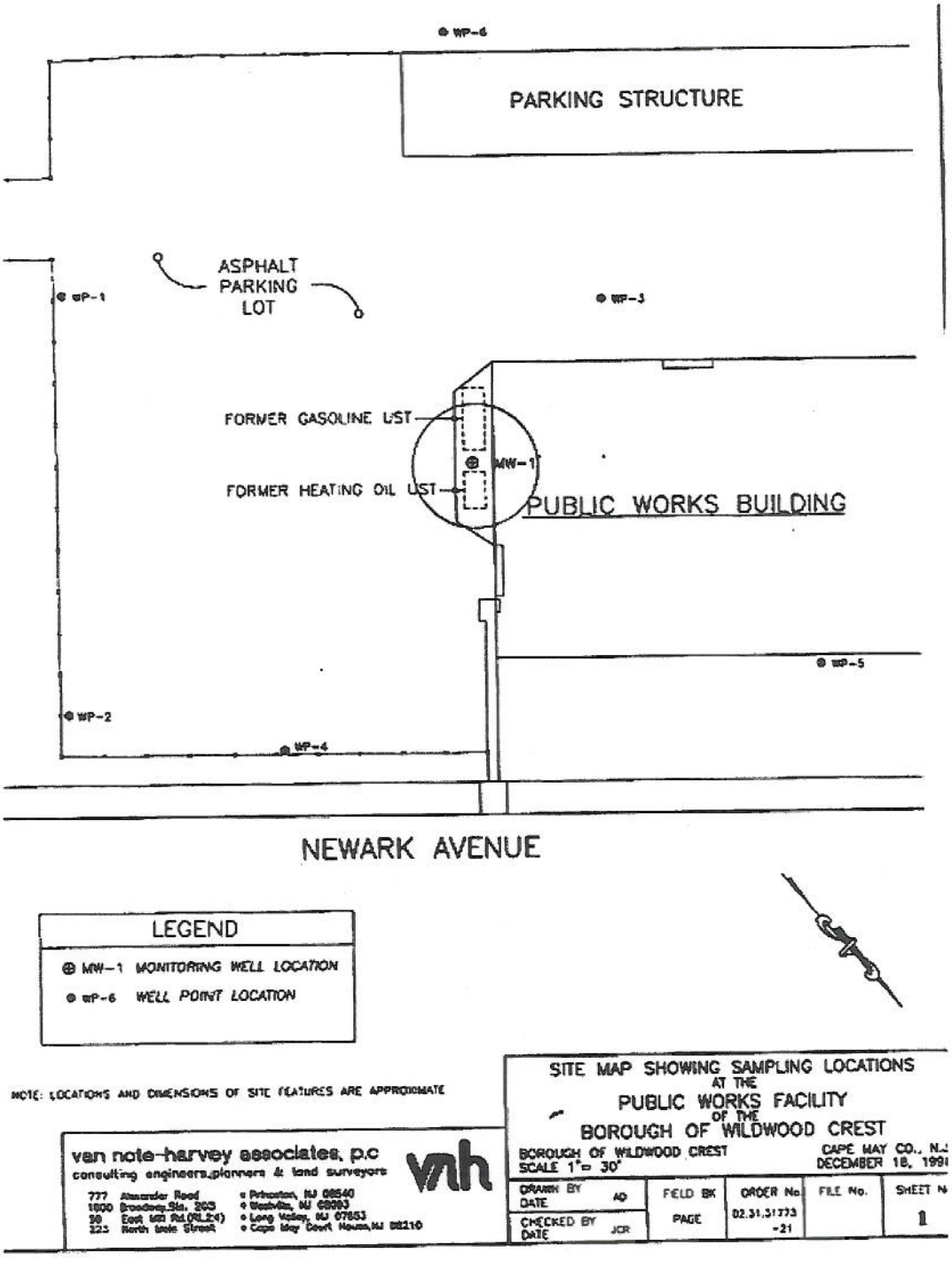

Figure 5: On-site groundwater sample locations at the facility

Appendix A

Toxicologic Summaries

The toxicological summaries provided in this appendix are based on ATSDR's ToxFAQs (http://www.atsdr.cdc.gov/toxfaq.html). The health effects described in the section are typically known to occur at levels of exposure much higher than those that occur from environmental contamination. The chance that a health effect will occur is dependent on the amount, frequency and duration of exposure, and the individual susceptibility of exposed persons.

