Final Release

Public Health Assessment

Southeast Rockford Groundwater Contamination Site

Winnebago County, Illinois

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Prepared by

The Illinois Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

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Summary

The Southeast Rockford Groundwater Contamination site is an area about 0.7 square miles in size along the southern edge of Rockford, Illinois. The site is an urban area with residential, commercial, retail, and industrial properties throughout. A large plume of contaminated groundwater lies under the area. An area of about 3 square miles may be affected by groundwater contamination in the future.

The groundwater contamination was first discovered in 1981 when the Rockford Water Utility found low levels of volatile organic compounds in four municipal wells. In 1982, additional well contamination was identified, and the contaminated wells were taken out of service. In 1984, the Illinois Environmental Protection Agency investigated a report that electroplating waste was being dumped illegally in an abandoned private well. No electroplating wastes were found in the groundwater, but several volatile organic chemicals (VOCs) were found.

As a result, the Illinois Department of Public Health sampled residential wells over a 5-year period and discovered more than 300 private wells had VOC contamination. In 1986, the Illinois State Water Survey completed a regional groundwater quality study. The study showed the residential and municipal wells in the original area contained significant levels of VOCs. The city of Rockford closed several municipal wells because of the contamination.

The site was proposed for inclusion on the National Priorities List in June 1988 and was added to the list in March 1989 as a state-lead, federally-funded Superfund site.

Several additional residential wells were sampled, and the U.S. Environmental Protection Agency, as part of an emergency response action, extended the city of Rockford's municipal water mains. Homes with contaminated groundwater were connected to the municipal system in 1990.

From the available information, the Illinois Department of Public Health concludes that this site is a public health hazard because of the risk to human health from past exposure, current exposure, and the potential for future exposure to contaminants in groundwater at levels that might result in adverse health effects. Since 1984, 810 homes have been connected to the Rockford municipal water supply, thereby stopping residents' exposure to contaminated groundwater. The owners of ten eligible properties have refused connection to the city water supply.

Purpose

The U.S. Environmental Protection Agency (USEPA) and the Illinois Environmental Protection Agency (Illinois EPA) requested that the Illinois Department of Public Health (IDPH) conduct a public health assessment for the Southeast Rockford Groundwater Contamination site. The purpose of the public health assessment is to evaluate any known or potential adverse human health effects that could result from exposure to contaminants related to the site.

Background

Site Description and History

The Southeast Rockford Groundwater Contamination site is an area about 0.7 square miles in size along the southern edge of Rockford, Illinois. An area of about 3 square miles is projected to possibly be affected by groundwater contamination in the future. The site is a large urban area with residential, commercial, retail, and industrial properties throughout (Attachment 1).

In 1981, area groundwater contamination was first identified when the Rockford Water Utility discovered low levels of volatile organic compounds (VOCs) in four municipal wells. Originally, the site covered approximately 0.7 square miles and was bordered to the north by Harrison Avenue, to the east by 21st Street, to the south by Sawyer Avenue, and to the west by 8th Street. In 1982, additional municipal well contamination was identified and several contaminated wells were taken out of service. [2]

In 1984, Illinois EPA investigated allegations of illegal dumping by an electroplating company and sampled nearby residential wells. Chemicals common to electroplating activities were not detected in the samples; however, the samples did contain several VOCs, including 1,1,1-trichloroethane, trichloroethene (TCE), and 1,1-dichloroethene. As a result, IDPH sampled residential wells over the next 5 years and discovered more than 300 private wells with VOC contamination. IDPH and the local health department recommended that households with total VOCs greater than 10 parts per billion (ppb) use an alternative water supply for cooking and drinking. Treatment alternatives were suggested for households that still wanted to use the contaminated water.

In 1986, the Illinois State Water Survey also completed a regional groundwater quality study. The study showed the residential and municipal wells in the original area contained significant levels of VOCs. The site was proposed for inclusion on the National Priorities List (NPL) in June 1988, and was added to the NPL in March 1989 as a state-lead, federally-funded Superfund site. [2]

In 1989, USEPA conducted additional sampling of 112 private wells in the original site area and found elevated levels of VOCs in the well water. As a result, USEPA provided bottled water and water filters to some homes within the area. In 1990, USEPA extended water mains and provided connections to the Rockford municipal water system for homes that met the USEPA emergency response action criteria. [1]

In October 1989, with technical assistance from the Agency for Toxic Substances and Disease Registry (ATSDR), IDPH evaluated residents' exposure to groundwater contaminants within the original study area. Sixty-three households were contacted to participate in the study, and 10 individuals agreed to answer household interview questions and have their blood drawn. Air samples were collected in 7 homes. Because the number of participants in the study was small, the ability of the study to statistically detect differences between participants and the comparison group were limited. The study suggested that air and water exposure to VOCs could result in elevated blood VOC levels. [2]

Residents of the area who had been exposed to TCE were added to the ATSDR National TCE Subregistry in June 1990. ATSDR follows the health status of the registrants until 2010 to allow scientists to gain more information about possible health effects of TCE exposure. [3]

In June 1990, Illinois EPA expanded the boundaries of the study area. A Remedial Investigation and Feasibility Study (RI/FS) included collecting samples from 117 residential, commercial, and industrial wells. The study area boundaries include Broadway to the north, Sandy Hollow Road to the south, Mulford Road to the east, and the Rock River to the west (Attachment 2). After considering public comments, Illinois EPA and USEPA chose to extend the municipal water mains to an additional 264 homes and to install a carbon treatment unit at Municipal Well #35, which was closed because of VOC contamination. Because of USEPA and Illinois EPA actions, 548 homes were connected to the Rockford municipal water system. [1]

In May 1991, Phase I of the RI began with a soil gas analysis and groundwater sample collection to characterize the nature and extent of groundwater contamination. Elevated levels of VOCs were found in soil gas and groundwater, and eight potential source areas were identified. Results from water analyses of several groundwater monitoring wells identified the area of contamination. Ekberg-Pine Manor Park, an area park where children frequently play, was within this area. [1]

In 1992, IDPH wrote an Interim Preliminary Public Health Assessment for the site. The conclusions were:

< The study area was considered to be a public health hazard because of the risk to human health resulting from past exposure and the potential for future exposure to hazardous substances at concentrations that might result in an increased risk of adverse health

effects. Since 1984, more than 300 homes had elevated levels of VOC contamination. Several wells had total VOC levels in excess of 300 ppb.

