

ANALYSIS OF SUBSURFACE STRATIGRAPHY OF THE SANITARY LANDFILL, URBANA, ILLINOIS

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ABSTRACT

Stratigraphic relations and morphology of the groundwater table show that leachate from the Urbana sanitary landfill has a good probability of being carried into nearby Boneyard Creek, a tributary of the Salt Fork of the Vermilion River. Further research is required to determine quantitatively whether contaminants contained in this leachate represent a significant hazard to the surrounding environment.

INTRODUCTION

Much controversy recently has surrounded the operation, management, and future closure of the Urbana, Illinois sanitary landfill. Journalistic preoccupation with this site is not atypical of the landfill's history.

Our objective has been to collect and correlate data from water wells, monitor wells, and any other available sources that provide meaningful geologic information for assessment of the probability of potential leachate movement from the sanitary landfill to nearby Boneyard Creek (Saline Branch) of the Salt Fork of Vermilion River. If underlying sedimentary strata are permeable and if available hydrologic information indicates a general migration toward and depression of the water table at Boneyard Creek, the probability of leachate being carried from the landfill into the stream is correspondingly great. Of course, numerous other factors, such as thickness and design of the impermeable seal used in construction of the site, care taken installing the seal, permanence of the seal, speed of water migration in the subsurface, and nature (chemical composition, stability, concentration, and longevity) of leachate compounds being transported also must be considered when assessing potential contamination of surrounding areas. All of these factors should be studied more exhaustively

and in greater detail. General understanding of the stratigraphic geology beneath and surrounding the sanitary landfill, however, is fundamentally important to more detailed analysis of the hydrology, geochemistry, and engineering geology of the site.

DATA

The sanitary landfill is in northeast Urbana. The site lies principally in the northwest quarter of Section 10, Township 19 North, Range 9 East of the Urbana quadrangle (7-1/2 minute, U.S. Geological Survey topographic map) and adjacent Thomasboro quadrangle. Rock data were obtained from water well records at the Illinois State Geological Survey (University of Illinois campus, Champaign) for Sections 9 and 10 primarily, but also for all sections immediately adjacent (specifically, Sec. 3, 4, 5, 8, 15, 16, and 17). Data from monitor wells for the sanitary dump were obtained from the Illinois Environmental Protection Agency (Springfield). These data included sample cutting descriptions as well as some water information in and around the perimeter of the Urbana sanitary landfill.

DISCUSSION

Analysis of available data indicates that the Urbana sanitary landfill is underlain by clay to a depth of about 20 m (60 ft) and by permeable sands to a depth of at least 70 m (210 ft) beneath the surface (Fig. 1). The water table exists roughly 5 to 7 m (15 to 20 ft) beneath the surface in clayey sediment and shows a significant depression toward the Boneyard Creek (Fig. 2) indicating groundwater movement from the permeable sediment into the creek.

If any leachate escapes the constructed seal to the landfill, it has a good probability of being carried directly into the stream. However, permeabilities measured by consulting engineering groups indicate that water movement may be slow enough (Charles Bartholomew Engineering, Inc. 1984) that potential contaminants might be diluted by meteoric waters to levels which are not toxic.

CONCLUSIONS

Although stratigraphic and hydrologic data indicate a strong possibility of leachate movement from the Urbana sanitary landfill to Boneyard Creek, chemical analyses of existing surface waters and groundwater composition would be helpful in more accurately assessing the potential danger. Quantitative data on the dilution and speed of potential leachate movement would be especially valuable. Additional information on the present condition and effectiveness of the designed landfill seal would be helpful but it is impractical to obtain. Nonetheless, two or three new monitor wells between the landfill and Boneyard Creek would allow more intensive, detailed, and accurate analysis of the potential hazard. In addition, these wells would provide a more effective guard against unsuspected leakage of leachate into Boneyard Creek.

REFERENCES

- Charles Bartholomew Engineering, Inc., 1984. Application for Permit to Develop A Landfill in Urbana, Illinois: Daily and Associates Engineering, Inc., Champaign, Illinois.

