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Public Health Assessment for

STOUGHTON CITY LANDFILL

STOUGHTON, DANE COUNTY, WISCONSIN

CERCLIS NO. WID980901219

JANUARY 19, 1994

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry

THE ATSDR HEALTH ASSESSMENT: A NOTE OF EXPLANATION

Section 104 (i) (6) (F) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, states "...the term 'health assessment' shall include preliminary assessments of potential risks to human health posed by individual sites and facilities, based on such factors as the nature and extent of contamination, the existence of potential pathways of human exposure (including ground or surface water contamination, air emissions, and food chain contamination), the size and potential susceptibility of the community within the likely pathways of exposure, the comparison of expected human exposure levels to the short-term and long-term health effects associated with identified hazardous substances and any available recommended exposure or tolerance limits for such hazardous substances, and the comparison of existing morbidity and mortality data on diseases that may be associated with the observed levels of exposure. The Administrator of ATSDR shall use appropriate data, risks assessments, risk evaluations and studies available from the Administrator of EPA."

In accordance with the CERCLA section cited, this Health Assessment has been conducted using available data. Additional Health Assessments may be conducted for this site as more information becomes available.

The conclusions and recommendations presented in this Health Assessment are the result of site specific analyses and are not to be cited or quoted for other evaluations or Health Assessments.

PUBLIC HEALTH ASSESSMENT

STOUGHTON CITY LANDFILL

STOUGHTON, DANE COUNTY, WISCONSIN

CERCLIS NO. WID980901219

Prepared by:

Wisconsin Department of Health and Social Services
Under a Cooperative Agreement With The
Agency for Toxic Substances and Disease Registry

THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

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.

Agency for Toxic Substances and Disease Registry.....*William L. Roper, M.D., M.P.H. Administrator*
Barry L. Johnson, Ph.D., Assistant Administrator

Division of Health Assessment and Consultation.....*Robert C. Williams, P.E., Director*
Juan J. Reyes, Deputy Director

Federal Programs Branch.....*Sally L. Shaver, Chief*

Community Health Branch.....*Cynthia M. Harris, Ph.D., Chief*

Remedial Programs Branch.....*Sharon Williams-Fleetwood, Ph.D., Chief*

Records & Information Management Branch.....*Max M. Howie, Jr., Chief*

Emergency Response & Consultation Branch.....*C. Harold Emmett, P.E., Chief*

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(703) 487-4650

ATSDR and its Public Health Assessment

ATSDR is the Agency for Toxic Substances and Disease Registry, a federal public health agency. ATSDR is part of the Public Health Service in the U.S. Department of Health and Human Services. ATSDR is not a regulatory agency. Created by Superfund legislation in 1980, ATSDR's mission is to prevent or mitigate adverse human health effects and diminished quality of life resulting from exposure to hazardous substances in the environment.

The Superfund legislation directs ATSDR to undertake actions related to public health. One of these actions is to prepare public health assessments for all sites on or proposed for the Environmental Protection Agency's National Priorities List, including sites owned or operated by the federal government.

During ATSDR assessment process the author reviews available information on

- the levels (or concentrations) of the contaminants,
- how people are or might be exposed to the contaminants, and
- how exposure to the contaminants might affect people's health

to decide whether working or living nearby might affect peoples' health, and whether there are physical dangers to people, such as abandoned mine shafts, unsafe buildings, or other hazards.

Four types of information are used in an ATSDR assessment.

1) **environmental data**; information on the contaminants and how people could come in contact with them

2) **demographic data**; information on the ethnicity, socioeconomic status, age, and gender of people living around the site,

3) **community health concerns**; reports from the public about how the site affects their health or quality of life

4) **health data**; information on community-wide rates of illness, disease, and death compared with national and state rates

The sources of this information include the Environmental Protection Agency (EPA) and other federal agencies, state, and local environmental and health agencies, other institutions, organizations, or individuals, and people living around and working at the site and their representatives.

ATSDR health assessors visit the site to see what it is like, how it is used, whether people can walk onto the site, and who lives around the site. Throughout the assessment process, ATSDR health assessors meet with people working at and living around the site to discuss with them their health concerns or symptoms.

A team of ATSDR staff recommend actions based on the information available that will protect the health of the people living around the site. When actions are recommended, ATSDR works with other federal and state agencies to carry out those actions.

A public health action plan is part of the assessment. This plan describes the actions ATSDR and others will take at and around the site to prevent or stop exposure to site contaminants that could harm peoples' health. ATSDR may recommend public health actions that include these:

- restricting access to the site,
- monitoring,
- surveillance, registries, or health studies,
- environmental health education, and
- applied substance-specific research.

ATSDR shares its initial release of the assessment with EPA, other federal departments and agencies, and the state health department to ensure that it is clear, complete, and accurate. After addressing the comments on that release, **ATSDR releases the assessment to the general public.** ATSDR notifies the public through the media that the assessment is available at nearby libraries, the city hall, or another convenient place. Based on comments from the public, ATSDR may revise the assessment. ATSDR then releases the final assessment. That release includes in an appendix ATSDR's written response to the public's comments.

If conditions change at the site, or if new information or data become available after the assessment is completed, ATSDR will review the new information and determine what, if any, other public health action is needed.

