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OPEN-FILE REPORT 80-UR - No. 10: HURON CITY

STATEWIDE LANDFILL STUDY:
HURON CITY LANDFILL SITE CHARACTERISTICS

by

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INTRODUCTION

Purpose and Scope

The purpose of this report is to summarize the geologic data, hydrologic data, and other site characteristics of the Huron City landfill. This information was compiled as a part of the Statewide Landfill Study.

In 1984, the state of South Dakota had 38 permitted solid waste landfills, both private and public, that accepted waste other than ordinary household waste. A study was undertaken in an effort to evaluate selected landfills in South Dakota and identify those that may be best suited for the disposal of these special wastes.

This study was conducted by the South Dakota Geological Survey and the Office of Air Quality and Solid Waste of the Department of Water and Natural Resources, now known as the Department of Environment and Natural Resources. The Office of Air Quality and Solid Waste contracted with the South Dakota Geological Survey for certain geological services. The South Dakota Geological Survey contribution to this study was three-fold. First, available geologic and hydrologic data from landfills in South Dakota were reviewed and evaluated. Second, monitoring well systems were designed and installed at four landfills which were selected by the Office of Air Quality and Solid Waste. Finally, the geology was evaluated in more detail at these four landfills.

Selection of Sites

Existing information concerning 38 permitted and 2 proposed landfill sites was reviewed by the Office of Air Quality and Solid Waste in order to prioritize the sites. The Office of Air Quality and Solid Waste used this preliminary screening to reduce the number of potential sites from 40 to 26 (table 1 and fig. 1).

TABLE 1. List of sites considered for further evaluation

1. Belle Fourche City	14. Miedema City
2. Brookings City - Proposed	15. Milbank City
3. Brown County	16. Miller City
4. Brule County	17. Pierre City - Proposed
5. Byre (Private)	18. Pierre City - Old Site
6. Davison County	19. Ralph Dawson (Private)
7. De Smet City	20. Rapid City
8. Gregory County	21. Sioux Falls (Runge) City
9. Haarstad (Private)	22. Vermillion City
10. Huron City	23. Walworth County
11. John Clements (Private)	24. Watertown City
12. Kadoka City	25. Winner City
13. Marshall County	26. Yankton County

Subsequently, the South Dakota Geological Survey evaluated these 26 sites and prepared a draft report describing each site. No field checking was done. Topics such as topography, drainage, climate, soils, geology, hydrology, water quality, adjacent land use, hazardous waste records, and operational practices were addressed. These reports included copies of available maps, lithologic logs, and water quality analyses. Draft copies of these unpublished reports are on file at the Department of Environment and Natural Resources in Pierre and the South Dakota Geological Survey in Vermillion. The individual report on the Huron City landfill is the basis for this report.

After the initial assessment of the 26 sites, the Office of Air Quality and Solid Waste established criteria for further prioritizing the sites. Four sites were selected for the installation of monitoring wells. The South Dakota Geological Survey conducted detailed investigations at the Brown County, Watertown City, Yankton County, and Rapid City landfills (fig. 1). A draft copy of the unpublished summary report is on file at the Department of Environment and Natural Resources in Pierre and the South Dakota Geological Survey in Vermillion. The following information was available regarding the Huron City landfill in 1986.

HURON CITY LANDFILL

Location

The Huron City landfill is located 4½ miles west of Huron in Beadle County. Its legal location is NE¼ sec. 13, T. 110 N., R. 63 W. (fig. 2).

Topography, Drainage, and Climate

The information on topography and drainage was taken from the Wolsey SE Quadrangle (United States Geological Survey, 1973). In actuality, the present landfill surface may be significantly different because of activities at the landfill.

The topography at the Huron City landfill is nearly flat. The elevation ranges from 1,305 to 1,313 feet for a maximum relief of 8 feet at the site (fig. 2).

There are no developed drainages within the site. In the southwest corner of the landfill is a small manmade pond. Nearby there are several small intermittent ponds. The May 12, 1980, permit required that the small intermittent wetland located in the site's extreme northeast corner not be used for disposal. No evidence of this wetland is present on figure 2.

The average annual temperature in Beadle County is 45 degrees Fahrenheit. Precipitation averages 21 inches per year. The average annual class A pan evaporation is 49 inches. Climatological data are from Spuhler and others (1971).

