

# CONTENTS

<b>Process Considerations in Design of Ozone Contactor for Disinfection</b> <i>by Shaukat Farooq, Richard S. Engelbrecht, and Edward S. K. Chian</i> . . . . .	835
<b>Solution of Coupled Nonlinear Ecosystem Equations</b> <i>by Gary C. Niemeyer</i> . . . . .	849
<b>Removal of Cadmium (II) by Activated Carbon Adsorption</b> <i>by Chin-Pao Huang and F. B. Ostovic</i> . . . . .	863
<b>River Temperature Variation with Freezing and Storage</b> <i>by Charles C. S. Song and Kim Sau Leung</i> . . . . .	879
<b>Variable-Order Model of Bacterial-Film Kinetics</b> <i>by Bruce E. Rittmann and Perry L. McCarty</i> . . . . .	889
<b>Dynamics of Growth and Breakage of Alum Flocculation in Presence of Fluid Shear</b> <i>by John D. Boadway</i> . . . . .	901
<b>Optimum Backwashing of Sand Filters</b> <i>by Appiah Amirtharajah</i> . . . . .	917
<b>Direct Injection of Reclaimed Water into an Aquifer</b> <i>by Paul V. Roberts, Perry L. McCarty, and William Roman</i> . . . . .	933
<b>Economic Assessment of FGD Sludge Disposal Alternatives</b> <i>by J. Wayne Barrier, H. Lewis Faucett, and L. Jack Henson</i> . . . . .	951

→

This Journal is published bimonthly by the American Society of Civil Engineers. Publications office is at 345 East 47th Street, New York, N.Y. 10017. Address all ASCE correspondence to the Editorial and General Offices at 345 East 47th Street, New York, N.Y. 10017. Allow six weeks for change of address to become effective. Subscription price to members is \$10.00. Nonmember subscriptions available; prices obtainable on request. Second-class postage paid at New York, N.Y. and at additional mailing offices. EE, EM, TE.

The Society is not responsible for any statement made or opinion expressed in its publications.

<b>Fate of Nutrients During Aerobic Digestion</b> <i>by Paul L. Bishop and Michael Farmer</i> . . . . .	967
<b>Lake Process Models Applied to Reservoir Management</b> <i>by Wesley L. Bradford and David J. Maiero</i> . . . . .	981
<b>Highway Construction Impact on Water-Supply Lakes</b> <i>by Kok-Heng Tan and Dhandapani Thirumurthi</i> . . . . .	997

---

TECHNICAL NOTES

Proc. Paper 14049

---

<b>Ecosystem Modeling: Structural Approach</b> <i>by Dennis P. Lettenmaier and Jeffrey E. Richey</i> . . . . .	1015
<b>Total Phosphorus Transport during Storm Events</b> <i>by F. H. Verhoff and D. A. Melfi</i> . . . . .	1021
<b>Simple Model for Ocean Outfall Plumes</b> <i>by Harvey C. Schau</i> . . . . .	1026
<b>Simple Sampler Activation and Recording System</b> <i>by Fred A. Koehler, Frank J. Humenik, Edd P. Harris, and James C. Barker</i> . . . . .	1032
<b>SWMM Stormwater Pollutant Washoff Functions</b> <i>by Thomas K. Jewell and Donald Dean Adrian</i> . . . . .	1036

---

DISCUSSION

Proc. Paper 14043

---

<b>Goal Programming Model for Water Quality Planning</b> , by A. Bruce Bishop, Rangesan Narayanan, William J. Grenney, and Paul E. Pugner (Apr., 1977. Prior Discussion: Feb., 1978). <i>closure</i> . . . . .	1043
<b>Oxygen-Sag in a Tidal River,</b> <sup>a</sup> by Garry J. Macdonald and Richard N. Weisman (June, 1977). <i>by William S. Wakelin</i> . . . . .	1044

---

<sup>a</sup>Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.

<b>Phosphate Removal Using Waste Calcium Sulfate,*</b> by Thomas L. Theis and Gail A. Fromm (Oct., 1977). <i>by Tirupathur Damodara Rao and Thiruvengkatachari Viraraghavan</i> . . . . .	1047
<b>Activated Sludge-Unified System Design and Operation,*</b> by Thomas M. Keinath, Mark D. Ryckman, Caleb H. Dana, and David A. Hofer (Oct., 1977). <i>by James J. Bisogni, Jr. and Richard I. Dick</i> . . . . .	1048
<b>Heuristic Algorithm for Wastewater Planning,*</b> by Cheng H. Chiang and Donald T. Lauria (Oct., 1977). <i>by Elbert E. Whitlach, Jr.</i> . . . . .	1051
<b>Laguna de Bay Water Resources Development,</b> by Ernest Pariset (Dec., 1977). <i>errata</i> . . . . .	1053
<b>Principles for Water Quality Management,*</b> by Daniel A. Okun (Dec., 1977. Prior Discussion: Aug., 1978). <i>by Earnest Boyce</i> . . . . . <i>by Edward J. Cleary</i> . . . . . <i>by C. Scott Clark</i> . . . . .	1053 1055 1057
<b>Density of Milled and Unprocessed Refuse,*</b> by Robert K. Ham, John J. Reinhardt, and Gerald W. Sevick (Feb., 1978). <i>by Robert P. Stearns</i> . . . . .	1059

INFORMATION RETRIEVAL

The key words, abstract, and reference "cards" for each article in this Journal represent part of the ASCE participation in the EJC information retrieval plan. The retrieval data are placed herein so that each can be cut out, placed on a 3 × 5 card and given an accession number for the user's file. The accession number is then entered on key word cards so that the user can subsequently match key words to choose the articles he wishes. Details of this program were given in an August, 1962 article in CIVIL ENGINEERING, reprints of which are available on request to ASCE headquarters.

---

\*Discussion period closed for this paper. Any other discussion received during this discussion period will be published in subsequent Journals.