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OPEN-FILE REPORT 80-UR – No. 9: HAARSTAD (PRIVATE)

STATEWIDE LANDFILL STUDY:
HAARSTAD (PRIVATE) 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 Haarstad (Private) 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 Haarstad (Private) 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 Haarstad (Private) landfill in 1986.

HAARSTAD (PRIVATE) LANDFILL

Location

The Haarstad (Private) landfill is located 3 miles west and 2 miles north of Iroquois in Beadle County. Its legal location is SE¼ sec. 21, T. 111 N., R. 59 W. (fig. 2).

Topography, Drainage, and Climate

The information on topography and drainage was taken from the Yale Quadrangle (United States Geological Survey, 1971). In actuality, the present landfill surface may be significantly different because of activities at the landfill.

The topography at the Haarstad (Private) landfill is relatively flat (fig. 2). The elevation ranges from 1,359 to 1,373 feet for a maximum relief of 14 feet at the site.

An intermittent stream, which drains to the south, divides the landfill site in half. Along its path, within the landfill boundaries, are two constructed ponds. This intermittent stream terminates in an intermittent pond approximately 1½ miles southwest of the landfill. In the extreme northwest corner of the landfill, a second intermittent stream crosses the site and flows southwest 1½ miles into a pond. A small natural intermittent pond is located in the northeastern corner of the site.

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 in the area of the Haarstad (Private) landfill consist of end moraine (till) deposits (fig. 3). One test hole was drilled in the southeast corner of the landfill and six test hole logs are available within 1 mile of the site (fig. 4; app. A). In general, the lithologies at all locations consist of up to 4 feet of topsoil overlying 3 to 14 feet of clay (till). The test holes were completed in shale. Only test hole BDS-26-78 contained sand; it was observed from 16 to 18 feet below the surface.

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 log 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 the records from the Office of Air Quality and Solid Waste, the material at the base of the landfill consists primarily of clay. 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 ground water movement cannot be determined for the landfill area. The nearest ground water supply (aquifer) is unknown.

Water Quality

No water quality data were available within the landfill or within 1 mile of the landfill boundaries.

Adjacent Land Features

Information in this section was taken from the Yale Quadrangle (United States Geological Survey, 1971) and the General Highway Map Beadle County (South Dakota Department of Transportation, 1978).

- * The nearest surface waters are three ponds: two located in the landfill and one pond located on the western boundary. There are several other small ponds within 1 mile of the site. Middle Pearl Creek is located three-quarters of a mile east 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: Haarstad (Private)
2. Population served: 1,200
3. Method of disposal: Cut and fill (trench)

4. Estimated amount of waste received per unit time: 2,293 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: Huron Dressed Beef

7. Land Use:

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

SUMMARY

- * The topography is relative flat near this site.
- * An intermittent stream, several small ponds, and intermittent ponds are present near this site.
- * The geology at this site generally consists of up to 4 feet of topsoil overlying 3 to 14 feet of clay till. Shale is present beneath the till. The seven reliable test holes used to characterize this site were completed in shale. One test hole contained sand from 16 to 18 feet below the land surface.
- * No monitoring wells were present near this site.
- * No water level data were available near this site.
- * No water quality data were available 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.
- 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, 1971, Yale quadrangle, South Dakota: 7.5 minute series (topographic), scale 1:24,000.

