PRELIMINARY HEALTH ASSESSMENT

WATERLOO COAL GASIFICATION PLANT

WATERLOO, BLACK HAWK COUNTY, IOWA

CERCLIS NO. IAD984566356

Prepared by

Iowa Department of Public Health/Health Assessment Team
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry
This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6)), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30-day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment 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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FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the Superfund law. This law set up a fund to identify and clean up our country’s hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of health threat, if any, posed by a site and recommends ways to stop or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports
identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.
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SUMMARY

The Waterloo Coal Gas Site (WCG) is located on a former coal-gasification facility between Sycamore and Elm Street along the Cedar River in Waterloo, Iowa (Figure 1). A majority of the property is currently owned by Mid-America Energy Company, R&A Trucking, and Crystal Distribution Services, Incorporated.

The plant originally produced gas by a coal gas process and later by a water gasification process. The carbureted water gas operation produced an additional emulsion-type waste stream that was a mixture of tars, oils, and water. Handling practices at the site involved spreading coal tar residuals, ash, and associated wastes over unlined soils and over areas of low topography. The major contaminants present in various on-site environmental media are cyanides, polynuclear aromatic hydrocarbons (PAHs), and benzene, ethylene, toluene, and xylene (BETX).

The Agency for Toxic Substances and Disease Registry (ATSDR) and the Iowa Department of Public Health (IDPH), based on review of available data, have concluded that the site currently does not pose a public health hazard; however, we will need to evaluate data that will be collected during the Remedial Investigation (RI) to thoroughly substantiate that conclusion. On-site soils contain benzo(a)pyrene above the environmental comparison value. Groundwater on-site contains various PAHs and cyanide above comparison values. Although people who worked at the site while it was operating may have been exposed to contaminants, we have no information to evaluate exposures if they did occur. We do not believe that anyone has been exposed to on-site contaminants since work was begun on the site in 1988 because we have not seen evidence of trespass; however, because soils are contaminated and site access is not completely restricted and the 1993 floods caused groundwater flow direction to reverse, some potential exposure pathways have been identified.

ATSDR and IDPH recommend additional environmental characterization, as planned in the RI, be implemented. No private wells have been identified in areas considered downgradient of the site under normal conditions (prior to and since flood waters receded). However, characterization of deeper aquifers has not been completed, and the possible effects of the 1993 flood have not been evaluated. For those reasons, investigation of private wells within a mile radius of the site, is underway.

To date, two Administrative Orders of Consent (AOC) have been signed regarding work at WCG. The December 1993 AOC provides for a removal action that has begun and is scheduled for completion in the fall of 1996. The May 1995 AOC provides for work on the Remedial Investigation/Feasibility Study (RI/FS) at the site. The RI/FS is now underway; however, the data collected thus far are not yet available for review and evaluation.

Data that were available for this public health assessment have been evaluated by the ATSDR Health Activities Recommendation Panel (HARP) for follow-up health actions. Because current data do not indicate that people are or have been exposed to site-related contaminants, no follow-up health actions are indicated at this time. If additional data indicate that exposure has occurred, further health actions will be evaluated for the site.
BACKGROUND

A. Site Description and History

The Waterloo Coal Gas Site is along the Cedar River in east-central Waterloo, Iowa, approximately 300 feet southwest of the intersection of Sycamore and Elm Street (Figure 1). Although the original facility encompassed approximately 3.6 acres and included 35 buildings, only a 2.8-acre area where wastes were generated or disposed is defined as the site.