For more information about ATSDR's assessment process and related programs please write to:

Director
Division of Health Assessment and Consultation
Agency for Toxic Substances and Disease Registry
1600 Clifton Road (E-32)
Atlanta, Georgia 30333

PREFACE: THE PURPOSE OF PUBLIC HEALTH ASSESSMENTS

The federal "Superfund" law requires the U.S. Agency for Toxic Substances and Disease Registry (ATSDR) to conduct a health assessment of all toxic waste sites that the U.S. Environmental Protection Agency (EPA) proposes for inclusion on the list of the nation's most hazardous waste sites. This list formally is called the National Priorities List. The Wisconsin Department of Health and Social Services works with ATSDR to prepare assessments. The purposes of health assessments are:

1. To evaluate whether contaminants at the site pose a current or future threat to public health;

2. To recommend any steps needed to protect the public from exposure to toxic substances; and

3. To recommend long-term health studies, when appropriate.

For each assessment health professionals look at the types of contamination present, including each chemical's toxicity; ability to move through soil, water or air; persistence in the environment; and ability to accumulate in the food chain. They look at ways that people could be exposed to contaminants such as eating breathing, or touching the chemicals. Investigators check relevant health records when appropriate to see if there may be increases in health effects related to public exposure to contaminants from the site. Finally, an assessment identifies the health hazards that a site may pose and recommends action to protect public health now and in the future.

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SUMMARY

The 27-acre Stoughton City Landfill operated between 1952 and 1982 as a disposal site for municipal and industrial waste. The site is located on the northeastern edge of the City of Stoughton, Wisconsin, approximately 13 miles southeast of Madison. Between the mid-1950s and the mid-1960s, the site was used for disposal of solvents and other wastes generated by a Stoughton plastics manufacturer. Contamination at other disposal sites used by the manufacturer led to concerns that this landfill may be affecting local groundwater and surface water and that a park planned for the site may not be safe.

Limited sampling data indicate that groundwater under the site is contaminated with tetrahydrofuran at levels exceeding Wisconsin Groundwater Enforcement Standards. However, this site-related contaminant has not been detected in private and municipal wells in areas surrounding the site. Moreover, surface water and sediment on the site and in adjacent wetlands do not appear to be contaminated with chemicals at concentrations above levels of human health concern. However, methane gas appears to exceed explosive levels in a portion of the landfill.

Significant human exposure to site-related contaminants has not occurred to date. However, such exposure could occur if the site is unremediated. Based on the lack of documented human exposure to site-related contaminants, the Division of Health has determined that this site poses no apparent human health hazard at the present time. The site would pose a public health hazard in the future if tetrahydrofuran in groundwater were to reach the municipal water supply at levels exceeding the Wisconsin Groundwater Enforcement Standard.

The recommendations of this health assessment are further analysis of monitoring well samples and the sandstone aquifer and to prevent methane migration into nearby buildings.

Since human exposure to contaminants is not likely, ATSDR's Health Activities Recommendation Panel has determined that no additional follow-up activities are need at this time.

The Division of Health will provide continuing public health education as new information related to public health issues becomes available, and will review and comment on public health aspects of sampling and subsequent activities to be done pursuant to the Record of Decision.

BACKGROUND

Site Description and History

The Stoughton City Landfill is on the eastern edge of Stoughton, Dane County, Wisconsin, a city of approximately 8,000 located 12 miles southeast of Madison (see Appendix B). A suburban area of Stoughton begins about 1000 feet south of the landfill and further development is expected to the south and east (7). Immediately northwest of the landfill are the Yahara River and undeveloped wetlands owned by Dane County. Wetlands also border landfill to the northeast. Aerial photographs indicate that farmland is about 1000 feet east of the wetland.

The 27-acre Stoughton City Landfill operated as an uncontrolled municipal waste dump from 1952 to 1969. During this time, refuse was usually burned and occasionally covered with dirt. Some solid and liquid waste may have been disposed of in bore-holes drilled in the western portion of the landfill. Until 1962, the landfill accepted all types of wastes collected from homes and businesses in Stoughton. Businesses using the landfill included dry cleaners, garages and other sources of potentially hazardous wastes (1). After 1962, the city disposed of refuse at another site but the landfill continued to accept waste independently transported to the site (1). A survey conducted during the Remedial Investigation (RI; see below) showed that many solvents, including methyl ethyl ketone, acetone, tetrahydrofuran, toluene and xylene mixtures, were disposed of at the landfill (2).

In 1969, the Wisconsin Department of Natural Resources (WDNR) licensed the site for disposal of solid waste. WDNR felt that the porous soil and relatively high water table made the location unsuitable for a landfill and, between 1971 and 1977, negotiated with the city in an effort to close the landfill. In 1977, the WDNR formally requested that the city submit an abandonment plan for the landfill. Between 1978 and 1982, when the landfill officially closed, the site was used for disposal of demolition and wood wastes only.

In the late 1950s and early 1960s, Uniroyal Plastics Inc. (then called U.S. Rubber Company) disposed of solid and liquid waste from their Stoughton plastics manufacturing plant at the site. No information on the precise quantities or types of waste is available. However, the company has provided lists of solvents used at their plant during that time. The discovery that waste solvents had contaminated groundwater at two other Uniroyal disposal sites, the Hagen Farm and the Every Farm, led the WDNR to request in March 1984 that the U.S. Environmental Protection Agency (USEPA) consider placing the site on the National Priorities List (NPL). This action would make the site eligible for further study and cleanup under the USEPA "Superfund" program. USEPA proposed placement on the NPL in October 1984 and placed it on the list in June 1986.

Prior to 1988, limited sampling was performed by the WDNR, the Wisconsin Department of Health and Social Services (WDHSS) and various contractors for the City of Stoughton. In 1988, in conformance with a Consent Order with USEPA, the City of Stoughton and Uniroyal

contracted with ERM-North Central of Deerfield, IL to perform a "Remedial Investigation/Feasibility Study" (RI/FS) on the Stoughton City Landfill. In 1989, a different contractor, ENSR Inc. of Chicago, IL, began work on the RI/FS, which was completed in January 1991. As stated in the Consent Order, the objectives of the RI were to determine the extent of hazardous contaminants released from the landfill and, if necessary, to identify potential actions that could be taken at the site to mitigate any hazards.

On September 30, 1991, USEPA signed a Record of Decision specifying a comprehensive cleanup plan for the site. The cleanup plan includes relocating waste from direct contact with the groundwater and capping the site with a cap meeting current WDNR standards for landfills. Because of inadequate groundwater data, the potentially responsible parties are required to install a number of new monitoring wells between the landfill and the municipal well. Based on the results of that sampling, the USEPA will decide whether or not to require a comprehensive groundwater cleanup of the site (4).

