

DISTRIBUTION OF SUSPENDED PARTICULATE MATTER NEAR ORANGE COUNTY, CALIFORNIA SEWAGE OUTFALL

Ronald L. Kolpack

*Marine Processes Research, 2038 Thomas Place, West Covina,
California 91792, U.S.A.*

SUMMARY

During the past two decades the combined annual total suspended solids mass emission rates from municipal wastewater discharges in southern California exceeded 2×10^5 tons. The Orange County sewage outfall discharges about 5×10^8 l day⁻¹ into the southeastern part of San Pedro Bay. The mass emission rate of total suspended solids from this outfall is about 2.8×10^4 tons yr⁻¹. Continuous light transmission profile measurements were made around the outfall to determine the distribution and transport pathways of suspended particulate matter from the continuous discharge of sewage effluent. This study was part of a large-scale effort to investigate the transport of fine-grained material off southern California.

Cross-sections through the area show a characteristic near-bottom flow of turbid water off the shelf into deeper water. Density discontinuities in the water column promote horizontal spreading of the near-bottom turbid water descending the nearby basin slope. Shoreward penetration of clear water on the shelf commonly divides the initial plume, with a second layer of turbid water at about 15-20 m.

The adjacent Newport Submarine Canyon modifies water circulation patterns in the area owing to the presence of oscillating currents in the axis of the canyon. In addition, internal wave activity and strong subsurface currents contribute to the formation of suspended particle maxima at several depths in the water column in the area around the Orange County outfall. These factors also produce a rapid dispersion of the effluent particles and net transport of material into deeper water. The dominant avenues of offshore transport occur at depths of 25, 50, 75, 125 and 225 m in the water column. These turbid layers become detached from the bottom and prevailing conditions suggest that much of the fine-grained material is transported out of the discharge area by subsurface currents.