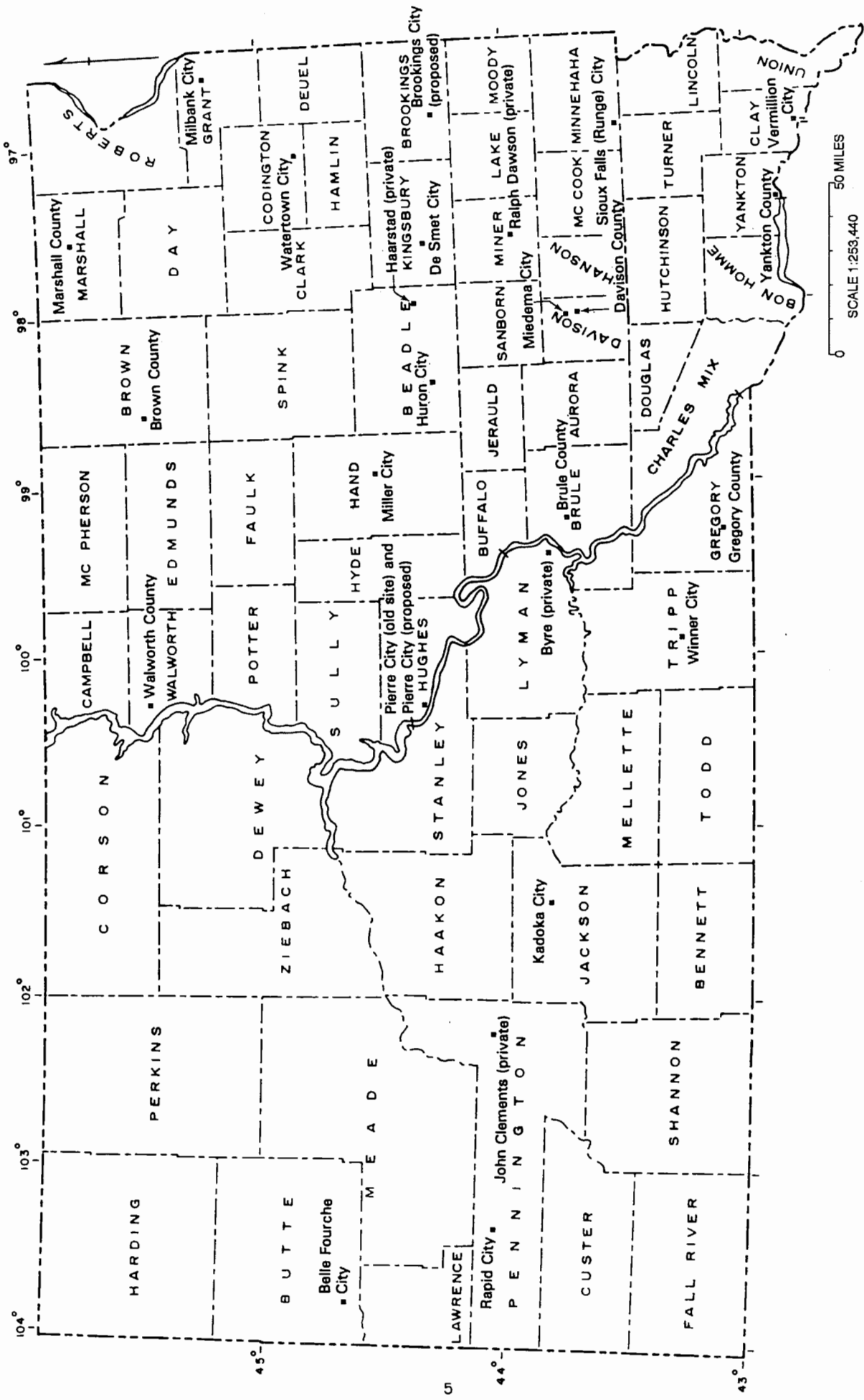