The northern third of the site, which was not used for waste disposal, is primarily composed of wetlands (see Appendix A)(3). The waste, which is 0-12 feet deep over an area of approximately 15 acres, is covered with approximately one foot of soil and seeded with grasses (5). About 200 feet below the ground surface is a layer of sandstone bedrock which is approximately 1000 feet thick (5). The soil between the waste and sandstone is comprised of glacial deposits containing fine grained sands, silt, and clay which are moderately permeable. No naturally occurring surface soils remain at the landfill (5).

Surface water runoff throughout the site is to ditches leading to the wetlands to the north and east. These wetlands drain into the Yahara River, which is 200 feet from the northwest boundary of the site and 800 feet west of the disposal area. A pond and ditch in the northern portion of the site (about 100 feet from the disposal area) often contain standing water. Some site-related compounds were found in these wetlands during the RI at concentrations exceeding Wisconsin Surface Water Quality Criteria.

Two major aquifers underlie the site: one in the glacial outwash and the other in the sandstone bedrock. During wet weather, the water table may reach 0-1 feet below the ground's surface. The two aquifers appear to be hydraulically connected (6).

Site Visit

Representatives from WDHSS visited the site on July 24, 1991. No physical hazards were evident and a locked gate was installed at the Amundson Parkway entrance. The Sampling and Analysis Plan for the Remedial Investigation indicated that another locked gate controlling vehicular access exists but was not seen during the site visit.

The RI states that snow fencing has been installed along the southern property boundary and warning signs placed every 200 feet along the western, northern and eastern boundaries. No snow fencing was visible during the site visit, although several signs were present. The site was covered with grasses widely scattered areas of bare soil and asphalt.

Demographics, Land Use and Natural Resource Use

The Stoughton City Landfill is on the eastern edge of Stoughton, a city of approximately 8,000 located 12 miles southeast of Madison (see Appendix B). Two nursing homes which use municipal water occupy land adjacent to landfill on the south. A suburban area of Stoughton begins about 1000 feet south of the landfill and further development is expected to the south and east (7).
Census data from 1980 indicates that most of the 365 people living adjacent to the site are over 65 years of age and very few are under 18. About 1/4 of the 289 people living between 1/8 and 1/4 mile of the site are under age 18 and very few are over 65. No Blacks, Asians or persons of Spanish origin live within 1/4 mile of the site. The Stoughton area has a population of 17,563 of which 98.8% are white (8). The area is predominantly middle class and housing is comprised mostly of single-family homes (8).

Immediately northwest of the landfill are the Yahara River and undeveloped wetlands owned by Dane County. Wetlands also border landfill to the northeast. Aerial photographs indicate that farmland is about 1000 feet east of the wetland.

Health Outcome Data

No state or local health data are relevant since no exposure has been documented nor have community health concerns been expressed.

COMMUNITY HEALTH CONCERNS

At the time of the site visit, the WDHSS arranged a meeting with the local public health agency and elected officials. The mayor of Stoughton and a representative of the Dane County Health Department attended. The WDHSS representative explained the purpose of public health assessments and requested information about community health concerns. The officials were not aware of any community health concerns related to the landfill. Rather, the community is concerned about the potential fiscal costs of the Superfund process and about the loss of a community recreational facility.

Anticipating potential concerns of the six users of private water supply wells located within 1500 feet of the landfill, WDHSS analyzed water samples from these wells in July 1988. WDHSS notified the well owners immediately that no contaminants were found in these samples. In addition, a representative of WDHSS presented its findings at a public meeting about the landfill in November 1988. At this meeting two citizens expressed concern that public officials were not properly characterizing the contamination at the site. Most concerns, however, related to the costs of the Superfund process.

WDHSS provided several opportunities for the community to identify health concerns associated with the landfill. A representative of WDHSS discussed the public health assessment at a public meeting in July 1991 and appeared at a public meeting in September 1991. A draft of this public health assessment was available locally for public comment in April 1992. Both meetings and the release of the public health assessment were covered by local media. WDHSS received no comments on the public health assessment.

ENVIRONMENTAL CONTAMINATION AND OTHER HAZARDS

This section describes contamination and other hazards associated with the Stoughton City Landfill site. Contaminants of concern are selected for further analysis in following sections. Areas considered to be "on-site" are those areas on Stoughton City Landfill property. All other areas are considered to be "off-site". Environmental sample results are summarized in this section as they apply to both on-site and off-site contamination.

The tables in this section list the contaminants of concern. We evaluate these contaminants in the subsequent sections of the Public Health Assessment and determine whether exposure to them has public health significance. ATSDR and WDHSS selects and discusses these contaminants based upon the following factors:

1. Concentrations of contaminants on and off the site.

2. Field data quality, laboratory data quality, and sample design.

3. Comparison of on-site and off-site concentrations with health assessment comparison values for (1) noncarcinogenic endpoints and (2) carcinogenic endpoints.

4. Community health concerns.

In the data tables that follow under the On-site Contamination subsection and the Off-site Contamination subsection, the listed contaminant does not mean that it will cause adverse health effects from exposures. Instead, the list indicates which contaminants will be evaluated further in the Public Health Assessment. When selected as a contaminant of concern in one medium, that contaminant will be reported in all media.

A comparison value is a contaminant concentration level below which human exposure is likely to be without harmful health effects. Comparison values are derived from toxicity data

and exposure dose assumptions for specific media (e.g. soils, drinking water, etc.). These values are referred to when possible to help select potential contaminants of concern from the results of samples taken from the site.

On-site Contamination

A summary of on-site sampling activities is presented in Table 1.