< A total of 548 residences within the “high risk” portions of the study area were connected to municipal water, eliminating exposure to contaminated groundwater. Pending completion of the Phase II remedial investigation, the potential for future risk to public health would need to be reevaluated. Evaluations would be dependent upon identifying active wells within the contaminant pathway. To date, investigations have tentatively identified several potentially responsible parties as potential sources for the groundwater contamination in the area. Given the close proximity of a large number of businesses, many more sources could be contributing to the overall local contamination. [2]

The recommendations included in the IDPH Interim Public Health Assessment were:

1) Residences with contaminated private wells or within the projected pathway of contamination should be provided with permanent alternative water supplies, and contaminated wells should be sealed.

2) Further investigation would be needed to identify wells that had not been sampled and could be or could become contaminated. Abandoned private wells had to be sealed in accordance with state law.

3) Further investigation was needed to determine and eliminate or control the source(s) of contamination. A more detailed environmental and industrial profile of past and present industry and disposal practices for the area needed to be developed.

4) Health outcome was to be reviewed as part of an expanded public health assessment. Consideration was to be given to performing an epidemiologic study or studies of this population in cooperation with ATSDR.

5) Further study of the various exposure pathways and their significance needed to be done. [2]

To evaluate the infiltration of soil gas into homes, IDPH collected residential air samples in nine basements on December 3 and 4, 1992. On June 8, 1993, IDPH returned to the home with the highest levels of VOCs in the basement to take additional samples upstairs to determine if the contaminants were migrating or if a source upstairs might be contaminating the basement air.[4]

Camp Dresser and McKee (CDM) conducted Phase II groundwater sampling from June 8 through June 10, 1993. During Phase II, 24 residential wells were sampled to determine if the contaminant plume had migrated beyond the boundaries of the site into areas where homes had not yet been connected to the city water supply. All except two of the homes served by the sampled wells were

single-family homes. The other two wells served 37 mobile homes and five homes at Barrett's Mobile Home Park. Many wells sampled in Phase II were also sampled during Phase I. [1]

CDM conducted residential air sampling in August 1993 and December 1994. Twenty homes were sampled, and 16 of the homes were chosen to be sampled because they were in close proximity to the source areas of contamination. The remaining four homes were used as background sample locations. [1]

In July 1999, an additional 262 homes were connected to the Rockford municipal water supply system. Most of those homes were part of a area defined from 1995 modeling of the projected movement of the contaminant plume over the next 70 years. As of July 2000, seven owners of ten properties have still refused to connect to the public water supply. Six of those homes are within the current plume area, and four of those homes are within the 70-year projected plume. [5]

Demographics

Rockford has a population of more than 140,000 people. Southeast Rockford is a large urban area with residential, commercial, retail, and industrial properties throughout. The study area covers 10 square miles, and the projected area of groundwater contamination covers approximately 3 square miles. About 36,000 people live within the site boundaries (Attachment 3). From 1990 census data, 90% of those people are white, 6% are black. Of the population, 3% have Hispanic ethnicity.

Natural Resource Use

The Rock River is on the western edge of the site, and the river is used for recreation only. Rockford obtains its water from 40 municipal wells throughout the city. Seven of the municipal wells are within a 3-mile radius of the site. Municipal Well #35 is within the contaminant plume and was closed in 1985 because of low-level VOC contamination. [2] In 1991, the well was equipped with a filter system and was reactivated. Under the Safe Drinking Water Act, the city of Rockford is required to sample the municipal water quarterly and to report those results to Illinois EPA. [1] Many homes within the site area had private sand point wells about 25 feet in depth. [2]

Site Visits

IDPH staff have made many visits to Southeast Rockford since 1984. The most recent site visit was in February 2001. The most apparent changes in the site over the years are the groundwater monitoring wells and the extension of water mains.

Discussion

Chemicals of Interest

IDPH compared the results of each environmental sample with the appropriate comparison value used to select contaminants for further evaluation for carcinogenic and non-carcinogenic health effects. Chemicals found at levels greater than comparison values or those for which no comparison values exist were selected for further evaluation. A discussion of each comparison value used is found in Attachment 4.

The chemicals of interest at this site are VOCs including chlorinated ethanes and ethenes, commonly used as solvents. The following discussion explains the contamination found in each environmental medium sampled.

Groundwater

The groundwater in the study area is contaminated with VOCs. The sampling data show that the contamination is widespread within the sand and gravel aquifer. The VOC contamination has affected shallow domestic wells and deeper municipal wells. Groundwater flow in the study area is west toward the Rock River.

Many wells have been sampled throughout the study area to define areas of contamination. Tables 1 – 5 show the chemicals of interest, the frequency of detection, and the highest levels of chemicals detected during the following sampling events:

< IDPH residential well sampling from 1984 to 1989 (Table 1);
< 1989 USEPA groundwater sampling of 111 private wells in the original site area (Table 2);
< June 1990 RI/FS sample results of 117 residential wells (Table 3);
< May 1991 Phase I of the RI monitoring well results (Table 4); and
< June 1993 CDM sample results of 24 residential wells (Table 5).

Most of the homes affected by VOC-contaminated groundwater were connected to the Rockford municipal water system. The owners of six homes in the current plume area have declined connection to the municipal water system. A 70-year model was developed to determine which homes may be affected if the contaminant plume were to migrate. All homes except four within the 70-year model and buffer zone were also connected to the municipal supply. [5]

Air

IDPH collected indoor air samples in the basements of homes within the study area to determine if elevated levels of VOCs were present. After controlling for the contribution of VOCs from household products, IDPH hoped to determine if VOCs had migrated from contaminated groundwater to residential basements. IDPH collected the first set of residential air samples on December 3 and 4, 1992, from the basements of nine homes. VOCs were detected in seven of the nine homes, but the source of the VOCs in six of the homes was not known.

