

Health Consultation

RAM LEATHER CARE FACILITY

CHARLOTTE, MECKLENBURG COUNTY, NORTH CAROLINA

EPA FACILITY ID: NCD982096653

SEPTEMBER 12, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR 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 which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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Prepared By:
North Carolina Division of Public Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Acronyms

AEGL	Acute Exposure Guideline Level
AT	Averaging time
ATSDR	Agency for Toxic Substances and Disease Registry
CF	Conversion factor
Cm	Centimeter
CREG	ATSDR Cancer Risk Evaluation Guide
CR	Contact rate
CV	Comparison Value
DAF	Dermal absorption efficiency
ED	Exposure duration
EF	Exposure frequency
EMEG	ATSDR Environmental Media Evaluation Guide
EPA	U.S. Environmental Protection Agency
EQRR	EQ Resource Recovery
HAZMAT	Hazardous Materials
IRi	Inhalation rate
IURF	Inhalation Unit Risk Factor
Kg	Kilogram
LOAEL	Lowest Observed Adverse Effect Level
MCLG	EPA Maximum Contaminant Level Goal
MCL	EPA Maximum Contaminant Level
M	Meter
mg	milligram
$\mu\text{g}/\text{m}^3$	micro-gram per cubic meter
μg	microgram
Ng	nano-gram
NA	Not applicable
NCDHHS	North Carolina Dept Health Human Services
NIOSH	National Institute for Occupational Safety and Health
NOAEL	No Observed Adverse Effect Level
PMCLG	EPA Proposed Maximum Contaminant Level Goal
ppm	Parts per million
ppb	Parts per billion
RfC	Reference Concentration
RfD	Reference Dose
SAd	Dermal surface area available for absorption
SAg	Dermal surface area available for ingestion
SVOC	Semi-volatile organic compound
VOC	Volatile organic compound

*** These acronyms may or may not be used in this report**

EXECUTIVE SUMMARY

The Ram Leather facility is a former dry cleaning and leather restoration business located at 15100 Albermarle Road, in Charlotte, which is located in eastern rural Mecklenburg County, NC just off Highway 27.

The Ram Leather facility was operational from 1977 to 1993. Currently the site is not being used for industrial processes. Based on evidence gathered in the past, it has been determined that waste including chlorinated solvents were improperly disposed of at this site. The Agency for Toxic Substances and Disease Registry (ATSDR) released a Public Health Assessment for the Ram Leather facility on January 31, 2006 which states that residents surrounding the Ram Leather facility may have been exposed to chlorinated solvents for an “indeterminate period of time” (ATSDR, 2006). According to the health assessment, residents are potentially exposed while carrying out common household tasks such as drinking, showering, bathing, and cooking.

Groundwater is the only source of drinking water within a two-mile radius of the Ram Leather facility. These solvents contaminated private well water on and off-site. Water samples taken at the private drinking wells from nearby houses detected concentrations of tetrachloroethylene (PCE), trichloroethylene (TCE), cis 1,2-dichloroethylene (cis-1,2-DCE), and vinyl chloride. Well water is the primary drinking source for the private homes surrounding the Ram Leather facility.

Environmental water and soil samples were collected as early as 1991. In 1996, installation of water treatment devices began on residential wells, which were identified as having solvent levels above the recommended drinking water standards (ATSDR, 2006). Initially, the United States Environmental Protection Agency (EPA) held responsibility for filter replacement on the devices. North Carolina Department of Environmental and Natural Resources (NCDENR) was tasked to replace the filters on the water treatment units after the EPA relinquished responsibility. After NCDENR stopped funding this action, responsibility for filter changes was transferred to the homeowners. Local officials reported that some residents might not properly utilize the treatment devices while others might not use the devices at all. There is no data to support the effectiveness of the treatment devices and, no way to determine how often the filters were replaced; therefore, the effectiveness of the water treatment program is unclear. Due to these concerns, ATSDR asked the North Carolina Department of Health and Human Services (DHHS) to evaluate current levels of contaminants in private well water.

Mecklenburg County Health Department conducted water sampling on June 28, 2007 at the request of NC DHHS. Some chemicals exceeded federal drinking water standards and may pose a health hazard to any residents who have been drinking the untreated water without a filter for long periods of time. Many residents report using filters and/or bottled water; therefore it is hard to determine if any residents are currently being exposed to contaminants that would cause adverse health effects.

The EPA began a program in 2004 to install a public water supply system to residences with contaminated well water. As of July 2008, the EPA reported that the public water system is

complete and ready to be brought on-line as soon as final documents are signed for “right of way”, with no further action needed from EPA or the NC DHHS.

The public water system is installed and will be operational by August 2008 according to EPA representatives. Once the public water supply system begins operating, residents will no longer have a potential for exposure to the contaminated groundwater, and this pathway will be considered **No Public Health Hazard**.

PURPOSE AND HEALTH ISSUES

The Ram Leather Care site was proposed for inclusion to the National Priorities List (NPL) on April 30, 2003, and added on September 29, 2003. The NPL was established by U.S. Environmental Protection Agency (EPA) and is a list of the hazardous waste sites across the nation where cleanup is warranted. Congress requires the Agency for Toxic Substances and Disease Registry (ATSDR) to conduct public health actions on all sites proposed to the NPL. A public health assessment (PHA) was conducted on the Ram Leather Site on January 31, 2006. This health consultation evaluates additional private well water samples at homes in the vicinity of the Ram Leather Care Site as a follow-up to the 2006 PHA.

BACKGROUND

SITE DESCRIPTION AND HISTORY

Privately owned residences surround the Ram Leather facility. At the time of the public health assessment conducted in 2006, it was determined that approximately 7,000 people obtain their drinking water from wells in the region (ATSDR, 2006). The site surrounding the Ram Leather site has silty clay loam soil, which covers weathered bedrock (saprolite zone) (ATSDR, 2006).

Ram Leather operated as a dry cleaning facility for approximately fourteen years. The primary contaminant of concern is chlorinated hydrocarbons such as tetrachloroethylene (PCE) and petroleum hydrocarbons used in the “cleaning and restoration process” (ATSDR, 2006).

According to the 2006 public health assessment on the Ram Leather facility, the Mecklenburg County Department of Environmental Protection “discovered illegal open burning of filters containing PCE” (ATSDR, 2006). In addition, the Ram Leather site incurred a number of infractions ranging from improper storage, improper handling methods, and overall negligent behavior regarding waste solvents at the site.

Sampling conducted in the early 1990s revealed solvents had indeed reached the well water used by several of the residents in nearby houses. On May 4, 1996, the EPA determined the site qualified for a high priority removal action (ATSDR, 2006). Because there is no water or soil sampling data prior to 1991, it is not known how long people were exposed before the contamination was discovered.

ATSDR conducted a site visit on May 25, 2004. During this visit, the survey team observed that access to the site was unrestricted and the on-site well was online. Currently the well located on-site is not used. In May of 2004 the survey team also observed an in-ground hole approximately 10 inches wide that appeared to contain water and another undetermined liquid (ATSDR, 2006).

The Ram Leather Facility is not used for industrial or private processes today. The well is not capped according to Mecklenburg Health Department officials, but it is not in use.

Groundwater Sampling

The on-site well and surrounding private residential wells were sampled many times between 1991–2002 by NCDENR, EPA, MCDEP, and the proprietor (ATSDR, 2006). Table 1 below shows the maximum concentration of each contaminant detected during those years. For more information on these sampling events, please refer to the 2006 Public Health Assessment (ATSDR, 2006).

Table 1. Maximum Concentration of Contaminants Detected In Private Residential Wells, 1991–2002

Date Sampled	Maximum concentration of PCE (ppb)	Maximum concentration of TCE (ppb)	Maximum concentration of <i>cis</i> -1,2-DCE (ppb)
5/91	19	–	1.8
8/91	8	–	-
1/92	45	–	5.8
2/92	66	1.7	–
7/92	26	–	–
8/92	6.5	–	–
6/93	–	–	–
3/94	24	2.8	24
9/95	204	8	6
12/95	100	26	42
4/99	110	4.1	4.5
8/02	54	2.2	40

Source: 2006 ATSDR health assessment ppb = parts per billion.

