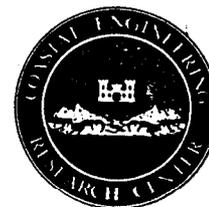




# Coastal Engineering Technical Note



## N-LINE (BATHYMETRIC CHANGES) MODEL

**PURPOSE:** The purpose of this technical note is to present an update of the status of the N-line model which was first reported in 1983. The original model was provided CERC (Perlin and Dean, 1983) for the purpose of simulating sediment transport and bathymetric changes in the vicinity of coastal structures. Following that initial release, several improvements and enhancements were made to the code in order to make the model easier to use and more general in scope. The latest version of the model and a detailed users guide are now available (Scheffner and Rosati, 1987).

**GENERAL:** The N-line model utilizes empirical sediment transport relationships to compute both along-shore and on- and off-shore sediment transport in the vicinity of coastal structures as a function of a specified off-shore wave climate. Effects of both refraction and diffraction are included. The model utilizes these computed distributions in a sediment continuity equation to predict shoreline and bathymetric changes in the vicinity of various coastal structures. Presently, the model can simulate single or multiple shore perpendicular groins or jetties, multiple detached breakwaters, dredged material disposal, and beach nourishment. The primary limitation of the model is due to the basic equilibrium profile assumption that the offshore depth increases continually in the offshore direction. This limitation precludes the modeling of offshore bars or troughs. A discussion of the capabilities and limitations of the model are presented in the users manual. The model is presently available for use on a Cyber 176 at Cybernet, the Corps' contract computer service.

**INPUT REQUIRED:** The present version of the model includes an interactive program for constructing an input data file. Input data include the offshore wave height, period, and direction in addition to a grain size descriptive of the location and the geometry of the modeled area. Input for the numerical model include a time step, along-shore grid spacing, and contour line specification. A complete description of the input variables is provided in the users manual which includes specific examples of input files and output results. The N-line model requires the International Mathematical and Statistical Library, Inc. (IMSL) subroutine package LEQTIB. If the user's computer center does not have access to this package, the user must supply a subroutine to facilitate the solution of a banded storage mode matrix.

WARNING: The model was developed to provide the potential user with a tool for predicting the effects of certain specific modifications to the coastal zone that is predominately influenced by waves and is not characterized by complex bathymetries or irregular structures. The model is not intended to apply to all situations, more sophisticated and expensive modeling efforts may be required for some applications. As with all numerical models, the user should be aware of the limitations of the model and interpret the results accordingly. This model is capable of yielding results even when it is incorrectly applied or applied to situations which are clearly inappropriate. The user should be aware that the model can be very expensive and time consuming to apply and should therefore be used appropriately.

AVAILABILITY: A copy of the new version of the N-line model and the interactive program for constructing input files can be obtained by sending a magnetic tape to Ms. Gloria Naylor, US Army Engineer Waterways Experiment Station, Computer Programs Library (CEWES-IM-SC), PO Box 631, Vicksburg, MS 39180-0631 and requesting a copy of the "N-line" model,

ADDITIONAL INFORMATION: For additional information contact Norman W. Scheffner of the Circulation and Transport Unit at CERC (601) 634-3220.

REFERENCES:

Perlin, M. and Dean, R. G. 1983. "A Numerical Model to Simulate Sediment Transport in the Vicinity of Coastal Structures" MR 83-10, Coastal Engineering Research Center, US Army Engineer Waterways Experiment Station, Vicksburg, MS.

Scheffner, N. W. and Rosati, J. D. 1987. "A User's Guide to the N-Line Model: A Numerical Model to Simulate Sediment Transport in the Vicinity of Coastal Structures" Instructional Report CERC-87-4, Coastal Engineering Research Center, US Army Engineer Waterways Experiment Station, Vicksburg, MS.