Citizen Gas and Electric Company manufactured hydrogen gas at the site from 1901 to 1956. The plant originally produced gas by a coal gas process. In 1911, the facility switched from coal gas to water gas production. The water gas production was modified to carbureted water gas in the early 1940s. The carbureted water gas operations produced an emulsion-type waste stream that was a mixture of tars, oils, and water. In many cases, the handling of waste material involved spreading coal tar residuals, ash, and associated wastes over unlined soils and over areas of low topography on the site.1, 2

During its operation, the plant produced approximately 33 billion cubic feet of gas. By-products of this process included tar sludge, ferrocyanide salts, ammonia, sulfur, oil sludges, gas condensates, tar and ammonia-contaminated liquors, sulfur removal wastes, cyanide and sulfur oxides, and polymer and petroleum sludges. The plant may have generated an estimated 24,090,000 gallons of waste tar during its operation. Historical data from other coal gasification plants show that approximately 76 percent of waste tar is dehydrated and sold. This means that 24 percent, or approximately 5,781,600 gallons, of waste tar may have been disposed on site.2

Following the availability of natural gas in the City of Waterloo in 1954, gas production slowed at the plant and was discontinued in 1956. The plant was dismantled from 1965 through 1967 by Clonick Steel Company of Chicago, Illinois. All materials of value that could be salvaged from the plant were sold. A concrete flood levee that separates the site from the Cedar River and foundations of large buildings remain. The northern portion of the site is not contaminated and not fenced. Two gravel roads leading from the uncontaminated norther portion of the site provide access to the contaminated central and southern portions of the site. However the contaminated areas are fenced and gates across the roads can be locked. Young trees cover approximately 50 percent of the central site area.

Currently, much of the property is still owned by Mid-America Energy Company, which has operated under other names in the past. In 1965, the eastern portion of the site was sold to Rath Meat Packing Company, which is now closed. The eastern portion of the property was subsequently transferred to the city and was later sold to Crystal Distribution Services, Incorporated, which later added Lot 3 and some adjacent land to their property.1 In 1974, the northern portion of the property was sold to the city and was later purchased by R&A Trucking, which built a truck parking lot on the property.1
Energy and Environmental Field Investigation Team (E&E/FIT) conducted a Screening Site Inspection (SSI) at the site in November 1988. Cyanides and polynuclear aromatic hydrocarbons (PAHs) were found in soils. On-site groundwater was not sampled and monitoring wells were not installed during the SSI. However, one off-site groundwater sample taken from a shallow municipal well located two miles west of the site did not contain contaminants from the site.

In June 1989, a Listing Site Inspection (LSI) was performed by E&E/FIT and EPA personnel. Widespread cyanide contamination in on-site soil and large volumes of oil or coal tar-saturated sands and cinder were found in the southeastern corner of the site. Three on-site monitoring wells and one off-site monitoring well, used to collect background information, were installed into the surficial aquifer. PAHs were found in water samples from the three on-site monitoring wells. No measurable levels of contaminants were identified in the off-site background well water sample.

Mid-America Energy (known as Midwest Gas at the time) conducted a Limited Site Investigation (LSI) beginning in November 1992 and ending in December 1992. Two additional monitoring wells (MW-101 & MW-102) were installed into the surficial aquifer. Water elevations in each well were recorded to evaluate their groundwater gradients. Investigators did not sample MW-3 because the well's location and construction quality was questionable. Sample results verified the presence of PAHs, volatiles (such as benzene, ethylbenzene, toluene, and xylene), and cyanide contamination in on-site soil and groundwater in areas owned at that time by the city. Areas owned by Crystal Distribution Services did not appear to be contaminated; however, some contaminant detection limits were greater than comparison values used to select contaminants of concern.

B. Actions Implemented During the Health Assessment

Two Administrative Orders of Consent (AOCs), dated December 1993 and May 1995, have been signed for the site. Objectives outlined in the December 1993 AOC provided for removal activities identify, excavate, process, and incinerate and/or dispose of all coal tar, visibly contaminated coal tar-impacted soils, and coal tar impacted materials, and to conduct a comprehensive private and public well water survey. Removal activities are currently underway with excavation and processing of about 8,800 tons of contaminated material complete. The contaminated material is transported to the Neal Station Power Generating Plant (located in the Port Neal Industrial District, approximately four miles southwest of Sergeant Bluff, Iowa) for incineration. Removal activities should be completed in the fall of 1996.

The May 1995 AOC provided for conducting the Remedial Investigation/Feasibility Study to determine the nature and extent of contamination and to evaluate remedial alternatives for the site (or to conduct an RI/FS). A Remedial Investigation (RI) workplan has been submitted for review. The comprehensive telephone or door-to-door well water survey outlined in the
December 1993 AOC will be conducted after groundwater data are obtained during the 1996 RI.