“–” chemical not detected or not sampled / **bolded shaded** numbers exceed the MCL for the chemical

Soil Sampling

Soil sampling was also conducted at the Ram Leather facility and surrounding areas from 1991 - 1999. VOCs, methyl-t-butylether (MTBE), mineral spirits, benzene, toluene, ethylbenzene, and xylene were detected at or below the applicable soil standards (ATSDR, 2006). Some samples during the sample years contained detectible levels of PCE, TCE, vinyl chloride, 1,1-dichloroethane and 1,2-dichloroethene, but the levels were still below the applicable standards (ATSDR, 2006). To date, none of the samples exceeded applicable soil standards or ATSDR comparison values (ATSDR, 2006).

DEMOGRAPHICS

According to year 2000 Census data, approximately 933 people live within 1 mile of the Ram Leather Care site (Figure 5, Appendix A). Ethnic groups within the 1-mile radius include 851 whites, 42 blacks, 17 Hispanics, 15 Asians, and 8 American Indians/Alaska Natives. Included in these numbers are 103 children aged 6 and younger, 61 adults aged 65 and older, and 216 females aged 15–44. Three hundred and nineteen housing units exist within the 1-mile area.

COMMUNITY HEALTH CONCERNS

The ATSDR held two public availability sessions in May 2004 at the Mint Hill Town Hall to gather community concerns about the Ram Leather Care site. Most of the residents were interested in getting their wells tested. Some residents wanted to know whether their wells were safe or whether they might be impacted by contaminants from the site. Residents also expressed their desire for more information about activities at the site. The Mecklenburg County Health Department and MCDEP staff assisted residents who wanted to know about previous well tests or to determine whether their wells were eligible for testing. Residents who asked about the status of EPA's plans and activities for the site were referred to the CDM representative, a contractor who was present to answer questions on EPA's behalf (ATSDR, 2006).

DISCUSSION

Private Well Water Data

NC DHHS asked the Mecklenburg County Health Department to conduct additional water samples on June 28, 2007. The sampling was conducted by the Mecklenburg County Health Department using standard methods for drinking water collection. The samples were analyzed by Charlotte Laboratory Services Division, a certified lab that conducted analysis of samples using EPA standards. The sampling on June 28, 2007 shows that there are still elevated levels of PCE and TCE in two of the three private drinking water wells tested. See Table 2 for sample results.

Table 2. Private Well Sampling Data, June 28, 2007

Location	Compound	Concentration (µg/L)	Comparison Values	
			Federal Drinking Water Standard MCL (µg/L)	State (DCDENR 2L HW) Standard (µg/L)
Well 15148	cis-1,2-dichloroethene	19	70	70
	Tetrachloroethene (PCE)	34	5.0	0.7
Well 15170	cis-1,2-dichloroethene	7	70	70
Well 15208	cis-1,2-dichloroethene	56	70	70
	Tetrachloroethene (PCE)	68	5.0	0.7
	Trichloroethene (TCE)	21	5.0	2.8

Bolded and shaded numbers exceed the MCL for the chemical
Other chemicals not listed = **ND**

The EPA began a program in 2004 to install a public water supply system to residences with contaminated well water. The EPA on scene coordinator reported that the water line would be activated and used by residents in late fall, early winter 2008. The process will be complete when documentation granting the “right of way” is signed by County and Federal representatives.

Exposure Pathways

According to the ATSDR, a completed exposure pathway is one that contains the following elements:

- Source of contamination
- Transport through a medium
- Point of exposure
- Route of exposure
- Exposed population

An exposure pathway is complete if all elements currently exist, or existed in the past. If all of the elements listed above are not present, the exposure is considered to be a potential pathway. The amount of time exposed, area exposed and type of exposure are factors used in defining the specific exposure event and must be considered when evaluating exposure routes. Furthermore, short (acute) or long (chronic) exposure events should be considered as factors in the completed pathway exposure.

A. Completed Exposure Pathway

The most significant completed exposure pathway concerning the residents near the Ram Leather facility is through ingestion (drinking the water) and contact (dermal). See Table 3 below, which illustrated completed exposure pathways. Residents living near the Ram Leather facility will be exposed if they drink, cook, shower, or bathe in the contaminated un-filtered well water. People around the Ram Leather Site who have been drinking contaminated water have been exposed for an indeterminate amount of time.

Table 3. Completed Exposure Pathway

Source	Medium	Exposure Point	Route of Exposure	Exposed population
Contaminated ground water	Groundwater	Private well water	Ingestion, dermal	Persons in the past and present with contaminated well water, using well water and not using filtration systems

B. Potential Exposure Pathway

Potential exposure pathway is when all of the elements of completed exposure pathway are not present. On-site at the Ram Leather facility, indoor air and groundwater are “potential” exposure

pathways. The possibility exists that if buildings on the Ram Leather facility were re-occupied, then the indoor air and groundwater exposure pathways will be completed. Groundwater could potentially migrate beyond the facility, which could cause an extended area of contamination. The on-site well is not capped and is currently used by cleanup contractors to pump and treat the local water. There is no other access to the site at this time. The ingestion and dermal exposure on-site will remain potential. Vapor intrusion into homes is possible but unlikely due to the levels of contaminants found in the water and soil.

Public Health Implications

This section discusses the ATSDR health effects that could plausibly result from exposures to contaminants at the Ram Leather Care site. For a public health hazard to exist, people must contact contamination at levels high enough and for long enough time to affect their health. The environmental data and conditions at the site revealed one major completed exposure pathway—use of private wells for potable purposes. Some people may have questions about acceptable non-potable uses for water contaminated with TCE and PCE. See Appendix E for frequently asked questions about non-potable well water use.

The only two contaminants of concern detected in private wells at the Ram Leather Care site were PCE and TCE. Levels of other chemicals are below applicable drinking water standards and are, therefore, not of public health concern. Three or four residences identified as having wells containing contaminants above applicable drinking water standards were provided with water treatment systems several years ago.

The water treatment systems, when used properly, remove chlorinated solvents to levels below drinking water standards if properly maintained; however, officials were notified that some residents are not changing their filters as advised. Therefore, filter breakthrough may have occurred, and some residents still may be exposed to contaminants. Ingestion of contaminated well water is assumed to be one of the primary routes of contaminant exposure for residents. When residents drank the water or drank beverages made using water from contaminated wells, they were orally exposed to contaminants.

Using the above assumptions the ATSDR calculated exposure doses for highly and averagely exposed children and adults resulting from ingestion, inhalation, and dermal contact with PCE and TCE in private wells in the 1996 public health assessment. An exposure dose is the amount of a contaminant that gets into a person's body. Exposure doses for ingestion, inhalation, and dermal contact were combined to determine the possibility of harmful effects. The combined exposure levels were compared with health guidelines to determine whether further toxicological evaluation is needed.

TCE

Non-cancer Health Effects

TCE at high doses has been linked with a variety of non-cancer conditions, including anemia and other blood disorders, stroke, nervous system disorders, urinary tract disorders, liver problems, kidney dysfunction, diabetes, eczema, and skin allergies. A study on the reproductive effects of TCE suggests that more miscarriages might occur when mothers drink water containing TCE.

Other studies have linked prenatal TCE exposure with congenital heart disease, eye malformations, neural tube defects, and oral cleft palates. The combined results of these studies are unclear; however, and further study is needed to understand the risk for reproductive and developmental effects associated with TCE exposure.

TCE was only detected in one well during the 2007 sampling event, at a level of 21 ppb. The 1996 Public Health Assessment calculated exposure doses for children and adults using the maximum detected at that time – 26 ppb. ATSDR determined that the corresponding exposure doses were significantly less than the NOAEL (no observable adverse effect level), and was unlikely to cause adverse health effects (ATSDR, 2006). Because the TCE level detected during the 2007 sampling event has not gone up, and the exposure factors concerning the site have not changed, exposure doses were not recalculated with the new sampling data for TCE.

Cancer Health Effects

The International Agency for Research on Cancer has determined that TCE is a probable human carcinogen. TCE causes liver and kidney cancer in experimental animals. Studies on the epidemiology of cancer among people exposed to TCE have found increases in kidney cancer, liver cancer, non-Hodgkin lymphoma, cervical cancer, Hodgkin disease, multiple myeloma, and pancreatic cancer. However, the association between exposure to TCE and cancer has been inconsistent across studies.