One home had VOC levels greater than comparison values (Table 6). That home had an abandoned pit in the basement that could have provided a route for the VOCs to migrate from the groundwater into the basement air. IDPH did not expect any adverse health effects from exposure to the VOCs because the family did not spend much time in the basement, but IDPH recommended that the family properly fill the pit. [4]

IDPH returned to this home on June 8, 1993, to take additional samples upstairs to determine if VOCs were migrating upstairs or if a source upstairs might be contaminating the basement air. Samples were collected from the kitchen, the basement, and from the pit in the basement. No VOCs were detected in the sample collected from the kitchen, and a very low level of 1,1,1-trichlorethane was detected in the basement sample. In the pit sample, 1,1,1-trichloroethane was detected at a level greater than the comparison value (Table 7). From the samples collected, IDPH concluded that the VOCs were not migrating upstairs, and exposure to the VOCs in the basement was minimal. IDPH again recommended that the pit be properly sealed. The owner of the home has since sealed the pit in the basement. [4]

CDM conducted residential air sampling in August 1993 and December 1994. Twenty homes were sampled. Four homes were used as background sample locations. Two samples, one indoors and one outdoors, were collected from the breathing zone at each home. VOCs were not detected in the outdoor air samples. None of the indoor samples contained VOCs that exceeded comparison values. [1]

Exposure Analysis

A chemical can cause an adverse effect only if people contact it at a sufficient level. That requires a source of exposure, an environmental transport medium, a point of exposure, a route of exposure, and an exposed population. An exposure pathway is complete if all of the components are present, and people were exposed in the past, are currently exposed, or will be exposed in the future. If parts of a pathway are absent, data are insufficient to decide whether it is complete, or exposure may occur at some time (past, present, future), then potential exposure pathway exists. If part of an exposure pathway is not present and will never exist, the pathway is incomplete and can be eliminated from further consideration.

Completed Exposure Pathways

Completed pathways associated with the site are summarized in Table 8. The most significant completed exposure pathway at this site is exposure to contaminated groundwater. For homes that have been connected to public water, residents were exposed to the contamination in the past. Six homes within the current plume area have refused to connect to the public water supply, so residents at those homes continue to be exposed to the contamination. Routes of exposure include ingestion of contaminated groundwater in private wells, inhalation of vapors from contaminated groundwater while showering, and dermal contact with contaminated groundwater.

A past completed exposure pathway existed for the inhalation of VOCs migrating through a dug pit in one home.

Potential Exposure Pathways

Residents of four homes within the 70-year projected plume area and buffer zone have refused to connect their homes to the public water supply. If contaminants were to migrate to their wells, they could be exposed to VOCs through ingestion, inhalation, and dermal contact.

Some residents within the study area have had air samples collected in their homes, but no indoor air samples have been collected since 1994. A potential exposure pathway exists for inhalation of VOCs migrating into the basements of homes from the groundwater contamination (Table 9).

Public Health Implications

Some residents within the study area with contaminated private wells have been exposed to VOCs through ingestion of contaminated drinking water, dermal contact with contaminated water, and inhalation of vapors from contaminated water used in the household. Residents in one home were likely exposed to VOCs in the indoor air migrating from a dug pit in the basement. Groundwater contamination was first discovered in 1981, but the actual duration of exposure is unknown.

Child Health Initiative

IDPH and ATSDR recognize that children are especially sensitive to many contaminants. For that reason, IDPH included children when evaluating exposures to VOCs. Children are the most sensitive population considered in this public health assessment. For that reason, the following toxicological evaluation includes information about specific concerns of children's exposures.

A. Toxicological Evaluation

The chemicals of interest at this site are VOCs found in the groundwater and include chlorinated ethanes and ethenes. These chemicals are all readily absorbed when inhaled or ingested. VOCs are not absorbed as readily through dermal contact. Acute and chronic target organs are primarily the central nervous system (CNS), liver, and kidneys. Symptoms of exposure may include headache, nausea, dizziness, and fatigue. How a chemical may affect your health depends on how much you are exposed to and how long you are exposed.

IDPH used the levels of contaminants in the groundwater (measured in parts per billion or ppb) to estimate exposure doses (measured in milligrams of chemical per kilogram of body weight per day or mg/kg/day). IDPH assumed that adults drink 2 liters of tap water per day and that children

drink 1 liter of tap water per day. Children receive a larger exposure dose because they ingest more liquid per body weight than adults. Inhalation of VOCs during showering and other activities was assumed to be equivalent to ingestion exposure, thus doubling the dose.

IDPH compared the estimated doses with minimal risk levels (MRLs) developed by ATSDR and reference doses (RfDs) developed by USEPA. The health guidelines are estimates of the daily exposure to a possible hazard that are not likely to cause adverse, noncancerous health effects. For chemicals of interest that are carcinogens, IDPH used the estimated dose to calculate the possible increased cancer risk for exposed persons.

Trichloroethene (TCE)

The maximum level of TCE detected in residential wells was 427.6 ppb. The maximum contaminant level (MCL) for TCE is 5 ppb. MCLs have been established by USEPA for public water supplies to reduce the chances of adverse health effects developing when people contact contaminated drinking water.

At 427.6 ppb, an estimated exposure dose for children would not exceed the ATSDR MRL of 0.2 mg/kg/day. TCE is under consideration by USEPA for classification as a probable human carcinogen. Exposure to TCE in water at the maximum levels detected could pose a low increased cancer risk. Animal studies suggest that exposure to high levels of TCE may cause liver cancer. Some studies of people exposed to high levels of TCE in drinking water over long periods may cause liver or kidney cancer; however, these results are inconclusive because the cancer could have been caused by other chemicals.

1,1,1-Trichloroethane (1,1,1-TCA)

The chemical 1,1,1-TCA has been detected in residential wells at levels up to 990 ppb. No health guidelines are currently available for this chemical, but the MCL for 1,1,1-TCA is 200 ppb. We do not know whether being exposed to this level of 1,1,1-TCA will cause adverse health effects, but persons who breathe air containing high levels of 1,1,1-TCA may become dizzy and lightheaded. Animals studies suggest that 1,1,1-TCA can cause skin irritation, nervous system effects and liver damage. Available information does not indicate that 1,1,1-TCA causes cancer.

Cis-1,2-Dichloroethene (cis-DCE) and trans-1,2-Dichloroethene (trans-DCE)

The maximum levels of cis-DCE and trans-DCE detected in residential wells were 1,233 ppb and 2.5 ppb, respectively. At those levels, the estimated exposures for children would not exceed the intermediate oral MRLs of 0.3 mg/kg/day for cis-DCE and 0.2 mg/kg/day for trans-DCE. For cis-DCE, estimated exposures for both children and adults would exceed the USEPA chronic oral RfD of 0.02 mg/kg/day.

The long-term effects of exposure to DCE are not known. Animal studies suggest that drinking cis-DCE causes effects on the blood and the liver. Breathing DCE vapors over long periods may affect the liver and lungs.