Table 1: Summary of On-Site Sampling at Stoughton City Landfill

Medium	Date	Sampler	Parameters
Soil Gas	1989	ERM[+]	VOC[*], SVOC[**], Some pest.[***]
Soils	1989	ERM	VOC, SVOC, Metals
Air	1989	ERM	Some VOC
Surface Water and Sediment	1989	ERM	VOC, SVOC, Metals
Groundwater	1982-90	Strand[++]	Indicators
	1984	Strand/WDNR	VOC
	1984	Various Contractors	VOC
	1989	ERM	VOC, SVOC, Metals, Pest.

[+] ERM-North Central Inc. under contract to Uniroyal and the City of Stoughton.
[++] Strand Associates Inc. under contract to the City of Stoughton
[*] Volatile organic compounds
[**] Semivolatile organic compounds
[***] Pesticides

Soil Gas. During the RI, 74 soil gas samples were taken from different locations on the landfill property and 10 samples adjacent to the landfill. In general, chlorinated solvents (concentrations non-detected [ND]-9.3 parts per million [ppm]) and fluorocarbons (ND-100 ppm) are distributed throughout the landfill. The highest levels of nonchlorinated solvents (2.5 ppm) and petroleum derivatives (3.2 ppm) were found in the west-central and northern portions of the landfill (see Appendix A) (9). Since soil gas sampling is not designed to identify particular compounds, the results of this sampling can only be used to identify areas where more sampling may be necessary.

Due to the detection of methane during installation of one of the monitoring wells, a comprehensive methane survey was conducted by USEPA in May 1989. In this survey, methane was detected at levels over the lower explosive limit in the west-central portion of the landfill and in the vicinity of the building (10).

Mixed soil/waste. Two mixed soil/waste samples were taken in conjunction with the installation of monitoring wells (MW) 2 and 6: one from 6 to 8 feet below the surface in the southwestern portion of the site (MW 2) (Appendix A) and one from 2 to 4 feet below the surface in the northeastern portion (MW 6). The samples were extracted and analyzed by gas chromatography. Benzene, chloroform and a number of polyaromatic hydrocarbons (PAHs) were identified in soil/waste from these locations but not quantified. The PAHs phenanthrene, fluoranthene, purene and benzo(a)anthracene were detected at levels which are not of health concern. No polychlorinated biphenyls were detected and the only pesticide identified was 4,4'-DDD in one sample. Lead, cadmium and mercury were found at levels above background but not at levels of health concern. Other metals of potential concern such as arsenic, barium, chromium and silver were not found. Concentrations of compounds were quantified only in one of the two soil/waste samples.

Soil. Four soil samples were taken in conjunction with the installation of monitoring wells, one from 0-2 feet below ground surface (bgs), one from 2-4 feet bgs and one from 4-6 feet bgs (11). Like the waste samples, analysis was performed by gas chromatography.

No specific solvents or polyaromatic hydrocarbons were identified in soil samples. Some unidentified hydrocarbons were detected. It is not clear if the 0-2 feet sample was taken from the surface; otherwise, no surface soil samples were analyzed.

Soils from the west-central portion of the landfill (Appendix A), which the soil gas survey identified as contaminated with solvents, were not analyzed.

Surface Water and Sediment. Six surface water samples were taken on and adjacent to the landfill boundaries and analyzed for methylene chloride, acetone, dichlorofluoromethane and metals. No solvents were detected in these samples, nor were metals detected at levels over twice background. Eight sediment samples were analyzed for the compounds described above as well as for 2-butanone, PAHs and metals. Extremely low levels of PAHs were found in one sample (12).

Air. Air sampling by the WDNR in response to odor complaints in 1985 revealed no volatile organic compounds (VOCs) in the vicinity of the landfill. During the RI, air samples were taken on two occasions from two upwind and seven downwind locations from the site. Trans-1,2-dichloroethene, ethyl benzene, toluene and xylenes were detected at 20-60 parts per billion at one unspecified location. These levels are lower than the threshold limit values calculated for use in occupational settings by a factor of approximately 10,000 (13) and are not of health concern.

Groundwater. Six monitoring wells were installed within the landfill in 1978 and have been sampled for indicator parameters (chemical oxygen demand, hardness, alkalinity, chloride, dissolved iron, field conductivity, field pH, and groundwater elevation) semiannually since 1982. Between 1982 and 1984, WDNR and various contractors sampled these wells for some VOCs. The results of these sampling episodes are inconsistent with one another (14) (see

QUALITY ASSURANCE AND QUALITY CONTROL below), so the data are of limited value. However, the data do suggest that the groundwater under the landfill may contain benzene, ethylbenzene, 1,2-dichloroethylene (1,2-dichloroethene), tetrahydrofuran, toluene, and xylenes.

During the RI, six two-well clusters consisting of one shallow well (15 feet below the surface) and one deep well (60-80 feet) were installed. The deepest monitoring well was 75.6 feet, and no well penetrated the bedrock from which the City of Stoughton obtains its water (15). Samples were collected during three sampling rounds in May, August and October, 1989. Analyses were conducted for a standard list of VOCs, semi-volatile organic compounds (SVOCs) and some metals during the first sampling round. Those which were not found (except for methylene chloride and acetone) were not analyzed during the second round (16). The third sampling round was conducted because holding times were exceeded for some compounds in the samples taken during the second round. A "background" water sample was taken from an unused residential well about 500 feet east of the landfill boundary. The well water contained 65 micrograms per liter (µg/L) of lead, a concentration exceeding Wisconsin's Groundwater Enforcement Standard of 50 µg/L. This well was installed with steel casing and is equipped with a hand-operated piston pump. Cadmium, copper, zinc and iron were also found in this well, suggesting to the authors of the RI that corrosion of the well casing and/or pump components may be the source of these compounds.

Results of groundwater testing during the RI are summarized in Table 2. Methylene chloride and acetone were also analyzed for but not detected.