In 2006, ATSDR found that residents drinking water contaminated with TCE had up to a low increased risk for cancer (ATSDR, 2006). Although the levels found during the 2007 sampling event were less than previous sampling events, there is uncertainty about the levels of TCE fluctuating over time and weather conditions. Based on historical maximum levels of TCE detected, residents may still have up to a low theoretical increased risk of cancer if they continue to drink contaminated, un-treated private well water.

PCE

Non-cancer Health Effects

Results from animal and human health studies indicate that exposure to high doses of PCE can adversely affect the nervous system and reproductive system. Findings from human studies suggest a causal relation between exposure to PCE in-utero and reproductive and developmental effects, including reduced birth weight and infants born small for gestational age. Studies in animals and humans suggest the developing fetus may be susceptible to PCE exposure from maternal exposure.

PCE was detected in two wells during the 2007 sampling event, at a maximum level of 68 ppb. The 1996 Public Health Assessment calculated exposure doses for children and adults using the maximum detected at that time – 204 ppb. ATSDR determined that the corresponding exposure doses were significantly less than the NOAEL (no observable adverse effect level), and was unlikely to cause adverse health effects (ATSDR, 2006). Because the PCE level detected during the 2007 sampling event was significantly less, and the exposure factors concerning the site have not changed, exposure doses were not recalculated with the new sampling data for PCE.

Cancer Health Effects

The International Agency for Research on Cancer classifies PCE as a probable carcinogen in humans. The findings from animal and human studies provide some evidence of PCE carcinogenicity in animals and limited evidence for carcinogenicity in humans. Cancer effects of PCE have been studied in laundry and dry-cleaning workers, who also may have been exposed to other petroleum solvents. Among these workers, excess incidence was reported of the following cancers: lymphosarcomas; leukemia; and cancers of skin, larynx, colon, lung, urogenital tract, and urinary bladder. Although these studies suggested a possible association between occupational exposure to PCE and TCE and increased lymphatic malignancies, the evidence was inconclusive because the workers also were exposed to petroleum solvents.

ATSDR found that residents drinking water contaminated with PCE had a low to moderate increased risk for cancer (ATSDR, 2006). Although the levels found during the 2007 sampling event were less than previous sampling events, there is uncertainty about the levels of PCE fluctuating over time and weather conditions. Based on historical maximum levels of PCE detected, residents may still have a low to moderate theoretical increased risk of cancer if they continue to drink contaminated, un-treated private well water.

C. Evaluating Health Effects from Exposure to Multiple Chemicals

The health impact of exposure to chemical mixtures can be of particular concern at hazardous waste sites because most such sites contain multiple chemical contaminants. Evaluation of chemical mixtures especially must consider potential toxic interactions at environmentally relevant doses of chemicals. However, relatively few studies have assessed toxic interactions in these low dose ranges. These studies found no discernable toxic response until the dose levels of the individual chemicals approached or exceeded their individual thresholds. However, when the chemicals were administered at their individual LOAEL doses, additive toxic effects clearly were evident. Furthermore, additive toxicity was observed even though the chemicals had different mechanisms of toxicity.

Other studies have provided evidence that exposure to chemical mixtures, in which the chemicals were administered at doses near their individual thresholds, can product additive toxic effects. However, no evidence exists of additive toxicity from exposure to chemical mixtures when the individual chemicals are administered at doses well below their individual thresholds. Nevertheless, the threshold doses for many toxic endpoints in animals are not well defined. Therefore, considering the potential for toxic effects from exposure to chemical mixtures at all sites is prudent (ATSDR *Guidance Manual for the Assessment of Joint Action of Chemical Mixtures*).

The 1996 Public Health Assessment considered multiple chemical exposures from private well water. The evaluation used higher concentrations than what was found in the 2007 sampling event and found that significant additive or interactive effects were **not** likely (ATSDR, 2006). Therefore, this health consultation will not re-evaluate multiple chemical exposures.

CHILD HEALTH CONSIDERATIONS

The ATSDR recognizes there are unique exposure risks concerning children that do not apply to adults. Children engage in increased outdoor activities and hand to mouth actions, have lower body weights and higher intake rate than adults, which result in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage (ATSDR, 1999).

As stated in the 2006 Public Health Assessment on Ram Leather, the fetus may be particularly susceptible to the toxic effects of chemicals such as TCE and PCE. Laboratory animals in epidemiologic studies indicate that VOC exposure to the fetus and children may result in adverse health effects. The exposure potential for TCE and PCE in children is unknown without further study.

CONCLUSIONS

In the previous public health assessment, the Ram Leather Site was classified as an *indeterminate public health hazard* for past exposures to multiple contaminants detected at the site and nearby drinking water wells. The indeterminate hazard designation was based on sampling data, unknown success of the treatment devices attached to the drinking water wells and the fact that only a portion of the houses could be sampled.

Recent sampling has shown that the Ram Leather site is a continuing source of contamination. Sampling has also shown that levels of TCE and PCE are still present in some of the drinking water wells, and it is still unclear how effective the treatment devices are. The drinking water pathway is still classified as an indeterminate public health hazard; however, DHHS believes that any hazard associated with drinking the water is reduced by using bottled water for drinking, and/or a properly maintained treatment system on the well.

EPA has installed a public drinking water system and plans to activate it for use by all homeowners by the end of 2008. After the public drinking water system is on-line and in-use, there will no longer be an exposure pathway of drinking contaminated water. At that time, this pathway of the Ram Leather site will be considered **No Public Health Hazard**.

RECOMMENDATIONS

- Because of fluctuating concentrations of TCE and PCE over time and varying weather conditions and unknown use and/or effectiveness of water filters, EPA should bring the public water supply system on-line as soon as possible.
- NC DHHS should continue outreach and education for the residents surrounding the Ram Leather site, including distribution of educational material on the contaminants of concern.
- NC DHHS, NC DENR, and/or EPA should inform residents on how to properly close a private well once the public water supply system is on-line and in use. If any private wells are to be used for non-potable purposes (e.g., irrigation), then residents should be educated on proper use to protect public health.

PUBLIC HEALTH ACTION PLAN

The purpose of the Public Health Action Plan (PHAP) is to ensure that this health consultation provides a plan of action designed to mitigate or prevent potential adverse health effects.

A. Public Health Actions Completed

- In May 1996, ERRB/EPA installed drinking water treatment systems on wells with contaminant levels above applicable drinking water standards. ERRB replaced the filters for the water treatment systems for 1 year.
- The NCDENR replaced the filters for the water treatment systems for 3 years until April 2000.
- ATSDR held a public availability session on May 25, 2004, to gather health concerns from the community.
- In Fall 2004, EPA began testing additional private wells at residents' request to determine whether wells are contaminated beyond the known areas of contamination.
- In July 2005, ATSDR mailed a Fact Sheet to residents entitled, "VOCs: Your Water and Your Health". The Fact Sheet contained information about VOCs in groundwater, home water filtration systems, and private well testing. This information was requested by residents during the public availability sessions in the community.
- In October 2005, ATSDR mailed a Fact Sheet to residents which summarized the findings of the Public Health Assessment and contained information on how to comment on the document.

B. Public Health Actions Planned

- Educational outreach distributed through the Mecklenburg County Health Department for residents near the Ram Leather site (Outreach should include acceptable non-potable uses for well water, dangers of TCE, PCE and other contaminants of concern, and a copy of this report). The educational material can be provided by NC DHHS or collected from electronic internet resources provided by the EPA.
- Information is available to local residents on *how to close a private well*. Local residents, who reside near the Ram Leather facility, should be aware of the following contact information for properly closing private wells in N.C.
 - DENR Customer Service at NCDENR, 1601 Mail Service Center, Raleigh, NC 27699-1601 or call 919-733-4984 Fax 919-715-3060
 - Mecklenburg Groundwater & Wastewater Services 700 N Tryon St Suite 211 Charlotte NC 28202 704-336-5103 or <http://groundwater.charmeck.org>

If any citizen has questions or concerns about this report, please contact the NC DHHS Occupational and Environmental Epidemiology Branch at (919) 707-5900.