Geology

Surficial deposits at the Huron City landfill consist of an end moraine made of till (fig. 3). The till is about 80 feet thick and it overlies the Pierre Shale (Hedges, 1968, pl. 1).

Ten reliable test hole logs were available within 1 mile of the landfill (fig. 4, app. A). Two of these test holes were drilled in the northwestern corner of the landfill site. Only soil and clay (till)

were observed to a depth of 48 feet. It should be noted, however, that plate 1 of Howells and Stephens (1968) shows that the northeastern quarter of sec. 13, T. 110 N., R. 63 W. (the landfill site) contains the Warren aquifer, and 10 to 25 feet of water saturated aquifer material is present in surficial (glacial) deposits at this location. However, test holes at the site are not deep enough to confirm the presence of the aquifer at this location.

Eight of the 10 test holes were drilled within 1 mile of the site boundaries (fig. 4, app. A). At test hole BDS-39-78, only clay till was encountered to a depth of 48 feet with the exception of one sand lens from 8 to 9 feet below land surface. At test hole BDS-40-78, 2 feet of soil were encountered overlying 46 feet of clay (till). East of the landfill in section 18, three test holes were drilled. At all three locations, 1 to 2 feet of soil was found overlying clay (till) to a depth of 40 to 48 feet. Northeast of the landfill in the northwest corner of section 7, two test hole logs were available. At the Huron City Well-1934, clay was encountered to a depth of 51 feet. A 4-foot thick sand layer was present from 51 to 55 feet followed by clay to 85 feet. From 85 to 103 feet, sand was encountered. Near this same legal location, a second hole was drilled 42 years later. It contained 3 feet of soil overlying clay to a depth to 53 feet. Sand was encountered from 53 to 69 feet (Warren aquifer). The hole was completed in clay at a depth of 90 feet. A test hole was drilled in the northeast corner of section 19. In general, 10 feet of sand was found overlying 42 feet of clay. Beneath the clay was 39 feet of sand or gravel (Warren aquifer). The hole was completed in clay at a depth of 100 feet.

Only data meeting the South Dakota Geological Survey criteria were used in this study. Lithologic logs were utilized if the legal locations were known to four quarter sections (2.5 acres) and if they were located within the landfill site or within 1 mile of the site boundaries. Also, the source of a log must have been known or the log was not utilized; for example, all logs of test holes drilled by the South Dakota Geological Survey identify the drilling company as "SDGS."

Hydrology

According to records from the Office of Air Quality and Solid Waste, the material at the base of the landfill consists primarily of clay (presumably till). The permeability of till is difficult to characterize due to the highly variable nature of its physical composition and texture (i.e., grain size) in both the vertical and horizontal directions. Fractures, if any, in the upper weathered portion of the till can also contribute to significant spatial changes in permeability. Let it suffice to say that till, as a unit, generally has much lower permeability than sand. No site specific permeability data are available.

Four monitoring wells are located within 1 mile of the site (fig. 4, app. A). Water level data are not available in the Office of Air Quality and Solid Waste records with the exception of one measurement from test hole BDS-10-77. The depth to water was 36 feet 1 day after drilling. Without the presence of adequately constructed monitoring wells (a minimum of three) in the proper locations and at the proper depths, the lateral hydraulic gradient and direction of potential ground water movement cannot be estimated for the landfill area. The location and depth to the nearest ground water supply (Warren aquifer) are uncertain.

Water Quality

Three wells within 1 mile of the site have reliable water quality data available (fig. 5, app. B). One 28-foot deep observation well located in the northwest corner of the landfill is in till. Four

samples were collected between October 1979 and October 1981. Conductivity values for all four samples ranged between 1,144 and 1,500 micromhos per centimeter. A 37-foot deep well located in till in the northwest corner of section 18 also had four water samples collected and analyzed between October 1979 and October 1981. Conductivity values were high and ranged between 8,120 and 11,400 micromhos per centimeter. The third well is 95 feet deep and is completed in aquifer material in the northeast corner of section 19. A sample collected on October 21, 1976, contained 1,464 milligrams per liter total dissolved solids.

