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	Engineering and Design WATER QUALITY AND ENVIRONMENTAL MANAGEMENT FOR CORPS CIVIL WORKS PROJECTS (REPORTS CONTROL SYMBOL DAEN-CWH-4)	
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Engineering and Design
WATER QUALITY AND ENVIRONMENTAL MANAGEMENT
FOR CORPS CIVIL WORKS PROJECTS
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1. Purpose

This regulation establishes a policy for the water quality management program at Corps civil works projects.

2. Applicability

This regulation applies to HQUSACE elements, major subordinate commands, districts, laboratories, and field operating activities (FOAs) having civil works responsibilities.

3. References

- a.* Public Law 80-845, Federal Water Pollution Control Act of 1948, as amended in 1956, 1961, 1965, 1970, 1972, 1977, and 1987.
- b.* Water Resources Development Act of 1986, 1988, 1990, and 1992.
- c.* Executive Order 12088, 13 October 1978 (3 C.F.R.).
- d.* ER 1105-2-100, Guidance for Conducting Civil Works Planning Studies.
- e.* ER 1110-1-261, Quality Assurance of Laboratory Testing Procedures.

f. ER 1110-1-263, Chemical Data Quality Management for Hazardous Waste Remedial Activities.

g. ER 1110-1-8100, Laboratory Investigations and Materials Testing.

h. ER 1110-2-240, Water Control Management.

i. ER 1110-2-1150, Engineering and Design for Civil Works Projects.

j. ER 1110-2-1462, Water Quality and Water Control Considerations for Non-Federal Hydropower Development at Corps of Engineers Projects.

k. EM 1110-2-1201, Reservoir Water Quality Analysis.

4. Authorities

- a.* The U.S. Army Corps of Engineers' water quality management authority is founded on the Federal Water Pollution Control Act (FWPCA) of 1948 and its amendments including the Clean Water Act of 1977 and the Water Quality Act of 1987. The FWPCA Amendment of 1972 (PL 92-500) strongly affirms the Federal interest in water quality. Executive Order 12088, Federal Compliance With Pollution Control Standards, dated 13 October 1978, requires compliance by Federal facilities and activities with applicable pollution control standards in the same manner as any non-Federal entity. To ensure project compliance, the Federal Facilities Compliance Act of 1990 provides for EPA and/or States to inspect Federally owned or Federally operated facilities that are subject to the Clean Water Act of 1977.

This regulation supersedes ER 1130-2-334 dated 30 April 1986, ER 1130-2-415 dated 28 October 1976, and ER 1110-2-1402 dated 15 September 1978.

b. Water control management authority is contained in specific project authorizations and other enabling legislation. The ultimate responsibility to control water quantity and quality at all Corps projects rests with the Corps.

5. Definitions

The following definitions apply to the use of these terms in this regulation.

a. Water - The surface and ground waters of the United States, its territories and protectorates, including estuaries and coastal waters.

b. Quality - The chemical, physical, and biological condition of water.

c. Water quality - The physical, chemical, and biological characteristics of water as it occurs on or beneath the surface of the earth including its quantity, distribution, movement, sediments, and biological community (including transients).

d. Water quality management - The management of water resources by the Corps of Engineers to improve, restore, conserve, and protect the physical, chemical, and biological quality of the water for natural and human use.

e. Operation - Same as regulation, pertains to the operation of water control structures for adjustment of flow quantity and quality.

6. Policy

a. It is national policy that the Federal government, in the design, construction, management, operation, and maintenance of its facilities, shall provide leadership in the nationwide effort to protect and enhance the quality of our air, water, and land resources. Federal facilities shall comply with all Federal, state, interstate, and local requirements in the same manner and extent as other entities. Federal antidegradation policy maintains and protects existing high quality waters where they constitute an outstanding national resource. Where the quality of a water resource supports a diverse, productive, and ecologically sound habitat, those waters will be maintained and protected unless there is compelling evidence that to do so will cause significant national economic and social harm.

No degradation is allowed without substantial proof that the integrity of the stream will not diminish. In all cases, the existing instream water uses and the water quality necessary to protect them will be maintained.

