

**STATE OF SOUTH DAKOTA
William J. Janklow, Governor**

**DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
Nettie H. Myers, Secretary**

**DIVISION OF FINANCIAL AND TECHNICAL ASSISTANCE
Kelly A. Wheeler, Director**

**GEOLOGICAL SURVEY
C.M. Christensen, State Geologist**

OPEN-FILE REPORT 80-UR – No. 6: DAVISON COUNTY

**STATEWIDE LANDFILL STUDY:
DAVISON COUNTY LANDFILL SITE CHARACTERISTICS**

by

**Sarah A. Chadima
Carolyn V. DeMartino
Keith A. Swenson**

**Science Center
University of South Dakota
Vermillion, South Dakota**

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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 Davison County 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 Davison County 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 Davison County landfill in 1986.

DAVISON COUNTY LANDFILL

Location

The Davison County landfill is located 1 mile east of Mitchell. Its legal location is NW $\frac{1}{4}$ SW $\frac{1}{4}$ sec. 25, T. 103 N., R. 60 W. (fig. 2).

Topography, Drainage, and Climate

The information on topography and drainage was taken from the Riverside Quadrangle (United States Geological Survey, 1957). In actuality, the present landfill surface may be significantly different because of activities at the landfill.

The topography at the Davison County landfill site consists primarily of flat land situated above a bluff (fig. 2). The northern end of the site slopes steeply to the north toward an intermittent stream drainage (Dry Run). The elevation ranges from 1,250 to 1,309 feet for a maximum relief of 59 feet at the site.

Local drainage is controlled by the James River and its tributaries. The intermittent stream (Dry Run), north of the landfill site, drains into Firesteel Creek, which then drains into the James River approximately three-fourths of a mile from the landfill (fig. 2).

The average annual temperature in Davison County is 46 degrees Fahrenheit. Precipitation averages 22 inches per year. The average annual class A pan evaporation is 51 inches. Climatological data are from Spuhler and others (1971).

Geology

Surficial deposits in the area of the Davison County landfill consist primarily of till (fig. 3). Alluvium from Dry Run is adjacent to the north end of the landfill site and it is directly connected with James River alluvium.

No lithologic log data are available within the site; however, 14 test hole logs were available within 1 mile of the site (fig. 4; app. A). In general, till was found overlying chalk or shale bedrock at depths ranging from approximately 51 to 82 feet. Surficial as well as buried sand or sand and gravel deposits were observed in all but four test holes.

Some available data were not included because they did not meet the South Dakota Geological Survey criteria 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.

No monitoring wells are present within 1 mile of the site. 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 nearest ground water supply (aquifer) is uncertain. The Ethan aquifer may be the closest aquifer to the landfill site. It lies near the surface approximately 1 to 2 miles southwest of the landfill site (Hansen, 1983).

Water Quality

Although water quality data were available, the legal locations and/or well depths were not known. 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 a water quality analysis must have been known or the analysis was not utilized.

Adjacent Land Use and Features

Information about adjacent land use and features was taken from the Riverside Quadrangle (United States Geological Survey, 1957) and the General Highway Map - Davison County (South Dakota Department of Transportation, 1976).

- * A pond is located half a mile north and another is located half a mile south of the site. A third pond, Firesteel Creek, and the James River are all within three-quarters of a mile of the site.
- * The city's sewage treatment facility is about half a mile west of the site in the Dry Run valley.
- * Interstate 90 runs through the southern half of the site. A service road off of South Dakota Highway 38, half a mile north of the site, provides access to the site.
- * Railroad tracks are located a quarter of a mile north of the site.
- * The Davison County landfill lies directly south of the Miedema City landfill 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: Davison County
2. Population served: 18,000
3. Method of disposal: Cut and fill (trench)
4. Estimated amount of waste received per unit time: 10,400 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: Trail King; Iowa Pork Inc.; Syncom
7. Land Use:
 - * Preoperational land use: Grazing
 - * Proposed post-operational land use: Grazing
 - * Current land use within a quarter of a mile radial area: Grazing, agriculture

SUMMARY

- * The geology of this site generally consists of till overlying chalk or shale bedrock. Surficial as well as buried sand or sand and gravel deposits were observed in 10 out of 14 test holes. Some available data were not included because they did not meet the South Dakota Geological Survey criteria used in this study.

- * This landfill is located near Dry Run and the James River as well as floodplain alluvial deposits.
- * No monitoring wells were present near this site.
- * No water level data were available near this site.
- * No reliable water quality data were available near this site.