Only data meeting the South Dakota Geological Survey criteria were used in this study. Water quality analyses were utilized if the legal locations were known to four quarter sections (2.5 acres) and if they were located within the landfill or within 1 mile of the site boundaries. Only wells with recorded depths less than 100 feet and with corresponding lithologic logs have been considered. This limit of 100 feet was arbitrarily chosen. It was assumed that any major changes in water quality would probably be detected within this 100-foot depth limit because of the relatively low permeability of the underlying till. Also, the analytical laboratory that produced the water quality analysis must have been known or the analysis was not utilized.

Adjacent Land Features

Information in this section was taken from the Wolsey SE Quadrangle (United States Geological Survey, 1973) and the General Highway Map - Beadle County (South Dakota Department of Transportation, 1978).

- * One pond is located in the southwest corner of the site. Many other ponds are located within three-quarters of a mile of the site.

Operational and Siting Criteria – Summary from the Office of Air Quality and Solid Waste Records

The most common responses found on the Office of Air Quality and Solid Waste site inspection reports prior to 1986 are given in this section. Copies of the microfiche data are available from the Department of Environment and Natural Resources in Pierre.

1. Site: Huron City
2. Population served: 21,000
3. Method of disposal: Cut and fill (Trench-Balefill)

The balefill system is a method of reducing the volume of solid waste that is generated. It works on the same principle as a kitchen garbage compactor.

4. Estimated amount of waste received per unit time: 7,772 tons/year
5. Access to site:

- * Fenced: Yes No Lockable gate: Yes No
- * Litter fences present: Yes No
- * All weather access road to site: Yes No

6. List industry present: Swift Independent Packing Co., Telelect, Inc., Innovative Industries, Huron Dressed Beef, Dakota Beef, Magness Marketing, Inc., Boles Continental Commission Co, Sodak Circuit Co., Raven Industries, Shall Better, Inc., Cenex Service Center, Dakota Air Spray, Hofer's Ag Air, Mick's Milling, Inc.

7. Land Use:

- * Preoperational land use: Agriculture
- * Proposed post-operational land use: Agriculture
- * Current land use within a quarter of a mile radial area: Agriculture

SUMMARY

- * Intermittent ponds and wetlands are near this site.
- * The geology at this site consists of till overlying Pierre Shale at a depth of about 80 feet. The Warren aquifer may be present beneath the area.
- * Ten reliable test hole logs were available within 1 mile of this site.
- * Four monitoring wells were present near this site.
- * One water level measurement had been taken near this site.
- * Nine reliable water quality analyses were available from three monitoring wells located near this site.

REFERENCES CITED

- Hedges, L.S., 1968, Geology and water resources of Beadle County, South Dakota; Part I: Geology: South Dakota Geological Survey Bulletin 18, 66 p.
- Howells, L.W., and Stephens, J.C., 1968, Geology and water resources of Beadle County, South Dakota, Part II: Water resources: South Dakota Geological Survey Bulletin 18, 65 p.
- South Dakota Department of Transportation, 1978, General Highway Map Beadle County, South Dakota: South Dakota Department of Transportation in cooperation with the United States Department of Transportation, (revisions as of January 15, 1979).
- Spuhler, W., Lytle, W.F., and Moe, D., 1971, Climate of South Dakota: Brookings, South Dakota, South Dakota State University Agricultural Experiment Station Bulletin 582, 30 p.
- United States Geological Survey, 1973, Wolsey SE quadrangle, South Dakota: 7.5 minute series (topographic), scale 1:24,000.