This national policy is founded on the overall objective established in the Clean Water Act to restore and maintain the chemical, physical, and biological integrity of the nation's waters. The thrust of this policy is to protect all existing and future uses including assimilative capacity, aquatic life, water supply, recreation, industrial use, hydropower, etc. Where uses are degraded, it is the national goal to restore those degraded waters to more productive conditions.

b. The Corps' policy is to take a leadership role in carrying out the goals and objectives of the national policy by managing the nation's water resources that are under our control so that they are protected, maintained, and restored. As steward of project resources, the Corps will not allow degradation of the aquatic resource except as noted in paragraph 6a above. In cases where degradation has occurred, it is the Corps' policy to restore the resource to a biologically productive, diverse, and ecologically robust condition. Corps management responsibilities extend throughout the area influenced by and influencing the water we manage. Because the management of our projects affects environments distant from our property boundaries and is influenced by actions of others also distant from our properties, the Corps must actively pursue a management philosophy committed to partnering with a wide range of resource organizations and interested individuals. It is Corps policy to develop and implement a holistic, environmentally sound water quality management strategy for each project. This strategy must be developed in concert with other authorized project purposes. However, the environment will be addressed as equal in value and importance to other project purposes when developing or carrying out management strategies. The Corps will, at least, manage its projects in accordance with all applicable Federal and state environmental laws, criteria, and standards. It is the goal of the Corps to responsibly manage our projects to maximize their environmental potential. The four pillars of the Army environmental strategy (conservation, prevention, restoration, and compliance) will help guide the Corps policy for water quality management.

c. Current budget guidance encourages districts to program funds for environmental restoration of aquatic wetland and upland habitat where Corps projects or their operation have caused quantifiable damage to these resources and where project modifications would result

in a cost-effective solution. Such restoration projects can be initiated using the General Investigation feasibility procedures which require Congressional authorization and non-Federal cost-sharing partner. Other authorities can be used to restore environmental resources such as Section 1135 of the Water Resources Development Act (WRDA) of 1986, Section 204 of WRDA 1992, and Section 216 of the Flood Control Act of 1970.

7. Commitment

a. Corps water control projects (dams, local protection, levee systems, and navigation projects) store, regulate, divert, constrict, or convey most of the surface waters in the United States. As water moves through Corps projects, the projects alter the physical, chemical, and biological character of much of that water. Consequently, Corps projects determine or significantly influence the ecological integrity of a large percentage of the riverine and estuarine environment in the United States. Corps water control decisions determine or significantly influence whether or not Corps projects have a positive or negative impact on the environmental value and human usefulness of much of the nation's water resources. As stewards of a significant percentage of the nation's aquatic environment, the Corps has a responsibility to preserve, protect, and where necessary restore that portion of the environment altered by Corps projects. The Corps is fully committed to environmentally sound project management and operation. It is the policy of the Corps that the environment be given equal standing not simply consideration in all aspects of project management and the operational decision-making process.

b. The water quality program and the Corps are committed to holistic watershed ecosystem based resource management. This requires a comprehensive understanding of the interactions of the uses and users of the aquatic environment and the impact of Corps structures and their operation on the aquatic environment. The continued development of ecological management skills within the Corps is essential for the development, protection, and restoration of the resources in our charge. Understanding the physical, chemical, and biological processes allows the Corps the opportunity to operate, maintain, and modify projects in ways that provide for sustainable human uses while protecting, restoring, and conserving the environmental value of the resource. The factors that determine the persistence, resilience, and robustness of ecosystems are

often counter-intuitive processes and lack of understanding complicates attempts to manage them.

c. The water quality program provides one of the greatest opportunities for the Corps to demonstrate its commitment to environmental leadership, conservation, restoration, and stewardship. By planning, designing, constructing, and operating water projects in a manner that achieves project purposes while preserving, protecting, and restoring the ecological integrity of the aquatic resources, the Corps can demonstrate its leadership role in responsible environmental engineering. Environmental success will not be measured by production of single or limited numbers of species, or enhanced recreational opportunities, but by expertise in reestablishing flow regimes, rehabilitating wetlands and riparian areas, managing sediment delivery, controlling the chemical and physical aspects of the aquatic systems, and overall ability to restore a dynamic, self-sustaining aquatic ecosystem. This approach will make a significant contribution toward the achievement of the sustainable development goals of the nation.

8. Management

Division-wide water quality management programs are required. Specific water quality management objectives must be developed by the districts for each project, and procedures must be outlined and implemented to meet those objectives. These objectives will be included in the project water control plans. These plans must be reviewed and updated as needed but not less than every 10 years. The plans must achieve environmentally sustainable overall use of the resource. The water quality management plans should be scoped to include all areas influencing and influenced by the project. Divisions must ensure that water quality management is an integral part of the water control management program. Division water control/quality elements are responsible for approval of deviations from water control manuals and should provide guidance in developing water quality data collection activities. Divisions should adopt and implement the following general water quality management objectives for all Corps water resources projects:

a. Ensure that water quality, as affected by the project and its operation, is suitable for project purposes, existing water uses, and public health and safety and is in compliance with applicable Federal and state water quality standards.

