

**Public Health Assessment**

**Downers Grove Groundwater Investigation  
(aka Ellsworth Industrial Park)**

**EPA Facility ID# ILN000508246**

**Downers Grove, DuPage County, Illinois**

Prepared by

Illinois Department of Public Health  
under cooperative agreement with the  
Agency for Toxic Substances and Disease Registry

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## **Purpose**

Illinois Environmental Protection Agency (Illinois EPA) requested that the Illinois Department of Public Health (IDPH) evaluate data from an investigation of residential wells in Downers Grove, DuPage County, Illinois. This public health assessment contains IDPH's determination of whether current conditions pose a public health hazard.

## **Background and Statement of Issues**

The village of Downers Grove is in suburban DuPage County, 25 miles west of Chicago (Attachment 1). Most of the homes in this 50,000-member community are connected to a public water supply. Residents in several unincorporated areas within the village use private wells as their water sources.

A recent public health assessment for residential wells in the nearby community of Lisle included sampling eastward toward Downers Grove (1). In the spring of 2001 Illinois EPA began a groundwater investigation east of Interstate 355 near Downers Grove. In April and May 2001, in response to community concerns about the private well sampling in Lisle, IDPH also collected groundwater samples from residential wells. Results of the samples showed contamination in some of the private wells. The contamination west of I-355 was mainly trichloroethylene (TCE), but both TCE and tetrachloroethylene (PCE) were found east of I-355, in Downers Grove. Because these results suggested differing sources of contamination, Illinois EPA initiated a separate investigation to identify contaminated wells and potential sources of contamination in Downers Grove (2).

In July 2001, Illinois EPA began sampling residential wells in southwestern Downers Grove and has since tested about 525 residential wells. Because several wells were found to contain one or more volatile organic compounds (VOCs), IDPH sent letters to residents, providing them with a health interpretation of the analytical results for their well water samples. These letters also offered guidance on how residents could reduce their exposure to the chemicals in their well water. The contaminated wells found so far are in an area extending from near I-355 east to Lee Avenue and from Inverness Avenue south to 63<sup>rd</sup> Street (Attachment 1).

About 200 wells (38%) contained TCE, PCE, or both chemicals at concentrations greater than the USEPA drinking water standard of 5 micrograms per liter of water ( $\mu\text{g/L}$ ) for each chemical. The remaining wells had levels of TCE, PCE, or a combination of the two chemicals less than the drinking water standards or had no detectable levels of either chemical. The highest levels of TCE and PCE detected were 16.6  $\mu\text{g/L}$  and 12.1  $\mu\text{g/L}$ , respectively. The highest combined level of TCE and PCE was 18.6  $\mu\text{g/L}$ . Low levels of 1,1,1-trichloroethane (TCA) were also found in 153 samples.

In September 2001, IDPH began assisting Illinois EPA with well sampling efforts. Illinois EPA distributed information on how residents would be notified of their well water results. This included an IDPH letter and fact sheets explaining the possible health effects of exposure to TCE and PCE. On October 11, 2001, public availability sessions were held at the Downers Grove Public Works office to discuss the groundwater investigation with residents. Personnel from IDPH were present along with representatives from other agencies and organizations.

The U.S. Environmental Protection Agency (USEPA) joined the groundwater investigation in December 2001 to help Illinois EPA determine the contamination source in Downers Grove. Sampling efforts targeted the Ellsworth Industrial Park as a source of the contamination. USEPA and Illinois EPA installed more than 40 monitoring wells in the area and have used a Geoprobe® to collect soil borings and groundwater samples from various depths. Investigation results led , USEPA and Illinois EPA to conclude that Ellsworth Industrial Park is the source of the groundwater contamination (2).

