KANSAS GEOLOGICAL SURVEY

The University of Kansas
1930 Constant Ave
Lawrence KS 66047-3726
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fax 785-864-5317
www.kgs.ku.edu

August 1, 2006

Mr. Paul R. Clark, P.G.
Allied Environmental Consultants, Inc.
1109 North Topeka
Wichita, KS 67214

RE: Existing Sumner County Landfill
Permit #119; Wellington, Kansas
AEC File No. 04039-01:0014

Dear Mr. Clark:

I have reviewed the information you provided to the Kansas Geological Survey (KGS) in your letter of July 27, 2006 on a permit modification for an existing construction and demolition landfill in Sumner County. The landfill expansion is located in NW¼ S25 T32S R1W, southeast of Wellington, Kansas.

Since my letter of July 15, 2004, the role of the KGS has changed with respect to the permit process for landfills. At the time of my letter, the regulations stated that the KGS must approve or exempt a landfill with respect to subsidence, landslides, and poor ground conditions. A clarification has been posted on the KDHE Bureau of Waste Management web site that states that the role of the KGS and other state agencies is to providing information of known environmental and geologic concerns at the proposed landfill sites.

I examined the materials you provided with your letter. Additionally, I examined the original documents (KGS Bulletin 151 and USGS Water Resources Investigation Report 92-4177) and two other reports (Olson, 1974, KGS Bulletin 208 and Gogel, 1981, KGS Chemical Quality CQ 9). Olson (1974) contains the original classification of suitability for landfills by soil type. It should be noted that you included the classification for area-type landfills and not the classification for trench-type landfills, which is moderate for Milan-type soils. Olson indicates that the problem for Milan-type soils is that they are too clayey and have poor workability.

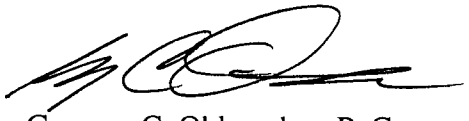
The other issue investigated for this landfill site was the possibility for land subsidence. The area is underlain by the Wellington Formation, which contains the Hutchinson Salt. The eastern edge of the Hutchinson Salt, which is a dissolution front, passes through Sumner County and approximately under the city of Wellington (Gogel, 1981). The landfill site is located east of the edge of the salt by about 1 mile. This indicates that subsidence due to salt dissolution may have a low possibility of occurrence at this landfill site.

- The Kansas Geological Survey's main concern is the potential ground-water contamination at this site as set forth in USGS WRIR 92-4177.
- The Kansas Geological Survey has no knowledge of landslide, karst, or poor ground conditions that might affect this application; however, the landfill site is close to the edge of the Hutchinson Salt, which has associated land subsidence concerns.

The above discussion represents our best assessment based on the information that the Kansas Geological Survey has about this locality and/or proposed project at the time of this writing. Other geologic conditions, not discussed herein, or for which the Kansas Geological Survey has no knowledge, may affect the viability or safe operation of this facility or property. The information provided in this letter is from regional or countywide studies and should not be used as a substitute for detailed site characterization by a licensed geologist or engineer. It is the responsibility of the applicant to provide any required site characterizations.

If you have any questions regarding these issues, please contact Gregory Ohlmacher at (785)-864-2194 or ohlmac@kgs.ku.edu.

Sincerely,



Gregory C. Ohlmacher, P. G.
Engineering Geologist

Allied Environmental Consultants, Inc.

July 27, 2006

Kansas Geological Survey
University of Kansas
Attn.: Mr. Gregory Olmache
1930 Constant Avenue
Lawrence KS 66047-3726

Reference: Existing Sumner County Landfill
Permit #199; Wellington, Kansas
AEC File No. 04039-01:0014

Dear Mr. Olmache:

This letter provides certain information submitted on behalf of Sumner County, for comment per your letter of July 15, 2004 and comments received from the KDHE regarding information to demonstrate the suitability of the area for a new Construction and Demolition (C & D) waste disposal cell at the existing Sumner County Landfill. This request is made according to K.A.R. 28-29-302. The proposed C&D waste cell will be on an existing permitted Landfill property located in the NW ¼ of Section 25, T32S, R1W, of the 6th Principal Meridian (see Figure 1).