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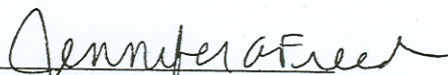
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CERTIFICATION

This Health Consultation for the Ram Leather Site was prepared by the North Carolina Division of Public Health (NC DHHS) under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consult and update was initiated. Editorial review was completed by the cooperative agreement partner.

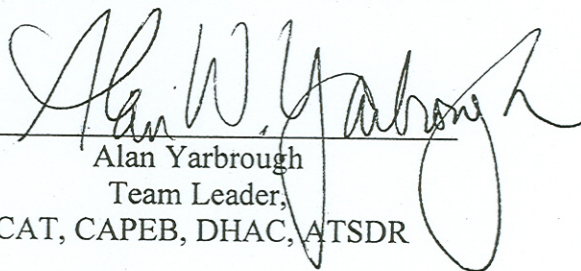


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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.



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References

- ATSDR, (2005). *Toxicological Profile, Update*. Federal Gov.
<http://www.atsdr.cdc.gov/toxfaq.html>
- ATSDR, (2007). *Public health assessment for ram leather care site*.
- ATSDR, (2003). *Public health assessment for lockwood solvent groundwater plume*.
http://www.atsdr.cdc.gov/hac/pha/lockwoodsolvents/lsg_toc.html
- Buben, J.A. and E.J. O'Flaherty. 1985. Delineation of the role of metabolism in the hepatotoxicity of trichloroethylene and perchloroethylene: A dose- effect study. *Toxicol. Appl. Pharmacol.* 78: 105-122.
- EPA (2003). *HRS documentation record. Ram Leather Care Site*.
<http://www.epa.gov/superfund/sites/docrec/pdoc1673.pdf>
- EPA, (2007). *Consumer Factsheet on: TETRACHLOROETHYLENE*.
http://www.epa.gov/safewater/contaminants/dw_contamfs/tetrachl.html
- EPA, (2007). *Consumer Factsheet on: TRICHLOROETHYLENE*.
<http://www.epa.gov/safewater/dwh/c-voc/trichlor.html>
- EPA, (2007). *Consumer Factsheet on: 1,2-DICHLOROETHYLENE*.
<http://www.epa.gov/safewater/dwh/t-voc/12-dich2.html>
- EPA, (2007). *Consumer Factsheet on: VINYL CHLORIDE*.
<http://www.epa.gov/safewater/dwh/c-voc/vinylchl.html>
- Hawley, Gessner (1981). *The condensed chemical dictionary tenth addition*. New York, NY: Van Nostrand Reinhold Company Inc. Pages 253, 355, & 429
- Hayes, J.R., L.W. Condie, Jr. and J.F. Borzelleca. 1986. The subchronic toxicity of tetrachloroethylene (perchloroethylene) administered in the drinking water of rats. *Fund. Appl. Toxicol.* 7: 119-125.
- International Agency for Research on Cancer (IARC).
Available at <http://www.iarc.fr/>
- NIOSH, National Institute for Occupational Safety and Health (2005). NIOSH Pocket Guide. Retrieved August 20, 2007, from Web site:
<http://www.cdc.gov/niosh/npg/npgd0383.html>
- Sax, & Lewis, N. Irving, Richard J. (1989). *Dangerous properties of industrial chemicals*. New York: Van Nostrand Reinhold.

Appendix A
Site Layout and Location Map
Figures (1-5)



Figure 1. Former Ram Leather operations building

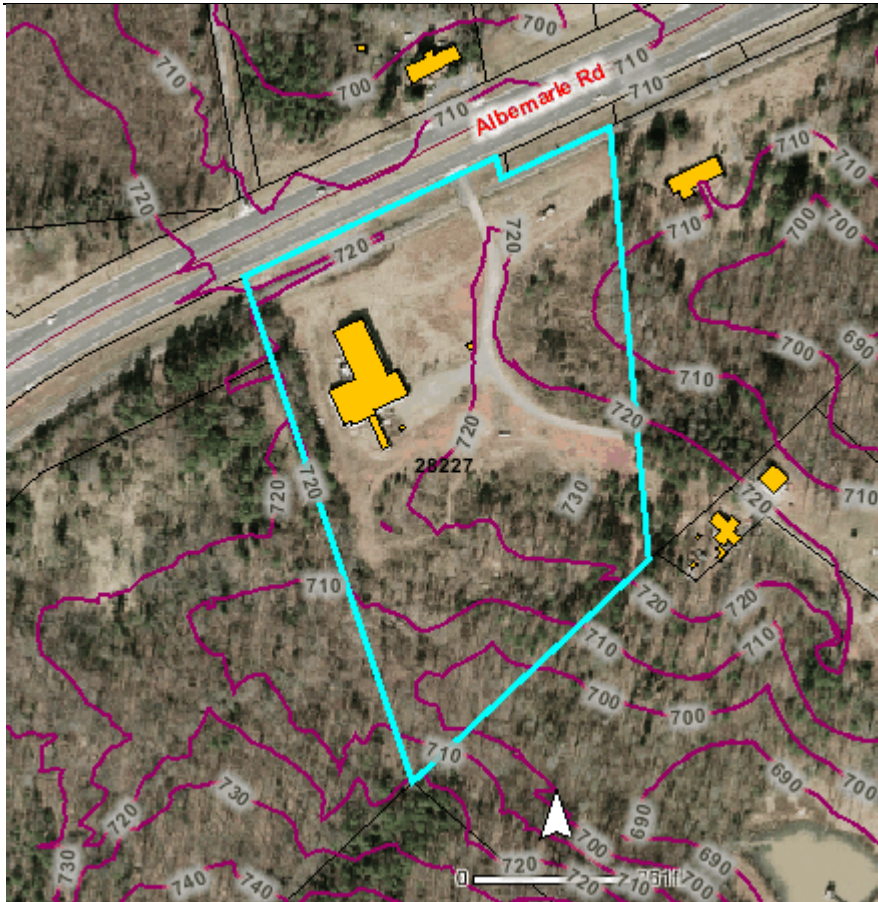
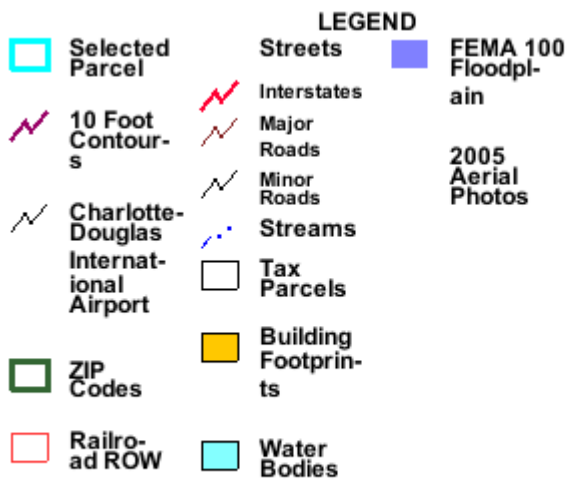


