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OPEN-FILE REPORT 80-UR – NO. 5: BYRE (PRIVATE)

STATEWIDE LANDFILL STUDY:

BYRE (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 Byre (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
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 Byre (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 Byre (Private) landfill in 1986.

BYRE (PRIVATE) LANDFILL

Location

The Byre (Private) landfill is located 3 miles east and 4 miles north of Oacoma in Lyman County. Its legal location is NW¼ NE¼ sec. 34, T. 105 N., R. 71 W. (fig. 2).

Topography, Drainage, and Climate

The information on topography and drainage was taken from the Chamberlain Quadrangle (United States Geological Survey, 1974). In actuality, the present landfill surface may be significantly different because of activities at the landfill.

The topography at the Byre (Private) landfill site slopes gently toward an intermittent stream valley to the north and east which drains into the Missouri River half a mile to the east. An active gravel pit is located in the south central part of the landfill site (fig. 2), south of a depression which may represent an abandoned gravel pit. To the west, the landfill is marked by a break in topography and the rolling hills and incised valleys which make up the local Missouri River watershed become dominant. Within the site, the elevation ranges from 1,395 to 1,433 feet for a maximum relief of 38 feet.

The average annual temperature in Lyman County is 47 degrees Fahrenheit. Precipitation averages 18 inches per year. The average annual class A pan evaporation is 53 inches. Climatological data are from Spuhler and others (1971).

Geology

Surface sediments at this site are represented by Missouri River terrace gravels overlying the Gregory member of the Pierre Shale (fig. 3). The thickness of the terrace gravels is unknown. The Pierre Shale crops out in the northwestern corner of the site. According to the Office of Air Quality and Solid Waste microfiche site inspection reports, the landfill is located in old gravel pits which have been lined with clay. No test hole data were found for the site.

Hydrology

According to microfiche records from the Office of Air Quality and Solid Waste, all sand and gravel were removed from the trench area so that the material at the base of the landfill consists primarily of clay. It is not known whether the bottoms of the gravel pits are in shale or whether the term "clay" refers to the clay lining. Therefore, the permeability of this material cannot be discussed. No site specific permeability data are available.

The only well on site (location unknown) is used to supply water for fire-control equipment (Office of Air Quality and Solid Waste site inspection report dated June 3, 1981). 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 unknown.

Water Quality

Although water quality data were available, the legal locations and/or well depths were not known for wells within 1 mile of the site boundaries. 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. 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 material (presumably shale). 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 Chamberlain Quadrangle (United States Geological Survey, 1974) and the General Highway Map - North Half - Lyman County (South Dakota Department of Transportation, 1980).

* The nearest surface water is the Missouri River located half a mile east of the site.

* The Kiowa State Public Hunting Area is located half a mile north 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 Department of Environment and Natural Resources 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: Byre (Private)

2. Population served: 1,200

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

4. Estimated amount of waste received per unit time: 1,560 tons/year

5. Access to site:

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

6. List industry present: No information available

7. Land Use:

   * Preoperational land use: Gravel pit
   * Proposed post-operational land use: Grazing
   * Current land use within a quarter of a mile radial area: Gravel pits and grazing

8. This landfill began operations in 1979 and was first permitted on October 1, 1979, thus predating many current regulations.

9. This landfill was closed in 1989.

SUMMARY

* This landfill is located in close proximity to intermittent streams and the Missouri River.

* The geology at this site generally consists of gravel (thickness unknown) overlying the Pierre Shale.

* This landfill is located in gravel pits which have been lined with clay.

* No test hole data were available near this site.