In August 2002, USEPA and Illinois EPA notified 14 businesses and a public utility in the Ellsworth Industrial Park area that they might potentially be liable for the groundwater contamination. On October 15, 2002, USEPA notified 20 businesses, public entities and individuals in Ellsworth Industrial Park that they had 60 days to provide a good faith offer to address the groundwater contamination problem. Also in October 2002, a group of homeowners from unincorporated Downers Grove with contaminated wells notified 10 businesses in the Ellsworth Industrial Park that the homeowners intended to sue them for contaminating their drinking water (2).

In January 2003, to help cover a large portion of the costs associated with connecting affected homes to a public water supply, a state grant was awarded to the village of Downers Grove. Construction of the water mains is expected to begin in Spring 2003.

## **Discussion**

### **Chemicals of Interest**

IDPH compared the results of each groundwater sample collected with the appropriate comparison values (CVs) to select chemicals for further evaluation for exposure and possible carcinogenic and noncarcinogenic health effects. Chemicals found at levels greater than CVs or those for which no CVs exist were selected for further evaluation. The types of CVs used in this health assessment are discussed in Attachment 2. IDPH assumed that the samples were collected and handled properly and that appropriate analytical techniques were used. The chemicals of interest are TCE and PCE.

## Exposure Evaluation

Residents who use private well water with TCE or PCE present, either individually or in combination, are exposed to these chemicals by drinking the water, inhaling the chemicals during showering or bathing, and by skin contact with the water. The potential for exposed persons to experience adverse health effects depends on

- < the specific chemicals to which a person is exposed,
- < the concentration of the chemicals present,
- < the length of time a person is exposed, and
- < the health condition of the person exposed.

IDPH used exposure scenarios based on adults drinking 2 liters (about 2 quarts) of water per day and children drinking 1 liter (about 1 quart) of water per day. We also assumed residents would be exposed to the chemicals while bathing and showering.

## TCE and PCE Exposure

TCE and PCE each have a maximum contaminant level (MCL) of 5 µg/L. To reduce the chances of adverse health effects from drinking contaminated water, USEPA has established MCLs for public water supplies. The standards are well below levels for which health effects have been observed. MCLs are enforceable limits that public water supplies must meet.

TCE and PCE are closely related chemicals with similar health endpoints and the same MCL. In our review of residential well data, IDPH considered any individual or combined level of these chemicals greater than 5 µg/L to exceed the MCL. The highest combined TCE-PCE level found was 18.6 µg/L.

## TCE and Health

The highest level of TCE detected in a private well was 16.6 µg/L. IDPH estimated the dose of TCE for children and adults exposed to groundwater containing 16.6 µg/L and found that exposure to that level of TCE might pose a very low increased cancer risk.

The estimated exposure to children and adults is less than the USEPA reference dose. A reference dose is an estimate of a daily exposure to the human population that is not likely to cause adverse health effects during their lifetime.

The updated toxicological profile for TCE (3) included studies of humans exposed to low levels of TCE in drinking water. These studies suggested that adverse health effects might include skin rashes, liver problems, urinary disorders, anemia and other blood disorders, and diabetes. The estimated exposure for Downers Grove residents is less than the USEPA reference dose, so these effects are considered unlikely to occur.

Recent studies in Massachusetts and New Jersey suggested elevations in childhood leukemia, neural tube defects, oral cleft defects, respiratory defects, eye defects, and small-for-gestational-age effects can be associated with TCE in drinking water. The Massachusetts studies have several limitations, however, including the presence of other contaminants and the small sample size (3). Studies in Tucson, Arizona, suggested an elevation in heart defects and low birth weights associated with TCE in drinking water. A study at Camp LeJeune, North Carolina, suggested an elevation in males-small-for-gestational-age associated with TCE in drinking water. But the levels of TCE in drinking water in these studies were several times greater than the levels detected in Downers Grove (4,5,6).

In the mid-1990s, USEPA withdrew the reference dose and cancer potency factor for TCE for review. To evaluate the potential health hazards of exposure to TCE in Downers Grove, IDPH used information from human and animal studies, the former cancer potency factor, and the current MCL for TCE. In August 2001, USEPA released a draft toxicological reassessment of TCE for comment. Although the data in the reassessment have not been yet adopted as USEPA policy, the proposed cancer potency factor would be greater than before. Using the proposed cancer potency factor, IDPH estimated that persons exposed to TCE at levels greater than the current MCL could experience a low increased risk for liver and kidney cancer. If USEPA adopts the proposed cancer potency factor, the agency also might re-evaluate the current MCL for TCE.