Benzene Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is flammable and is formed from both natural processes and human activities. Benzene is widely used in the United States; it ranks in the top 20 chemicals for production volume. Some industries use benzene to make other chemicals such as plastics, resins, and nylon and synthetic fibers. Benzene is also used to make rubber, lubricants, dyes, detergents, drugs, and pesticides. Natural sources of benzene include volcanoes and forest fires. Benzene is also a natural constituent of crude oil, gasoline, and cigarette smoke. Outdoor air contains low levels of benzene from tobacco smoke, automobile service stations, exhaust from motor vehicles, and industrial emissions. Indoor air generally contains higher levels of benzene from products such as glues, paints, furniture wax, and detergents.

Breathing very high levels of benzene can result in death, while high levels can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness. Eating or drinking foods containing high levels of benzene can cause vomiting, irritation of the stomach, dizziness, sleepiness, convulsions, rapid heart rate, and death. The major effect of benzene from long-term (365 days or longer) exposure is on the blood. Benzene causes harmful effects on the bone marrow and can cause a decrease in red blood cells leading to anemia. It can also cause excessive bleeding and can affect the immune system, increasing the chance for infection. Some women who breathed high levels of benzene for many months had irregular menstrual periods and a decrease in the size of their ovaries. It is not known whether benzene exposure affects the developing fetus in pregnant women or fertility in men. Animal studies have shown low birth weights, delayed bone formation, and bone marrow damage when pregnant animals breathed benzene.

The USDHHS has determined that benzene is a known human carcinogen. Long-term exposure to high levels of benzene in the air can cause leukemia, cancer of the blood-forming organs.

Ethylbenzene. Ethylbenzene is a colorless, flammable liquid with a pungent odor. Ethylbenzene is commonly used as a solvent, chemical intermediate in the manufacture of styrene and synthetic rubber and as an additive in some automotive and aviation fuels. Occupational exposure to ethylbenzene may occur during production and conversion to polystyrene and during production and use of mixed xylenes. The general public can be exposed to ethylbenzene in ambient air as a result of releases from vehicle exhaust and cigarette smoke.

Ethylbenzene can be absorbed through the lungs, digestive tract, and skin. It also crosses the placenta. The liver is the major organ of ethylbenzene metabolism. In humans the major metabolites of ethylbenzene are mandelic acid (64 to 70%) and phenylglyoxylic acid (25%); however, these compounds are only minor metabolites in laboratory animals. Excretion occurs primarily in the urine.

Ingestion of sublethal amounts of ethylbenzene is likely to cause central nervous system (CNS) depression, oro-pharyngeal and gastric discomfort, and vomiting; however, specific experimental data are not available. Animal studies indicate that the primary target organs following chronic oral exposures are likely to be the liver and kidney. The oral RfD for chronic exposures is based on increased weight and histopathological changes in the liver and kidneys of rats.

Acute exposures to high atmospheric concentrations of ethylbenzene may cause eye and respiratory tract irritation and CNS effects (e.g., coordination disorders, dizziness, vertigo, narcosis, convulsions, pulmonary irritation, and conjunctivitis). Concentrations of 1,000 ppm (434 mg/m^3) can be highly irritating to the eyes of humans; the threshold for eye irritation has been reported to be 200 ppm (879 mg/m^3). No evidence is available to suggest that occupational exposures to ethylbenzene result in chronic toxic effects; however, histopathological changes in the liver and kidney have been observed in experimental animals following prolonged inhalation exposures. Laboratory studies also indicate that exposure to ethylbenzene (4,340 mg/m^3) during gestation results in adverse developmental effects in rats (skeletal variants) and rabbits (reduced number of live offspring per litter).

