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OPEN-FILE REPORT 80-UR - No. 13: MARSHALL COUNTY

STATEWIDE LANDFILL STUDY:
MARSHALL COUNTY 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 Marshall 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 Marshall 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 Environmental and Natural Resources in Pierre and the South Dakota Geological Survey in Vermillion. The following information was available regarding the Marshall County landfill in 1986.

MARSHALL COUNTY LANDFILL

Location

The Marshall County landfill is located 9 miles east of Britton. Its legal location is NE $\frac{1}{4}$ sec. 28, T. 127 N., R. 56 W. (fig. 2).

Topography, Drainage, and Climate

The information on topography and drainage was taken from the Kidder SE Quadrangle (United States Geological Survey, 1954). In actuality, the present landfill surface may be significantly different because of activities at the landfill.

The topography at the Marshall County landfill consists of a gently sloping but irregular ground surface (fig. 2). The elevation ranges from 1,753 to 1,794 feet for a maximum relief of 41 feet at the site.

Most surface drainage is controlled by an intermittent tributary stream to Crow Creek, located in the James River basin. This tributary cuts across section 28 in a southeast to northwest direction approximately a quarter of a mile southwest from the southwest corner of the site. A draw extends into the site as small local depressions trending north to northeast. Located in the extreme northeast corner of the landfill site is a small marshy area (fig. 2). Several small marshy areas and ponds are located within 1 mile of the site.

The average annual temperature in Marshall County is 43 degrees Fahrenheit. Precipitation averages 21 inches per year. The average annual class A pan evaporation is 45 inches. Climatological data are from Spuhler and others (1971).

Geology

Surficial deposits in the area of the Marshall County landfill consist of end moraine material composed of till (fig. 3). According to the records from the Office of Air Quality and Solid Waste, one test hole has been drilled in the northeast corner of the landfill, however, the exact legal location is unknown.

One test hole has been drilled within 1 mile of the site (fig. 4, app. A). In the southeast corner of section 27, clay-rich till was encountered to a depth of 80 feet. The first gravel layer reported was between the depths of 80 and 88 feet. The hole was completed at a depth of 785 feet.

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

The material at the base of the landfill consists primarily of sandy loam (Office of Air Quality and Solid Waste records). Presumably, the terminology used by soil scientists (sandy loam) refers to 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.

According to Koch (1975), the Roslyn aquifer underlies the site. It is approximately 50 feet thick in this area. In general, the aquifer occurs between the elevations of 1,530 to 1,400 feet (Koch, 1975), which is approximately 200 to 300 feet below the ground surface at the landfill.

Water Quality

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

Adjacent Land Use and Features

Information about adjacent land use and features was taken from the Kidder SE Quadrangle (United States Geological Survey, 1954) and the General Highway Map - Marshall County (South Dakota Department of Transportation, 1979).

- * There are several small marshes and ponds located near the site.
- * State Highway 10 is located half a mile southwest 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: Marshall County

2. Population served: 5,900
3. Method of disposal: Cut and fill (trench)
4. Estimated amount of waste received per unit time: 2,907 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: No information available.
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