- b. Define baseline water quality conditions for each project. A preproject water quality evaluation, and/or a description of the postconstruction water quality characteristics must be developed at the earliest time in which data collection and evaluation are practical.
- c. Establish and maintain a water quality monitoring and data evaluation program that ensures achievement of water quality management objectives and to evaluate project performance and water quality trends.
- d. Identify existing and potential water quality problems, and develop and implement appropriate solutions. Identify opportunities for water quality improvements to projects or receiving waters and initiate management actions that accomplish those improvements.
- e. Integrate water quality considerations into all water control management decisions.
- f. Maintain coordination and communication among division and district elements involved in environmental and water quality matters.
- g. Maintain close coordination and, where possible, collaboration with all interested governmental and nongovernmental entities with regard to activities that may affect or be affected by the water quality or water control decisions associated with Corps projects.
- h. Use an interdisciplinary team approach to develop objectives, establish priorities, and execute the water quality management program.
- i. Develop an understanding and continuing awareness of the water quality factors and processes in the project, in the watershed, and in the area influenced by project operation.
- j. Where degraded conditions exist, develop a plan for restoration that will restore the aquatic environment to a desirable, biologically diverse, productive, and robust condition. This plan should normally be coordinated with appropriate local, state, and other Federal agencies.
- k. Ensure that the project and its operation offer the lowest stress possible to the aquatic environment.
- l. Ensure that Corps projects are managed to accentuate the projects' potential to play a positive role

in the conservation and preservation of natural and cultural resources.

- m. Document the water quality management activities of the program and individual projects to record trends, identify problems and accomplishments, and provide guidance to program managers.
- n. Recognize that some problems and opportunities are of short duration and demand rapid response. The district water managers should be empowered to react in a time frame commensurate with the event and with best available information and judgment. Long-term situations provide for more comprehensive study and refined response.
- o. As appropriate, promote and develop cost-sharing partnerships in accordance with authorities outlined in paragraph 6c.

9. Water Quality Data Collection Program

A continuing water quality data collection program is necessary for each Corps project. This data collection is essential in order to understand and manage the environmental resources of the Corps' water projects effectively. Data collection activities should be guided by the following general rules:

- a. Data collection efforts will be determined on a project-specific basis. Local conditions, specific project characteristics, and program objectives will be used to determine parameters to be measured, sampling and analytical methods, frequency of sampling, number and location of data collection stations, and data analysis techniques to be employed.
- b. Sample collection and handling shall be accomplished using scientifically sound and commonly accepted procedures.
- c. Biological monitoring programs are encouraged. Biological data are often the most important component of a water quality data collection effort, are especially useful in identifying pollution spikes or other forms of environmental stress, and often are more cost effective than more conventional chemical and physical data. In most cases an integration of physical, chemical, and biological data is needed to understand the performance and behavior of a project. A component of a monitoring program should be determining if threatened or

endangered species may be adversely affected or if there are opportunities to improve the habitat of these species.

d. Partnering of data collection efforts with other governmental and nongovernmental entities is encouraged and is cost effective. Use of appropriately trained volunteers for observers and data collection is encouraged.

e. A quality assurance/quality control (QA/QC) program covering all aspects of data collection and analysis is required to ensure validity of the data. Analytical procedures accepted by the U.S. Environmental Protection Agency (EPA) should be utilized as appropriate.

f. Data collection programs must be evaluated and modified as necessary to satisfy established objectives, eliminate unnecessary sampling, and address changes in priorities.

10. Water Quality Data Collection Objectives

a. Water quality data collection activities will be carried out to support one or more of the following objectives as appropriate for a given project or system of projects:

(1) Establish baseline conditions and identify trends, opportunities, and problems.

(2) Assess compliance with applicable Federal, state, and local water quality standards.

(3) Provide an adequate database for understanding project conditions and facilitate coordination with Federal and state agencies with regard to watershed activities influencing water quality.

(4) Investigate special problems, design and implement modifications, and improve water management procedures.

(5) Provide data to support reservoir regulation elements for effective management and control of water quality and environmental problems.

(6) Provide water quality data required for real-time project regulation.

(7) Evaluate water/sediment interactions and their effects on overall water quality.

(8) Engineer aquatic environments and ecosystems.

(9) Develop and maintain the environmental awareness and sensitivity essential for sound stewardship for the resource.