No epidemiological information is available on the potential carcinogenicity of ethylbenzene in humans following oral or inhalation exposures. A statistically significant increase in total malignant tumors was observed in female rats dosed orally with ethylbenzene; however, because of study limitations, these results cannot be considered conclusive. Although ethylbenzene has been tested by NTP in a two-year rodent bioassay, the results of that study are not yet available. Ethylbenzene is placed by EPA in Group D, not classifiable as to human carcinogenicity, based on a lack of data in humans and animals.

Toluene. Toluene is a colorless liquid widely used as raw material in the production of organic compounds and as a solvent. It is readily absorbed from the gastrointestinal and respiratory tracts and, to a lesser degree, through the skin. Toluene is distributed throughout the body, with accumulation in tissues with high lipid content. It is metabolized in the liver, primarily to hippuric acid and benzoyl glucuronide, compounds that are rapidly excreted in the urine.

In humans and animals, the primary effect associated with inhalation exposure to toluene is central nervous system (CNS) depression. Short-term exposure of humans to 100-1500 ppm has elicited CNS effects such as fatigue, confusion, incoordination, and impairments in reaction time, perception, and motor control and function. Exposure to concentrations ranging from 10,000-30,000 ppm has resulted in narcosis and deaths. Prolonged abuse of toluene or solvent mixtures containing toluene has led to permanent CNS effects. Exposure to high concentrations of toluene (1,500 ppm) has produced hearing loss in rats. Hepatomegaly and impaired liver and kidney function have been reported in some humans chronically exposed to toluene. Toluene vapors may cause eye irritation, and prolonged or repeated dermal contact may produce drying of skin and dermatitis.

In experimental animals, subchronic inhalation exposure to 2,500 ppm toluene resulted in increased liver and kidney weights (rats and mice), increased heart weights (rats), increased lung weights, and centrilobular hypertrophy of the liver (mice). Chronic inhalation exposure to 600 or 1,200 ppm for 2 years produced degeneration of olfactory and respiratory epithelia of rats and minimal hyperplasia of bronchial epithelia in mice.

Subchronic oral administration of toluene at doses ranging from 312 to 5,000 mg/kg/day produced clinical signs of neurotoxicity at 2,500 mg/kg in rats and mice. Other effects observed at higher doses in rats included increased relative liver, kidney, and heart weights (females only) and necrosis of the brain and hemorrhage of the urinary bladder.

Equivocal evidence shows that exposure to toluene in utero causes an increased risk of CNS abnormalities and developmental delay in humans. Animal studies, in which toluene was administered by inhalation, showed that exposure results in fetotoxicity and delayed skeletal development but does not cause internal or external malformations in rats. An oral study noted an increased incidence of embryonic deaths, cleft palate, and maternal toxicity in mice administered 1 mL/kg toluene during gestation.

An increased incidence of hemolymphoreticular neoplasms was reported in rats exposed to 500 mg/kg of toluene by gavage for 2 years; however, results from two long-term inhalation studies indicate that toluene is not carcinogenic at concentrations up to 1,200 ppm. Based on U.S. Environmental Protection Agency guidelines, toluene was assigned to weight-of-evidence group D, not classifiable as to human carcinogenicity.

Xylenes. Xylene is a colorless, sweet-smelling easily flammable liquid. It occurs naturally in petroleum and coal tar and is formed during forest fires. Xylene is used as a solvent and in the printing, rubber, and leather industries. It is also used as a cleaning agent, a thinner for paint, and in paints and varnishes. It is found in small amounts in airplane fuel and gasoline.

Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. It is unknown if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

The International Agency for Research on Cancer (IARC) has determined that xylene is not classifiable as to its carcinogenicity in humans. Human and animal studies have not shown xylene to be carcinogenic, but these studies are not conclusive and do not provide enough information to conclude that xylene does not cause cancer.