271
13

UC-12

D-498

C00-2158-10

INVESTIGATION OF THE INFLUENCE OF THERMAL DISCHARGE
FROM A LARGE ELECTRIC POWER STATION ON THE TEMPERATURE
AND NEAR-SHORE CIRCULATION OF LAKE MICHIGAN

Quarterly Progress Report

C. H. Mortimer and G. K. Sato
Center for Great Lakes Studies
The University of Wisconsin--Milwaukee
Milwaukee, Wisconsin, 53201

1 October 1973 - 31 December 1973

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

Prepared for the U. S. Atomic Energy Commission
Under Contract No. AT(11-1) 2158

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

24

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

I. Introduction:

This quarterly progress report describes the work conducted during the past three months at the Center for Great Lakes Studies on nearshore circulation in Lake Michigan near the Oak Creek Power Plant, Oak Creek, Wisconsin.

II. Current Meter Program:

No more current meters were reset due to the problems associated with the premature release of current meters and their defective recordings as mentioned in the last report.

The current meters from Stations 5 and 1 were recovered on September 19 and November 7, respectively. (See Figure 1 for Station locations.) The squib in the Sedar from Station 1 had failed to fire; as a result the meters had to be recovered by divers. Unfortunately none of the above meters contained complete data. The records are still being analyzed.

Analysis of the data from previous surveys is continuing. Some data have been processed, using computer programs now developed, to obtain hourly averaged values from ten minute interval values, vector frequency diagrams, and progressive vector diagrams.

The vector frequency diagrams illustrate the distribution of current meter data according to intervals of speed and direction. Preliminary analyses indicate the current direction to be predominantly parallel to the depth contours for current speeds between 3 cm/sec and 25 cm/sec. Most of the currents were in the southeasterly direction. For speeds less than 3 cm/sec, distinct patterns could not be discerned.

The progressive vector diagrams can be used to show the general flow pattern of the currents past current meters. The progressive vector diagrams exhibited straight line flow characteristics indicating the absence of any dominant periodic motions such as inertial motion.

Time series analysis of hourly wind and current data for April 1972 show that most of the variance is contained in the long period regions of the spectra. The lack of coherence between wind and current data for an entire month indicates the need for treating both time series as "episodes" of events rather than a continuous time series for the entire period during which measurements were made.

III. Future Work:

The use of vector frequency and progressive vector diagrams will be continued on the rest of the data to determine the general flow characteristics of the currents. The application of time series analysis to the data will be further investigated. Also, the cause of the episodic nature of current data will be studied. The development of a rigorous testing and maintenance routine for the current meters is proceeding.

Figure 1
Current Meter Station Locations

Scale: 1" = 1.9 miles