REFERENCES CITED

- Hansen, D.S., 1983, Water resources of Hanson and Davison Counties, South Dakota: United States Geological Survey Water Resources Investigations Report 83-4108, 55 p.
- South Dakota Department of Transportation, 1976, General Highway Map – Davison County, South Dakota: South Dakota Department of Transportation in cooperation with the United States Department of Transportation (revisions as of May 31, 1977).
- 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, 1957, Riverside quadrangle, South Dakota: 7.5 minute series (topographic), scale 1:24,000, (photorevised in 1974).
- Wong, H.D., 1960, Geology of the Alexandria quadrangle: South Dakota Geological Survey Geologic Quadrangle Map, scale 1:62,500, text.

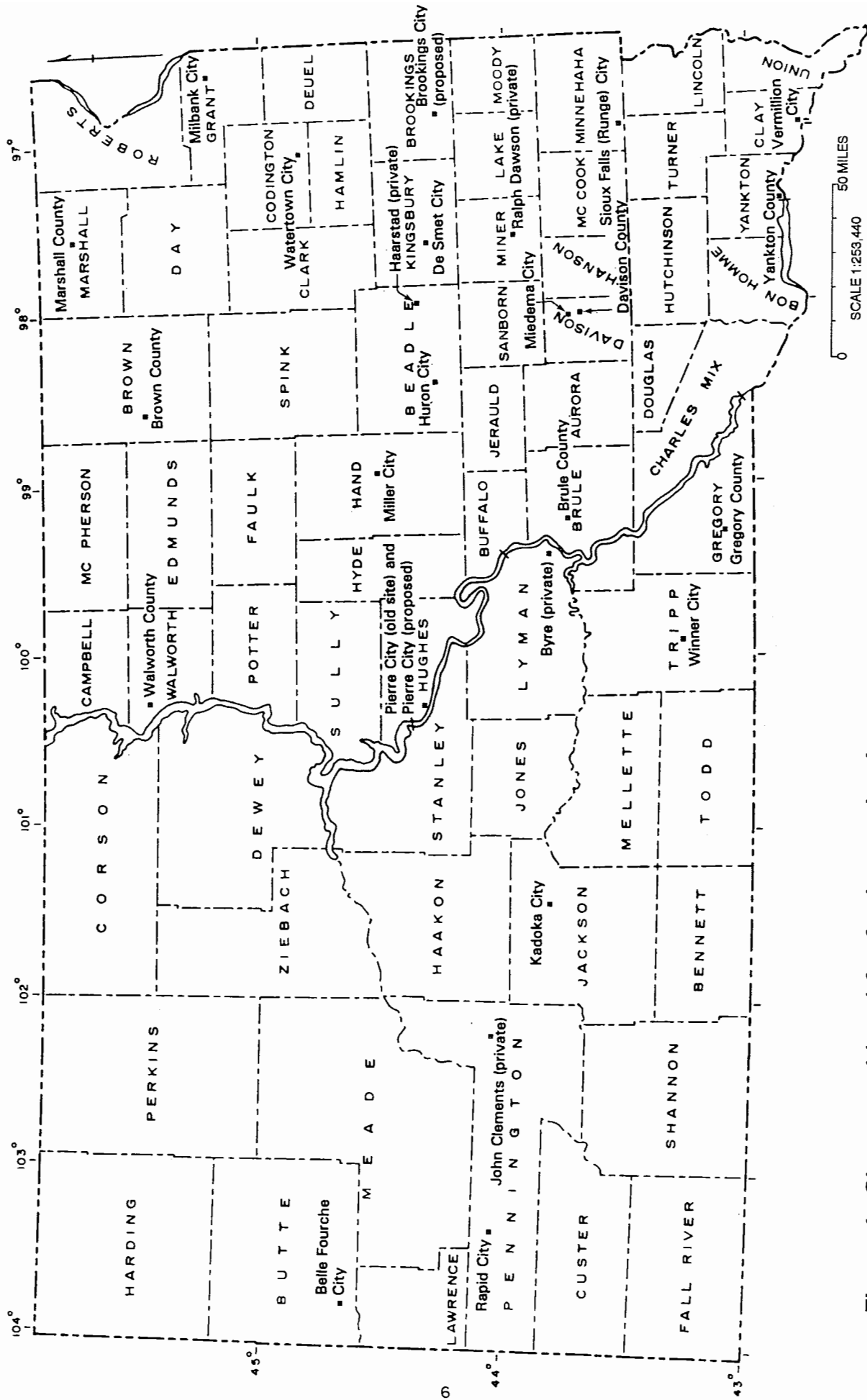
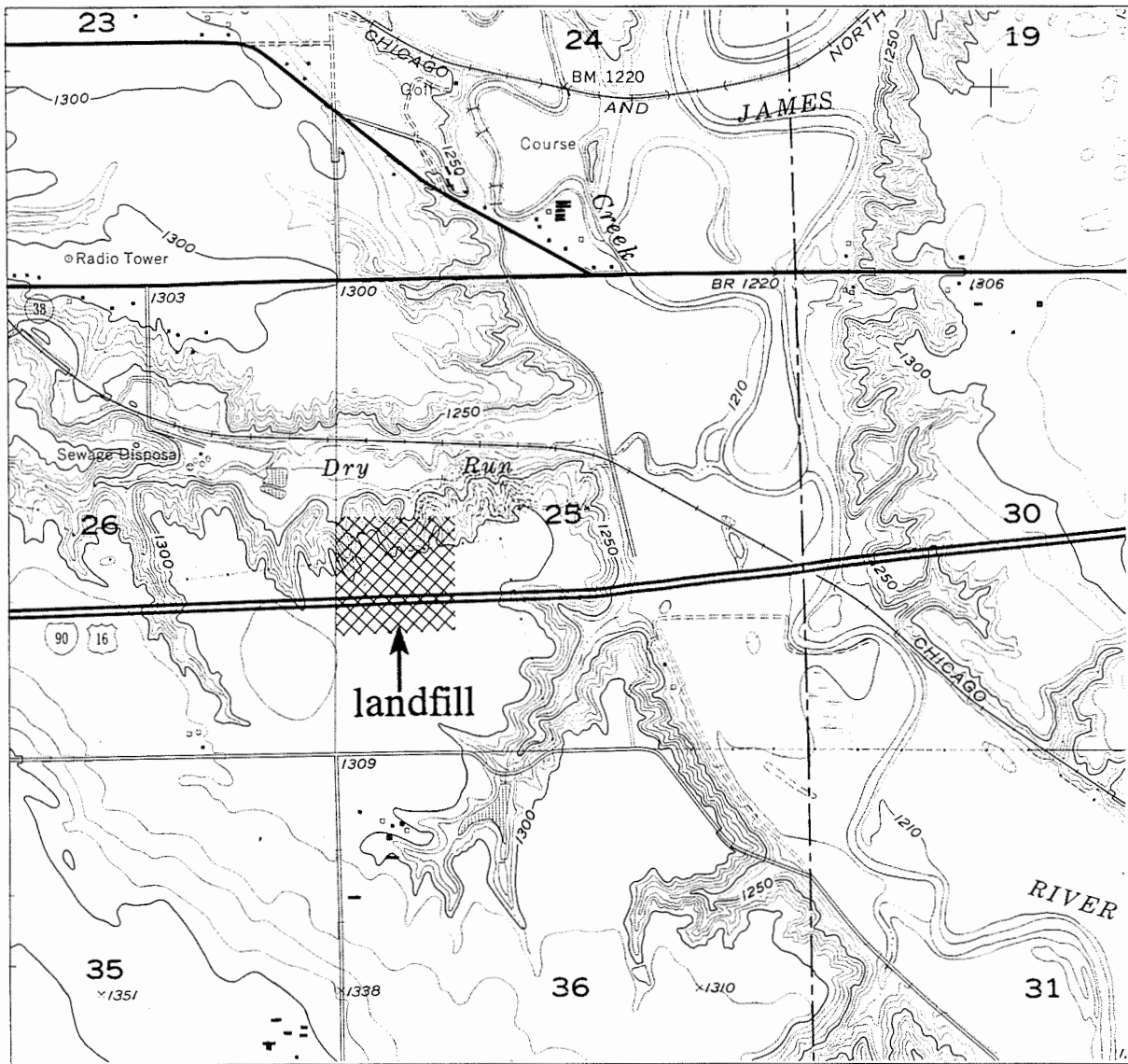


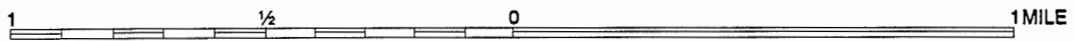
Figure 1. Sites considered for further evaluation.