C. Site Visit

On June 16, 1993, representatives from the Iowa Department of Public Health (IDPH) Toxic Substance Evaluation Program and the Blackhawk County Health Department (BCHD) visited the site. Areas of special interest were the site property boundaries and monitoring well locations. IDPH and BCHD personnel walked the site perimeter where the former coal and water gasification manufacturing process took place but were unable to enter the contaminated central and southern areas because locked gates and fences made site access impossible. At that time, site access to contaminated areas was fully restricted by a chain-link fence approximately 8 feet high. Entrance areas into the site were padlocked and restricted with chain-link gates. Most of the site was heavily vegetated. No signs were posted to warn people that the area contained hazardous waste.

We found the site surrounded by commercial and industrial properties to the east, north, and west. A railroad track and the Cedar River were on the south. A large commercial building owned by Crystal Distribution Services was northeast of the site boundary. A large demolition project for the city was also underway east of the site. The large industrial complex that once housed the Rath Meat Packing Company was being torn down. Traffic next to the site was primarily commercial in nature. Private residences were seen within a mile of the site in all directions.

On September 21, 1995, Richard Welke, a IDPH Health Assessor, visited the site. Although the site was still fenced, some fencing in the central portion had been removed. Removal actions and excavation activities were ongoing. A temporary office was set up south of the Crystal Distribution Services parking lot. Large trenches, soil piles, and heavy equipment were visible around the southeast section of the site. Several air monitoring stations were placed around the site’s perimeter. A semi-tanker was parked next to the north fenceline. An entrance gate (which was padlocked) was observed, although no signs were posted to inform the public about the hazardous area. Some monitoring wells installed in the southeast section of the site were removed because of ongoing soil excavation and removal activities.

D. Demographics

Waterloo, Iowa, has a population of 57,256 people according to the 1990 census report. The population within one mile of the Waterloo Coal Gas Site at Sycamore and Elm street consists of 15,654 people. Of that number, 7.8% of the people within one mile are under age 5, and 17.5% are age 65 and older. There are four schools within this area: Saint Johns, Lowell, Sacred Heart, and East High School.

E. Land Use

A residential area is located north of the site. The closest single family residence is approximately 440 feet from the northern site boundary, and the closest multi-family
dwelling is approximately 480 feet north of the site. Along both sides of the river, in either direction from the site, are active and abandoned light industries, small retail establishments, and private residences. A large commercial building owned by Crystal Distribution Services is northeast of the site.

F. Natural Resource Use

Shallow groundwater at the site is approximately 15-18 feet below the surface. In general, shallow groundwater in the area flows in a south-southeast direction toward the Cedar River. However, shallow groundwater appeared to be recharged by the Cedar River when groundwater measurements were taken during the 1991 Limited Site Investigation. Further investigation is needed to determine if water flow direction changes during high water conditions or if the shallow groundwater in the area of the site is always recharged by the river. No private wells have been found in the areas between the site and the Cedar River. A well survey is planned during the RI process if contamination is migrating through groundwater toward populated areas.

The City of Waterloo obtains water from 15 wells. Six shallow wells are located upgradient along the Cedar River, approximately 2.5 miles northwest of the site. Nine bedrock wells are scattered throughout the city, with the closest approximately 1.75 miles southwest of the site. A continuous confining layer does not exist between the unconsolidated alluvium and the underlying limestone bedrock. Therefore, waterbearing units of the alluvial deposits and the waterbearing units of the underlying bedrock are considered to be hydrologically connected.

The Cedar River is used for fishing and other recreational purposes. People also hunt in the area, although no evidence has been found that people have trespassed on the site to hunt.

G. Health Outcome Data

The state maintains health databases on several registries: Cancer Registry, Birth Defects Registry, Infant Mortality Database, and Tuberculosis (TB) Registry. Disability Prevention Programs (case evaluation for low birth weights, infant deaths, etc.) are also maintained by the state. The state cancer registry has collected data since 1969. The birth defects registry has collected data since 1985.