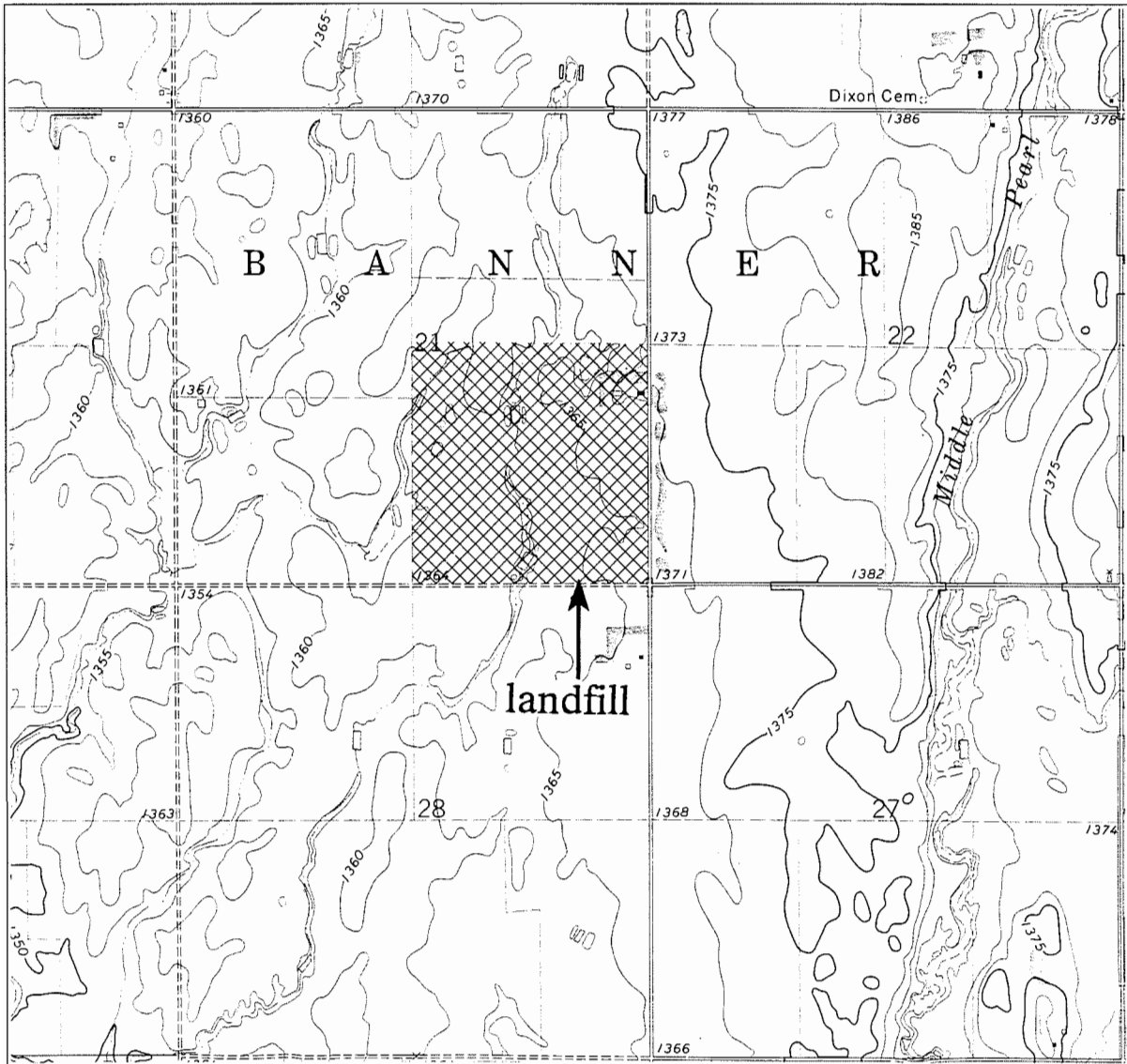