R. 60 W. | R. 59 W.

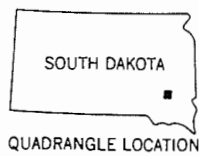


T. 103 N.

SCALE 1:24000



CONTOUR INTERVAL 10 FEET, RIVERSIDE QUADRANGLE



QUADRANGLE LOCATION

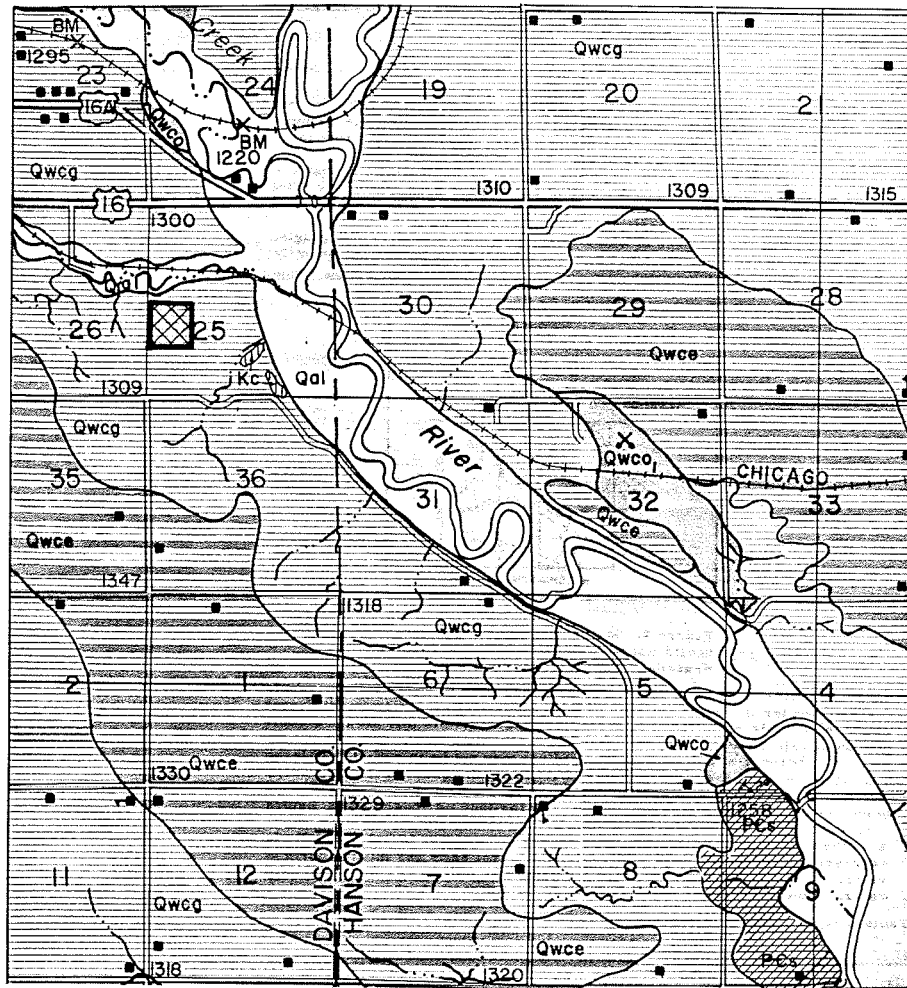
Landfill location: NW 1/4 SW 1/4 sec. 25,
T. 103 N., R. 60 W.
Davison County

Adapted from United States
Geological Survey (1957)




Figure 2. Location of the Davison County landfill.