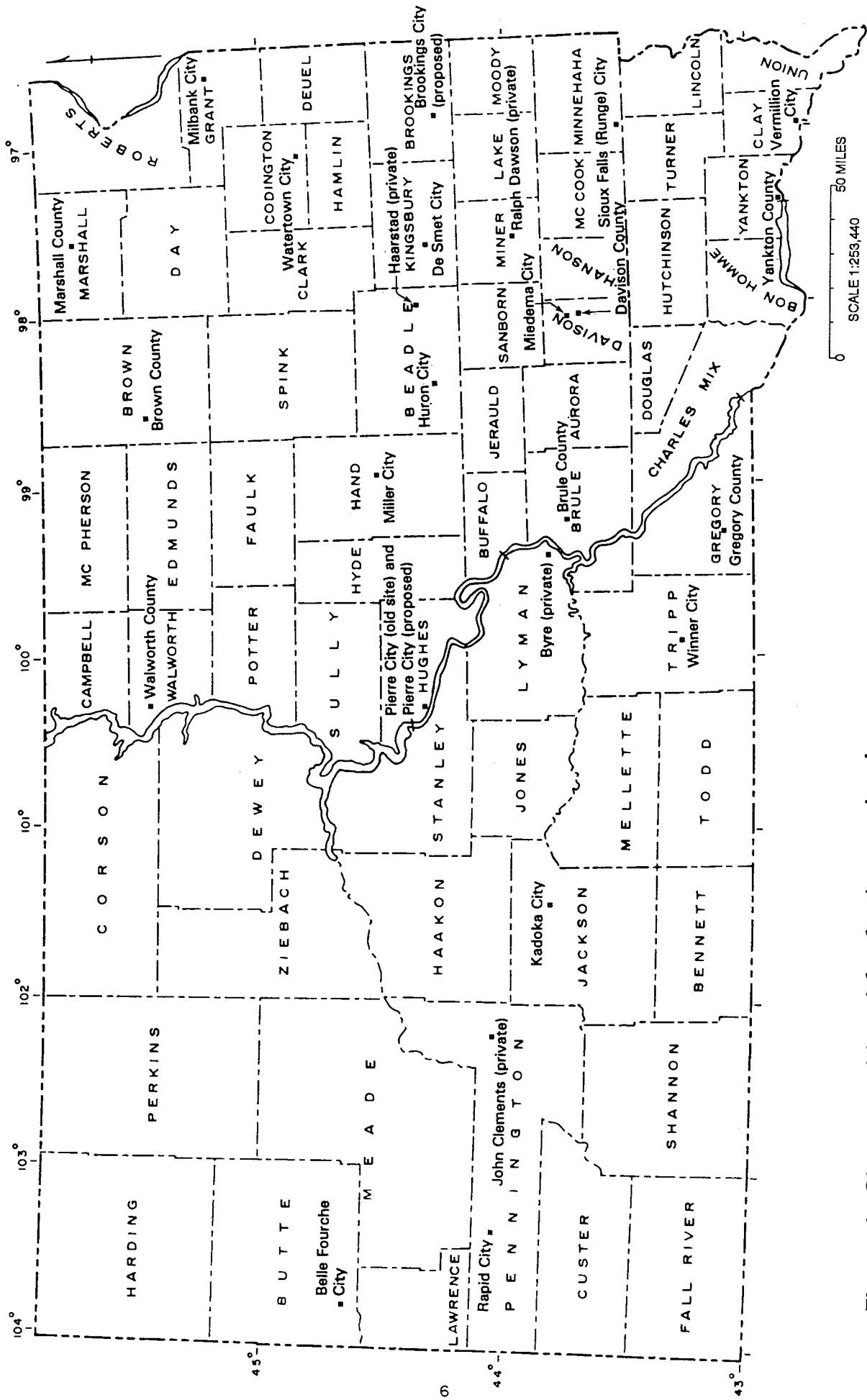