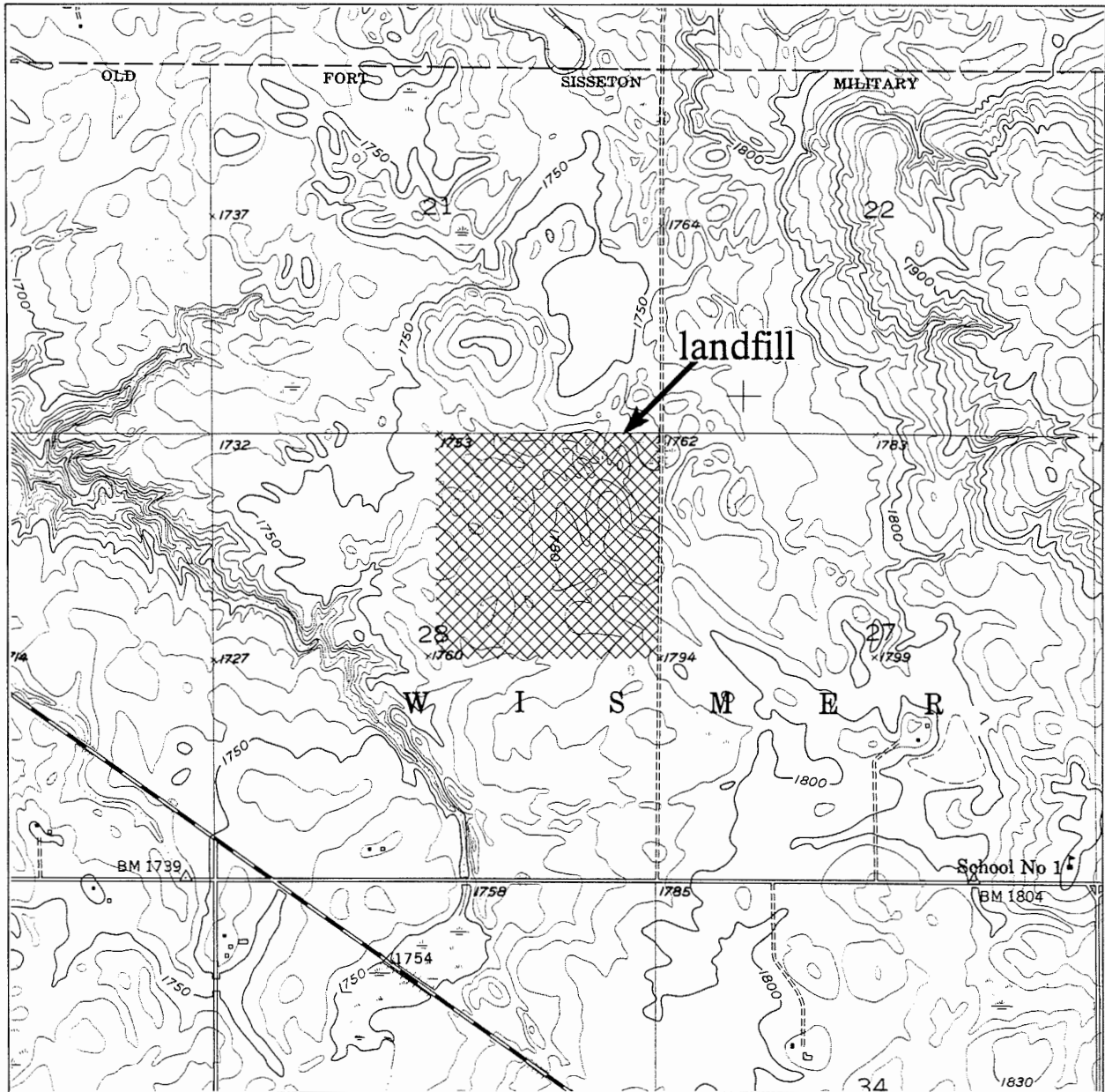
SUMMARY

- * The geology at this site generally consists of topsoil overlying till.
- * This landfill is located in close proximity to intermittent streams, ponds, and marshy areas.
- * One reliable test hole log was available near this site.
- * 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

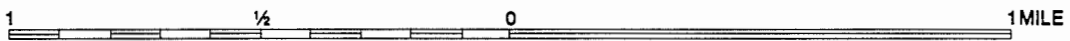
- Koch, N.C., 1975, Geology and water resources of Marshall County, South Dakota, Part 1: Geology and water resources: South Dakota Geological Survey Bulletin 23, 76 p.
- South Dakota Department of Transportation, 1979, General Highway Map Marshall County, South Dakota: South Dakota Department of Transportation in cooperation with the United States Department of Transportation, (revisions as of January 31, 1980).
- 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, 1954, Kidder SE quadrangle, South Dakota: 7.5 minute series (topographic), scale 1:24,000.

R. 56 W.

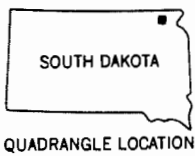


T. 127 N.

SCALE 1:24000



CONTOUR INTERVAL 10 FEET, KIDDER SE QUADRANGLE



QUADRANGLE LOCATION

Landfill location: NE $\frac{1}{4}$ sec. 28,
T. 127 N., R. 56 W.
Marshall County

Adapted from United States
Geological Survey (1954)



Figure 2. Location of the Marshall County landfill.