An evaluation as to the usefulness of these health outcome databases is presented in the Health Outcome Data Evaluation section of this document. The county and local health departments do not have relevant or appropriate health data pertinent to this site.

COMMUNITY HEALTH CONCERNS

During the site visit on June 16, 1993, a representative from the Blackhawk County Health Department indicated that residents living near the site have not expressed any health concerns associated with the site. The county Health Department wanted to be notified if
any health risks were identified during future site investigations.

Copies of this public health assessment were made available for public review and comments on February 1, 1994, for 30 days. Although written and oral comments were requested, no comments were received. The public comment period was extended until April 6, 1994, when an availability meeting was conducted in Waterloo by IDPH and ATSDR representatives. Representatives from ATSDR Region VII, EPA Region VII, and the Iowa Department of Natural Resources were in attendance. The IDPH education consultant coordinated the meeting with IDPH staff. During the meeting, IDPH and ATSDR offered to meet with anyone who had specific health concerns.

Three people asked the following questions:

1. A member of a family that owns a rental house near the site wanted to know about the effects of exposure to site contaminants and how we can detect if someone has been exposed to contaminants.

2. A representative of the media wanted to know if there is any current threat to public health.

3. A sub-contractor at the site wanted to know if exposure to water in 2 sub-basement levels of old buildings that are being demolished east of the site could result in exposure and adverse health consequences?

These concerns are addressed in the Community Health Concerns Evaluation section of this document.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

The tables in this section list site contaminants in the environmental media sampled that equal or exceed a comparison value. Figure 2 shows soil boring and monitoring well locations. The data reviewed and evaluated were that collected during the Site Screening Inspection, the Listing Site Inspection, and the Limited Site Inspection. The comparison values used to select contaminants for further evaluation for this site include the Cancer Risk Environmental Guide (CREG), the Reference Dose Media Exposure Guide (RMEG), the Proposed Maximum Contaminant Level (PMCL), and the Lifetime Health Advisory (LTHA).

The CREG is derived from the cancer slope factor developed for contaminants that may pose a cancer risk should exposure occur over a period of 70 years. The CREG is based on a one-in-one-million risk of developing cancer as a result of that lifetime of exposure. The RMEG is derived from the Reference Dose, a dose of a contaminant that may cause noncancer, adverse health effects upon exposure. The PMCL is one that EPA research suggests is safe for all people if the contaminant is found in their drinking water. The levels is a goal and is not legally enforceable because technology may not exist to be able to reduce levels to that amount. The LTHA is a level for drinking water that EPA feels should not be
exceeded over a long period of time.

A. On-Site Contamination

Soil (0-6 inches)

Soil was sampled at zero to six-inch depths during both the Site Screening Inspection and the Listing Site Inspection. The samples are referred to as surface soil samples although the depth does not correspond to ATSDR’s established surface soil level of 0 - 3 inches. Benzo(a)pyrene was the only contaminant found above comparison values at this depth. The highest concentrations were found in the central portion of the site at boring location #3 during the Site Screening Inspection and in the southeast portion of the site during the Listing Site Inspection at location #12 (Table I and Figure 3). Although no consistent pattern of soil contamination has been verified, contamination generally appears to spread in a northwesterly direction from the southeast area of the site (Figure 3).

<table>
<thead>
<tr>
<th>Contaminant (1988 Samples)</th>
<th>Maximum Concentration (mg/kg)</th>
<th>Location</th>
<th>Comparison Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzo(a)pyrene</td>
<td>89.0</td>
<td>SSI #3</td>
<td>0.1 CREG</td>
</tr>
<tr>
<td>(1989 Samples)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>4.9</td>
<td>LSI #12</td>
<td>0.1 CREG</td>
</tr>
</tbody>
</table>

SSI - Screening Site Inspection
LSI - Listing Site Inspection

Subsurface Soil (0-2 feet, 0-7 feet, and >10 feet)

Composite subsurface soil samples were collected at various depths for the Site Screening Inspection the Listing Site Inspection, and the Limited Site Investigation. The depths at which soils were collected for each study were as follows:

0-2 feet and 0-7 feet -- Site Screening Inspection
>10 feet -- Listing Site Inspection
0 - 44 feet at 6.5 foot intervals -- Limited Site Investigation

Once again, benzo(a)pyrene was the only contaminant found above comparison values. Table II and Figures 4 and 5 provide information on the amount and sampling location of the maximum level found.