### **PCE and Health**

The highest level of PCE detected in a private well was 12.1 µg/L. IDPH estimated the dose of PCE for children and adults exposed to groundwater containing 12.1 µg/L and found that exposure to that level of PCE might pose a very low increased cancer risk.

The estimated exposure to children and adults is less than the USEPA reference dose. A reference dose is an estimate of a daily exposure to the human population that is not likely to cause adverse health effects during their lifetime. The health effects of breathing PCE in air or drinking water with low levels of PCE are not well established. Results of animal studies, conducted with amounts much higher than those found in the Downers Grove well water samples, suggest that PCE can cause liver and kidney damage as well as liver and kidney cancers (7).

### **Community Concerns**

On October 11, 2001 and September 4, 2002, public availability sessions were held in Downers Grove to give residents an opportunity to comment on the site evaluation, ask questions, and express their health concerns. IDPH participated in these sessions along with representatives from the Agency for Toxic Substances and Disease Registry, the Village of Downers Grove, the DuPage County Health Department, the Water Quality Association of Lisle, and Illinois EPA.

Many area residents who attended the public availability sessions expressed anger about the high cost of connecting to the Downers Grove public water system. Depending on the home, the cost could be greater than \$10,000.

Previously, the village of Downers Grove put water main pipes in most of the affected area with the agreement that homeowners would eventually be annexed to the village. The village water manager has stated that the annexation deadline is in 6 to 8 years. Many homeowners have sought annexation because of the well contamination. Part of the affected area does not have water main pipes in place. Approximately half the homeowners in that area have signed a petition to be annexed to the village.

Many area residents have ignored or refused offers by Illinois EPA to test their wells for the presence of contaminants. It is possible that some residents fear their property values will decrease if they are asked to disclose the presence of contaminants in their well water.

At public availability sessions, some residents alleged that the Illinois EPA Bureau of Water and the DuPage County government knew that the Belmont Highwood Water District wells were contaminated with VOCs in the late 1980s and early 1990s. They also alleged that private well owners in the area were not informed. Illinois EPA stated that public water systems were not required to test for VOCs until 1990. After VOCs were detected in 1992, the Belmont Highwood Water District would have been required to notify only their end users of the presence of VOCs in the water. Also, Illinois EPA prepared a Well Site Survey Report summarizing this information and provided the report to DuPage County. Illinois EPA was unaware of private wells in the area. Due to the ineffectiveness of the previous notification process, new legislation was drafted by Illinois EPA in consultation with IDPH. New statewide procedures are now in place to make sure that private well owners are notified of known groundwater contamination in their area. Senate Bill 2072 was enacted in July 2002 by which Illinois EPA notifies IDPH about public water well contamination. IDPH then works with the local health department to notify private well owners of potential groundwater contamination in the area of their wells.

Residents also had general questions about the health effects associated with TCE and PCE, and expressed concern about cancer rates.

A copy of the draft public health assessment for the Downers Grove Groundwater Investigation site was available for public review and comment at the Downers Grove Public Library at 1050 Curtiss Street in Downers Grove, Illinois from November 17, 2002 to January 3, 2003. Comments received can be found in Attachment 4.

## Health Outcome Data

The IDPH Division of Epidemiologic Studies reviewed the incidence of cancer for Downers Grove ZIP codes 60515 and 60516 from 1989 to 1998 (Attachment 3) The rate of kidney and liver cancers combined was less than the expected number of cases (78 cases observed and 90 cases expected). No other biologically plausible type of cancer related to TCE or PCE exposure was statistically significant (8).