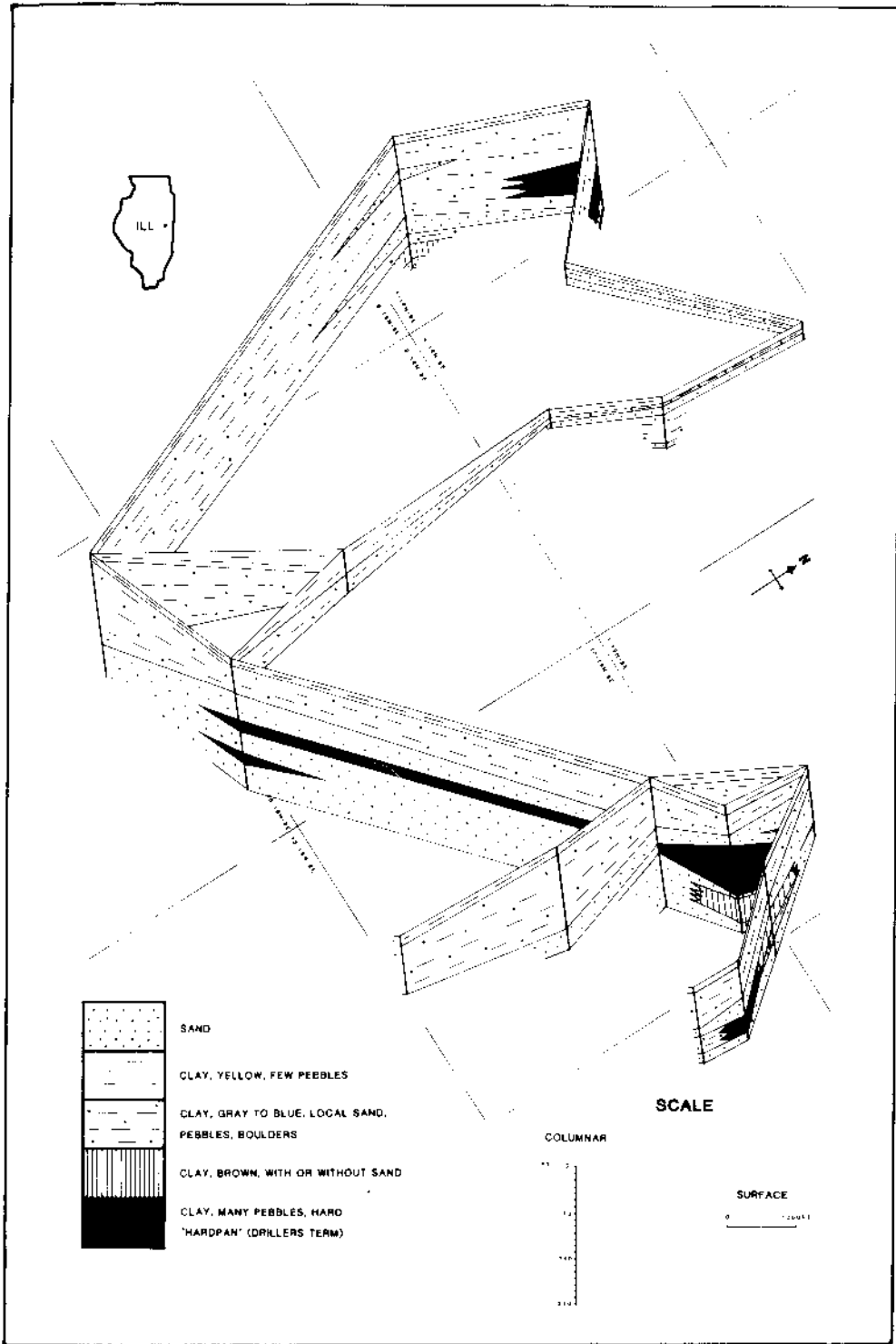


Fig. 1. Fence diagram of sedimentary units underlying the Urbana sanitary landfill and adjacent area.