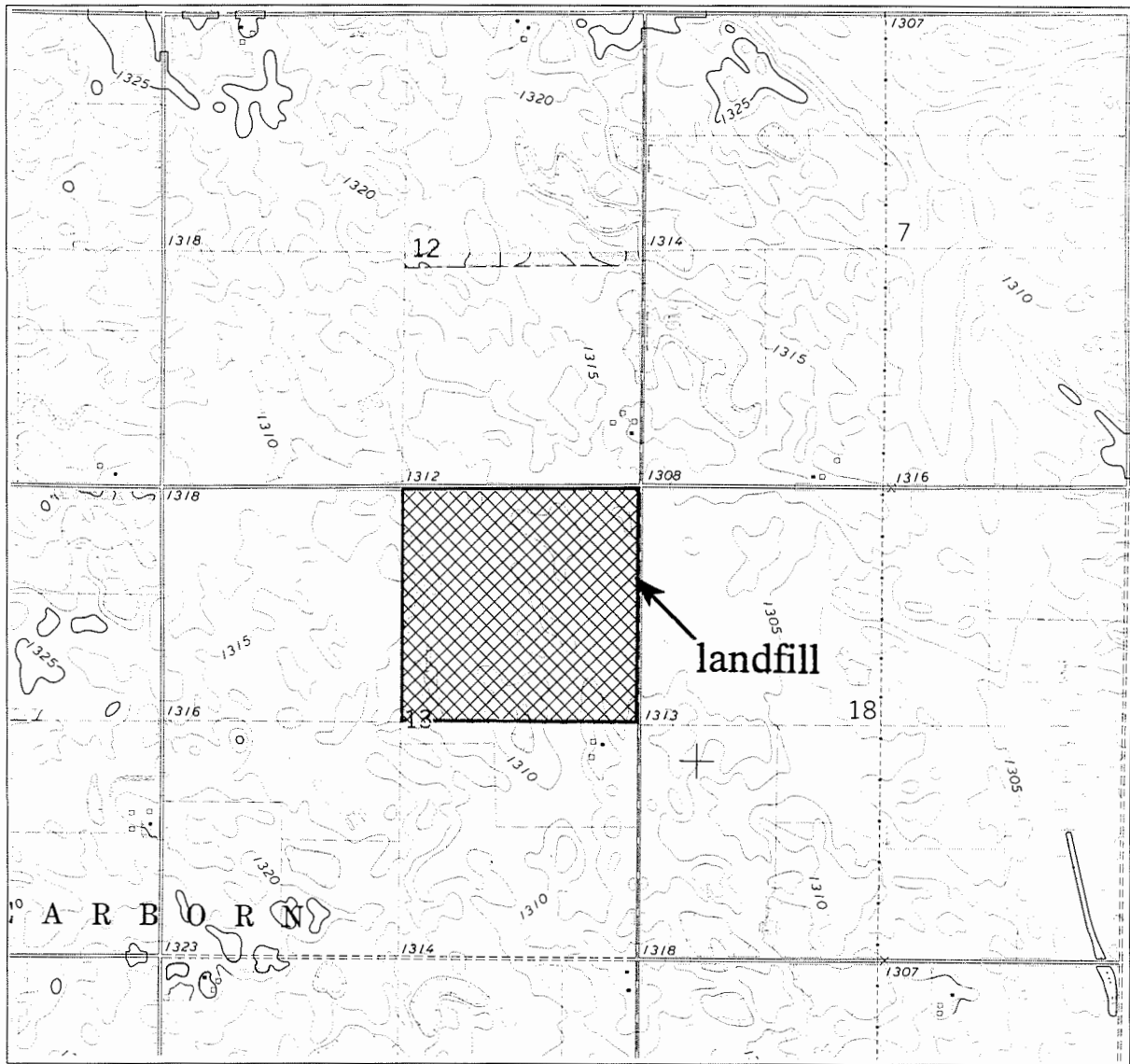


