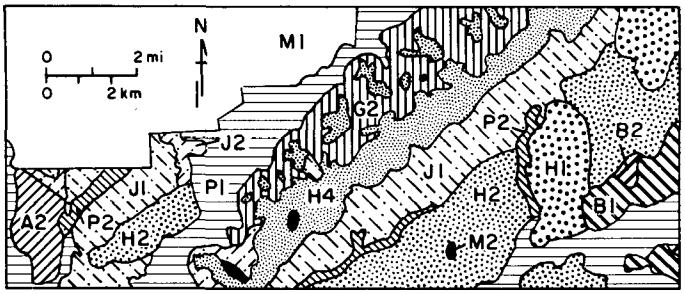

EXPLANATION

P1	Floodplain	B1	Low-relief blacksoil
P2	Tributary stream	B2	Rolling blacksoil
A2	Terrace	J1	Low-relief sand and mud
H1	Sand hill	J2	Rolling sand and mud
H2	Rolling sand	M1	Lignite mine
H4	Indurated sand	M2	Gravel pit
G2	Steep hillside		

Figure 1. Section of environmental map, Jackson-Yegua trend, 15 miles east of College Station, Texas, showing a part of the Gibbons Creek lignite mine (M1).

REFERENCES CITED

Fisher, W. L., *et al.*, 1970, Depositional systems in the Jackson Group of Texas - their relationship to oil, gas and uranium: The University of Texas at Austin, Bureau of Economic Geology Geological Circular 70-4, 28 p.

Henry, C. D., and Basciano, J. M., 1979, Environmental geology of the Wilcox Group lignite belt, East Texas: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 98, 28 p.

Kaiser, W. R., Ayers, W. B., Jr., and La Brie, L. W., 1980, Lignite resources in Texas: The University of Texas at Austin, Bureau of Economic Geology Report of Investigations No. 104, 52 p.

DIAGENETIC INCORPORATION OF HEAVY METALS IN CLAYS: IMPORTANCE IN THE INTERPRETATION OF ENVIRONMENTAL TEST WELL MONITORING DATA

Wayne C. Isphording[1]

ABSTRACT

Increased pressure from governmental agencies and environmental groups has, in recent years, required that the drilling of most test wells in closed bays and estuaries be accompanied by extensive chemical and biological monitoring programs. The procedures normally used to monitor heavy metal contamination can lead to mis-interpretation (and litigation), however, because they fail to consider the actual means by which metals are adsorbed, and incorporated, in sediments. Specifically, "whole sediment" chemical analysis does not reveal whether a metal is present in bottom clays as: (1) a structural ion in the clay lattice, (2) as one substituting for a cation in a non-indigenous material, (3) as an ion incorporated in exchangeable sites, or (4) as a metallically-chelated compound adhering to the surface of the clay platelets. Information of this type is necessary in order to determine if an observed elevated metal content, following completion of the well, is the result of the drilling operation, or some other activity that may have taken place in the area.

Data derived from an extensive monitoring program accompanying Mobil Oil's drilling of a test well in Mobile Bay, Alabama showed, for example, that increases in barium and strontium were not related to contamination of the bottom sediments by drilling muds but rather were traceable to the presence of both elements as substitutional impurities in the shell material that made up the drilling pad. Other elevated metal contents for copper, lead, zinc and chromium in the bay have subsequently been traced to dredging and construction activities which caused a release of metals from chelated sites in the bottom sediments by disruption of Eh conditions.

The acquisition of metal partitioning data, therefore, may provide critical information during monitoring studies that will help establish the true sources of anomalous metal contents in estuarine sediments (Sponsored by Mississippi-Alabama SEA GRANT Consortium).

[1]Department of Geology, University of South Alabama, Mobile, Alabama 36688