R. 60 W. | R. 59 W.



T. 102 N. | T. 103 N.

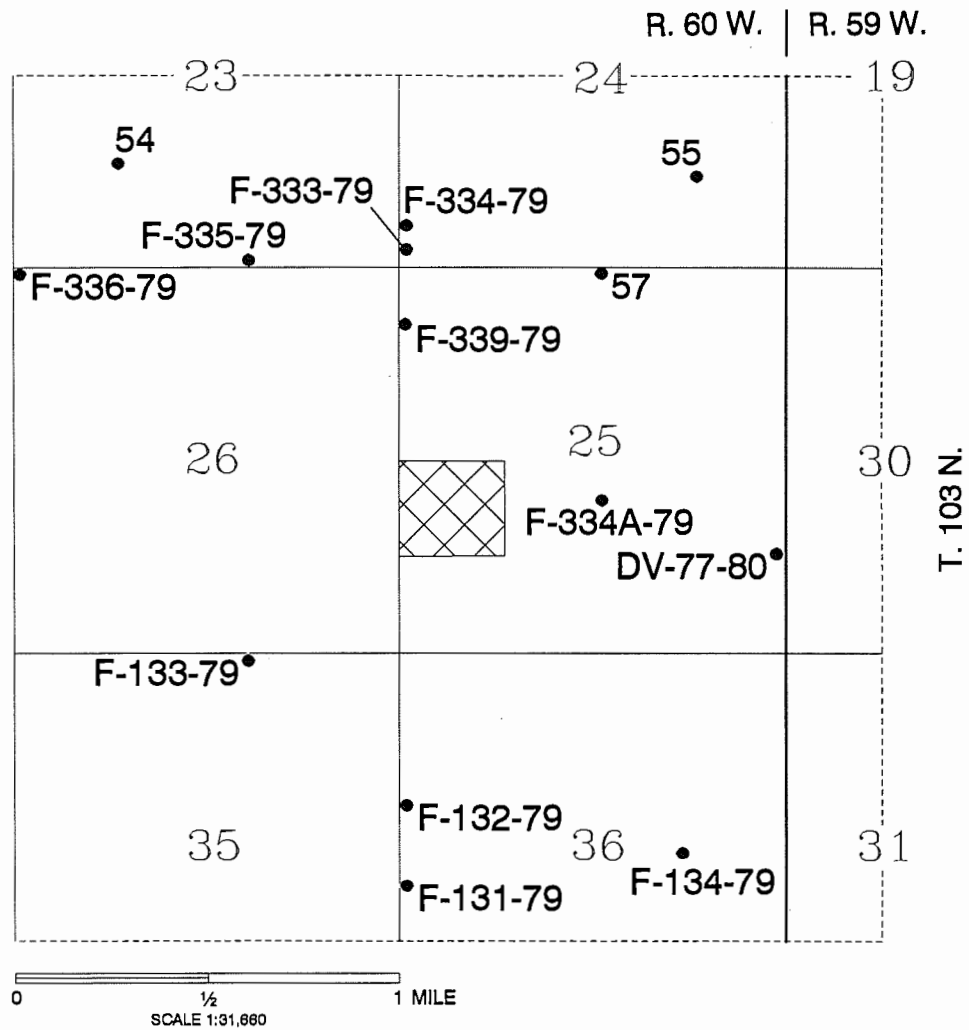
0 1/2 1 2 3 MILES
SCALE 1:62,500

- Qal..... Alluvium
- Qwco..... Cary outwash
- Qwce..... Cary end moraine
- Qwcg..... Cary ground moraine
- Pc..... Sioux Formation
- Kc..... Carlile Shale
-  Landfill



Adapted from Wong (1960)

Figure 3. Geology near the Davison County landfill.



Landfill

Landfill location: NW¼ SW¼ sec. 25,
T. 103 N., R. 60 W.
Davison County



F-334-79 Test hole. Letters and numbers are the test hole identifier.

Figure 4. Locations of test holes drilled within 1 mile of the Davison County landfill.

APPENDIX A

Legal locations of Davison County landfill area logs of test holes

Listed below are the legal locations of those test holes cited in this report. Please contact the South Dakota Geological Survey if a copy of a lithologic log is needed.

SE SE NW SW sec. 23, T. 103 N., R. 60 W.

SE SW SW SE sec. 23, T. 103 N., R. 60 W.

NW NW SW SW sec. 24, T. 103 N., R. 60 W.

NW SW SW SW sec. 24, T. 103 N., R. 60 W.

NW NW SE SE sec. 24, T. 103 N., R. 60 W.

NE NE NE NW sec. 25, T. 103 N., R. 60 W.

NW SW NW NW sec. 25, T. 103 N., R. 60 W.

NE SE NE SW sec. 25, T. 103 N., R. 60 W.

SE SE NE SE sec. 25, T. 103 N., R. 60 W.

NW NW NW NW sec. 26, T. 103 N., R. 60 W.

NE NW NW NE sec. 35, T. 103 N., R. 60 W.

SE SE SW NE sec. 36, T. 103 N., R. 60 W.

SW NW SW NW sec. 36, T. 103 N., R. 60 W.

NW NW NW SW sec. 36, T. 103 N., R. 60 W.