The local geology is summarized as follows, taken from the sources indicated:

According to the Soil Survey of Sumner County, Kansas, the site soils are classified as Mb – Milan loam (1 to 3% slopes) and Mc – (3 to 6% slopes). The Milan loam (1 to 3% slopes) is a deep, gently sloping well-drained soil on uplands. In the type section, the surface layer is a dark grayish-brown loam approximately 10-inches in thickness. Locally, the surface layer varies from 7 to 14-inches. The subsoil is approximately 38-inches thick. The upper part is a dark brown, firm clay loam: the middle section is a dark reddish-gray, very firm clay loam: and the lower portion is a red, firm sandy clay loam. The substratum is a yellowish-red sandy clay loam.

The Milan loam (3 to 6% slopes) is a deep, sloping well-drained soil on uplands; typically, located on short side slopes. The surface layer is a dark grayish-brown loam approximately 10-inches thick. Locally, the surface layer varies from 7 to 14-inches in thickness. The subsoil is approximately 38-inches thick. The upper part is a dark brown, firm clay loam: the middle section is a dark reddish-gray, very firm clay loam: and the lower portion is a red, firm sandy clay loam. The substratum is a yellowish-red sandy clay loam.

The deposits underlying the surface soil are part of the Pleistocene terrace deposits and the Permian-age Wellington Formation, according to the Geology and Ground-Water Resources of Sumner County, Kansas (1961, Bull. 151), and the USGS Water Resources Investigations Report 92-4177. The drill logs and figures presented by USGS in their investigation report suggest that the proposed Phase 3 C&D landfill will occupy the Pleistocene deposits (ranging from blue-gray clay to silt, sand and gravel). The USGS report also provides Figure 9, showing suitability of soils for solid waste disposal within the quarter section, as classified by Olson in a 1974 report on the basis of depth to water table, land slope, characteristics, etc. (see enclosed). The Phase 3 area will parallel the cover material pit and occupy the general area of the holding pond. The USGS shows the area to have "slight limitations" to area-type sanitary landfill operations. The landfill bottom elevations will range from a high of 1198 ft to 1180 feet, and recent groundwater elevations beneath the proposed site ranged from 1166 to 1169.98, so the Phase 3 cell bottom is about 10 feet above the groundwater surface.

The nearest structural feature to the site is the Nemaha Anticline, and no major faults are known to occur in Sumner County (USGS Report 92-4177, *Hydrogeology and Ground-water Quality Conditions at the Sumner County Landfill South-Central Kansas, 1989*). Additionally, the site and vicinity is not known to be subject to karst, subsurface mining or other features that potentially jeopardize land stability.

The Anawalt House, 1109 N. Topeka ■ Wichita, KS 67214 ■ Mail: P.O. Box 234 ■ Wichita, KS 67201-0234
Phone: (316) 262-5698 ■ Fax: (316) 262-0736 ■ www.alliedenvironmental.com