## Child Health Initiative

IDPH recognizes that children are especially sensitive to some contaminants. Children get a larger dose from drinking contaminated water than adults because they drink more water per kilogram of body weight than do adults. IDPH includes children when evaluating exposures to contaminants and considers children the most sensitive population evaluated in this public health assessment. The doses children experienced by drinking contaminated well water were not at levels known to cause noncarcinogenic health effects. Long-term exposure to TCE and PCE could pose a very low increased cancer risk. The findings of studies done in Massachusetts and New Jersey suggested that childhood leukemia and adverse birth outcomes were associated with exposure to TCE during gestation (4,5,6). The TCE concentrations found in drinking water in these studies were several times greater than levels found in Downers Grove.

## Conclusions

About 200 wells (38%) contained TCE and PCE at levels greater than the USEPA drinking water standard (MCL) of 5 µg/L for each chemical. Because the MCLs for TCE and PCE in drinking water are considered to be protective of public health, prudent public health practice supports considering exposure to contaminated groundwater in Downers Grove **a public health hazard**.

Based on the information currently available, IDPH also concludes that while long-term exposure to contaminated well water could pose a very low increased cancer risk, no health studies are available definitively associating an adverse health effect in animals or humans exposed to the levels of TCE and PCE observed in Downers Grove.

A review of cancer incidence data indicated that kidney cancer and liver cancer have not occurred more often than would be expected among residents within the ZIP code area. The cancer cases are distributed throughout the ZIP code area and are not clustered near the contaminated wells. Depending on future findings regarding the nature and extent of TCE and PCE contamination, an additional evaluation could be considered.

Data are not yet available to help evaluate whether levels of TCE and PCE in private wells are increasing over time. Should TCE or PCE levels increase, then long-term use of contaminated groundwater could result in a slightly increased cancer risk. Because other health effects from



long-term use of drinking water with low levels of TCE and PCE contamination are not well studied, IDPH offers the following recommendations and public health action plan.

### **Recommendations and Public Health Action Plan**

IDPH recommends the following:

- < Residents with levels of VOCs greater than the MCL should seek a remedy to reduce or prevent future exposure to contaminated groundwater. Municipal water or a water treatment unit meeting the National Sanitation Foundation standard number 53 for removal of VOCs are two alternatives. IDPH has provided information through letters and fact sheets distributed to residents before and after well sampling.
- < Illinois EPA and USEPA should conduct sampling to determine the source of the groundwater contamination. An investigation of Ellsworth Industrial Park is currently underway.
- < Public availability sessions should be held to provide health information to area residents. IDPH has met this recommendation by participating in public availability sessions in October 2001 and September 2002. Staff from IDPH, Illinois EPA, the DuPage County Health Department, and the Illinois Attorney General Office were present to answer questions from area residents, and to provide updates for the ongoing groundwater investigation. IDPH will participate in future availability sessions as needed.

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### **Certification**

This Downer's Grove public health assessment was prepared by the Illinois Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.