From the available data, it appears that groundwater under the western section of the landfill is contaminated at least with chlorofluorocarbons and tetrahydrofuran. Bis (2-ethylhexyl) phthalate was also found in one sample at a level exceeding the Groundwater Enforcement Standard. The contaminants are present at all sampling depths in the two wells closest to this area. Monitoring wells south of the site do not contain any site-related contaminants. However, no data are available for the area of the landfill identified as the most contaminated from the soil gas samples (the west-central portion; Appendix A) or for the deeper aquifer.

Xylenes, 1,2-dichloroethene, arsenic, barium and lead were also found at levels below enforcement standards in a small number of samples.

Table 2: Chemicals of Potential Health Concern in On-Site Groundwater

Compound	Concentrations Detected (µg/L) Minimum	Maximum	Frequency of Detection[@]	Standard
VOCs				
Tetrahydrofuran (THF)	19	660*	6/25	50[+]
Trichlorofluoromethane	6.4*	16	6/25	None
SVOC				
Bis(2-ethylhexyl)phthalate	-	44*	1/23	3[++]

* Estimated value or below Contract Required Quantitation Limits. The highest verified value for THF was 492 µg/L.
[@] Number of detects/number of sampling events.
[+] Wisconsin Groundwater Enforcement Standard
[++] Wisconsin Proposed Groundwater Enforcement Standard

Source: Remedial Investigation Report, Table 4-12.

Off-site Contamination

Samples are defined "off-site" if taken outside the boundaries of the 27-acre parcel identified in Appendix A. The history of sampling for off-site contamination is summarized in Table 3.

Table 3: Summary of Off-Site Sampling Results

Location	Date	Sampler	Parameters
Yahara River	1984	WDNR	VOC
Downwind air	1985	WDNR	VOC
Municipal wells	1982	WDNR	VOC
	1983	WDNR	VOC
	1985	WDNR	VOC
	1986	WDNR	VOC
	1991	City of Stoughton	THF
Private wells	1988	WDHSS	VOC

Soils. No off-site soil sampling has been performed. A methane gas survey in 36 unspecified residences south of the landfill was performed by the USEPA Emergency Response Team. No methane gas was detected during the course of this survey (17).

Surface water. No VOCs were detected in a single surface water sample collected from the Yahara River at an unspecified location adjacent to the landfill. The sample was collected by Strand Associates on behalf of the City of Stoughton in September 1984 (18).

Some surface water samples were taken from wetlands adjacent to the site but outside the site boundary. Results from these samples are described in "on-site sampling" above.

Air. In response to complaints about odors emanating from the landfill, the WDNR collected samples downwind from the landfill in 1985. No VOCs were detected at that time (19). However, the conditions of sampling are not available so these data are of limited value (see QUALITY ASSURANCE AND QUALITY CONTROL below).

Groundwater. Municipal wells for the City of Stoughton have been sampled for VOCs including the dichloroethene isomers, xylenes, trichlorofluoromethane, benzene and tetrahydrofuran four times by the WDNR since 1982 as part of a statewide water quality investigation. No VOCs were detected in these samples (20). In July, 1991, a private contractor hired by the City of Stoughton analyzed samples from wells 3 and 6 for tetrahydrofuran, and none was found above the detection limit of 10 µg/L (21). In 1988, WDHSS analyzed water from five residential wells south of the site and from a water supply well at a cemetery approximately 1500 feet southeast of the landfill boundary. No VOC contamination was detected in any of these wells.

No off-site groundwater sampling was performed during the RI.

A search of the Toxic Chemical Release Inventory for the zip code including Stoughton did not reveal any facilities releasing the chemicals of concern at this site. One rubber manufacturer is located within the zip code.

Quality Assurance and Quality Control

Little or no quality assurance/quality control (QA/QC) information is available for pre-RI investigations. For example, well construction details, sample storage procedures or instrument calibration are not available for any of the WDNR or Strand Inc. sampling. Thus, inconsistencies in the data are impossible to explain. These data can only be used as guidelines for further sampling.

QA/QC procedures are better documented in the RI, although some details such as the depth of soil gas samples are not specified. No samples were split between more than one laboratory, a common data validation procedure. However, in accordance with USEPA-established procedures, Environmental Standards, Inc., of Valley Forge, Pennsylvania

undertook a quality assurance review of all groundwater sampling data. The reviewers concluded that many of the data values could not be used due to laboratory analysis problems. As a result, these data values were flagged in the final report. In addition, the USEPA "validated" the data for Round 1 (22).

Physical and Other Hazards

Methane gas is present at levels over the explosive limit in the southwestern section of the landfill (Appendix A) and under the building constructed on the site. The relatively permeable cap allows methane to escape, and, thus, pressure would probably not build up to explosive levels. Nevertheless, gas concentrations inside the building could potentially reach explosive levels.

PATHWAYS ANALYSES

People may be exposed to the chemicals of concern in a number of ways. The pathways analysis looks at five elements in two broad categories **Environmental Pathways** - the source of the chemicals, where they are found (soil, water, air), the ways the chemicals may move from the site; and **Human Exposure Pathways** - ways by which people could be exposed to the chemicals (touch, ingestion, inhalation), and the groups of people that might be exposed.

Exposure pathways are referred to as completed, potential, or eliminated. A completed pathway is one where there is a clear indication that people were exposed to chemicals from the site and when there is sufficient information to evaluate that exposure. All five of the elements must exist for a completed pathway to exist. This includes exposures that occurred in the past and exposures that are currently happening.

A potential pathway exists when there is insufficient information to link a chemical to a known level of exposure among an identified population. A potential pathway may refer to a past, present, or future exposure. An exposure pathway can be eliminated if one of the five elements is missing and will never be present.

Environmental Pathways

Waste. Soil gas analysis revealed the presence of a number of solvents, most notably in the west-central portion of the landfill (see **on site contamination** above). These solvents are volatile and may migrate off the site into nearby soils. However, the fact that no methane was found off the site indicates that measurable levels of landfill gases are not likely to be migrating as far off-site as the location of the houses.