1,2-Dichloroethane and 1,1-Dichloroethane

The chemical 1,2-dichlorethane was detected in residential wells at levels up to 62 ppb. At those levels, the estimated exposure doses for children would not exceed the oral MRL of 0.2 mg/kg/day. Therefore, noncancer health effects are not expected to occur. Exposure to 1,2-dichloroethane in water at the maximum levels detected may pose a low increased cancer risk. Animal studies suggest that drinking large amounts of 1,2-dichloroethane causes a variety of tumors. Studies of humans exposed to 1,2-dichloroethane are inconclusive. One study found an increase in colon and rectal cancer in people who drank contaminated water, but other chemicals were also present in the water.

Residential wells contained 1,1-dichloroethane at levels up to 533 ppb. No health guidelines or MCLs exist for this chemical, but the MCL for 1,2-dichloroethane, a similar chemical, is 5 ppb. Studies in animals suggest that breathing high levels of 1,1-dichloroethane in air can cause kidney disease after long-term exposure. This chemical is not classified as a carcinogen.

1,1-Dichloroethene (1,1-DCE)

The chemical 1,1-DCE was detected in residential wells at levels up to 154 ppb. Children exposed to the maximum level detected could have doses that exceed ATSDR's chronic oral MRL of 0.009 mg/kg/day. The maximum estimated exposure dose is much lower than the lowest level that caused liver effects in mice. Exposure to 1,1-DCE in water at the maximum levels detected may pose a low increased cancer risk. Animal studies suggest that 1,1-DCE may cause kidney cancer.

Tetrachloroethene (PCE)

PCE was detected in residential wells at levels up to 545 ppb. At this level, the USEPA oral RfD would be exceeded for both children and adults. Workers exposed to elevated levels of PCE in the dry cleaning industry experienced dizziness, headache and other nervous system effects.

Vinyl Chloride

The maximum level of vinyl chloride detected in residential wells was 113.5 ppb. Exposure to that level would exceed ATSDR's chronic oral MRL of 0.00002 mg/kg/day for both children and adults. The maximum estimated exposure dose is much lower than the lowest level that caused liver effects in rats. Exposure to vinyl chloride in water at the maximum levels detected may pose a moderate increased cancer risk of liver cancer.

B. Health Outcome Data Evaluation

1989 Study

With technical assistance from ATSDR, IDPH conducted a study in October 1989 to evaluate the exposure of residents within the original study area to groundwater contaminants. The study had two purposes: first, to determine if the Southeast Rockford residents had mean blood levels of VOCs higher than those reported in a comparison group, a subset of the National Health and Nutritional Examination Survey (NHANES III); second, to determine if a correlation could be established between blood levels and exposure to VOCs in water and air in the home. [2]

Because the number of participants in the study was small, the ability of IDPH and ATSDR to statistically detect differences between participants and the comparison group was limited. Results of the study suggested that air and water exposure to VOCs may result in elevated blood levels, and that residents may have had increased exposure to VOCs. Air levels of 1,1-dichloroethene were correlated with water levels, and inhalation exposures may contribute more to overall VOC body burden than do ingestion exposures. [2]

TCE Subregistry

Residents in the area who were exposed to TCE were added to the ATSDR National TCE Subregistry in June 1990. The TCE Subregistry is one of four chemical-specific subregistries that comprise the National Exposure Registry (NER). Individuals with documented exposure to specific chemicals comprise the NER. Participants report any health effects they experience, and the information is reported in the NER. At the start of the study, participants are asked about their smoking and work history, demographic history, and a series of health-related questions. The same questions are asked during each followup. The goal is to determine if any adverse health effects can be associated with long-term exposure. [3]

Information has been collected on 4,986 individuals (4,652 living and 334 deceased) for the TCE Subregistry Baseline data file. All of these individuals had documented environmental exposure to TCE and resided in 15 areas in 5 states (Michigan, Illinois, Indiana, Pennsylvania, and Arizona). TCE registrants were exposed to TCE through their drinking water. To be eligible for the TCE Subregistry, persons had to have lived in one of the affected areas for more than 30 days and used the water at an address where the water supply was contaminated with TCE.[3] Many of the water supplies contained other contaminants as well as TCE.

Comparisons were made between the health-outcome rates in the TCE Subregistry and composite morbidity rates from the 1989 through 1994 National Health Interview Survey, administered by the National Center for Health Statistics. [3] Morbidity data analyses showed TCE Subregistry registrants had an increased reporting rate for several health outcomes, most of which were

consistent across data collection points. The following statistically significant increases ($p \leq .01$ significance level) over the June 1990 initial baseline interview were found:

- Speech impairment and hearing impairment reporting rates for children under 10 years of age were statistically increased at baseline, but not for the followups. Reporting rates decreased for all other age groups.
- Reporting rates for anemia and other blood disorders increased at all collection points, particularly for those aged less than 10 years and people aged 35 through 64 years.
- Stroke was reported in excess at each data collection period. The greatest increases were for females aged 10 through 54 years and males 25 through 44 years.
- Urinary tract disorders were reported at a higher rate for females in all age groups, and for males aged 10 through 25 years.
- Reported rates for liver problems were elevated or significantly higher for females aged 45 through 64 years; kidney problems were also reported in excess at baseline for females aged 55 through 64 years.
- Diabetes rates were higher for females aged 18 through 24 years and 45 through 54 years at all reporting periods; an overall increase was found during Followup 3.
- Skin rashes, eczema, and other skin allergies were reported at a higher rate at baseline and Followup 3; the two youngest age groups (less than 17 years) had the highest rates.

When interpreting statistical results, and planning future activities based on the results, certain limitations of the TCE Subregistry data files must be kept in mind. For instance, a bias in reporting rates would exist because registrants (1) were more aware of their TCE exposure, (2) had been advised of the potential effect on their health, and (3) might have sought medical care more often than the general population. To moderate this potential bias, TCE Subregistry data were collected with the restriction that a health care provider had to have either told the registrant they had, or treated them for, the condition. Statistically significant deficits for the TCE population (the population exposed to TCE had less than expected numbers) were found for the following health conditions:

- hearing impairment (after age 25 years);
- asthma, emphysema, or chronic bronchitis;
- arthritis, rheumatism, or other joint disorders; and
- other respiratory allergies or problems, such as hay fever.

Although the findings of the TCE Subregistry report do not identify a causal relationship between TCE exposure and adverse health effects, they do reinforce the need to continue ongoing followup of registrants. [3] The health status of those residents will be followed to allow scientists to gain more information about exposure to TCE until 2010.