### TABLE II
**ON-SITE SUBSURFACE SOIL**

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Maximum Concentration (mg/kg)</th>
<th>Location</th>
<th>Comparison Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benzo(a)pyrene</td>
<td>250.0</td>
<td>SSI #17</td>
<td>0.1 CREG</td>
</tr>
<tr>
<td></td>
<td>0-7'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>41 J</td>
<td>LSI #3</td>
<td>0.1 CREG</td>
</tr>
<tr>
<td></td>
<td>&gt;10'</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benzo(a)pyrene</td>
<td>930</td>
<td>MWG-B5</td>
<td>0.1 CREG</td>
</tr>
<tr>
<td></td>
<td>0-6.5'</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SSI - Screening Site Inspection
LSI - Listing Site Inspection
J - qualitatively identified, estimated value.
MWG - Midwest Gas--Limited Site Investigation

Groundwater

Groundwater was first sampled in 1989 during the Listing Site Inspection. PAHs were found above comparison values in Well #2 and Well #3. The quality of Well #3 was questioned because the well was drilled into an area of high soil contamination, which may have resulted in contamination of the groundwater.
New wells were drilled for the Limited Site Investigation, and groundwater measurements and samples were collected in 1991 for that study. Cyanide and naphthalene were found above comparison values at that time. Table II provides information on the maximum values found and the sampling locations for both the 1989 and the 1991 samples. Groundwater measurements suggested that the Cedar River was recharging the area groundwater at that time.

### TABLE III
**ON-SITE GROUNDWATER**

<table>
<thead>
<tr>
<th>Contaminant (1989-Listing Site Inspection)</th>
<th>Maximum Concentration (μg/L)</th>
<th>Location</th>
<th>Comparison Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acenaphthene</td>
<td>830</td>
<td>Well #3</td>
<td>600 RMEG</td>
</tr>
<tr>
<td>Benz(a)anthracene</td>
<td>16 J</td>
<td>Well #2</td>
<td>0.1 PMCL</td>
</tr>
<tr>
<td>Chrysene</td>
<td>270 J</td>
<td>Well #3</td>
<td>0.2 PMCL</td>
</tr>
<tr>
<td>Cyanide</td>
<td>96.8</td>
<td>Well #2</td>
<td>200 RMEG</td>
</tr>
<tr>
<td>Fluoranthene</td>
<td>450</td>
<td>Well #3</td>
<td>400 RMEG</td>
</tr>
<tr>
<td>Fluorene</td>
<td>630</td>
<td>Well #3</td>
<td>400 RMEG</td>
</tr>
<tr>
<td>Naphthalene</td>
<td>6,300</td>
<td>Well #3</td>
<td>20 LTHA</td>
</tr>
<tr>
<td>Pyrene</td>
<td>650</td>
<td>Well #3</td>
<td>300 RMEG</td>
</tr>
</tbody>
</table>

(1991-Limited Site Investigation)

<table>
<thead>
<tr>
<th>Cyanide</th>
<th>237</th>
<th>MW-101</th>
<th>200 RMEG</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>883</td>
<td>Well #2</td>
<td></td>
</tr>
<tr>
<td>Naphthalene</td>
<td>740</td>
<td>Well #1</td>
<td>20 LTHA</td>
</tr>
<tr>
<td></td>
<td>3,100</td>
<td>Well #2</td>
<td></td>
</tr>
</tbody>
</table>

J - qualitatively identified, estimated value.

### B. Off-site Contamination

Off-site sampling has been confined to the collection of background data for groundwater and some soil. The data collected are not useful for comparison because we are not sure what detection limits were used and because some benzo(a)pyrene was detected in the off-site soil.
samples. The planned RI is intended to characterize the extent of contamination and to provide information on whether contaminants have migrated from the site.