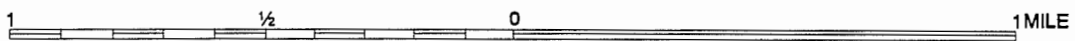
Figure 1. Sites considered for further evaluation.

R. 63 W. | R. 62 W.

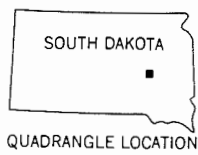


T. 110 N.

SCALE 1:24000



CONTOUR INTERVAL 5 FEET, WOLSEY SE QUADRANGLE



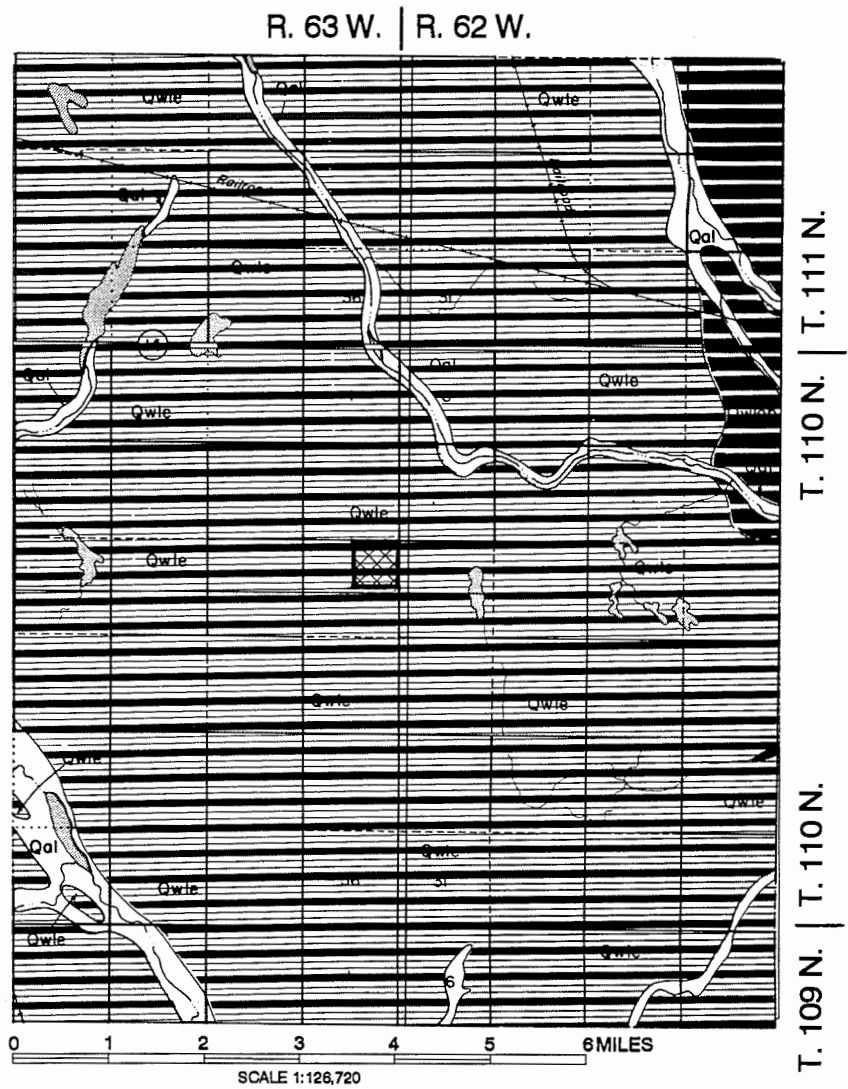
QUADRANGLE LOCATION

Landfill location: NE $\frac{1}{4}$ sec. 13,
T. 110 N., R. 63 W.
Beadle County

Adapted from United States
Geological Survey (1973)



Figure 2. Location of the Huron City landfill.