Figure 2. Former Ram leather operations location



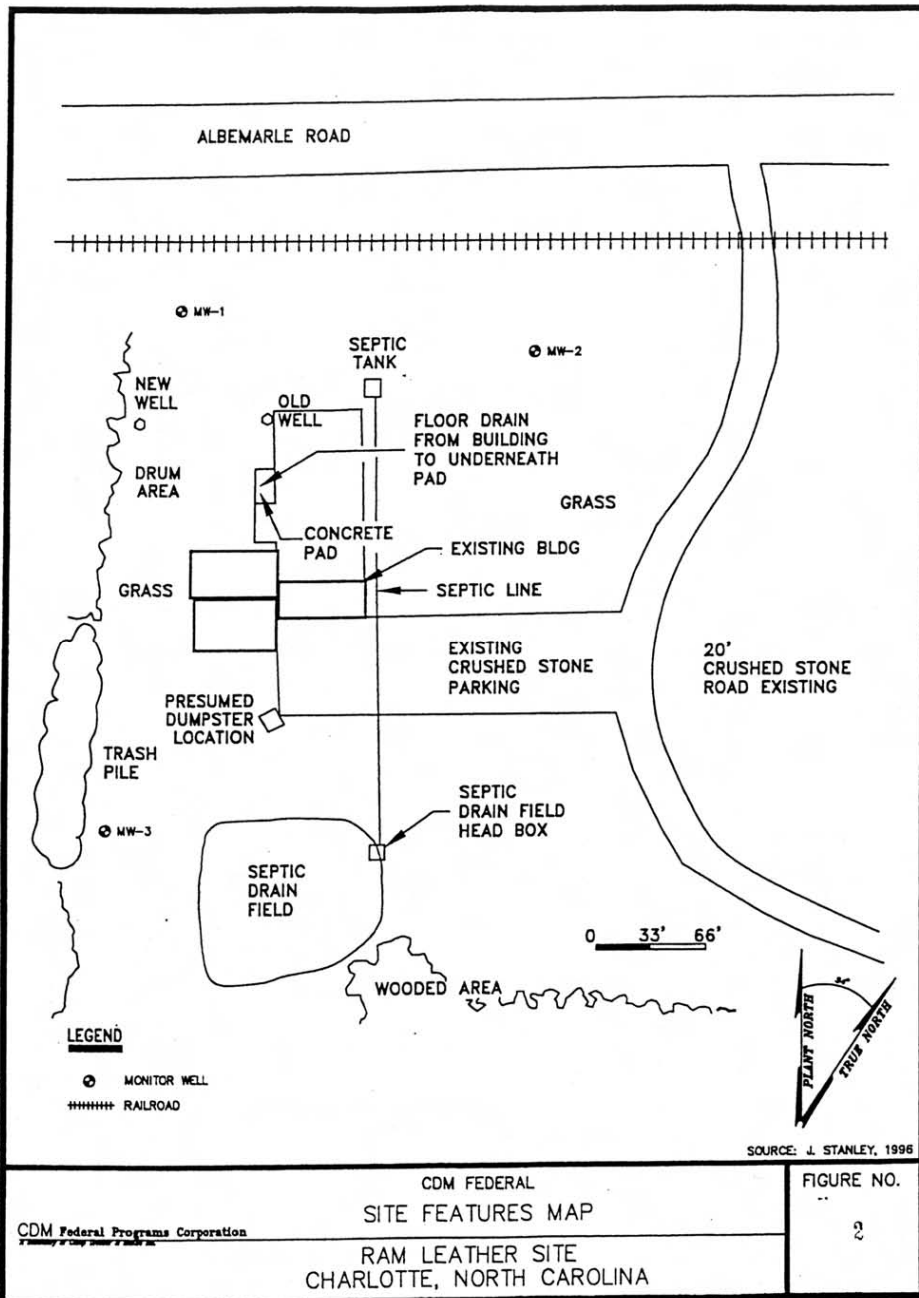


Figure 3. Ram Leather site drawing

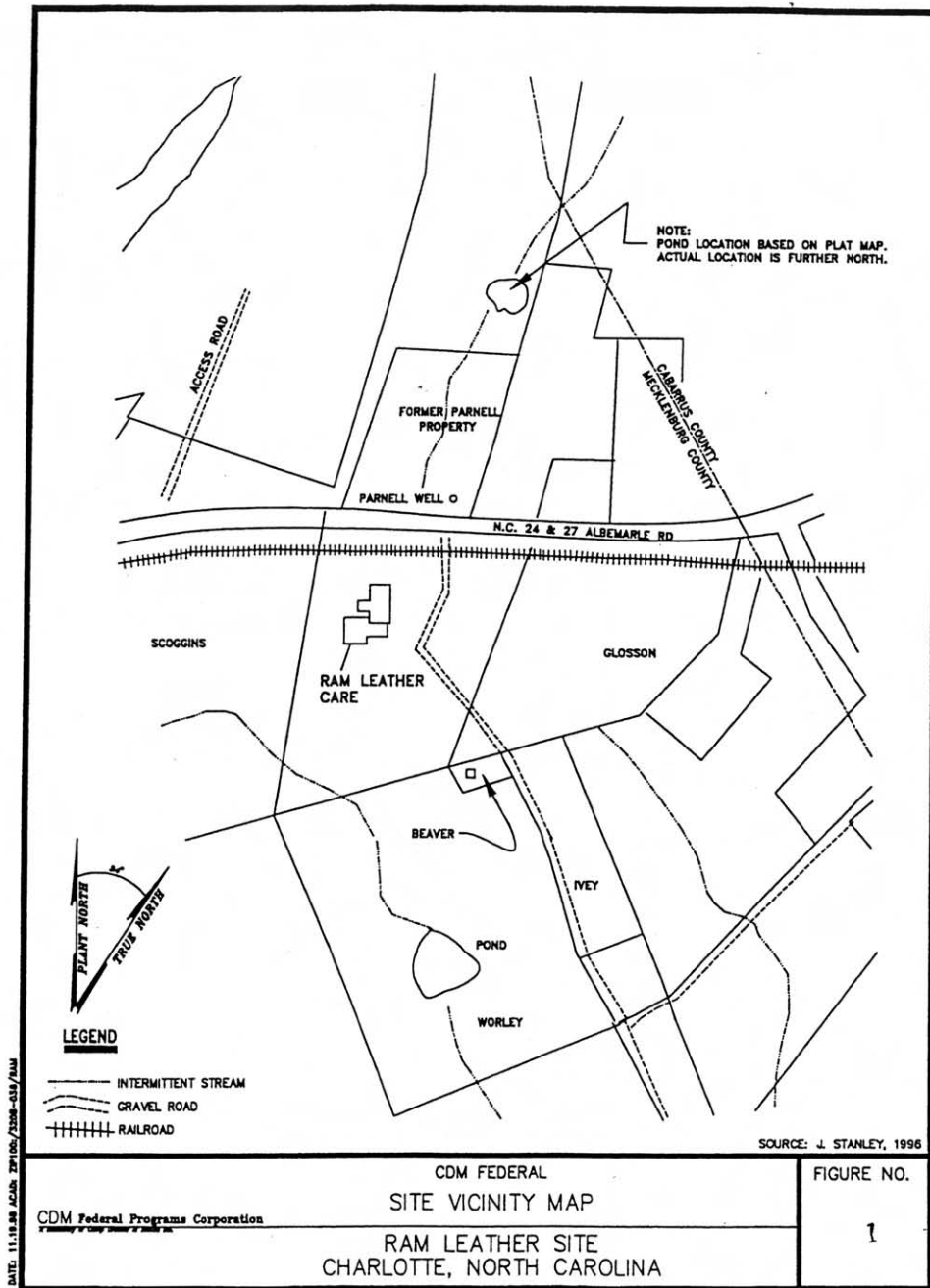
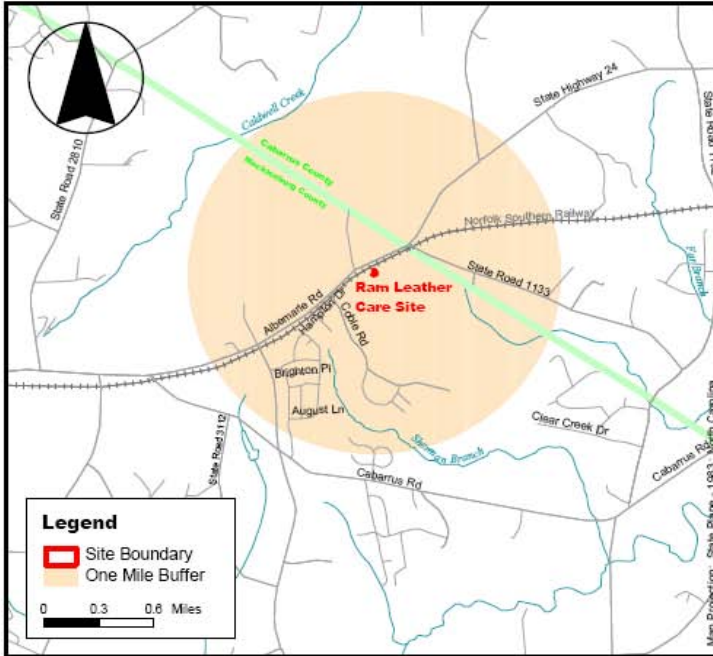


Figure 4. Ram Leather site vicinity map.