Figure 1. Sites considered for further evaluation.

R. 59 W.

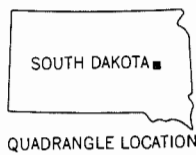


T. 111 N.

SCALE 1:24000



CONTOUR INTERVAL 5 FEET, YALE QUADRANGLE



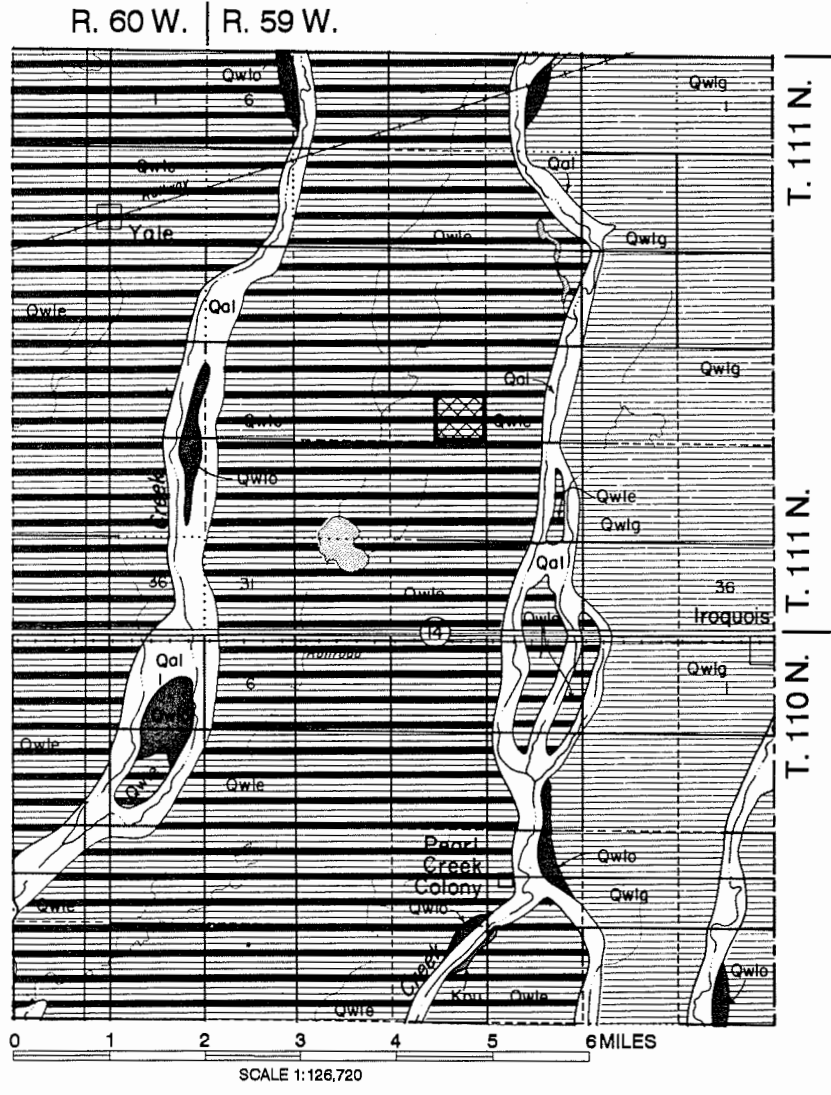
QUADRANGLE LOCATION



Landfill location: SE $\frac{1}{4}$ sec. 21,
T. 111 N., R. 59 W.
Beadle County



Adapted from United States
Geological Survey (1971)

Figure 2. Location of the Haarstad (Private) landfill.