One waste sample of two analyzed during monitoring well installation appeared to be contaminated with PAHs, one pesticide, cadmium and low levels of lead and mercury. Because these compounds bind tightly to organic matter and soil particles, they are not likely to migrate into groundwater (23, 24, 25, 26, 27).

Soil. Soil gas results indicate that soil in a wide area may be contaminated with solvents. The most pervasive compounds include trans-1,2-dichloroethene, trichloroethene and fluorocarbons. While these compounds may volatilize from soil into the air, limited air sampling data do not indicate that such volatilization is occurring.

Food Chain. Potential chemical exposure through the food chain may occur through consumption of contaminated wildlife. The area is surrounded by wetlands which may be inhabited by waterfowl and fish taken from the Yahara River may be consumed. Limited sampling data from surface water both on site and in the Yahara River indicate that contaminant releases occurring from the landfill into surface water are too low to concentrate in the food chain to levels of human health concern. In addition, no or low levels of contaminants are apparently present in the wetland sediments. Therefore, contaminant exposure through consumption of wildlife is not expected to be significant.

Groundwater. Tetrahydrofuran, trichlorofluoromethane and bis(2-ethylhexyl)phthalate were detected at levels potentially of health concern in the shallow aquifer. Limited evidence in the RI report indicates that the shallow aquifer flows radially from high points in the landfill (Appendix A). The shallow aquifer discharges into the Yahara River to the west and the wetlands to the east.

The wetlands to the east are owned by Dane County and do not contain any private wells. To the south, six homes southeast of the site use well water drawn from the shallow aquifer. WDHSS sampling in 1988 for VOCs including those found in the landfill indicated that well water in these homes did not contain VOCs. In addition, monitoring wells south of the site do not appear to be contaminated Apparently, contaminants are not flowing toward these homes.

Two of the four municipal wells serving the City of Stoughton are located within one mile west of the landfill. Flow in the bedrock aquifer, which is the source of water for the Stoughton municipal wells, appears to be northwest toward the Yahara River in the direction of these wells (28). One of these wells, Well 6, located approximately 3000 feet west of the site and is cased to a depth of 210 feet and is an open hole to a total depth of 950 feet (29). In July 1991, neither of the two wells contained THF at a level above the detection limit.

Surface Water. Limited sampling data indicate that surface water near the site contains some metals and organic compounds at levels exceeding Wisconsin Surface Water Quality Standards and may be hazardous to aquatic life (see "on-site contamination" above). Any contaminated groundwater flowing into the Yahara River will be greatly diluted in river water.

Air. VOCs in the air above the site reported in the RI are the same as those found in the landfill. Therefore, VOCs originating from the landfill may be contaminating air above the landfill. The compounds were present at levels marginally exceeding their detection limits.

Concentrations at any populated areas downwind of the landfill would likely be well below detectable levels.

Similarly, any potential releases of methane into outdoor air would likely be diluted before reaching nearby homes. However, methane could reach potentially explosive levels inside enclosed structures built over the landfill.

Human Exposure Pathways

Ingestion. Possible routes of ingestion of chemicals from the Stoughton City Landfill are through ingestion of contaminated groundwater or soil. The available evidence also indicates that contaminated groundwater is not reaching nearby wells or the Stoughton municipal wells. However, more information on concentrations of contaminants in the sandstone aquifer between the site and the municipal wells is needed before final conclusions can be made about future exposures. Soil ingestion may be significant if the area is used for a park and children are allowed to play on potentially contaminated soils. The extent of surface soil contamination is not known since surface soils have not been analyzed.

Inhalation. Inhalation is not expected to be a significant exposure route at residences located near the landfill. While VOCs were detected in the air above the landfill and individuals may be exposed to these compounds if the area is used as a park, levels of exposure would be extremely low. Since the surface soil is planted with grasses, it is not likely to be eroded by wind.

Dermal Absorption. While access to the site is essentially unrestricted, there are no signs of frequent use. Dermal absorption of landfill contaminants at the site is unlikely due to the current usage of the area and the low levels of contaminants present. However, the lack of surface soil analysis, especially in areas identified by the soil gas survey as contaminated, makes precise estimation of exposure by dermal absorption difficult.

In summary, exposure to site-related contaminants is not expected through ingestion or inhalation. Dermal exposure has not been reported in the past and probably will not occur in the future since only low levels of contaminants have been found.

PUBLIC HEALTH IMPLICATIONS

Toxicological Evaluation

Significant exposure to landfill contaminants does not appear to have occurred to date. Soil and air contaminant concentrations are below levels of health concern and no wells which are presently being used for human water consumption contain site-related contaminants. However, tetrahydrofuran, which has been found in the shallow aquifer under the site, may flow toward the city well. Although health data on tetrahydrofuran is not extensive, one study of rats was located which indicate that ingestion of the chemical at high doses may be

associated with alterations in liver enzymes or blood cell counts (30). Inhalation of the chemical has also been found to cause respiratory irritation and liver damage (31). Bis-(2-ethylhexyl)phthalate is classified as a probable human carcinogen by the USEPA (32) and ingestion of the chemical may increase cancer risks.

Health Outcome Data Evaluation

"Health outcome data" is a phrase referring to records of death and disease. When there is evidence that people near a site have been exposed to contaminants at levels that could lead to an increase in rates of death or disease, a review of health outcome data may be appropriate. A review also may be appropriate if there are reports of unusual clusters of diseases near a site. There is no evidence of significant public exposure to chemicals from the landfill, and WDHSS is not aware of any reports of clusters of chronic disease near this site.

Community Health Concerns Evaluation

As discussed earlier, no health concerns related to the site have been expressed by the community to date. Concerns about the proper characterization of the site are being addressed through the Record of Decision and additional sampling. Additional groundwater monitoring is designed to determine the precise extent of contamination.