Ram Leather Care Site

Charlotte, North Carolina
EPA Facility ID NCD982096653

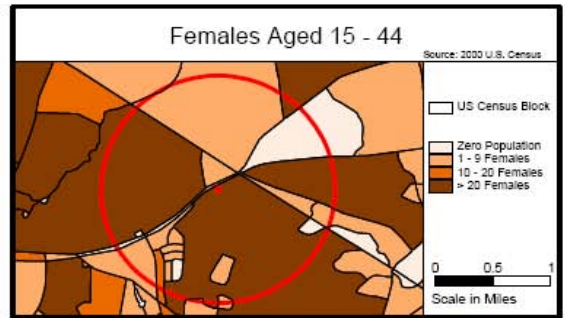
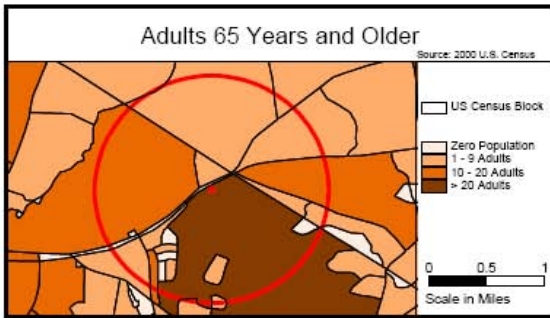
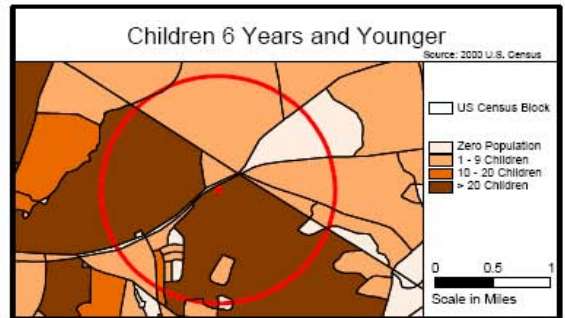
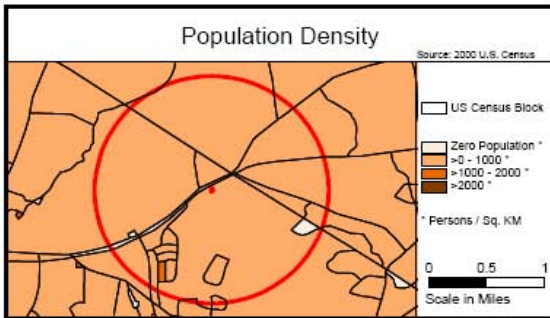
INTRO MAP



Mecklenburg County, North Carolina

Demographic Statistics Within Area of Concern*	1mi	4mi
Total Population	928	16032
White alone	851	13728
Black alone	42	1711
Am. Indian & Alaska Native alone	8	80
Asian alone	15	206
Native Hawaiian and Other Pacific Islander alone	0	1
Some other race alone	0	118
Two or More races	12	196
Hispanic or Latino	17	325
Children Aged 6 & Younger	103	1909
Adults Aged 65 & Older	61	1037
Females Aged 15 - 44	216	3682
Total Housing Units	319	5894

Demographic Statistics Source: 2000 US Census
*Calculated using an area-proportion spatial analysis technique



JVA031624



Figure 5. Ram Leather site demographics map.

Appendix B
ATSDR ToxFAQ's

This fact sheet answers the most frequently asked health questions (FAQs) about tetrachloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Tetrachloroethylene is a manufactured chemical used for dry cleaning and metal degreasing. Exposure to very high concentrations of tetrachloroethylene can cause dizziness, headaches, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death. Tetrachloroethylene has been found in at least 771 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is tetrachloroethylene?

(Pronounced tět'ra-kló'r' ò-ěth'ə-lēn')

Tetrachloroethylene is a manufactured chemical that is widely used for dry cleaning of fabrics and for metal-degreasing. It is also used to make other chemicals and is used in some consumer products.

Other names for tetrachloroethylene include perchloroethylene, PCE, and tetrachloroethene. It is a nonflammable liquid at room temperature. It evaporates easily into the air and has a sharp, sweet odor. Most people can smell tetrachloroethylene when it is present in the air at a level of 1 part tetrachloroethylene per million parts of air (1 ppm) or more, although some can smell it at even lower levels.

What happens to tetrachloroethylene when it enters the environment?

- Much of the tetrachloroethylene that gets into water or soil evaporates into the air.
- Microorganisms can break down some of the tetrachloroethylene in soil or underground water.
- In the air, it is broken down by sunlight into other chemicals or brought back to the soil and water by rain.
- It does not appear to collect in fish or other animals that live in water.

How might I be exposed to tetrachloroethylene?

- When you bring clothes from the dry cleaners, they will release small amounts of tetrachloroethylene into the air.
- When you drink water containing tetrachloroethylene, you are exposed to it.

How can tetrachloroethylene affect my health?

High concentrations of tetrachloroethylene (particularly in closed, poorly ventilated areas) can cause dizziness, headache, sleepiness, confusion, nausea, difficulty in speaking and walking, unconsciousness, and death.

Irritation may result from repeated or extended skin contact with it. These symptoms occur almost entirely in work (or hobby) environments when people have been accidentally exposed to high concentrations or have intentionally used tetrachloroethylene to get a "high."

In industry, most workers are exposed to levels lower than those causing obvious nervous system effects. The health effects of breathing in air or drinking water with low levels of tetrachloroethylene are not known.

Results from some studies suggest that women who work in dry cleaning industries where exposures to tetrachloroethyl-

This fact sheet answers the most frequently asked health questions (FAQs) about trichloroethylene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Trichloroethylene is a colorless liquid which is used as a solvent for cleaning metal parts. Drinking or breathing high levels of trichloroethylene may cause nervous system effects, liver and lung damage, abnormal heartbeat, coma, and possibly death. Trichloroethylene has been found in at least 852 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is trichloroethylene?

Trichloroethylene (TCE) is a nonflammable, colorless liquid with a somewhat sweet odor and a sweet, burning taste. It is used mainly as a solvent to remove grease from metal parts, but it is also an ingredient in adhesives, paint removers, typewriter correction fluids, and spot removers.

Trichloroethylene is not thought to occur naturally in the environment. However, it has been found in underground water sources and many surface waters as a result of the manufacture, use, and disposal of the chemical.

What happens to trichloroethylene when it enters the environment?

- Trichloroethylene dissolves a little in water, but it can remain in ground water for a long time.
- Trichloroethylene quickly evaporates from surface water, so it is commonly found as a vapor in the air.
- Trichloroethylene evaporates less easily from the soil than from surface water. It may stick to particles and remain for a long time.
- Trichloroethylene may stick to particles in water, which will cause it to eventually settle to the bottom sediment.
- Trichloroethylene does not build up significantly in

plants and animals.

How might I be exposed to trichloroethylene?

- Breathing air in and around the home which has been contaminated with trichloroethylene vapors from shower water or household products such as spot removers and typewriter correction fluid.
- Drinking, swimming, or showering in water that has been contaminated with trichloroethylene.
- Contact with soil contaminated with trichloroethylene, such as near a hazardous waste site.
- Contact with the skin or breathing contaminated air while manufacturing trichloroethylene or using it at work to wash paint or grease from skin or equipment.

How can trichloroethylene affect my health?

Breathing small amounts may cause headaches, lung irritation, dizziness, poor coordination, and difficulty concentrating.

Breathing large amounts of trichloroethylene may cause impaired heart function, unconsciousness, and death. Breathing it for long periods may cause nerve, kidney, and liver damage.

This fact sheet answers the most frequently asked health questions (FAQs) about 1,2-dichloroethene. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. This information is important because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Exposure to 1,2-dichloroethene occurs mainly in workplaces where it is made or used. Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired. *cis*-1,2-Dichloroethene has been found in at least 146 of the 1,430 National Priorities List sites identified by the Environmental Protection Agency (EPA). *trans*-1,2-Dichloroethene was found in at least 563 NPL sites. 1,2-Dichloroethene was found at 336 sites, but the isomer (*cis*- or *trans*-) was not specified.

What is 1,2-dichloroethene?

(Pronounced 1,2-dī-klōr' ē-ēth'ēn)

1,2-Dichloroethene, also called 1,2-dichloroethylene, is a highly flammable, colorless liquid with a sharp, harsh odor. It is used to produce solvents and in chemical mixtures. You can smell very small amounts of 1,2-dichloroethene in air (about 17 parts of 1,2-dichloroethene per million parts of air [17 ppm]).