C. Toxic Chemical Release Inventory (TRI)

To identify facilities that could contribute contamination to environmental media in proximity to the site, IDPH searched the TRI Database for 1987-1990, the years for which data were available. The TRI was developed by EPA to track data submitted by industries on estimated annual releases (emission rates) of toxic chemicals to the environment (air, water, land, or underground injection). The TRI did not contain information on any industry that could be influencing conditions at or near this site.

D. Quality Assurance and Quality Control

In preparing this preliminary public health assessment, IDPH relied on the information provided in the referenced documents and assumes that adequate QA/QC measures were followed with regard to the chain of custody, laboratory procedures, and data reporting. The validity of the analyses and conclusions drawn for this preliminary public health assessment are determined by the availability and reliability of the referenced information. The detection limits used to identify some contaminants collected during the Limited Site Investigation were greater than comparison values used to select contaminants for further evaluation.

E. Physical and Other Hazards

Although large trenches and heavy equipment used for removal work were seen during the September 1995 site visit, site access is limited. Warning signs, however, were not present and would add to site security.

PATHWAYS ANALYSES

In order to determine whether people have been exposed to site contaminants, we evaluate the components of exposure pathways. The components of exposure pathways are: 1) a source of contamination; 2) an environmental media through which contaminants travel; 3) a point where people actually contact the contamination; 4) a biological route through which the contamination enters the body; and 5) a population that actually comes into contact with the contamination. We have to have information confirming the presence of each exposure pathway component in order to consider an exposure pathway completed. If information for any component is missing, we consider the exposure pathway as potential and request data gaps be filled if possible. If any component of an exposure pathway is missing, and we have enough information to show that exposure is not an issue, we eliminate that particular exposure pathway from further discussion. The following discussions provide information on the exposure pathways we considered for this site.
A. Completed Exposure Pathways

No completed exposure pathways were identified with the information we evaluated for this site. Because the investigations completed thus far are preliminary in nature, data gaps exist. We have identified a number of potential exposure pathways. Once data from the RI/FS are available, we expect to be able to determine if any of the exposure pathways are complete.

B. Potential Exposure Pathways

Possible Exposure to Contaminants in Soil

Former employees of the facility could have been exposed to contaminants in on-site soils. Their exposure would have likely been a result of working in areas where wastes were disposed. The few employees that may have worked in these areas could have taken some of the contaminants into their bodies through direct skin contact, through inhalation of the volatile and semivolatile compounds, and through incidental ingestion of contaminated soils. Only one contaminant, benzo(a)pyrene, was found in soils at a level above comparison values, although data available for the evaluation of surface soil contamination is minimal.

People who live in the area could have been exposed to site contaminants by inhaling the contaminants entrained on dust particles blown from the site. However, with vegetation in the area capturing some dust and with the distance of populations from the contaminated areas, no measurable contaminated dust particles would be expected to reach the nearest residents.

Groundwater

On-site groundwater is contaminated with PAHs, cyanide, and naphthalene. We do not know of any private drinking water wells in the area between the site and the Cedar River where groundwater appears to flow at the site. Limited background samples that have been collected and analyzed suggest that the contaminants have not likely migrated to areas where private and public drinking water wells are located. Therefore, we do not believe that anyone has been exposed to contaminants in the groundwater to date. However, groundwater studies are incomplete, and the planned groundwater investigations data are needed to confirm that no one is exposed to contaminants through their drinking water.

Surface Water and Sediment

Surface water and sediment in the Cedar River were not sampled during previous investigations. We do know that people use the Cedar River for fishing and other recreational purposes, although, when on site visits, we have not seen any people in the vicinity of the site. Information on any contaminant concentrations present in Cedar River water and sediment would be helpful in evaluating any exposures that may occur as a result of direct skin contact through swimming or wading and through incidental ingestion of the water or sediment.
Biota

People fish in the Cedar River, although we have not seen any fishermen in the vicinity of the site when we have been there. Because investigations of the site and surrounding areas are incomplete, we cannot evaluate the potential for exposure through consumption of contaminated fish. The information that we do have on the types of contaminants at the site suggests that little accumulation in fish would be expected.