Most concerns expressed thus far involve the costs of the Superfund process. The public health assessment is not intended or authorized to examine costs associated with the Superfund process.

CONCLUSIONS

1. The Stoughton City Landfill poses no apparent public health hazard under current conditions. However, if the site is unremediated and contaminants continue to be released from the site, the water of the Stoughton municipal supply may become impacted and the site would pose a public health hazard.

2. Local residents have not expressed concern that the landfill is affecting their health. While groundwater in the upper aquifer appears to flow primarily into the Yahara River, it may also be flowing to the south toward private residences. At present, these wells do not appear to be at risk for contamination since the southernmost monitoring wells on the site do not contain any site-related contaminants.

3. Air over the site does not appear to contain site-related contaminants.

4. No information concerning contaminant concentrations in the sandstone aquifer between the landfill and the Stoughton municipal wells is available. Therefore, the extent of the contaminant plume and the potential for contamination of the municipal wells cannot be precisely defined.

5. Potential methane buildup in enclosed structures may present an explosive hazard.

RECOMMENDATIONS

1. Private wells in the area do not appear to be in the path of contamination and do not need to be sampled further. However, the two monitoring wells on the southern site boundary (MW-1 and MW-2) should be continue to be monitored to insure that contaminants are not flowing in this direction.

2. The sandstone aquifer between the site and the Stoughton municipal wells should be tested for chemicals found in monitoring wells at the site.

3. Take steps to prevent methane from migrating into buildings where it could explode.

Need For Follow-Up Health Activities

According to federal law, public health assessments of "Superfund" sites should help agencies decide if more actions to address health-related concerns is appropriate. Such action might include carrying out more detailed studies on cases of disease near a site or arranging for educational programs about exposure to toxic chemicals at a site (33). WDHSS and ATSDR's Health Activities Recommendation Panel reviewed the information about the Stoughton City Landfill to determine the need for follow-up activities. Since human exposure to contaminants is not likely to have occurred at this site, no additional health activities are needed at the site. WDHSS and ATSDR will determine the need for more health activities if high levels of contamination are released when the site is cleaned up or if new information shows that public exposure is greater than expected.

PUBLIC HEALTH ACTIONS

The Department of Health and Social Services, in cooperation with ATSDR, will conduct the following activities to respond to the recommendations of this public health assessment:

1. Provide continuing public health education as new information related to public health issues becomes available;

2. Review and comment on public health aspects of sampling and subsequent activities to be done pursuant to the Record of Decision, after the lead agency overseeing the investigation provides copies of the plans to the Department of Health and Social Services;

3. Advise and consult with the Wisconsin Department of Natural Resources and the USEPA on public health concerns that may arise as new information about the site becomes available.

PREPARER OF REPORT

Jay Goldring, Ph.D.
Research Scientist-Toxicologist
Division of Health
Wisconsin Department of Health and Social Services

ATSDR REGIONAL REPRESENTATIVES

Louise Fabinski, Region V
Regional Services, Office of the Assistant Administrator

Denise Jordan-Izaguirre, Region V
Regional Services, Office of the Assistant Administrator

ATSDR TECHNICAL PROJECT OFFICER

William Greim
State Programs Section, Remedial Programs Branch
Division of Health Assessment and Consultation

CERTIFICATION

This Stoughton City Landfill Public Health Assessment was prepared by the Wisconsin Department of Health and Social Services 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.

William Greim
Technical Project Officer
Remedial Programs Branch
Division of Health Assessment and Consultation (DHAC)
ATSDR