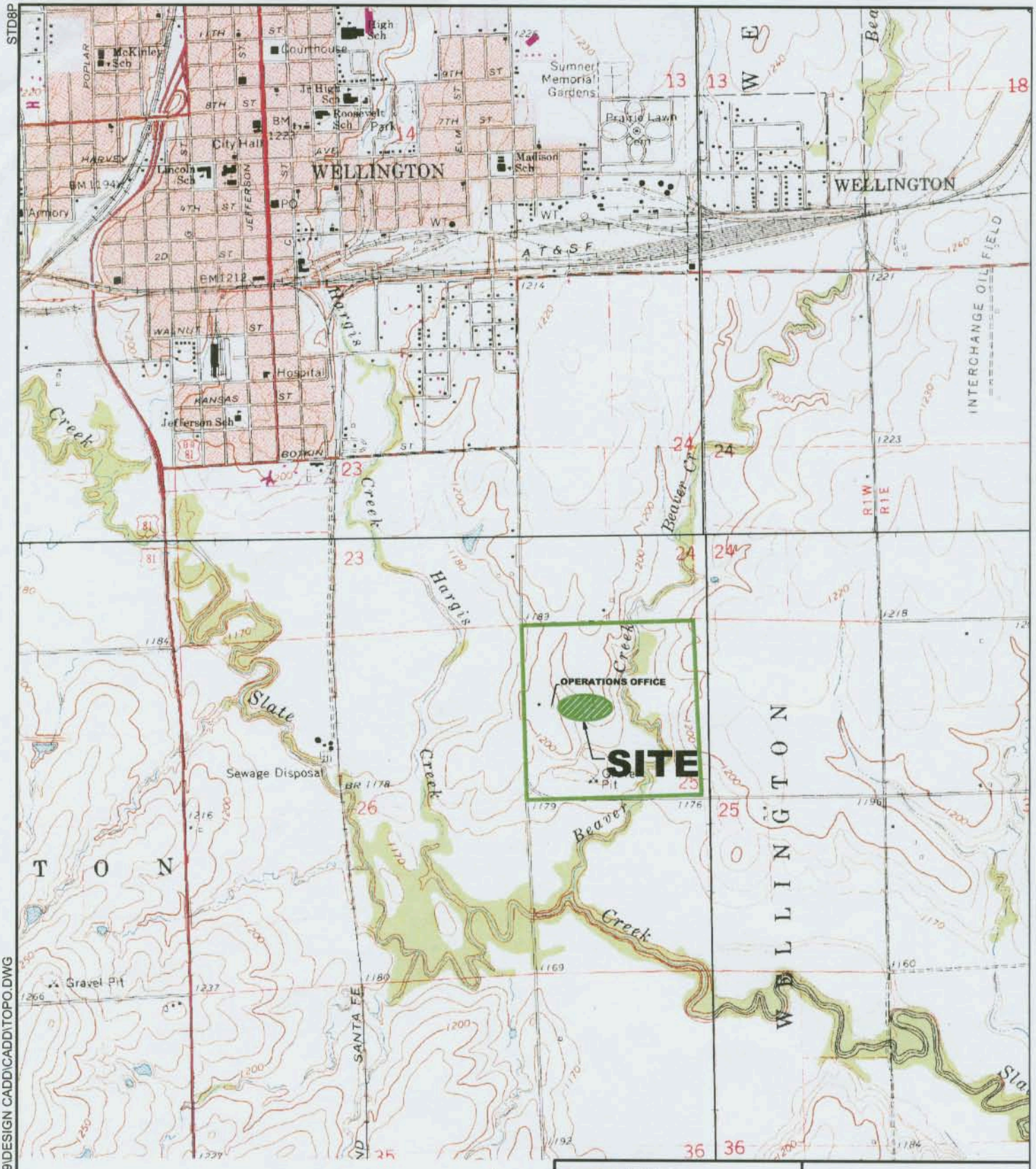
Please respond to Allied Environmental Consultants, Inc., 1109 North Topeka, Wichita, Kansas 67214. Thank you for attention to this matter.

Sincerely,

ALLIED ENVIRONMENTAL CONSULTANTS, INC.