Community Health Concerns

The main community health concerns at the site in the past have been related to exposure to contaminated groundwater. Before USEPA and the city of Rockford connected homes to the public water system, several residents were concerned that they were drinking and using unsafe water. ATSDR held a public availability session regarding the TCE Subregistry in 1999. Some concern still exists regarding past exposure and current exposure to contaminants in air.

Is my family being exposed to significant levels of VOC vapors?

VOCs were not detected in the outdoor air samples. IDPH compared levels of VOCs found in the Southeast Rockford basement air samples with the appropriate comparison values to see if exposure might cause adverse health effects. Only one home had levels that exceeded comparison values, and the source of the VOCs was a pit in the basement. The pit has been sealed. IDPH would not expect anyone at that home to experience adverse health effects as a result of that exposure because the levels were below those associated with health effects.

Is it safe for children to play in Ekberg-Pine Manor Park?

Illinois EPA samples showed that groundwater beneath the park was contaminated; however, the results of air samples taken in the park areas did not show the presence of contaminants at levels that would be expected to cause adverse health effects.

Is the Rockford public water supply safe to drink?

Yes. The Rockford public water supply is tested regularly for VOCs that have been found in the area groundwater. Samples complied with regulations for distribution.

Conclusions

From the available information, IDPH concludes that the Southeast Rockford Groundwater Contamination site is a public health hazard because people have been and could be exposed to unsafe levels of contaminants in the water. Since 1984, 810 homes have been connected to the Rockford municipal water supply, thereby stopping those residents' exposure to contaminated groundwater. The owners of 10 homes within the current and projected plume and buffer zone have refused connection to the city water system.

Indoor and outdoor air samples collected in 1994 indicate that no one was exposed to any of the VOCs migrating from groundwater, through soil, into homes or yards at unsafe levels.

Recommendations and Public Health Action Plan

Provide health education to the residents of the homes that are not on the public water supply. IDPH will work with Illinois EPA, USEPA, the Winnebago County Health Department and the city of Rockford to educate the owners of the 10 homes not connected to the city water system about the health effects associated with long-term exposure to VOCs.

Sample the indoor air of several homes in the area to see if conditions have changed since 1994. Illinois EPA expects to begin sampling in late 2001.

Continue to evaluate groundwater contamination in the study area to determine if the plume is moving where predicted by the 70-year model. Illinois EPA plans to confirm the model's accuracy.

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Certification

This Southeast Rockford Groundwater Contamination Site 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 public health assessment 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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16. Agency for Toxic Substances and Disease Registry. Toxicological Profile for 1,1,1-Trichloroethane. Atlanta, GA. August 1995.

17. Agency for Toxic Substances and Disease Registry. Toxicological Profile for 1,1-Dichloroehane. Atlanta, GA. May 1994.

18. Agency for Toxic Substances and Disease Registry. Toxicological Profile for Vinyl Chloride. Atlanta, GA. October 1996.

Tables

Table 1. Chemicals of Interest in IDPH Residential Well Samples 1984-1989

Chemical	Frequency of Detection	Maximum Value Detected (in ppb)	Comparison Value Used (in ppb)
trichloroethene	90/105	140	5 MCL
1,1,1-trichloroethane	102/105	990	200 MCL
trans-1,2-dichloroethene	68/105	100	100 MCL
1,1-dichloroethane	91/105	100	none*
1,1-dichloroethene	92/105	154	7 MCL
tetrachloroethene	102/105	12	5 MCL

ppb = parts per billion
MCL = maximum contaminant level
* = no comparison value exists for 1,1-dichloroethane; the MCL for 1,2-dichloroethane is 5 ppb

Table 2. Chemicals of Interest in USEPA Residential Well Samples – 1989

Chemical	Frequency of Detection	Maximum Value Detected (in ppb)	Comparison Value Used (in ppb)
trichloroethene	100/111	120	5 MCL
1,1,1-trichloroethane	99/111	397	200 MCL
cis-1,2-dichloroethene	81/99	323	70 MCL
1,1-dichlorethane	88/111	320	none*
1,1-dichloroethene	12/14	47.8	7 MCL
tetrachloroethene	2/12	6.7	5 MCL

ppb = parts per billion
MCL = maximum contaminant level
* = no comparison value exists for 1,1-dichloroethane; the MCL for 1,2-dichloroethane is 5 ppb

Table 3. Chemicals of Interest in Illinois EPA Residential Well Samples – 1990

Chemical	Frequency of Detection	Maximum Value Detected (in ppb)	Comparison Value Used (in ppb)
trichloroethene	72/117	427.6	5 MCL
1,1,1-trichloroethane	62/117	990.8	200 MCL
cis-1,2-dichloroethene	31/117	1,233	70 MCL
1,1-dichloroethane	30/117	533.2	none*
1,1-dichloroethene	26/117	109.7	7 MCL
tetrachloroethene	40/117	545	5 MCL
vinyl chloride	3/117	113.5	2 MCL

ppb = parts per billion
MCL = maximum contaminant level
* = no comparison value exists for 1,1-dichloroethane; the MCL for 1,2-dichloroethane is 5 ppb

Table 4. Chemicals of Interest in Illinois EPA Groundwater Monitoring Well Samples – 1991

Chemical	Frequency of Detection	Maximum Value Detected (in ppb)	Comparison Value Used (in ppb)
trichloroethene	34/68	3,600E	5 MCL
1,1,1-trichloroethane	47/68	12,000E	200 MCL
cis-1,2-dichloroethene	35/68	4,100	70 MCL
1,2-dichloroethane	7/68	62	5 MCL
1,1-dichloroethane	35/68	2,900E	none*
1,1-dichloroethene	30/68	940E	7 MCL
tetrachloroethene	18/68	1,200E	5 MCL
vinyl chloride	1/68	5	2 MCL

E = Reported results exceeded the calibration range of the laboratory
ppb = parts per billion
MCL = maximum contaminant level
* = no comparison value exists for 1,1-dichloroethane; the MCL for 1,2-dichloroethane is 5 ppb

Table 5. Chemicals of Interest in CDM Residential Well Samples – 1993

Chemical	Frequency of Detection	Maximum Value Detected (in ppb)	Comparison Value Used (in ppb)
trichloroethene	20/24	8	5 MCL
1,1-dichloroethane	12/24	15	none*

ppb = parts per billion
MCL = maximum contaminant level
* = no comparison value exists for 1,1-dichloroethane; the MCL for 1,2-dichloroethane is 5 ppb