There are two forms of 1,2-dichloroethene; one is called *cis*-1,2-dichloroethene and the other is called *trans*-1,2-dichloroethene. Sometimes both forms are present as a mixture.

What happens to 1,2-dichloroethene when it enters the environment?

- 1,2-Dichloroethene evaporates rapidly into air.
- In the air, it takes about 5-12 days for half of it to break down.
- Most 1,2-dichloroethene in the soil surface or bodies of water will evaporate into air.
- 1,2-Dichloroethene can travel through soil or dissolve in water in the soil. It is possible that it can contaminate groundwater.
- In groundwater, it takes about 13-48 weeks to break down.

- There is a slight chance that 1,2-dichloroethene will break down into vinyl chloride, a different chemical which is believed to be more toxic than 1,2-dichloroethene.

How might I be exposed to 1,2-dichloroethene?

- Breathing 1,2-dichloroethene that has leaked from hazardous waste sites and landfills.
- Drinking contaminated tap water or breathing vapors from contaminated water while cooking, bathing, or washing dishes.
- Breathing 1,2-dichloroethene, touching it, or touching contaminated materials in the workplace.

How can 1,2-dichloroethene affect my health?

Breathing high levels of 1,2-dichloroethene can make you feel nauseous, drowsy, and tired; breathing very high levels can kill you.

When animals breathed high levels of *trans*-1,2-dichloroethene for short or longer periods of time, their livers and lungs were damaged and the effects were more severe with longer exposure times. Animals that breathed very high

Appendix C

ATSDR Public Health Hazard Levels

ATSDR categories for exposure pathways at hazardous waste sites are as follows:

Urgent Public Health Hazard:	This category applies to exposure pathways and sites that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects and require quick intervention to stop people from being exposed
Public Health Hazard:	The category applies to exposure pathways and sites that have certain physical features or evidence of chronic (long-term), site-related chemical exposure that could result in adverse health effects.
Indeterminate Public Health Hazard:	The category applies to exposure pathways and sites where important information is lacking about chemical exposures, and a health determination cannot be made.
No Apparent Public Health Hazard:	The category applies to pathways and sites where exposure to site-related chemicals may have occurred in the past or is still occurring, however, the exposure is not at levels expected to cause adverse health effects.
No Public Health Hazard:	The category applies to pathways and sites where there is evidence of an absence of exposure to site-related chemicals.

Appendix D
ATSDR Glossary

Appendix E - ATSDR Glossary

Absorption

The process of taking in. For a person or animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

Acute

Occurring over a short time [compare with chronic].

Acute exposure

Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with intermediate duration exposure and chronic exposure].

Additive effect

A biologic response to exposure to multiple substances that equals the sum of responses of all the individual substances added together [compare with antagonistic effect and synergistic effect].

Adverse health effect

A change in body function or cell structure that might lead to disease or health problems.

Aerobic

Requiring oxygen [compare with anaerobic].

Ambient

Surrounding (for example, *ambient* air).

Anaerobic

Requiring the absence of oxygen [compare with aerobic].

Analyte

A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

Analytic epidemiologic study

A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

Antagonistic effect

A biologic response to exposure to multiple substances that is less than would be expected if the known effects of the individual substances were added together [compare with additive effect and synergistic effect].

Background level

An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

Biodegradation

Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

Biologic indicators of exposure study

A study that uses (a) biomedical testing or (b) the measurement of a substance [an analyte], its metabolite, or another marker of exposure in human body fluids or tissues to confirm human exposure to a hazardous substance [also see exposure investigation].

Biologic monitoring

Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath) to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

Biologic uptake

The transfer of substances from the environment to plants, animals, and humans.

Biomedical testing

Testing of persons to find out whether a change in a body function might have occurred because of exposure to a hazardous substance.

Biota

Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

Body burden

The total amount of a substance in the body. Some substances build up in the body because they are stored in fat or bone or because they leave the body very slowly.

CAP See Community Assistance Panel.

Cancer

Any one of a group of diseases that occurs when cells in the body become abnormal and grow or multiply out of control.

Cancer risk

A theoretical risk of for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

Carcinogen

A substance that causes cancer.

Case study

A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

Case-control study

A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease.

CAS registry number

A unique number assigned to a substance or mixture by the American Chemical Society Abstracts Service.

Central nervous system

The part of the nervous system that consists of the brain and the spinal cord.

CERCLA [see Comprehensive Environmental Response, Compensation, and Liability Act of 1980]

Chronic

Occurring over a long time (more than 1 year) [compare with acute].

Chronic exposure

Contact with a substance that occurs over a long time (more than 1 year) [compare with acute exposure and intermediate duration exposure].

Cluster investigation

A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors.

Community Assistance Panel (CAP)

A group of people, from a community and from health and environmental agencies, who work with ATSDR to resolve issues and problems related to hazardous substances in the community. CAP members work with ATSDR to gather and review community health concerns, provide information on how people might have been or might now be exposed to hazardous substances, and inform ATSDR on ways to involve the community in its activities.

Comparison value (CV)

Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

Completed exposure pathway [see exposure pathway].

Comprehensive Environmental Response,

Compensation, and Liability Act of 1980 (CERCLA) CERCLA, also known as Superfund, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances.

Concentration

The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

Contaminant

A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

Delayed health effect

A disease or injury that happens as a result of exposures that might have occurred in the past.

Dermal

Referring to the skin. For example, dermal absorption means passing through the skin.

Dermal contact

Contact with (touching) the skin [see route of exposure].

Descriptive epidemiology

The study of the amount and distribution of a disease in a specified population by person, place, and time.

Detection limit

The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

Disease prevention

Measures used to prevent a disease or reduce its severity.

Disease registry

A system of ongoing registration of all cases of a particular disease or health condition in a defined population.

DOD

United States Department of Defense.

DOE

United States Department of Energy.

Dose (for chemicals that are not radioactive)

The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An “exposure dose” is how much of a substance is encountered in the environment. An “absorbed dose” is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

Dose (for radioactive chemicals)

The radiation dose is the amount of energy from radiation that is actually absorbed by the body. This is not the same as measurements of the amount of radiation in the environment.

Dose-response relationship

The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

Environmental media

Soil, water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

Environmental media and transport mechanism

Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where human exposure can occur.

EPA

United States Environmental Protection Agency.

Epidemiologic surveillance

The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

Epidemiology

The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

Exposure

Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [acute exposure], of intermediate duration, or long-term [chronic exposure].

Exposure assessment

The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

Exposure-dose reconstruction

A method of estimating the amount of people's past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

Exposure investigation

The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

Exposure pathway

The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a source of contamination (such as an abandoned business); an environmental media and transport mechanism (such as movement through groundwater); a point of exposure (such as a private well); a route of exposure (eating, drinking, breathing, or touching), and a receptor population (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a completed exposure pathway.

Exposure registry

A system of ongoing followup of people who have had documented environmental exposures.

Feasibility study

A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

Geographic information system (GIS)

A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

Grand rounds

Training sessions for physicians and other health care providers about health topics.

Groundwater

Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with surface water].

Half-life ($t^{1/2}$)

The time it takes for half the original amount of a substance to disappear. In the environment, the half-life is the time it takes for half the original amount of a substance to disappear when it is changed to another chemical by bacteria, fungi, sunlight, or other chemical processes. In the human body, the half-life is the time it takes for half the original amount of the substance to

disappear, either by being changed to another substance or by leaving the body. In the case of radioactive material, the half life is the amount of time necessary for one half the initial number of radioactive atoms to change or transform into another atom (that is normally not radioactive). After two half lives, 25% of the original number of radioactive atoms remain.

Hazard

A source of potential harm from past, current, or future exposures.

Hazardous Substance Release and Health Effects Database (HazDat)

The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

Hazardous waste

Potentially harmful substances that have been released or discarded into the environment.

Health consultation

A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with public health assessment].

Health education

Programs designed with a community to help it know about health risks and how to reduce these risks.

Health investigation

The collection and evaluation of information about the health of community residents. This information is used to describe or count the occurrence of a disease, symptom, or clinical measure and to estimate the possible association between the occurrence and exposure to hazardous substances.