Paul R. Clark, P.G.
VP / Technical Director

Enclosures



LEGEND

PHASE III C&D DISPOSAL UNIT

N

ALLIED ENVIRONMENTAL CONSULTANTS, INC.
1109 N. TOPEKA
WICHITA, KS 67214
(316) 262-5698

PROJECT: 04039:0014
SCALE: 1:600
DATE: 4–19–06

SITE LOCATION
SUMNER CO. LANDFILL

FIGURE 1

DWN BY: JJS | CHKD BY: PRC | SHT: 1.OF.1

FILENAME:H:\PROJECTS\0014\04039\DESIGN CADD\CADD\TOPO.DWG

STD8P

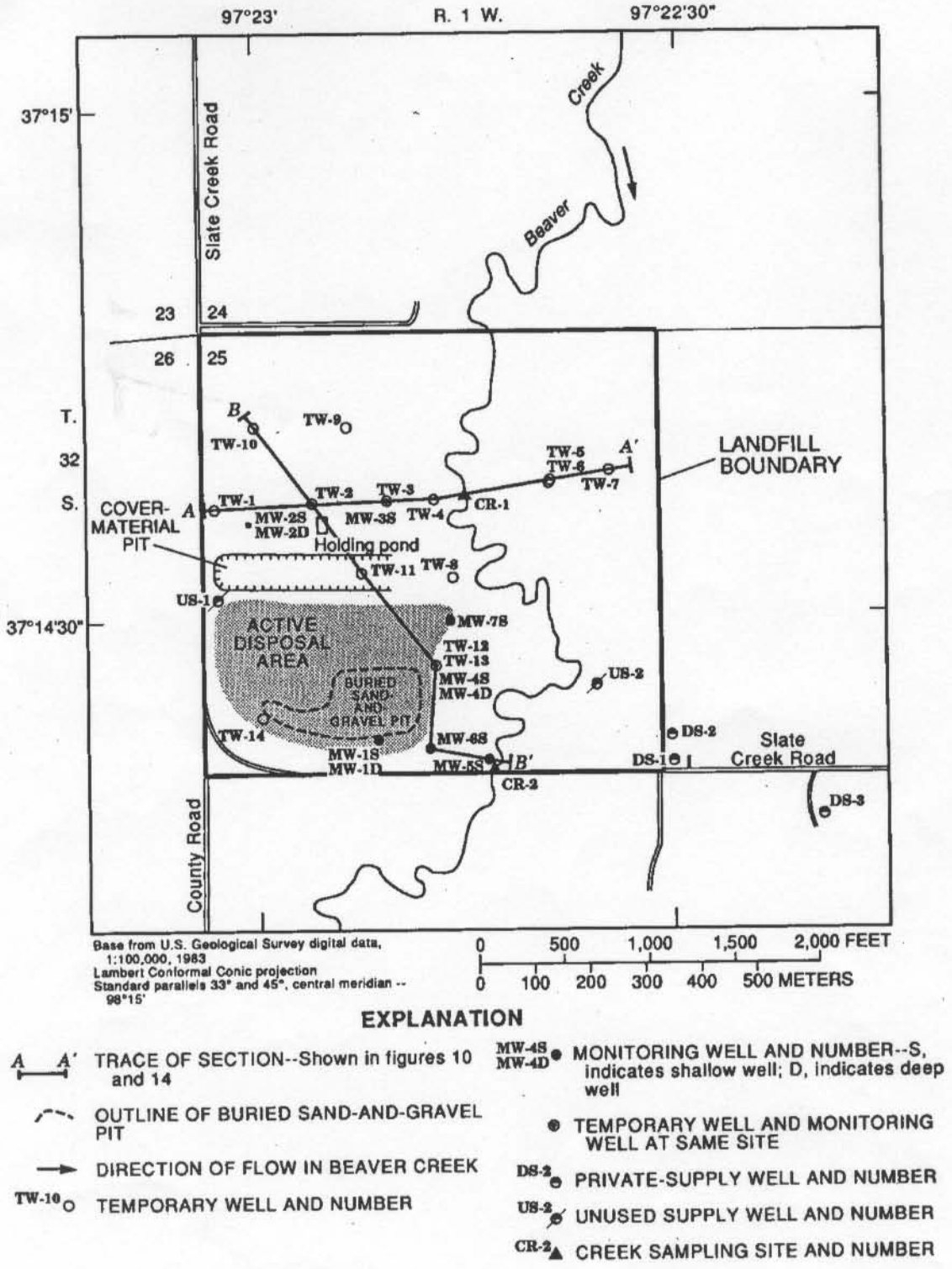


Figure 3. Location of temporary, monitoring, private-supply, and unused supply wells, and Beaver Creek sampling sites.