PUBLIC HEALTH IMPLICATIONS

This section of the document provides information about the toxicity of contaminants present in exposure pathways, discusses health outcome data that may be helpful to people if they have been exposed to site contaminants, and provides information to people who have expressed health concerns about the site.

A. Toxicologic Evaluation

We do not have any information that suggests that people are exposed to site-related contaminants. Former employees who worked in areas where wastes were disposed may have been exposed to the contaminants through direct skin contact, through inhalation of volatile and semivolatile compounds, and through incidental ingestion. We do not have any information on what contaminants or levels of contaminants may have been included in those exposures; therefore, we cannot provide any information on the possible health impact. We have not received any complaints of adverse health outcomes that former workers feel may be associated with exposure.

Although we do not believe that anyone has been exposed to contaminants in groundwater, the levels of naphthalene, polycyclic aromatic hydrocarbons (PAHs), and cyanide warrant discussion.

Naphthalene and Polycyclic Aromatic Hydrocarbons (PAHs):

The maximum concentration of naphthalene found in on-site groundwater to date is 6,300 μg/L. If that level reached private drinking water wells, the estimated dose for an adult, assuming consumption of 2 liters a day for a 70 kilogram person, would exceed the Minimal Risk Level (MRL) established for non-cancer, adverse health effects for naphthalene exposure (8). If an estimated dose exceeds a MRL, we further evaluate the conditions of any exposure that may occur and determine if the exposure might result in adverse health effects. The most important health effect to check following naphthalene exposure is a type of anemia that is associated with exposure to high levels of naphthalene. Children, African-Americans, and people of Mediterranean decent are most susceptible (8).

The levels of the PAHs present in on-site groundwater would not result in a dose that would exceed Reference Doses for individual contaminants if those levels migrated to private wells (4). Our concern with these contaminants is the uncertainty of what happens to the body.
when exposed through ingestion and dermal contact to all of the contaminants at once over a long period of time (4). Some of the PAHs are classified as possible carcinogens. For that reason, long-term exposure to PAHs is undesirable.

Cyanide:

Cyanide was detected in on-site groundwater at a maximum concentration of 883 µg/L. EPA does not allow more than 200 µg/L cyanide in public drinking water supplies. Ingestion of water with cyanide concentrations equal to the highest level found in on-site groundwater would result in a dose about equal to the Reference Dose established for free cyanide. We do not know what kind of cyanide or cyanide compound is in the water (10). If that level of cyanide were found in a drinking water well, we would want to further evaluate any exposure conditions for possible adverse health effects. Knowing the type of cyanide would be critical for such an evaluation because the toxicity of each type varies (10). Breathing difficulties and nervous system disorders are known to result from exposures to cyanide (10). Cyanide exposure is not believed to cause cancer.

B. Health Outcome Data Evaluation

We did not evaluate any health outcome data because we did not identify any completed exposure pathways, and none of the databases available contain information that would be helpful in answering the questions posed by area residents. Additionally, no former employees have reported any illnesses they associate with their possible exposure.

C. Community Health Concerns Evaluation

The following question-answer discussion is in response to public concerns posed during the April 6, 1994, public availability meeting held in Waterloo, Iowa:

1. A member of a family that owns a rental house near the site wanted to know about the effects of exposure to site contaminants and how we can detect if someone has been exposed to contaminants.

Answer:

No one living near the site is expected to experience any adverse health effects because, to date, we have not found any indication that people living near the site have been exposed to contamination at the site. We did identify possible conditions for exposure and provided some information on what we might expect if exposure does occur. If the people living around the site feel they may have come into contact with contaminants, we welcome that information, and we will provide them with information regarding the specific exposure they describe to us.
2. A representative of the media wanted to know if there is any current threat to public health.

Answer:

No. We did not find any information to suggest that anyone is coming in contact with site contaminants at this time. We have identified some data gaps that are critical to our final site evaluation. Once the Remedial Investigation becomes available, we will evaluate that information and take action to stop exposure if preliminary information proves inaccurate regarding exposure.