R. 57 W. | R. 56 W.

R. 56 W. | R. 55 W.



T. 127 N. | 128

T. 126 N. | T. 127 N.

0 1 2 3 4 5 6 MILES

SCALE 1:126,720

Qal..... Alluvium

Qwll..... Lacustrine deposits


Qwpl..... Perched lacustrine deposits

Qwlvo..... Valley outwash

Qwlgm..... Ground moraine

Qwism..... Stagnation moraine

Qwlem..... End moraine

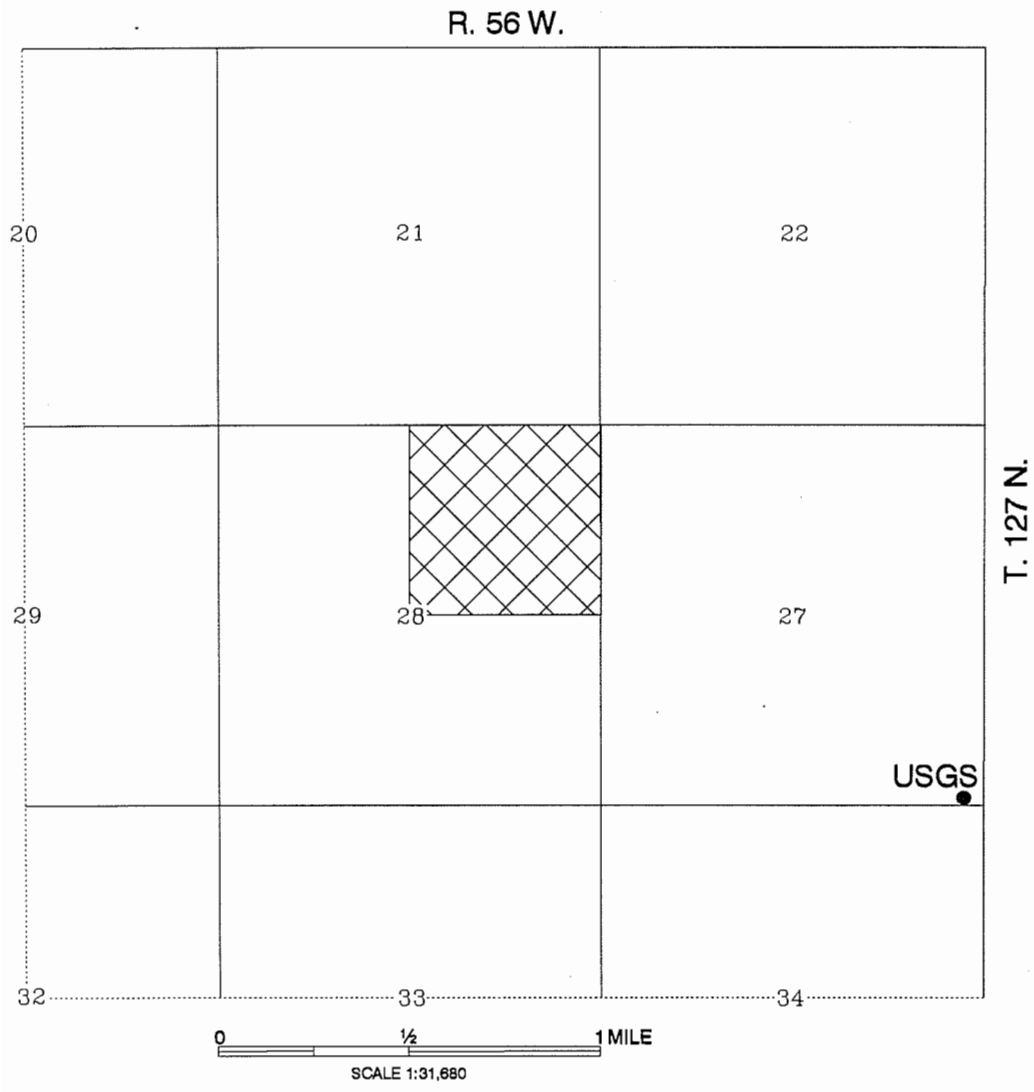
 Surface water body

 Landfill



Adapted from Koch (1975, pl. 2)

Figure 3. Geology near the Marshall County landfill.



USGS ● Test hole. Letters are the test hole identifier.



Landfill location: NE $\frac{1}{4}$ sec. 28,
T. 127 N., R. 56 W.
Marshall County

Figure 4. Location of a test hole drilled within 1 mile of the Marshall County landfill.

APPENDIX A

Legal location of Marshall County landfill area lithologic log

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

SE SE SE SE sec. 27, T. 127 N., R. 56 W.