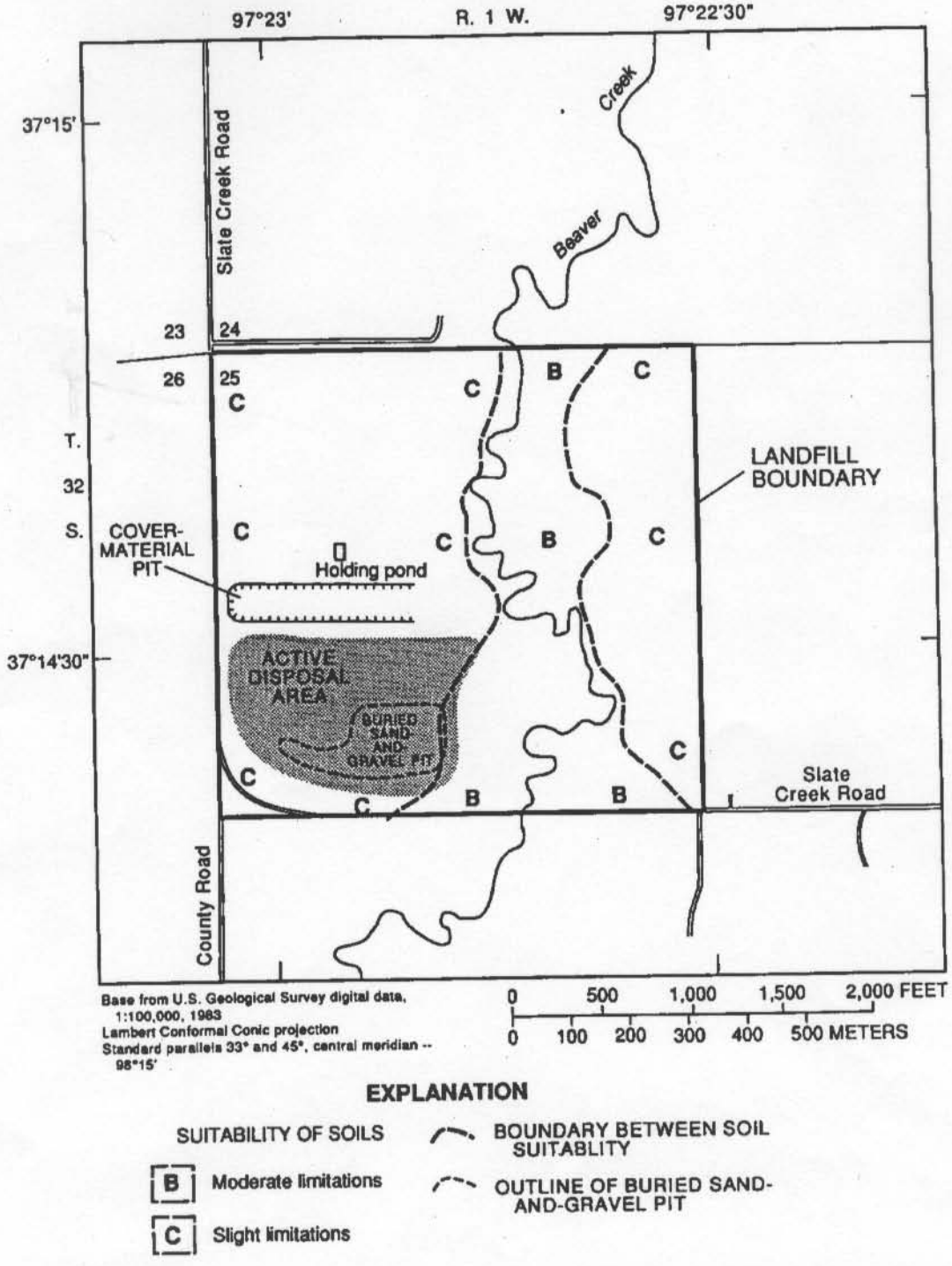


Figure 9. Suitability of soils within the landfill for area-type, sanitary-landfill operations, ranked from moderate to slight limitations (Based on rankings assigned to soil types by Olson, 1974).

probably is similar in lithology to the Wellington Formation observed in the outcrop along Beaver Creek, although stratigraphically lower.

Except for the area where the Wellington Formation crops out along Beaver Creek, the landfill is overlain by Pleistocene terrace and alluvial deposits of varying thickness and lithology (figs. 10A and 10B). Terrace deposits that were visible in the wall of the cover-material pit (fig. 10B) consist of layers of sand and gravel with interbedded layers of clayey sand and shell fragments, overlain by a layer of red sandy silt and clay with interbedded layers of sand and gravel. The contact between the sand-and-gravel layer and the overlying red sandy silt and clay layer is distinct and can be traced around the entire pit. Logs from temporary wells TW-1, TW-2, TW-3, TW-4, and TW-10 indicate a stratigraphic succession similar to that observed in the wall of the cover-material pit. Terrace deposits penetrated by temporary wells TW-5, TW-6, TW-7, and TW-9 had a larger clay content than those in the pit area. Southeast of the active disposal area, terrace deposits consist mostly of sand and gravel. On the east side of Beaver Creek, sediments penetrated consist of blue-gray clay with interbedded silt, sand, and gravel overlain by red sandy silt and clay with minor amounts of sand and gravel. The blue-gray clay probably

