

74006

Philadelphia Sewage and Dupont Acid Dumpsite Surveys 7-9 August 1974

Vessels: R/V Atlantic Twin - Tom Anderson, Master
Submersible NEKTON Gamma - Gerry Shiller, Pilot

Scientific Observers: D. Folger, USGS, Chief Scientist; B. Reynolds and
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Fourteen dives were carried out in and around the two dumpsites located about 40 NM southeast of the mouth of Delaware Bay. The study was part of a coordinated effort involving surface ships (R/V Annandale and R/V Advance II), an ERTS overpass, and sewage release by a City of Philadelphia barge.

The eight dives carried out at five locations in the Philadelphia site lay along or close to the track of the barge which released sewage on 7 August. Unfortunately, only one dive near the area, preceding the dump, was made on the 7th. Winds of 30 to 40 knots (occasionally gusting to 60 knots) precluded additional dives. The remaining seven took place on the 8th and 9th. A summary of observations is as follows:

Water column - The thermocline lay between about 12 and 30 meters with temperature decline from about 23° C to 12° C. Highest turbidity occurred in and below the thermocline although no significant variations with depth were often noted by observers. Bottom currents (~50 cm from the bottom) were sluggish (2-5 cm/sec) and moved mostly to the northwest or northeast. One observation showed flow to the east.

Bottom - In the NW part of the site the bottom topography is relatively flat with common small hummocks and depressions (~15 cm diameter, 5 cm high or deep). In the central and SE parts of the area ripples are common. Wavelengths measured were ~30 cm to 100 cm and wave heights 2-5 cm. Most are symmetrical with broad flat tops oriented N-S, NE-SW, and less commonly NW-SE. The bottom is partially to almost completely covered by a thin (2-3 mm) veneer of brownish-gray flocculated (organic?) material below which light tan to gray, fine to coarse sand (occasionally pebbles) is present. The flocculated material is often absent or thin on ripple and mound crests and is usually present and thickest in depressions. Shell detritus on the bottom most often included sea clams, razor clams, and sand dollars. Empty shells generally lie concave side up.

Biology - Among living organisms on the bottom sand dollars were most abundant (20-180/m²) with less common shrimp (<100/m²), and starfish (10/m²). Seascallops were most abundant (3-4/m²) in the SE part of the dumpsite. Other less common organisms included crabs, nudibranchs, flounder, and hake.

In summary, no obvious layer of settling sludge was apparent in the water column nor were accumulations on the bottom identified. The

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NEKTON GAMMA 1974
(FOLGER)

sludge, in part, may account for the flocky layer on the bottom but it was the consensus of experienced observers that the layer could have been due primarily to natural processes. In any event, its distribution on the bottom clearly indicates that fine organic detritus will concentrate in swales, ripple troughs, and depressions. The biologists did not note any obvious significant disruption of the faunal and floral bottom community.

In the acid dumpsite five dives were carried out at four locations. One took place on the 7th of August while the remainder took place on the 9th. The results are as follows:

Water column - The thermocline lay between 11 and 30 m with a temperature decline from 23°C to 12°C. No distinctive differences were noted in water column turbidity during the dive carried out on the 7th or on the dives on the 9th in the southeast corner of the site. Near the center of the dumpsite, however, light green water was observed at the surface extending roughly E-W in a belt about 1/2 NM wide. Two dives carried out in this green water revealed increased turbidity above and in the thermocline. On the first dive in this area a layer of zero visibility extended from 6-9 meters and was underlain by a zone (12-15 m) containing abundant, large (1-3 cm diameter), reddish yellow flocks. Fine suspended matter, similar to that observed at other locations, was present above and below these two zones. The pH of the water above about 15 m was reduced and the anomalous water was probably due to the most recent acid dump. Bottom current flow measured at two locations was northward at 4-5 cm/sec.

Bottom - The bottom was either hummocky (10 cm diameter; 1-5 cm high) or had ripples (wave length 15-75 cm; 1-5 cm high) oriented mostly NE-SW or N-S. At one location ridges and swales were present with a 3-5 m wavelength. The surficial layer on the bottom comprised patchy deposits of flaky to granular yellow-brown material usually less than 2 mm thick. The loose, flocky material, common in the sewage site, was rare. The underlying gray fine sand was commonly exposed on ripple and mound crests. Shell fragments included mostly sea clams, razor clams, and sand dollars.

Biology - Sand dollars were often the most common organism (180-270/m²); crabs and blood stars were the next most common. Juvenile flounder, skates, scallops, and hake were present but not as abundant.

In summary, the low visibility layer and the underlying zone containing large reddish-yellow flocks above and in the thermocline were the major anomalies observed in the site. Whether the sparsity of the flocculated layer on the bottom is related to acid additions cannot be determined without further observation.