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

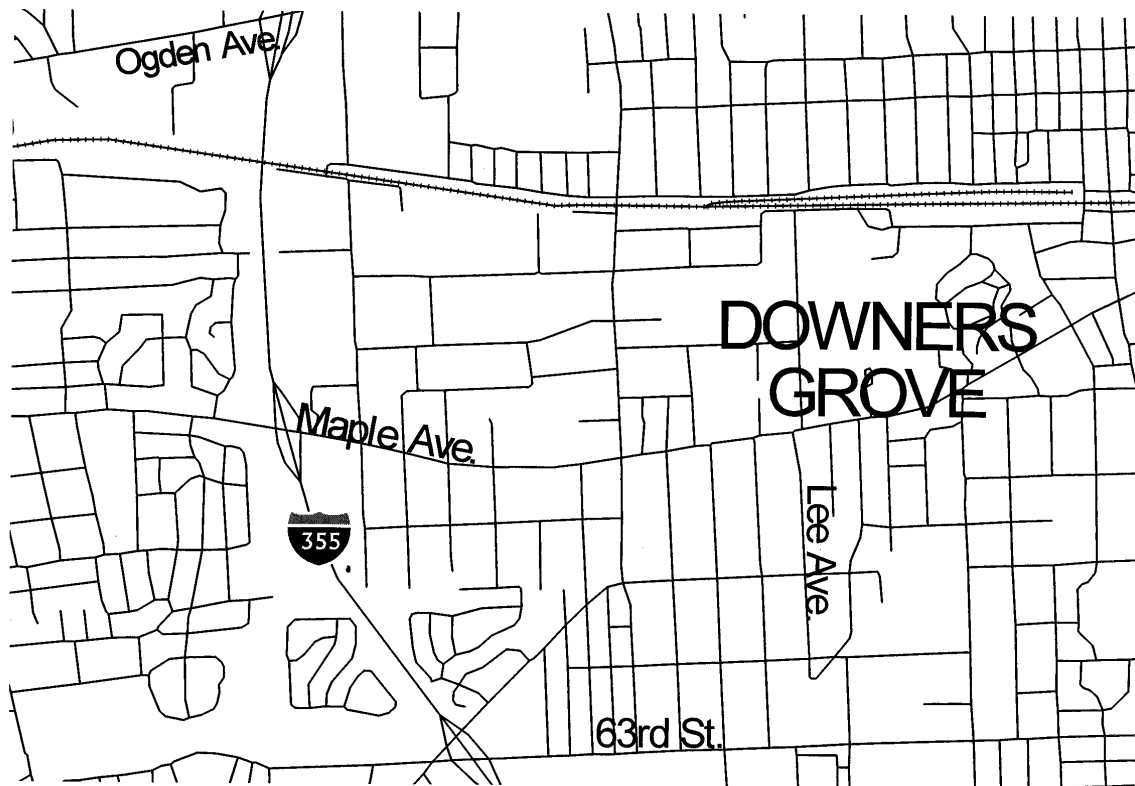
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## **Attachments**

ATTACHMENT 1

# Downers Grove Groundwater Investigation and Adjacent Areas



Source: IDPH GIS

## **ATTACHMENT 2**

### **Comparison Values Used in Screening Contaminants for Further Evaluation**

To reduce the chances of adverse health effects occurring from exposure to contaminated drinking water, maximum contaminant levels (MCLs) have been established by USEPA for public water supplies. These standards are well below levels for which health effects have been observed; they also take into account the financial feasibility of achieving specific contaminant levels. MCLs are enforceable limits that public water supplies must meet.

Lifetime health advisories for drinking water (LTHAs) have been established by USEPA for drinking water. They are the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects over a lifetime of exposure. LTHAs are conservative values which incorporate a margin of safety.

**ATTACHMENT 3**

**INCIDENCE OF CANCER IN ZIP CODES 60515 AND 60516 OF  
DOWNERS GROVE (DUPAGE COUNTY), ILLINOIS**

**1989-1998**

Prepared by the

Division of Epidemiologic Studies  
Illinois Department of Public Health

September 2001

## Background

The Illinois Department of Public Health, Division of Environmental Health, contacted the Division of Epidemiologic Studies, with a request to evaluate the cancer incidence in Downers Grove, DuPage County. They had received a report from the Illinois Environmental Protection Agency that some private wells in Downers Grove were contaminated with trichloroethylene and tetrachloroethylene which are both categorized by the International Agency for Research on Cancer as reasonably anticipated to be human carcinogens. Dr. Tiefu Shen, Chief of the Division of Epidemiologic Studies, initiated a study of the cancer incidence.

## Methods

The study area was defined by the Division of Environmental Health as ZIP code areas 60515 and 60516 of Downers Grove. All cases of cancer diagnosed among residents of the study area for the most recent ten years of complete data, 1989 through 1998, were identified. The source for these data was the Illinois State Cancer Registry (ISCR). Identification of cancer cases in ISCR is dependent upon reporting by diagnostic and therapeutic facilities as mandated by state law.