Health promotion

The process of enabling people to increase control over, and to improve, their health.

Health statistics review

The analysis of existing health information (i.e., from death certificates, birth defects registries, and cancer registries) to determine if there is excess disease in a specific population, geographic area, and time period. A health statistics review is a descriptive epidemiologic study.

Indeterminate public health hazard

The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

Incidence

The number of new cases of disease in a defined population over a specific time period [contrast with prevalence].

Ingestion

The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see route of exposure].

Inhalation

The act of breathing. A hazardous substance can enter the body this way [see route of exposure].

Intermediate duration exposure

Contact with a substance that occurs for more than 14 days and less than a year [compare with acute exposure and chronic exposure].

In vitro

In an artificial environment outside a living organism or body. For example, some toxicity testing is done on cell cultures or slices of tissue grown in the laboratory, rather than on a living animal [compare with in vivo].

In vivo

Within a living organism or body. For example, some toxicity testing is done on whole animals, such as rats or mice [compare with in vitro].

Lowest-observed-adverse-effect level (LOAEL)

The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

Medical monitoring

A set of medical tests and physical exams specifically designed to evaluate whether an individual's exposure could negatively affect that person's health.

Metabolism

The conversion or breakdown of a substance from one form to another by a living organism.

Metabolite

Any product of metabolism.

mg/kg

Milligram per kilogram.

²mg/cm

Milligram per square centimeter (of a surface).

³mg/m

Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

Migration

Moving from one location to another.

Minimal risk level (MRL)

An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see reference dose].

Morbidity

State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life.

Mortality

Death. Usually the cause (a specific disease, condition, or injury) is stated.

Mutagen

A substance that causes mutations (genetic damage).

Mutation

A change (damage) to the DNA, genes, or chromosomes of living organisms.

National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or NPL)

EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

No apparent public health hazard

A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

No-observed-adverse-effect level (NOAEL)

The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

No public health hazard

A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

NPL [see National Priorities List for Uncontrolled Hazardous Waste Sites]

Physiologically based pharmacokinetic model (PBPK model)

A computer model that describes what happens to a chemical in the body. This model describes how the chemical gets into the body, where it goes in the body, how it is changed by the body, and how it leaves the body.

Pica

A craving to eat nonfood items, such as dirt, paint chips, and clay. Some children exhibit pica-related behavior.

Plume

A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

Point of exposure

The place where someone can come into contact with a substance present in the environment [see exposure pathway].

Population

A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

Potentially responsible party (PRP)

A company, government, or person legally responsible for cleaning up the pollution at a hazardous waste site under Superfund. There may be more than one PRP for a particular site.

ppb

Parts per billion.

ppm

Parts per million.

Prevalence

The number of existing disease cases in a defined population during a specific time period [contrast with incidence].

Prevalence survey

The measure of the current level of disease(s) or symptoms and exposures through a questionnaire that collects self-reported information from a defined population.

Prevention

Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

Public comment period

An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

Public availability session

An informal, drop-by meeting at which community members can meet one-on-one with ATSDR staff members to discuss health and site-related concerns.

Public health action

A list of steps to protect public health.

Public health advisory

A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

Public health assessment (PHA)

An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health [compare with health consultation].

Public health hazard

A category used in ATSDR's public health assessments for sites that pose a public health hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or radionuclides that could result in harmful health effects.

Public health hazard categories

Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard.

Public health statement

The first chapter of an ATSDR toxicological profile. The public health statement is a summary written in words that are easy to understand. The public health statement explains how people might be exposed to a specific substance and describes the known health effects of that substance.

Public meeting

A public forum with community members for communication about a site.

Radioisotope

An unstable or radioactive isotope (form) of an element that can change into another element by giving off radiation.

Radionuclide

Any radioactive isotope (form) of any element.

RCRA [See Resource Conservation and Recovery Act (1976, 1984)]

Receptor population

People who could come into contact with hazardous substances [see exposure pathway].

Reference dose (RfD)

An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

Registry

A systematic collection of information on persons exposed to a specific substance or having specific diseases [see exposure registry and disease registry].

Remedial Investigation

The CERCLA process of determining the type and extent of hazardous material contamination at a site.

Resource Conservation and Recovery Act (1976, 1984) (RCRA)

This Act regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed of, or distributed.

RFA

RCRA Facility Assessment. An assessment required by RCRA to identify potential and actual releases of hazardous chemicals.

RfD See reference dose**Risk**

The probability that something will cause injury or harm.

Risk reduction

Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

Risk communication

The exchange of information to increase understanding of health risks.

Route of exposure

The way people come into contact with a hazardous substance. Three routes of exposure are breathing [inhalation], eating or drinking [ingestion], or contact with the skin [dermal contact].

Safety factor [see uncertainty factor]**SARA** [see Superfund Amendments and Reauthorization Act]**Sample**

A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see population]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

Sample size

The number of units chosen from a population or environment.

Solvent

A liquid capable of dissolving or dispersing another substance (for example, acetone or mineral spirits).

Source of contamination

The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an exposure pathway.

Special populations

People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

Stakeholder

A person, group, or community who has an interest in activities at a hazardous waste site.

Statistics

A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to determine whether differences between study groups are meaningful.

Substance

A chemical.

Substance-specific applied research

A program of research designed to fill important data needs for specific hazardous substances identified in ATSDR's toxicological profiles. Filling these data needs would allow more accurate assessment of human risks from specific substances contaminating the environment. This research might include human studies or laboratory experiments to determine health effects resulting from exposure to a given hazardous substance.

Superfund Amendments and Reauthorization Act (SARA)

In 1986, SARA amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

Surface water

Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with groundwater].

Surveillance [see epidemiologic surveillance]

Survey

A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see prevalence survey].

Synergistic effect

A biologic response to multiple substances where one substance worsens the effect of another substance. The combined effect of the substances acting together is greater than the sum of the effects of the substances acting by themselves [see additive effect and antagonistic effect].

Teratogen

A substance that causes defects in development between conception and birth. A teratogen is a substance that causes a structural or functional birth defect.

Toxic agent

Chemical or physical (for example, radiation, heat, cold, microwaves) agents which, under certain circumstances of exposure, can cause harmful effects to living organisms.

Toxicological profile

An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

Toxicology

The study of the harmful effects of substances on humans or animals.

Tumor

An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

Uncertainty factor

Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a safety factor].

Urgent public health hazard

A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

Volatile organic compounds (VOCs)

Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

Appendix E
Frequently Asked Questions

* Information taken from PUBLIC HEALTH ASSESSMENT LOCKWOOD SOLVENT GROUNDWATER PLUME YELLOWSTONE COUNTY, MONTANA dated July 7, 2003

- *Can I use well water to water my garden? Is it then safe to eat vegetables from my garden?*

Yes. There is no evidence that the chlorinated solvents are taken up by plants. Therefore, we believe it is safe to eat vegetables that were watered with well water.

- *Is it safe for children to play in the sprinklers (well water)?*

No. We want to avoid direct skin contact with contaminated well water. Therefore, we recommend using water from the public water system when children are playing in the sprinklers.

- *Is it safe for me to water my pets and/or livestock with well water?*

No. We recommend using water from the public water system when watering pets and other animals.

- *Is it safe for me to use well water to wash my car?*

Yes, but we recommend that you limit exposure by wearing waterproof gloves, boots and, of course, wash your car outside in the open air so any vapors can easily disperse.

- *Can I use well water to water my lawn? Will it hurt my lawn, flowers or shrubs?*

Yes, you can use well water to water your lawn, flowers and shrubs and it shouldn't harm them.

- *Can I use well water for my houseplants?*

Yes. Using well water for your houseplants should not harm them.

- *Can I use well water to fill up our swimming pool? Is it safe for my kids to swim in it?*

No. We want to avoid direct skin contact with contaminated well water, therefore, we recommend using water from the public water system for swimming pools.

- *If I do need to be in contact with well water, what precautions should I take?*

You should try to limit your exposure. Wear waterproof gloves and boots and avoid working in enclosed, poorly-ventilated spaces.

- *Is there anything else I can do to limit exposure to contaminated well water?*

Yes. You could consider closing out your well. The North Carolina DENR office can give you more information about how to close your private well.