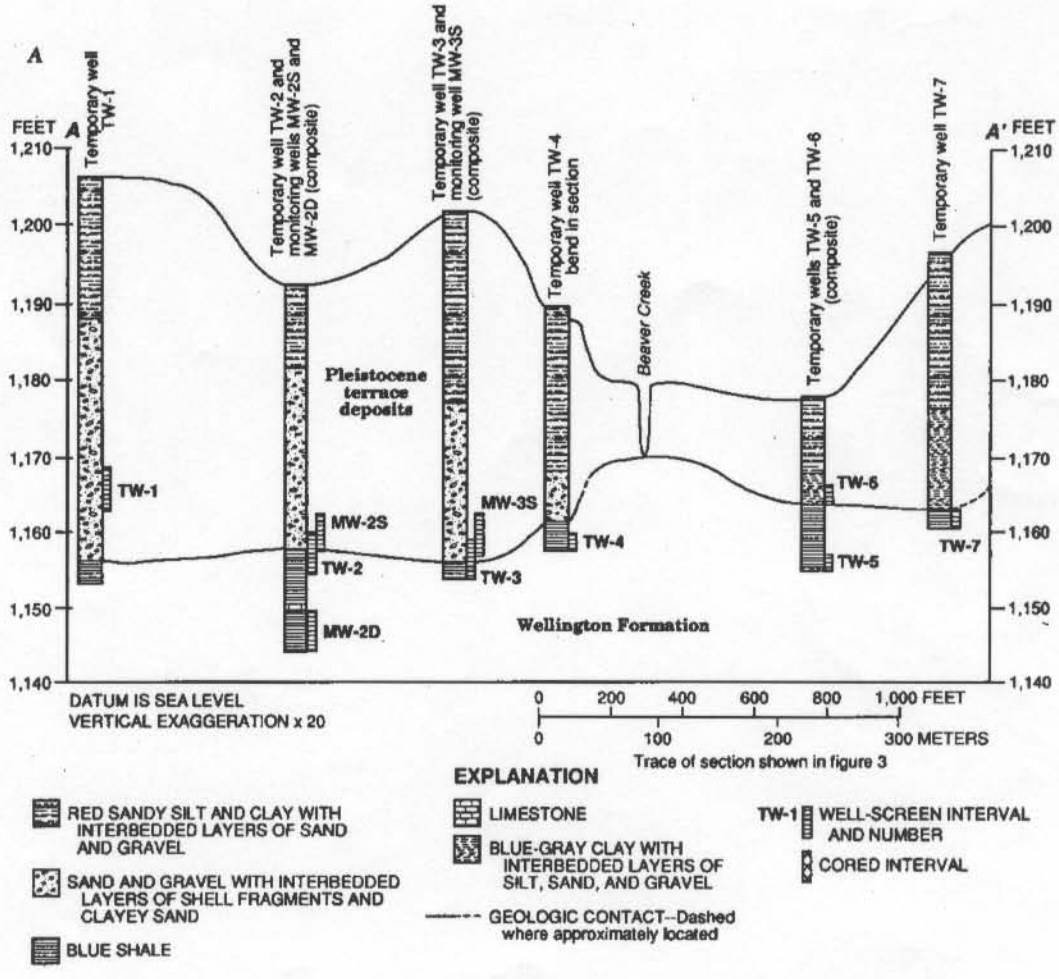


Figure 10. Geologic sections showing lithology of geologic units based on auger cuttings, natural gamma-ray logs, and split-spoon cores: (A) section A-A'; and (B) section B-B'.