Table 6. Chemicals of Interest in IDPH Basement Air Sampling – December 3-4, 1992

Chemical	Frequency of Detection	Maximum Value Detected (in ppb)	Comparison Value Used (in ppb)
1,1,1-trichloroethane	4/9	1,000	700 I-EMEG

ppb = parts per billion
I-EMEG = intermediate environmental media evaluation guide

Table 7. IDPH Re-sample of Basement Air – June 8, 1993

Chemical	Level in Kitchen (in ppb)	Level in Basement (in ppb)	Level in Basement Sump Pit (in ppb)	Comparison Value Used (in ppb)
1,1,1-trichloroethane	BDL	2.5	218	700 I-EMEG

ppb = parts per billion
I-EMEG = intermediate environmental media evaluation guide
BDL = below detection limit (. 0.5 ppb)

Table 8. Completed Exposure Pathways

Pathway name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Number Exposed	Chemicals
Groundwater	Contaminant plume	Groundwater	Private Wells	Dermal Ingestion Inhalation	Residents	Past Present Future	Drinking, Bathing & Other Uses	2,400	VOCs
Indoor Air	Contaminant plume	Air	Basements	Inhalation	Residents	Past	Activities in Basements	5	VOCs

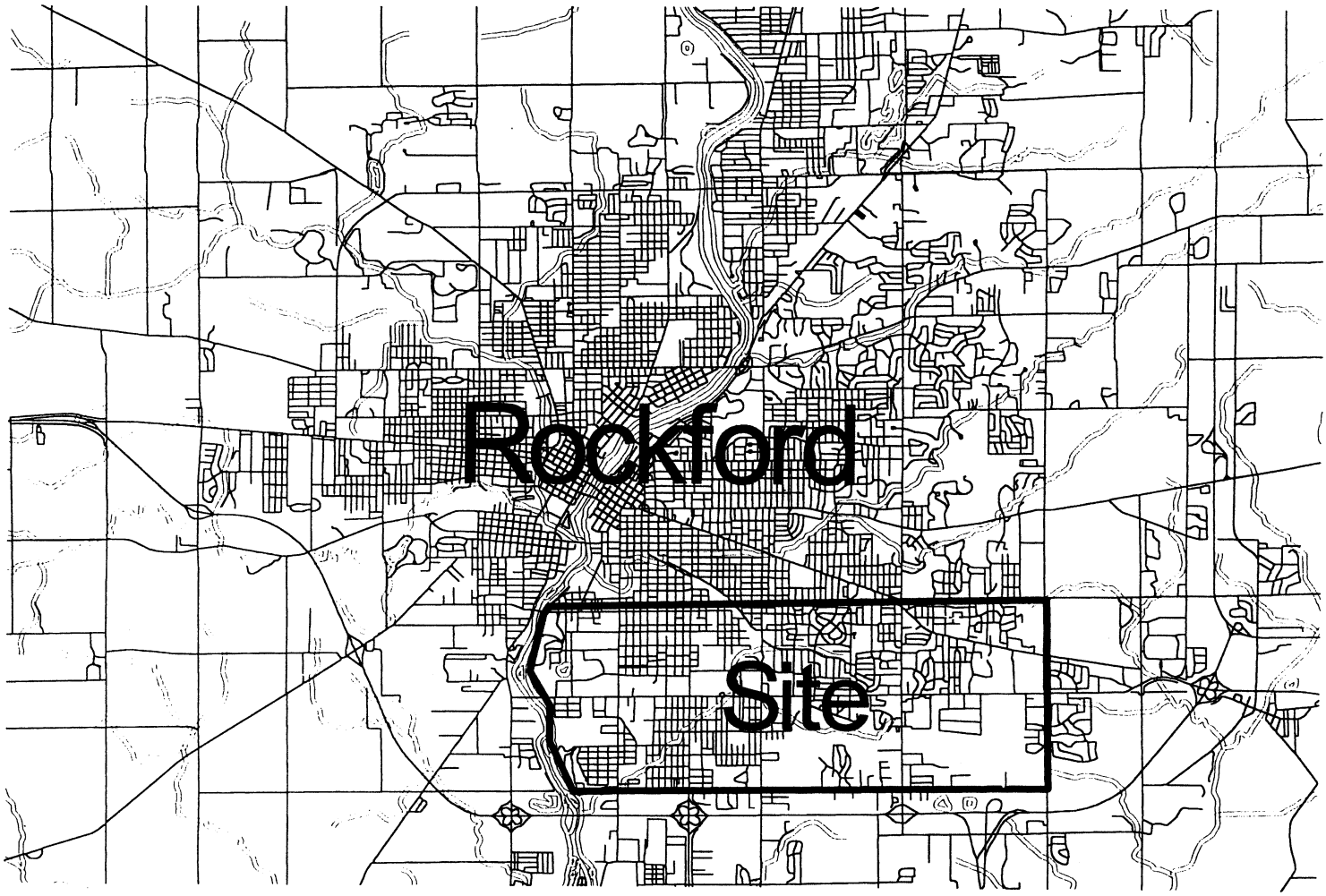
Table 9. Potential Exposure Pathways

Pathway name	Source	Medium	Exposure Point	Exposure Route	Receptor Population	Time of Exposure	Exposure Activities	Estimated Number Exposed	Chemicals
Groundwater	Contaminant plume	Groundwater	Private Wells	Dermal Ingestion Inhalation	Residents	Future	Drinking, Bathing & Other Uses	20	VOCs
Indoor Air	Contaminant plume	Air	Basements	Inhalation	Residents	Future	Activities in Basements	2400	VOCs