Qal..... Alluvium

Qwlo..... Outwash deposits

Qwle..... End moraine

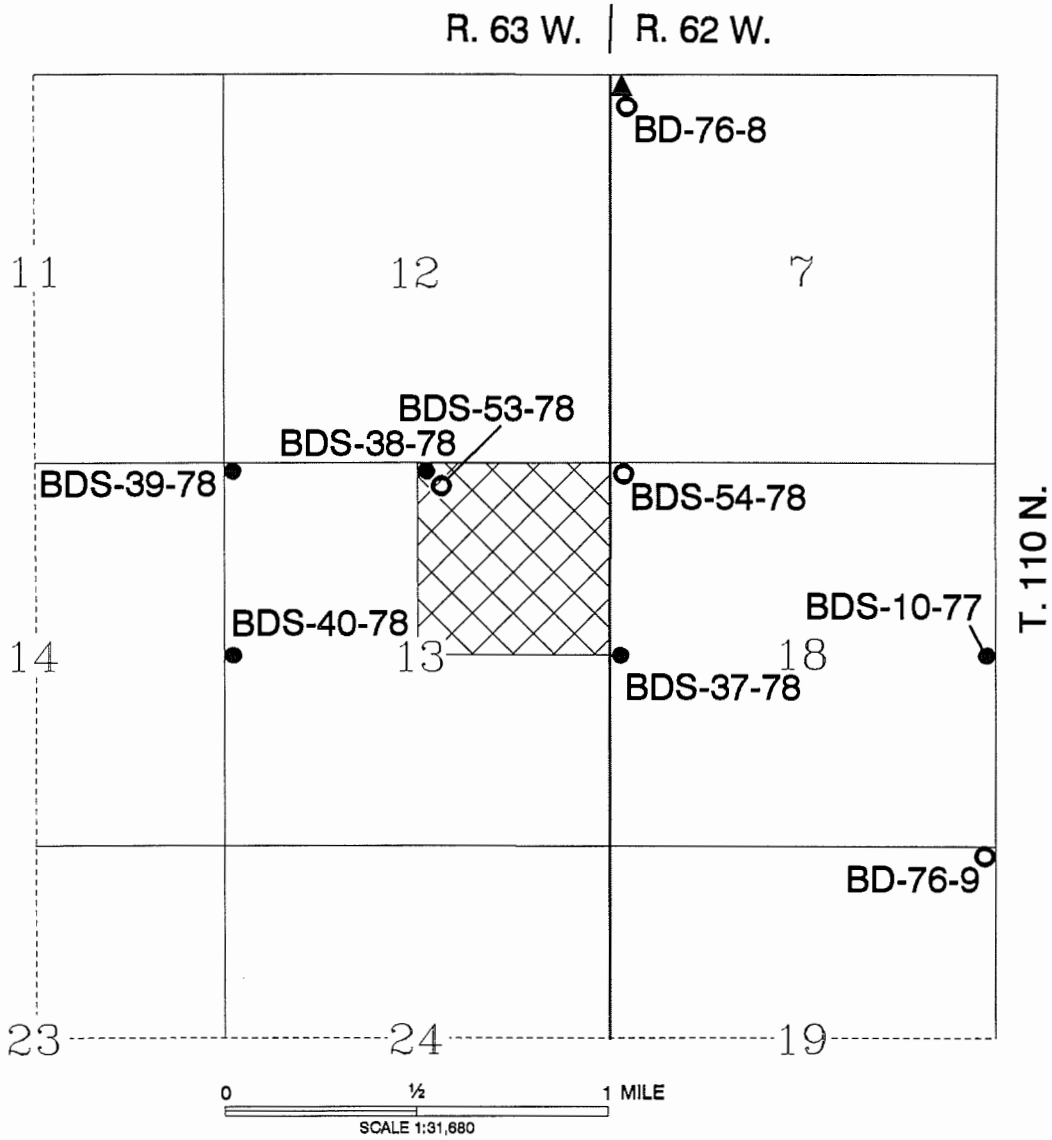
Qwlop..... Outwash plain deposits

 Intermittent lake

 Landfill

Adapted from Hedges (1968, pl. 1)

Figure 3. Geology near the Huron City landfill.