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

Robert C. Williams, P.E., DEE
Director, DHAC, ATSDR

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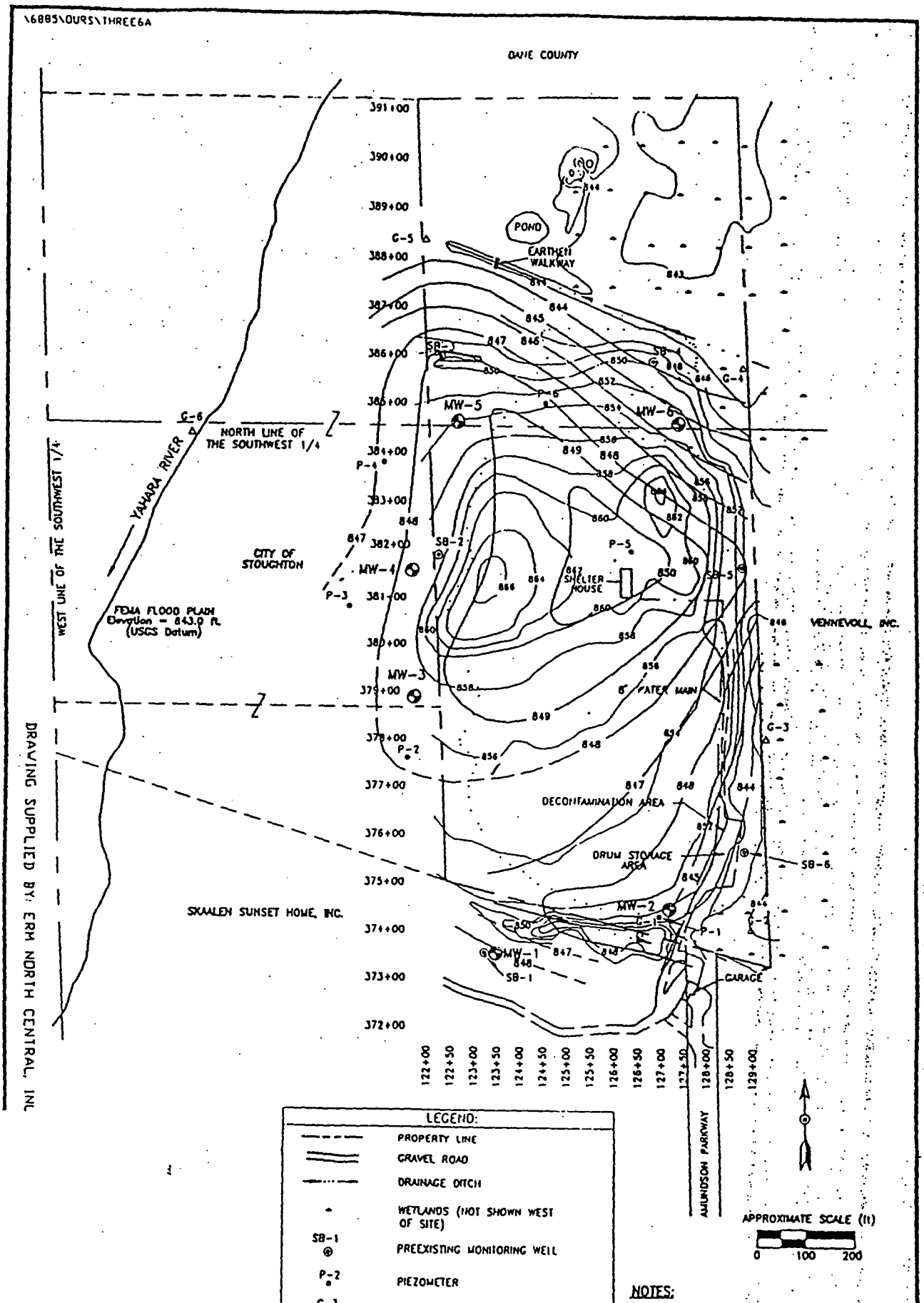
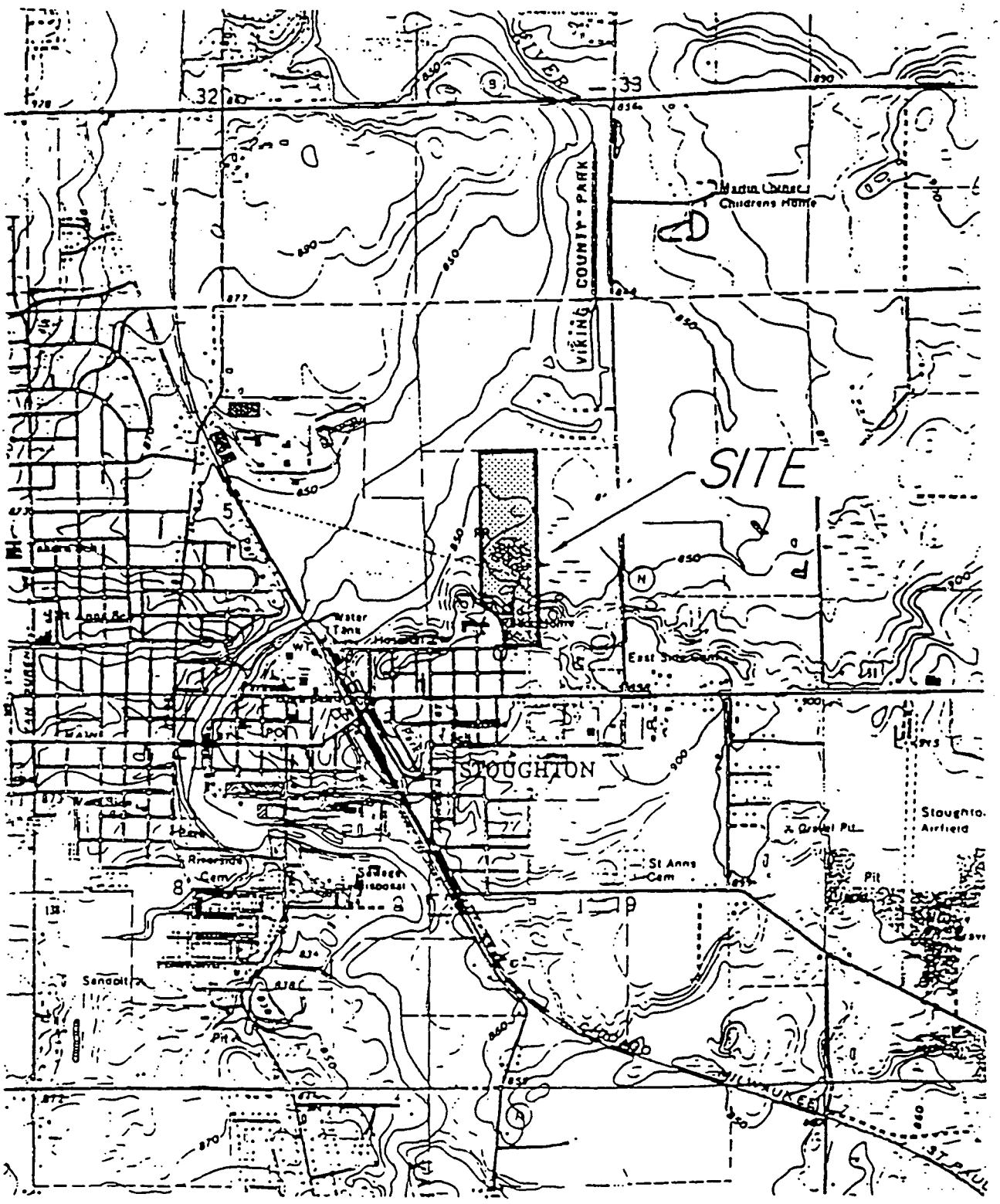
LIST OF APPENDICES



Appendix A.
Ground Water Flow
and Well Locations



Appendix B.

Site Location

ENSR™
ENSR CONSULTING AND ENGINEERING

FIGURE 1-1
SITE LOCATION MAP
STOUGHTON CITY LANDFILL
STOUGHTON, WISCONSIN

DRAWN: JDG	DATE: 3/6/90	PROJECT NUMBER: 6885-002
APPV'D:	REVISED:	DRAWING NUMBER: