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OPEN-FILE REPORT 80-UR - NO. 8: GREGORY COUNTY

STATEWIDE LANDFILL STUDY:

GREGORY 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 Gregory 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
2. Brookings City - Proposed
3. Brown County
4. Brule County
5. Byre (Private)
6. Davison County
7. De Smet City
8. Gregory County
9. Haarstad (Private)
10. Huron City
11. John Clements (Private)
12. Kadoka City
13. Marshall County
14. Miedema City
15. Milbank City
16. Miller City
17. Pierre City - Proposed
18. Pierre City - Old Site
19. Ralph Dawson (Private)
20. Rapid City
21. Sioux Falls (Runge) City
22. Vermillion City
23. Walworth County
24. Watertown City
25. Winner City
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 Gregory 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 Gregory County landfill in 1986.

GREGORY COUNTY LANDFILL

Location

The Gregory County landfill is located 2 miles south and 2½ miles east of Burke. Its legal location is SW¼ sec. 10, T. 96 N., R. 71 W. (fig. 2).

Topography, Drainage, and Climate

The information on topography and drainage was taken from the Herrick NW Quadrangle (United States Geological Survey, 1964). In actuality, the present landfill surface may be significantly different because of activities at the landfill.

The topography at the Gregory County landfill is relatively flat (fig. 2). The site is flanked on the northwest and northeast by two intermittent streams which drain into Pete's Creek, an intermittent stream located approximately half a mile north of the landfill. The topography at the north end of the landfill reflects a steepening of slope toward these drainages. The elevation ranges from 2,141 to 2,193 feet for a maximum relief of 52 feet at the site.

Surface drainage is primarily controlled by an intermittent stream (Pete's Creek) north of the landfill. Pete's Creek flows to the northeast into the South Fork Whetstone Creek which flows into the Missouri River, a total distance of approximately 15 miles.

The average annual temperature in Gregory County is 49 degrees Fahrenheit. Precipitation averages 21 inches per year. The average annual class A pan evaporation is 54 inches. Climatological data are from Spuhler and others (1971).

Geology

Baker and others (1952) indicate that this area is represented almost entirely by Herrick gravels (fig. 3). A minor amount of Bijou Formation is present. The Bijou Formation consists of interbedded siltstone, sandstone, and pebble conglomerate that is partly silicified. An old gravel pit is located in

the north-central part of the landfill. According to a letter dated July 11, 1977, from the South Dakota Geological Survey, the landfill is located in an area covered by fine sand.

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 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 sand and gravel. The permeability of these materials is not known but can be represented in qualitative terms. In general, the permeability of sand and gravel is greater than that of silt and clay. 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 estimated for the landfill area.

The landfill may be located in an aquifer. The following paragraphs are taken from a letter dated August 23, 1978, from the South Dakota Geological Survey.

> "We find the site to be geologically unsuitable because it is located in a portion of the Dallas-Fairfax aquifer. The Dallas-Fairfax aquifer is a shallow aquifer which covers the central portion of Gregory County and as such constitutes the sole source of shallow ground water for most of the municipalities and many of the rural residents of Gregory County."
>
> "A second objection to the site is that there is a high probability that leachate from the landfill will move laterally through the aquifer and be discharged as surface water into the creek to the north of the landfill."

Water Quality

Although water quality data were available, the legal locations and/or well depths were not known for wells near the landfill. 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. 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 Herrick NW Quadrangle (United States Geological Survey, 1964) and the General Highway Map - Gregory County (South Dakota Department of Transportation, 1979).

* The Chicago and Northwestern railroad tracks and Highway 18 are located a quarter of a mile south of the site.

* The nearest surface water is Pete's Creek located north of the site. There are three small ponds approximately three-fourths of a mile south of the site, one pond located 1 mile east-southeast of the site, and one pond located 1 mile northwest 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: Gregory County

2. Population served: 3,200

3. Method of disposal: Cut and fill (Trench)

4. Estimated amount of waste received per unit time: 3,385 tons/year

5. Access to site:

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

6. List industry present: No information available

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

* This landfill is located on relatively flat land; intermittent streams flank the site.

* The geology at this site consists primarily of permeable sand or gravel.

* No reliable test hole logs were available for this site.

* No monitoring wells were present near this site.

* No water level data were available near this site.

* No reliable water quality analyses were available near this site.

REFERENCES CITED

Baker, C.L., Stevenson, R.E., and Carlson, L.A., 1952, Geology of the Herrick quadrangle: South Dakota Geological Survey Geologic Quadrangle Map, scale 1:62,500.

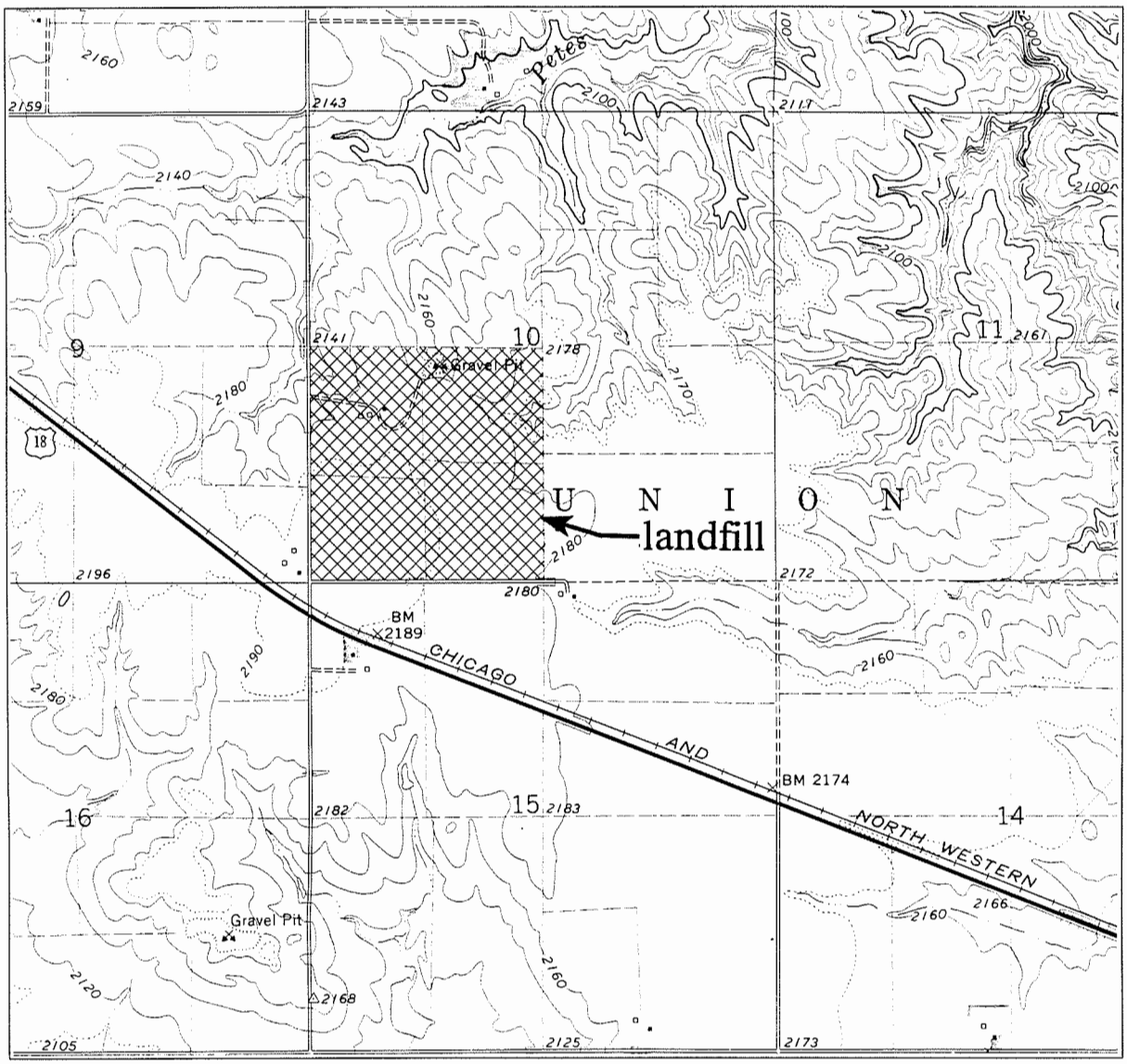
South Dakota Department of Transportation, 1979, General Highway Map Gregory County, South Dakota: South Dakota Department of Transportation in cooperation with the United States Department of Transportation, (revisions as of June 30, 1981).