Landfill

Landfill location: NE $\frac{1}{4}$ sec. 13,
T. 110 N., R. 63 W.
Beadle County

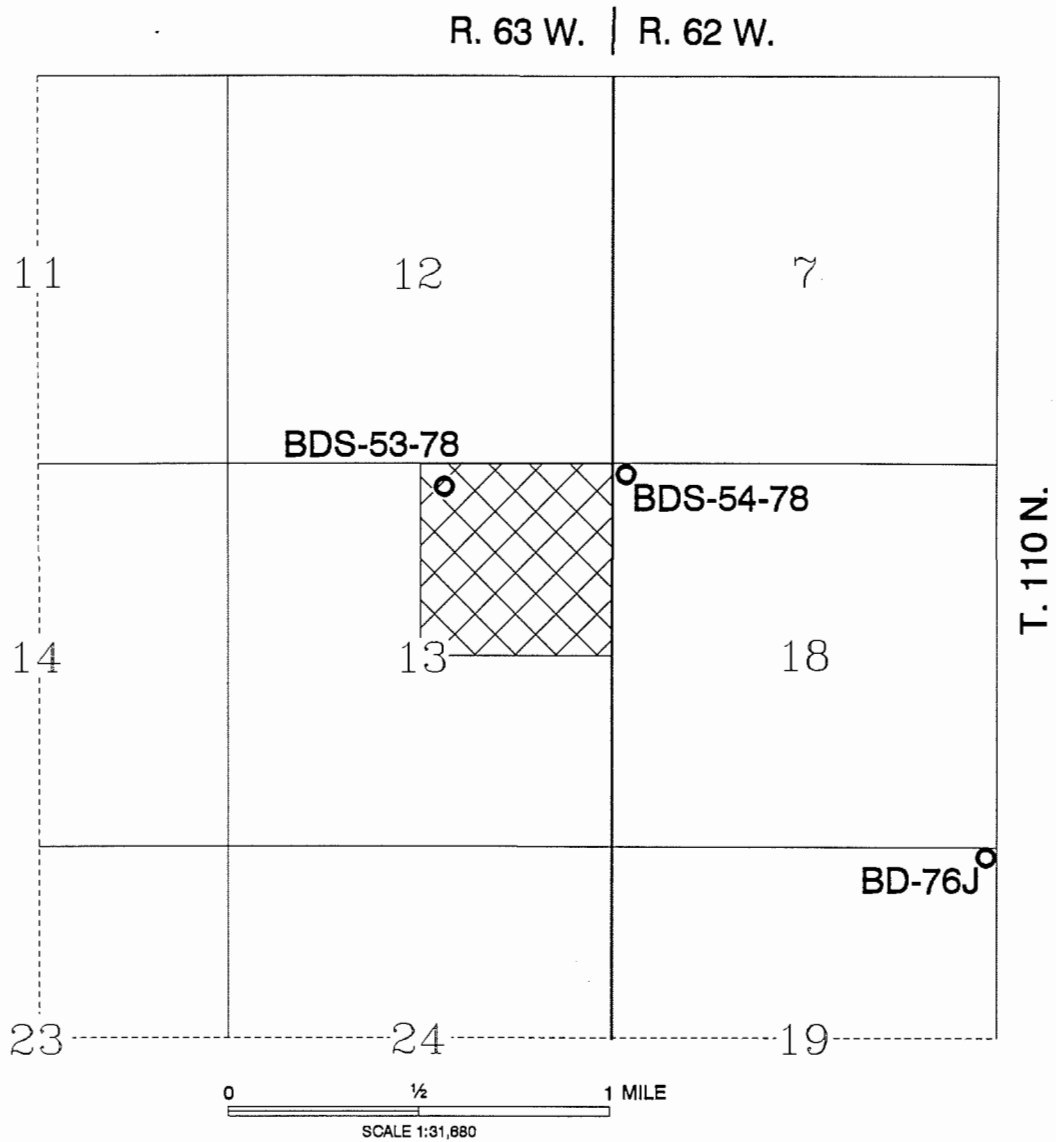
BDS-39-78 ● Test hole. Letters and numbers are the test hole identifier.

BD-76-9 ○ Monitoring well. Letters and numbers are the monitoring well identifier.

▲ Huron City well-1934.



Figure 4. Locations of test holes and monitoring wells drilled within 1 mile of the Huron City landfill.



Landfill

Landfill location: NE $\frac{1}{4}$ sec. 13,
T. 110 N., R. 63 W.
Beadle County




BD-76J  Monitoring well. Letters and numbers are the monitoring well identifier.

Figure 5. Locations of water quality samples collected within 1 mile of the Huron City landfill.

APPENDIX A

Legal locations of Huron City landfill area logs of test holes and monitoring wells

Listed below are the legal locations of the test holes and wells cited in this report. Please contact the South Dakota Geological Survey if a copy of a lithologic log is needed. If a legal location is duplicated, that means more than one test hole or well has been drilled or installed at that location.

NW	NW	NW	NW	sec. 07,	T. 110 N.,	R. 62 W.
NW	NW	NW	NW	sec. 07,	T. 110 N.,	R. 62 W.
SE	SE	SE	NE	sec. 18,	T. 110 N.,	R. 62 W.
NW	NW	NW	NW	sec. 18,	T. 110 N.,	R. 62 W.
SW	SW	SW	NW	sec. 18,	T. 110 N.,	R. 62 W.
NE	NE	NE	NE	sec. 19,	T. 110 N.,	R. 62 W.
NW	NW	NW	NE	sec. 13,	T. 110 N.,	R. 63 W.
NW	NW	NW	NE	sec. 13,	T. 110 N.,	R. 63 W.
NW	NW	NW	NW	sec. 13,	T. 110 N.,	R. 63 W.
SW	SW	SW	NW	sec. 13,	T. 110 N.,	R. 63 W.

APPENDIX B

Legal locations of Huron City landfill area water quality analyses

Listed below are the legal locations of the water quality analyses cited in this report. Please contact the South Dakota Geological Survey if a copy of an analysis is needed.

NW NW NW NW sec. 18, T. 110 N., R. 62 W.
NE NE NE NE sec. 19, T. 110 N., R. 62 W.
NW NW NW NE sec. 13, T. 110 N., R. 63 W.