In addition, ISCR has agreements with other central cancer registries to send back Illinois cancer data which are identified outside the state. These registries include Arkansas, California, Florida, Indiana, Iowa, Kentucky, Michigan, Mississippi, Missouri, North Carolina, Washington, Wisconsin, Wyoming, Barnes-Jewish Hospital in St. Louis, and the Mayo clinic in Minnesota. Completeness of out-of-state reporting depends upon the years of operation of these other central registries, the extent of their identification of out-of-state residents, and their standards of quality. Out-of-state diagnoses among residents of the study area accounted for less than one percent of the total number of cases reported and were included in the study. Completeness of reporting from all reporting sources, assessed using the NAACCR Standard,<sup>1</sup> is considered to be 95 percent complete for this time frame (1989-1998).

All cancer cases from the study area were grouped by tumor site, sex, and age. These are referred to as the *observed* cases. Age- and sex-specific rates from a comparable population in Illinois were applied to each age group of the study population and to each tumor site to obtain an *expected* number of cases for the study area.<sup>2</sup> The comparable population was defined as an area with a similar population density and race distribution as the study area. Population data were obtained from the 1990 U.S. Census, the most reliable source for population counts by age and sex for small areas.

The observed number of cases was compared with the expected number of cases. Based on the Poisson model, a probability of 0.01 or less for an observed number of cancer cases that was higher or lower than the expected number was considered to be a statistically significant difference.<sup>3</sup>

When a significant excess was identified, and when appropriate for the site in question, other data elements and risk factor data, as reported to ISCR, were reviewed. These may include



stage of disease at diagnosis, tobacco and alcohol use, occupational information, morphologic type of tumor, and location of residence within the study area.

When the observed number is less than six cases for a specific tumor site, the number is not mentioned in this report to protect the privacy of individuals. If possible, the cases are grouped with other sites within body organ systems, or when not possible, they are included in the *All Other Sites* category.

## **Results and Discussion**

For all cancer sites combined, the incidence of cancer among males in the study area was 1,283 cases with 1,318 cases expected. In females, 1,523 cases were observed while 1,585 cases were expected. These differences were not statistically significant for either sex. In addition, none of the differences between observed and expected numbers of cases for each site group was statistically significant. The numbers have been aggregated in the table to protect the privacy of individuals.

## **Analytical Considerations**

In drawing conclusions from these data, two aspects of the statistical method need to be addressed. First, random fluctuations in disease occurrence cannot be completely ruled out in explaining differences between the observed and expected numbers, even when the difference is statistically significant.

The second aspect is the power of the statistical test, that is, the probability that a true departure from the expected number can be detected by significance testing. A non-significant difference sometimes reflects the low statistical power rather than the absence of differences. The power of a test varies with the number of cases expected.<sup>4</sup> In the study area, the power of detecting a doubling was low in both sexes for cancers of the esophagus, liver and bone and for Hodgkin's lymphomas and myelomas.

In addition, the latency between the time of exposure and the onset of clinically-recognizable disease for most adult cancers is between 10 and 20 years. Specific cancers may vary somewhat in the length of the latent period, but generally speaking, recent exposure, that is exposures in the last 10 years, cannot be expected to be associated with current cancer incidence. The history of residency for cases included in the present study could not be assessed because this information is not collected by the cancer registry, nor is such information available for the general population in the area.

### **Additional Comments**

Cancer is a common disease, sometimes more common than many people believe. In the U.S., one in two men have a lifetime risk of developing cancer. For women, the lifetime risk is one

in three.<sup>5</sup> The number of people with cancer is increasing in most communities because more people are living to the ages of greatest cancer occurrence.