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, 1964, Herrick NW quadrangle, South Dakota: 7.5 minute series (topographic), scale 1:24,000.

Figure 1. Sites considered for further evaluation.

R. 71 W.

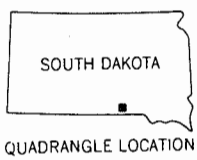


T. 96 N.

SCALE 1:24000

1 ½ 0 1 MILE

CONTOUR INTERVAL 20 FEET, HERRICK NW QUADRANGLE

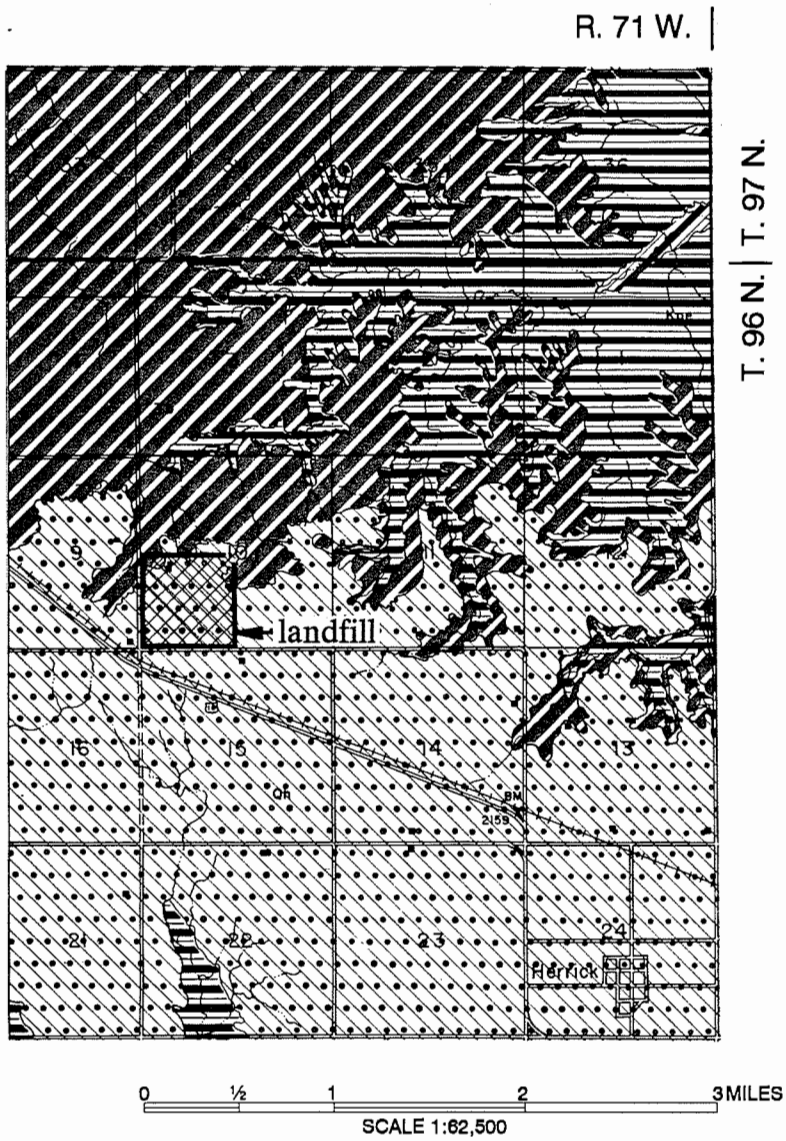


QUADRANGLE LOCATION

Landfill location: SW¼ sec. 10,
T. 96 N., R. 71 W.
Gregory County

Adapted from United States
Geological Survey (1964)

Figure 2. Location of the Gregory County landfill.



Qh..... Herrick Gravels

Tb..... Bijou Formation

Kpe..... Elk Butte member of the Pierre Shale

Kpm..... Mobridge member of the Pierre Shale

Landfill

Adapted from Baker and others (1952)

Figure 3. Geology near the Gregory County landfill.