

# Energy Production and Reservoir Water Quality



A Guide to the Regulatory, Technical, and  
Theoretical Basis for Required Studies

EDITED  
BY

James Martin      John Higgins  
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# ENERGY PRODUCTION AND RESERVOIR WATER QUALITY

*A Guide to the Regulatory, Technical, and  
Theoretical Basis for Required Studies*

SPONSORED BY  
Environmental Effects Committee of the Energy Engineering Division  
of the American Society of Civil Engineers

EDITED BY  
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of Civil Engineers*

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# Foreword

The ASCE Energy Engineering Division held a Workshop 2000 attended by all committee chairs to discuss problems of mutual interest for which task committees might be formed. The Environmental Effects Committee, the Fossil Generation and the Hydropower Committee brought up the problem of the effect of water quality regulations on power generation operations. This was truly a joint problem since power generation at both fossil and hydropower operations could affect the water quality within and downstream of impoundments and water quality conditions within a reservoir could often limit hydropower generation. In addition, many steam electric power plants are located along hydropower reservoirs; the thermal discharges from these plants can affect reservoir water quality, and the plants' withdrawals can entrain resident or migratory fish and other aquatic organisms.

A result of Workshop 2000 was to form a small group from the two committees to more specifically define the objectives of a task committee and to seek funding to support it. The group decided to form a task committee on "Energy Production and Reservoir Water Quality" within the Environmental Effects Committee. The objective of the task committee was to produce a guideline document on study methods and procedures for investigating the interrelationship between energy production and water quality in reservoirs.

The group applied for and obtained support through an ASCE Opportunity Fund award. The ASCE Opportunity Fund was created by the ASCE Board of Direction, and administered through the Opportunity Fund Committee, to encourage development of innovative programs that promote civil engineering and its goals, enhance value to members, or advance the public image of the profession. Additional funds for final manuscript preparation were made available through the ASCE TAC budget to the Energy Engineering Division. The task committee assembled to undertake the study and prepare the guidelines is shown in the list of contributors. Each of these individuals volunteered their own time to the task committee for meetings, correspondence, document writing and assembly. Some of their employees funded portions of the expenses of meetings, made facilities available for meetings, and provided editorial and library assistance. The volunteer contributions of time and their own employer resources leveraged the ASCE funding contributions by about 10:1.

There are a large number of steps in bringing a working group and document like this together. A detailed outline of the document was prepared and distributed to the contributors in early 2001. Working sessions were held in the Spring and Fall of 2001 with different groups of contributors to further revise the outline and to make writing assignments. Drafts of chapters prepared following these sessions underwent

extensive review, re-write, and reorganization at a working session in the Spring of 2002. Contributors to individual chapters met and corresponded among themselves during the Fall and Winter of 2002, and chose a lead author for each chapter to bring the ii contributions together. The chapter lead authors met in the Spring of 2003 to review an assembled draft of the document, do further editing, and to prepare remaining material for copyediting and formatting. A small internal editorial group met to review the copyedited document, select and contact final outside reviewers, and prepare any required revisions in response to outside reviewer comments. The final document was submitted to ASCE Publications for printing and distribution in 2006.

At the time the Environmental Effects Task Committee was beginning this project, the ASCE TAC Engineering Mechanics Division (EMD) was completing a ASCE Publications report on Environmental Fluid Mechanics. The EMD made available draft summaries of its text chapters to the Task Committee for review, to serve as a reference and to minimize duplication of effort. In addition, the Task Committee held a session on its work at the EMD annual conference in 2002. As a result, this publication and the EMD report are highly complementary; the EMD report deals mostly with the theoretical aspects of environmental fluid mechanics, while this document is intended primarily to assist with resolving actual situations.

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