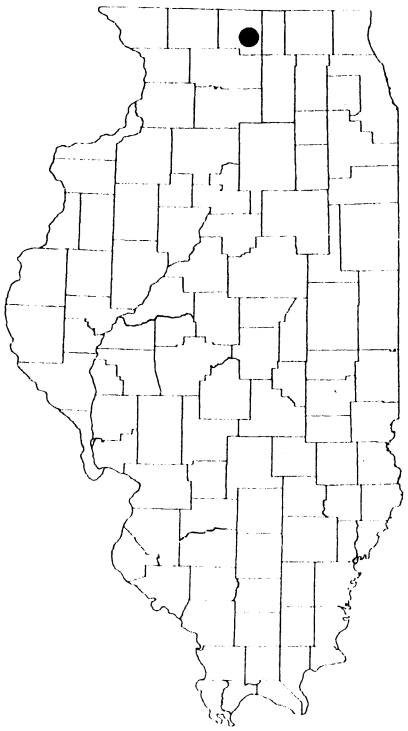
Attachments

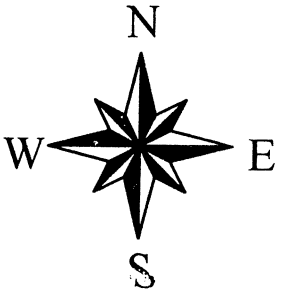
ATTACHMENT 1

Approximate Location of Southeast Rockford Groundwater Site



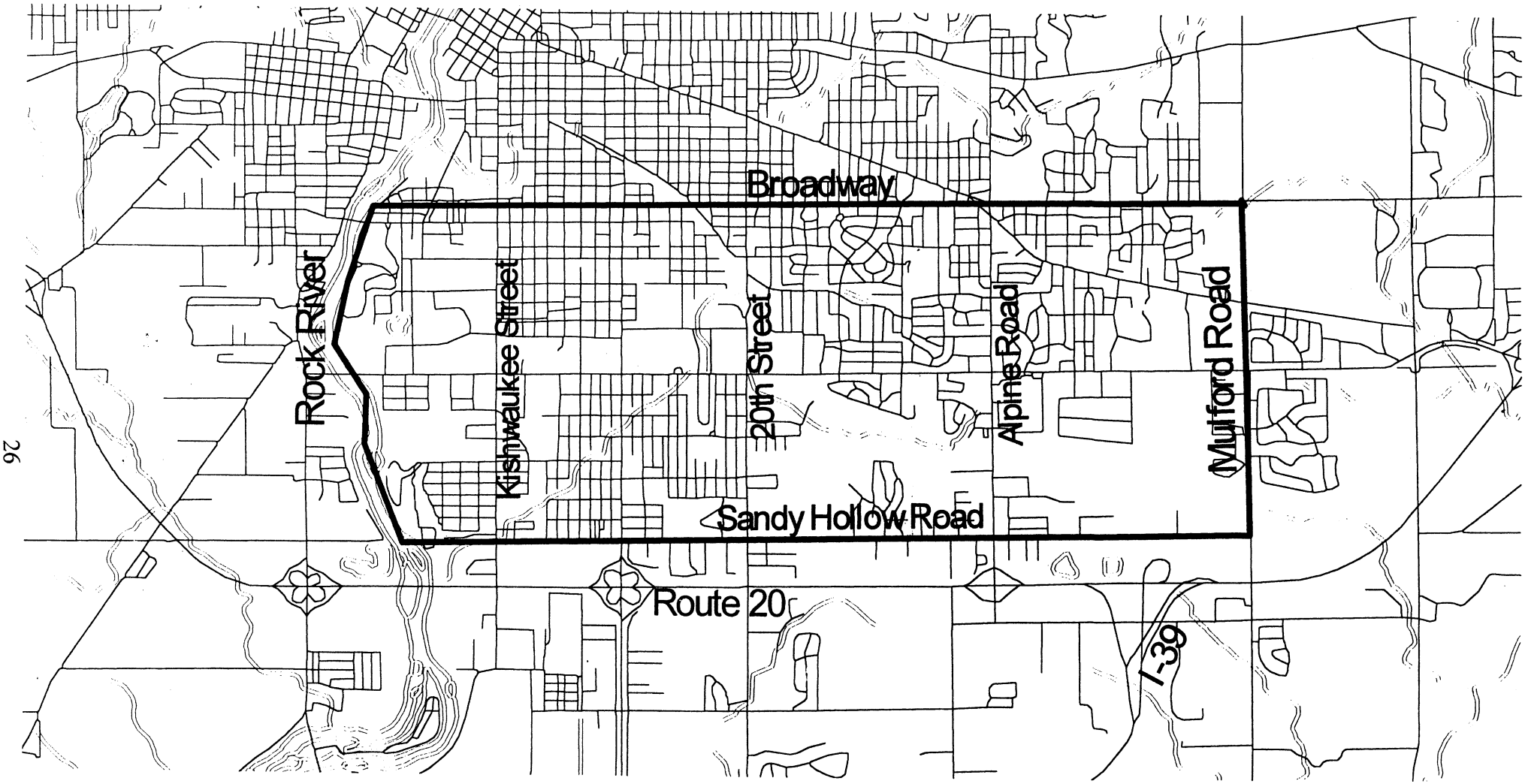
Surface Water
Roads





Source: IDPH GIS

1990 Expanded Boundaries of Southeast Rockford Groundwater Site

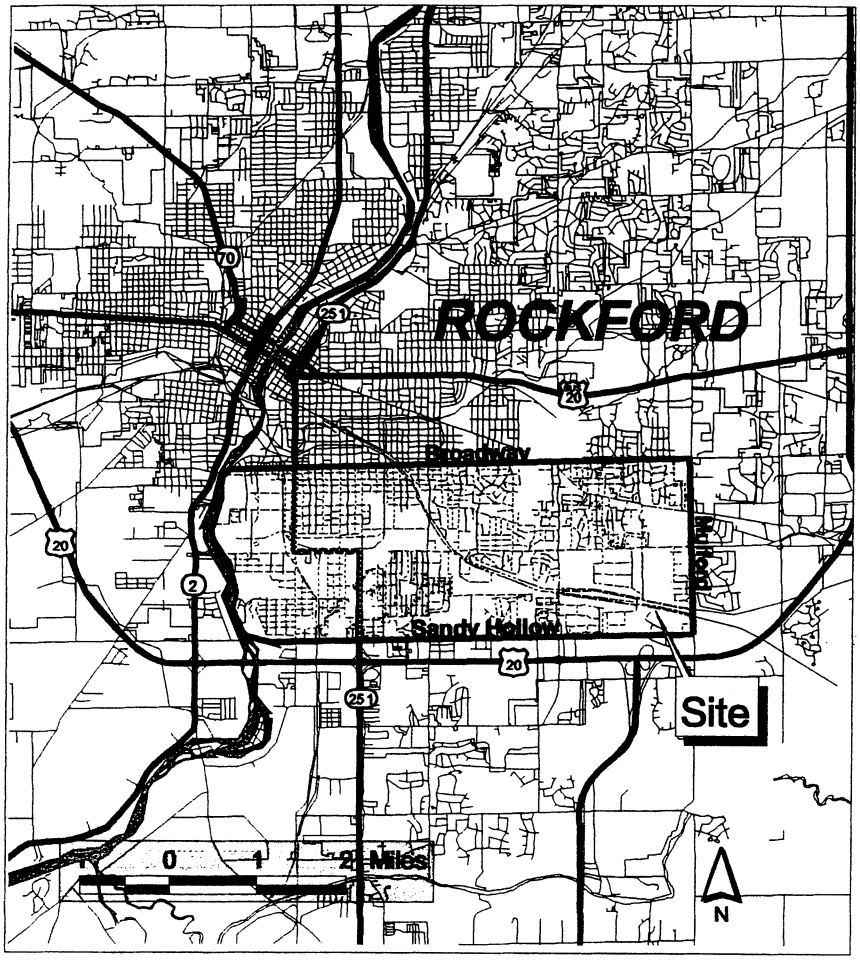


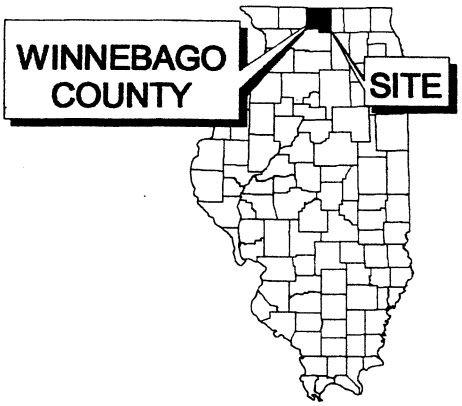
Surface Water
Roads

Source: IDPH GIS

ATTACHMENT 3

Southeast Rockford Site
Winnebago County, Illinois
CERCLIS No. ILD981000417

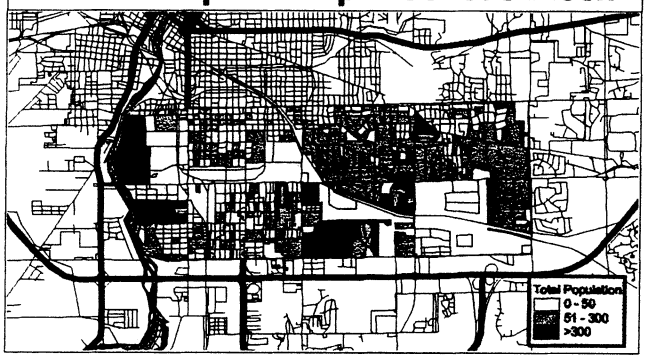




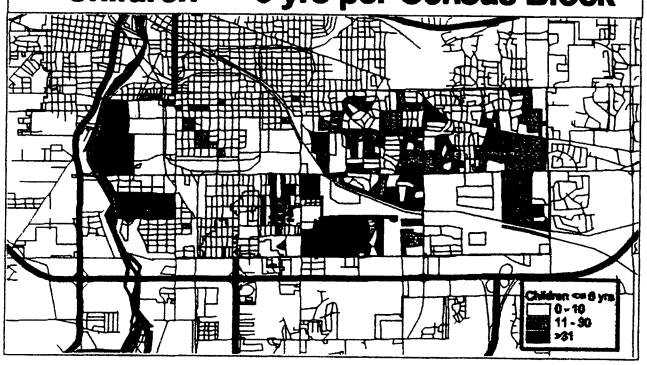
Summary Statistics Within Site Boundaries

Total Number of People	35812
Children Age 6 and Younger	3940
Adults Age 65 and Older	4727
Females Ages 15-44	8531
Younger than 18 yrs	9006
Older than 18 yrs	26806
White	32365
Black	2274
Asian or Pacific Islander	637
American Indian, Eskimo, Al	87
Other Race	449
Hispanic Origin	1173

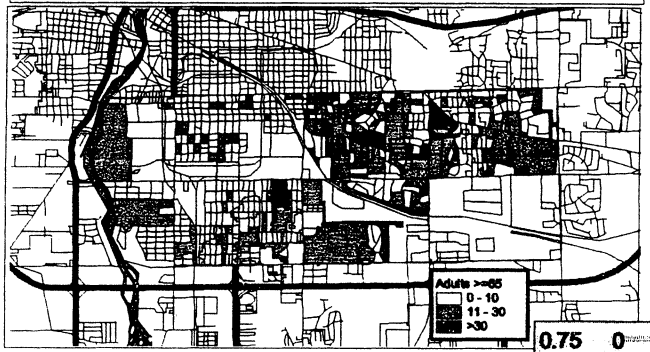
Total Population per Census Block



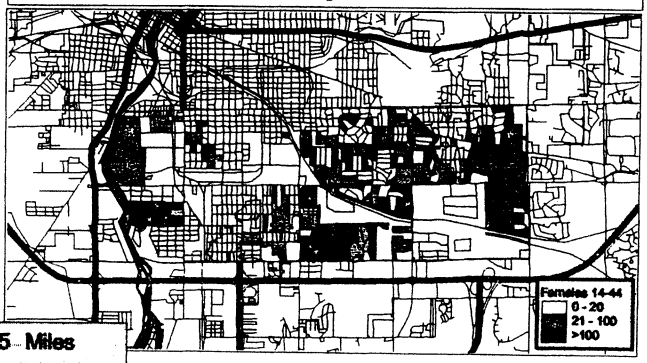
Children <= 6 yrs per Census Block



Adults >= 65 per Census Block



Females 14-44 per Census Block



0.75 0 0.75 1.5 Miles

IDPH - Toxicology Section 1/00

Attachment 4

Comparison Values Used In Screening Contaminants For Further Evaluation

Maximum Contaminant Levels (MCLs) have been established by USEPA for public water supplies to reduce the chances of developing adverse health effects from exposure to contaminated drinking water. The standards are well below levels for which health effects have been observed and take into account the financial feasibility of achieving specific contaminant levels. These are enforceable limits that public water supplies must meet.

Environmental Media Evaluation Guides (EMEGs) are developed for chemicals based on their toxicity, frequency of occurrence at National Priorities List (NPL) sites, and potential for human exposure. They are derived to protect the most sensitive populations and are not action levels, but rather comparison values. They do not consider carcinogenic effects, chemical interactions, multiple routes of exposure, or other media-specific routes of exposure. They are very conservative concentration values designed to protect sensitive members of the population.

COMMENTS FROM PUBLIC COMMENT PERIOD

September 9 to October 12, 2001