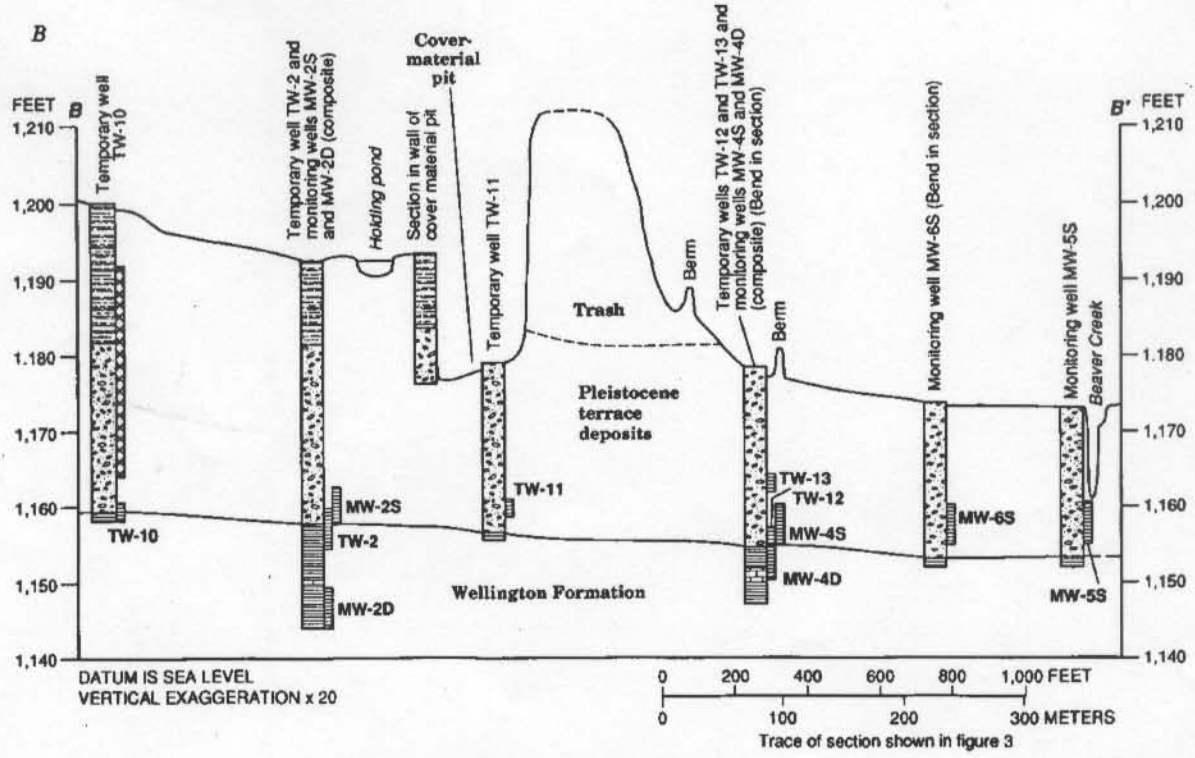


Figure 10. Geologic sections showing lithology of geologic units based on auger cuttings, natural gamma-ray logs, and split-spoon cores: (A) section A-A'; and (B) section B-B'--Continued

originated from weathering and reworking of the Wellington Formation, whereas the red sandy silt and clay probably represents terrace deposits. A thin layer of Holocene alluvium is present along Beaver Creek and consists of reworked sand and gravel from terrace deposits and shale and limestone fragments from the Wellington Formation.

The altitude and configuration of the top of the bedrock surface is shown in figure 11. The contours show that the bedrock surface slopes southwesterly with a steep scarp trending southeast from the vicinity of temporary well TW-10 (fig. 11). This scarp probably is the northeast edge of a southeast-trending buried stream channel. Coarser sediments would be expected to prevail in this former drainageway, whereas finer sediments would be expected outside of (northeast of) the channel; this concept is supported by the lithology penetrated in boreholes at the landfill.

Hydrology

North of the active disposal area, surface runoff drains southward to a holding pond near the cover-material pit (fig. 5). Surface runoff in the vicinity of the pit flows to the lowest (west) end of the pit where it ponds. Water in the holding pond and pit slowly evaporates or seeps into the ground. Elsewhere on the landfill, surface runoff drains south and east towards Beaver Creek. Berms have been constructed around the south and east sides of the landfill to help control surface runoff.

Water-level measurements in wells and in Beaver Creek (table 4) were used to construct potentiometric-surface maps (figs. 12A, 12B, and 13) and a hydrogeologic section (fig. 14). The direction of ground-water flow shown by the potentiometric contours and lines of equipotential is perpendicular to the contours or lines at any given point. Ground-water flow direction in terrace deposits west of Beaver Creek generally