Many people could reduce their chances of developing or dying from cancer by adopting a healthier lifestyle and by visiting their physician regularly for a cancer-related checkup. Screening examinations, conducted regularly by a health care professional, can result in the detection of cancers of the breast, tongue, mouth, colon, rectum, cervix, prostate, testis, and melanomas at earlier stages, when treatment is more likely to be successful. More than half of all new cancer cases occur in the nine screening-accessible cancer sites listed above.<sup>5</sup>

Current knowledge suggests that the leading preventable cause of cancer is cigarette smoking.<sup>6</sup> Exposures to carcinogenic chemicals, ionizing radiation, and other agents produced by humans is responsible for less than five percent of human cancers.<sup>6</sup> Generally speaking, any possible risk associated with the environment would most likely only have a small effect on cancer incidence relative to that of tobacco.<sup>5</sup> The following table shows the best current estimates for the causes of cancer.

<b>Causes of Cancer in the United States</b>	<b>Percent</b>
smoking	30
adult diet and obesity	30
sedentary lifestyle	5
alcohol	3
reproductive factors	3
prenatal factors and growth	5
occupational factors	5
environmental pollution	2
ionizing and UV radiation	2
viruses and other biologic agents	5
prescription drugs and medical procedures	1
food additives and contaminants	1
family history of cancer	5
socioeconomic status	3

Source: Harvard School of Public Health. Harvard Report on Cancer Prevention Volume 1: Causes of Human Cancer. *Cancer Causes and Control*. London: Rapid Science Publishers; 1996:Vol 7.

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Illinois State Cancer Registry  
Division of Epidemiologic Studies  
Illinois Department of Public Health

Observed and Expected Numbers of Cancer Cases by Site and Sex  
Residents of ZIP Code Areas 60515 and 60516 of Downers Grove, Illinois  
1989-98

Cancer Site Group	Males		Females	
	Obs.	Exp. <sup>a</sup>	Obs.	Exp. <sup>a</sup>
Oral Cavity	37	32	26	21
Esophagus	18	15	7	7
Stomach	34	29	16	19
Colorectal	145	165	154	179
Liver	8	12	7	7
Pancreas	32	28	33	35
Lung	202	206	155	164
Melanomas	43	41	30	33
Breast invasive	-	-	495	506
Breast <i>in situ</i>	-	-	103	89
Cervix	-	-	27	28
Uterus	-	-	85	90
Ovary	-	-	73	65
Prostate	356	365	-	-
Testis	32	23	-	-
Bladder	87	95	37	42
Kidney	37	42	26	29
Nervous System	15	23	17	20
Myelomas	14	14	26	16
Lymphomas	63	68	61	65
Leukemias	39	37	30	32
All Other Sites	121	123	115	138
All Sites	1,283	1,318	1,523	1,585

SOURCE: Illinois State Cancer Registry, October 2000.

<sup>a</sup>Expected numbers are based on the age-and sex-specific incidence rates in an area of Illinois with a similar population density and race distribution as the study area.

**ATTACHMENT 4****Public Comments**

Comment 1. On page 1 in the third paragraph of Background and Statement of Issues, it states that the northern boundary is Maple Avenue. This is incorrect. The affected area actually extends north to Inverness Avenue.

The text has been changed to indicate the correct northern boundary of the affected area.

Comment 2. Your report compares the incidence of cancer rates across the entirety of the ZIP code populations of 60515 and 60516 to those in a much larger control group. This comparison, and therefore the conclusion, is flawed because the contamination plume does not extend to the entirety of ZIP codes 60515 and 60516.

Cancer data is reported in data sets by either county or ZIP code to protect confidentiality of the individuals. The best data available from the Illinois State Cancer Registry for the affected area was the 60515 and 60516 ZIP codes. Data about cancers in the exact area affected by the contamination is not available.

Comment 3. Can a health study look at other disorders such as auto-immune diseases and other non-cancer effects?

At this time, IDPH does not have plans for this type of health study in Downers Grove. The estimated exposure for Downers Grove residents is less than the USEPA reference dose, so non-cancer effects are unlikely. The main public health focus is reducing or eliminating future exposures for persons with elevated levels of contaminants in their private well water. Depending on future findings regarding the nature and extent of TCE and PCE contamination, an additional evaluation could be considered.