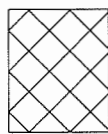
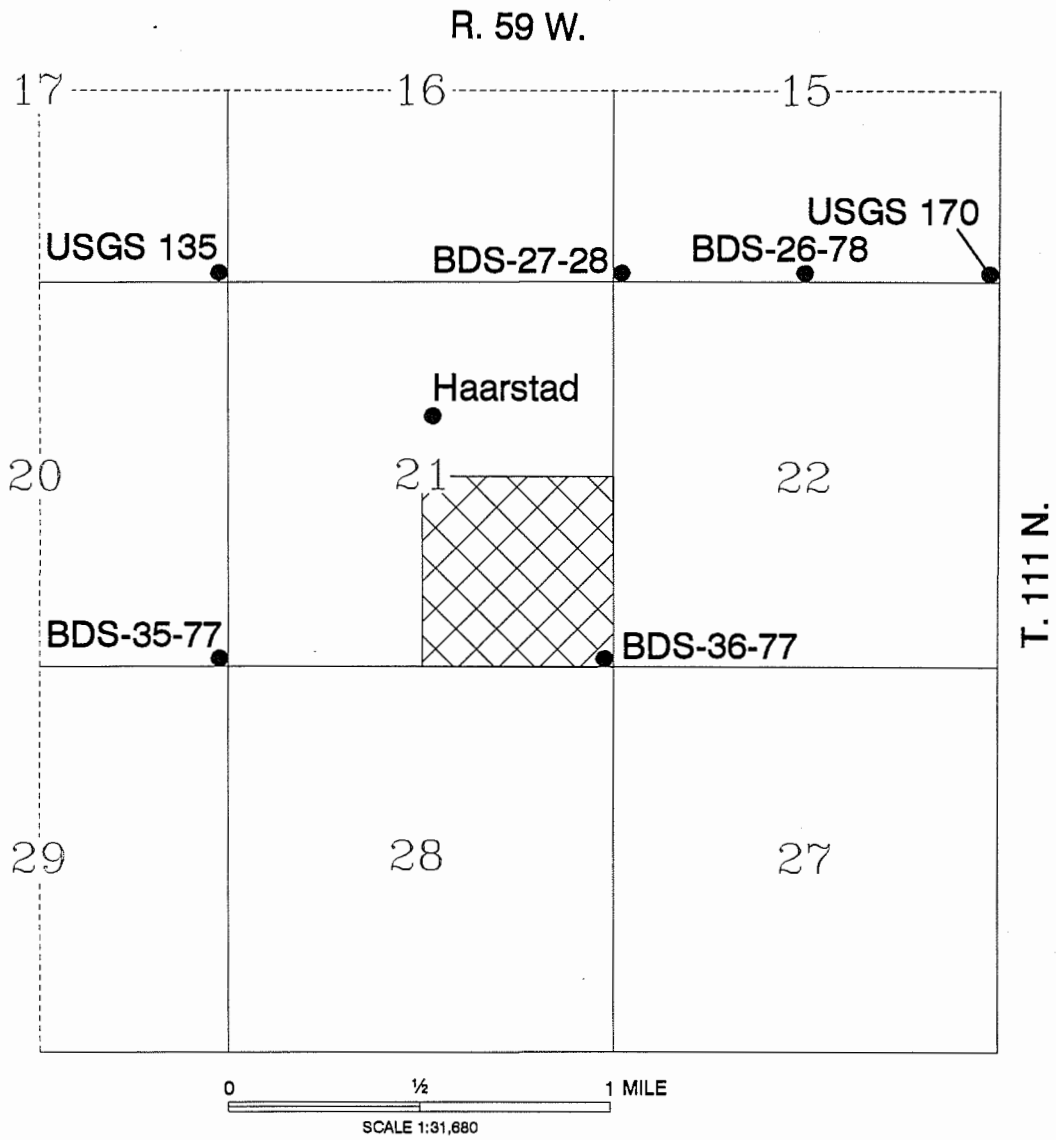


- Qal..... Alluvium
- Qwlo..... Outwash deposits
- Qwlg..... Ground moraine
- Qwle..... End moraine
- Kpu..... Pierre Shale undifferentiated
-  Intermittent lake
-  Landfill



Adapted from Hedges (1968, pl. 1)

Figure 3. Geology near the Haarstad (Private) landfill.



Landfill

Landfill location: SE $\frac{1}{4}$ sec. 21,
T. 111 N., R. 59 W.
Beadle County



BDS-35-77 • Test hole. Letters and numbers are the test hole identifier.

Figure 4. Locations of test holes drilled within 1 mile of the Haarstad (Private) landfill.

APPENDIX A

Legal locations of Haarstad (Private) 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.

SW SW SW SW sec. 15, T. 111 N., R. 59 W.
SE SE SE SW sec. 15, T. 111 N., R. 59 W.
SE SE SE SE sec. 15, T. 111 N., R. 59 W.
NE SE SE SE sec. 17, T. 111 N., R. 59 W.
SE SE SE SE sec. 20, T. 111 N., R. 59 W.
SW NW SW NE sec. 21, T. 111 N., R. 59 W.
SE SE SE SE sec. 21, T. 111 N., R. 59 W.