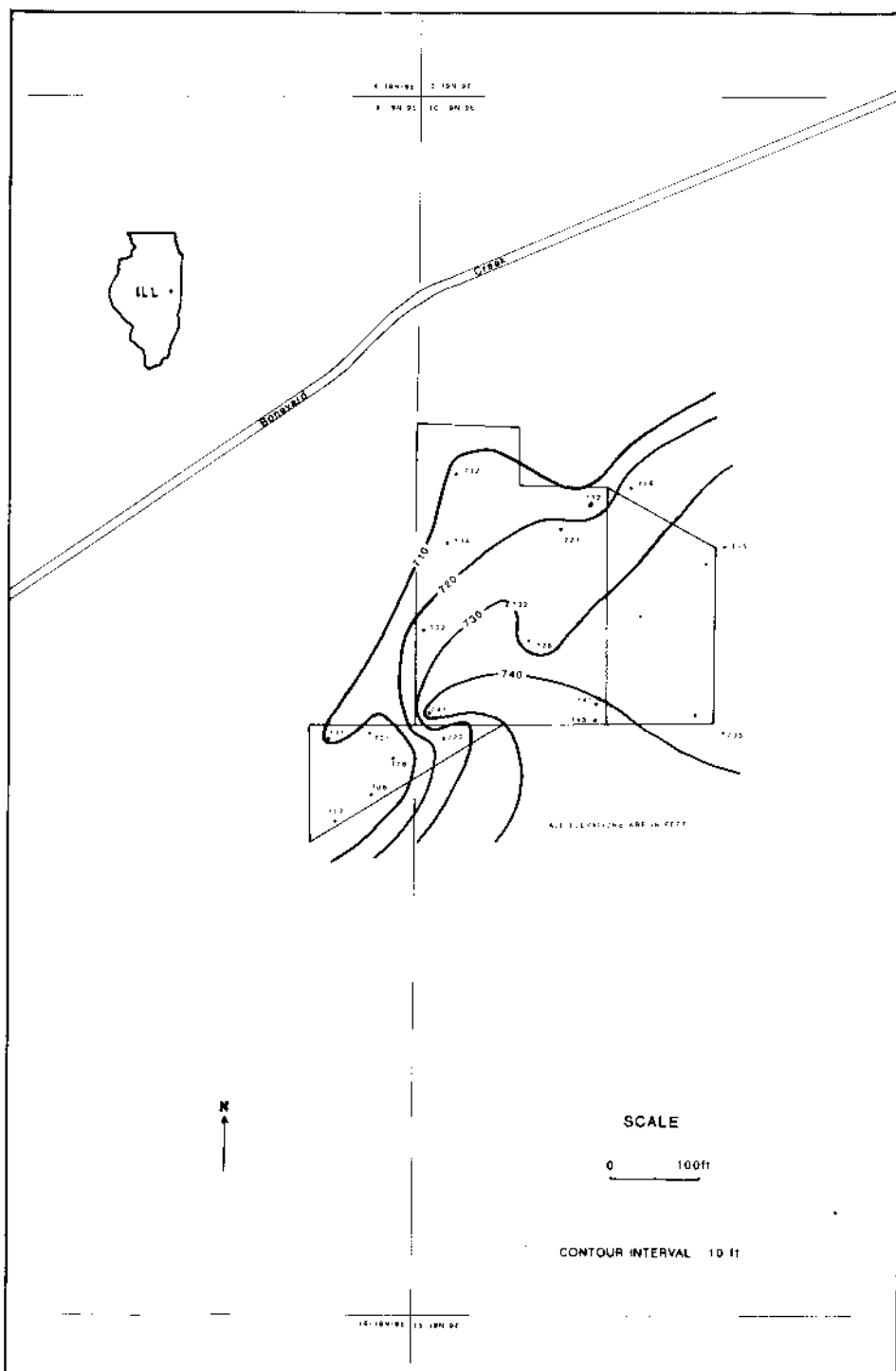


Fig. 2. Contour map of water table surface underlying the Urbana sanitary landfill indicating general groundwater flow toward Boneyard Creek.