# INITIAL AND NEAR-FIELD SUBSEQUENT DILUTION AT THE KEY WEST OUTFALL

John J. Tsai, NOAA/AOML (NOAA/Atlantic Oceanographic and Meteorological Laboratory 4301 Rickenbacker Causeway, Miami, Florida 33149)
John R. Proni, NOAA/AOML
Hening Huang, Hazen and Sawyer
Julius F. Craynock, NOAA/AOML

ABSTRACT
A one-year field study of discharge from the Key West Outfall was conducted from June 1993 to July 1994. A towed CTD was used to measure salinity about every other month with a fixed current mooring next to the outfall. Salinity deficit was used as a tracer to estimatre the minimum surface dilution at the boil and near field subsequent dilution. The measured dilution at the boil ranged from 6:1 to 35:1, and a zone of intertidal dilution 50 m in radius was observed. Total physical dilution was rapid within 200 m and reached 100:1 at about 500 m from the boil.

INTRODUCTION
Initial and subsequent dilutions of waste-water discharged from municipal outfalls have been of great concern to environmentalists fo5r a long time. Different approaches have recently developed (e.g., Proni et al., 1994; Huang et al., 1994; Huang et al., 1995) for mixing zone studies to define the "worse case" criteria required by the EPA. However, field data are still inadequate. Recent study at four outfalls off the southeast coast of Florida provide excellent results of initial dilution and subsequent dilution (Proni et al., 1994)

Different approaches can be used to determine initial and subsequent dilutions of outfalls. One of the least expensive and most cost-effective ways is through conductivity measurements with current information. Salinity deficits at the boil and the surrounding area can generate easy measurements of initial and subsequent dilutions when the position associated with each measurement can be accurately determined.

This paper presents partial results of a study at the Key West Outfall using a current mooring near the outfall over a one-year period with towed CTD measurements about every two months during the same period of current mooring. A semi-empirical equation from dimensional analysis for initial dilution was derived and compared with data from SEFLOE II (Hazen and Sawyer, 1994). Subsequent dilutions as a function of distance from boil position were estimated from salinity deficits and compared with dye measurements at the same outfall.