3. A sub-contractor at the site wanted to know if exposure to water in 2 sub-basement levels of old buildings that are being demolished east of the site could result in exposure and adverse health consequences?

Answer:

Because of the buildings' location in relation to the site, it is unlikely that site contaminants were in the basement water. However, the area-wide floods that caused the water to accumulate in the basements also caused unusual groundwater flow conditions. For that reason we cannot say with certainty that the water was free of site-related contaminants. We do not believe that the short-term exposure to any of the contaminants that may have been present would result in any latent or long-term effects.
CONCLUSIONS

ATSDR and IDPH have concluded, based on the information reviewed, that the Waterloo Coal Gas site does not appear to pose a public health hazard, although more data are needed to confirm that conclusion. The limited data available do not show that anyone is currently exposed to contaminants on or from the site.

Potential exposure pathways, however, exist under current site conditions. Groundwater flow from the site has not been adequately characterized and flow conditions may change when floods occur. Information is needed to confirm the preliminary data, which indicate no drinking water wells have been affected by the site.

Additionally, better characterization is needed of possible contaminant migration to off-site soils and to the Cedar River water and sediment. Once Cedar River data are available, an evaluation of potential fish contamination can be made.

Although site access is restricted, warning signs would enhance site security.

Potential past exposures cannot be evaluated because, if former Waterloo Coal Gas workers were exposed to contaminants, the levels and duration of exposures are not known. No former employees have expressed concern about their health as a result of working at the site.

Some community members have asked about the potential for exposure to site contaminants and about resulting health effects. We do not believe that anyone living or working off site has been exposed to site-related contaminants. We will review data that is now being generated through the RI/FS process for changes in condition and will notify people of our evaluation.
RECOMMENDATIONS

1. Characterize groundwater at the site as planned through the RI. Conduct a private well survey that encompasses areas that could be affected by any flow direction scenario. Sample private wells that may be affected.

2. Characterize the possible migration of site contaminants to other off-site media including surface soil, surface water, and sediment.

3. Evaluate sediment data to determine if fish tissue sampling should be performed.

4. Consider posting warning signs around the site to enhance site security. Maintain the integrity of the fence.

5. Provide IDPH with RI data for evaluation as they become available.

HEALTH ACTIVITIES RECOMMENDATION PANEL (HARP)

The data and information developed in the Waterloo Coal Gasification preliminary public health assessment have been evaluated by the ATSDR Health Activities Recommendation Panel (HARP) for follow-up health actions. The available information does not indicate that people are or have been exposed to site related contaminants at levels which could cause illness or disease. Therefore, no follow-up health actions are indicated at this time. If additional data become available, ATSDR and IDPH will reevaluate this site for any indicated follow-up health actions.

PUBLIC HEALTH ACTION PLAN

This section describes the actions to be taken at the site by ATSDR, IDPH, and other governmental agencies. The purpose of the public health action plan is to ensure that this public health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. The public health actions to be implemented for this site are as follows:
A. Actions Undertaken

A public availability meeting was held in Waterloo, Iowa (Logan Intermediate School Cafeteria) on April 6, 1994, to compile community health concerns about the site. The IDPH staff conducted one-on-one meetings with concerned citizens. A Waterloo Coal Gas site fact sheet was issued to the public during this meeting.

B. Actions Planned

IDPH and ATSDR are available to address new community concerns that may arise when remedial activities begin. New environmental data will be reviewed to determine if other public health actions are indicated.
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CERTIFICATION

The Waterloo Coal Gas preliminary public health assessment has been prepared by the Iowa 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 initiated.

[Signature]
Technical Project Officer, SPS, KPB, DHAC

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

[Signature]
Chief, SPS, SSAB, DHAC, ATSDR
REFERENCES


2. Listing Site Inspection, Waterloo Coal Gas Site, Waterloo, Iowa; Ecology and Environment Inc./ Field Investigations Team; for Region VII EPA, Kansas City, Kansas, May 21, 1990.


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SITE LOCATION