* No reliable 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

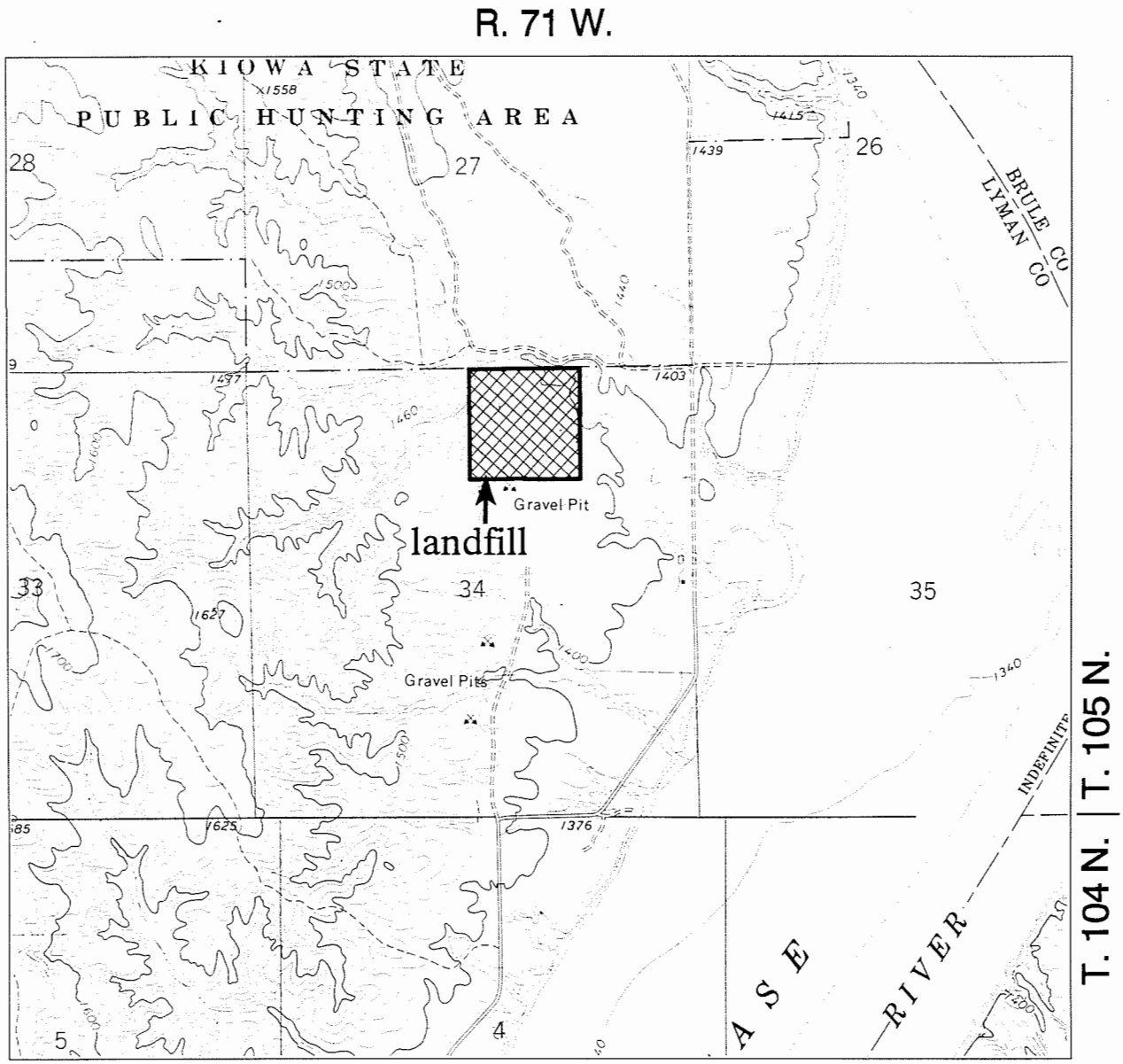
Petsch, B., 1952, Geology of the Chamberlain quadrangle: South Dakota Geological Survey Geologic Quadrangle Map, scale 1:62,500.

South Dakota Department of Transportation, 1980, General Highway Map - North Half - Lyman County, South Dakota: South Dakota Department of Transportation in cooperation with the United States Department of Transportation, (revisions as of September 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, p. 30.

United States Geological Survey, 1974, Chamberlain quadrangle, South Dakota: 7.5 minute series (topographic), scale 1:24,000.

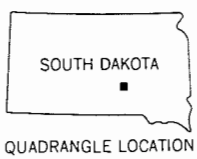
Figure 1. Sites considered for further evaluation.



SCALE 1:24000

1 ½ 0 1 MILE

CONTOUR INTERVAL 20 FEET, CHAMBERLAIN QUADRANGLE



Landfill location: NW¼ NE¼ sec. 34,
T. 105 N., R. 71 W.
Lyman County

Adapted from United States Geological Survey (1974)

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

Qal ..... Alluvium

Qoal ..... Older alluvium

Qg ..... Gravels

Qt ..... Glacial till

Qtr ..... Terrace remnants

Kpsv ..... Sully member - Verendrye facies

Kpso ..... Sully member - Oacoma facies

Kpg ..... Gregory member

Kpss ..... Sharon Springs member

Pierre Shale

Kns ..... Smoky Hill member - Niobrara Formation

Landfill

N

Adapted from Petsch (1952)

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