(10) Monitor swimming beaches and water supplies for priority pollutants.

b. Other objectives or special needs for water quality data may occur. District offices must take the initiative in determining data needs, identifying problems or opportunities, proposing solutions, justifying resources, implementing approved actions, and reporting results.

c. When designing water quality studies or developing or revising water control plans, the views of other Federal, state, and local agencies regarding data requirements must be fully considered. Data collection is costly and labor-intensive; therefore, every opportunity to share data and partner the data collection effort must be exercised. Coupling water quality data with hydrologic and other environmental data is essential.

11. Engineering and Design

During engineering and design it is necessary that certain studies and evaluations be accomplished to determine appropriate project management objectives and ensure a product that will accomplish those objectives.

a. For interstate waters, describe/cite Federal-state water quality standards as approved by the EPA. For intrastate waters, describe/cite water quality standards established by the state.

b. Present an up-to-date analysis and interpretation of a watershed-based, aquatic ecosystem evaluation of the preproject conditions. This evaluation must include an evaluation of all physical, chemical, and biological factors that influence or are likely to be influenced by the project or its operation. The assessment should include economic and social components as a part of the overall ecosystem analysis. This analysis must identify early on the data needs and data availability to successfully develop a comprehensive report.

c. Develop watershed-based ecosystem management tools and practices that will achieve required quality standards and sustainably maintain an ecosystem that can support the social, economic, and environmental goals set for the project. The presentation should include optimum and allowable variation of water quality and quantity and identify seasonal objectives and goals for environmental ecosystem management. The evaluation should include expected postproject conditions.

d. Develop typically predictive models of the physical, chemical, and biological response to the project and its operation to allow design feedback and the development of adequate operating plans. These efforts typically must be complete before final design can be accomplished.

e. Obtain assistance in the development of these studies and models from the Corps' Committee on Water Quality if needed.

12. Water Quality Data Application

a. Water quality data must be applied to understand and manage water resources effectively. Application of appropriate mathematical models promotes efficient and effective use of data. Models are powerful tools for guiding project operations, refining water quality sampling programs, planning project modifications, evaluating management scenarios, improving project benefits, and illuminating new or understanding complex phenomena. Models should be used to the maximum extent practicable.

b. Use of automated data management systems (collection, interpretation, and storage) contributes to the efficiency. Divisions and districts must utilize automated information systems appropriate to their needs. In order to make water quality data widely available, data should be transferred to the EPA Storage and Retrieval System (STORET).

13. Reporting

The diversity and magnitude of impacts Corps projects and water management activities have on natural resources are very significant. Corps projects and their mode of operation often determine the fate of ecosystems, usefulness of the water resource, and overall

benefit derived from a project. The impacts of projects and their operation are often far reaching, affecting the environment and resource usefulness quite distant from the project. This makes effective monitoring and reporting essential to responsible management. Various reports are required to ensure that adequate information is available to HQUSACE, divisions, districts, other agencies, and the public. Reports are not limited to reservoir projects but encompass all civil works projects that influence the physical, chemical, or biological condition of the aquatic environment. Reports are prepared for the following general objectives:

a. To provide information needed to manage the water quality program.

b. To ensure a review of division and district water quality management programs.

c. To disseminate information to the public, other agencies, academia, the media, and within the Corps.

d. To direct research and development (R&D), program R&D resources to meet identified needs, and establish new or terminate existing R&D programs.

e. To evaluate the design, management, and operation of each project.

f. To document identified opportunities, problems, and solutions.

g. To serve as a basis for developing technical guidance.

h. To provide a base for formulation of Corps-wide programs.

i. To store institutional knowledge and provide historical documentation.

j. To provide feedback to improve project planning, design, and operation and maintenance.

14. Reports Types

Accomplishment of the reporting objectives requires several types of reports. Each type should be tailored to address the specific characteristics of the project and meet the information needs of the report user.

a. *Project-specific reports.* Project-specific reports provide basic information on all pertinent factors affecting water quality and the aquatic environment. These reports should be prepared for each project and be updated as needed. These technical reports should contain: a general project description; watershed characteristics; physical project elements affecting water quality; water quality management objectives; data collection activities; evaluation of water quality conditions; effect of water control operations on water quality; and a description of the physical, chemical, and biological processes that take place in the project, affect the project, or are affected by the project. The report should comprehensively describe project water quality and the project's impact on water quality. It should identify specific concerns, problems, or opportunities. Project-specific reports describe historical and current water quality conditions and are developed along the lines of an owner's manual for the project. These technical reports are extremely useful to HQUSACE, divisions, and districts. The reports may also be useful to other resource agencies so they can better understand and appreciate the project and the effect and influence of the project on the water quality environment.

b. *Needs assessment reports.* Needs assessment reports are similar to project-specific reports and can often be incorporated into them. They describe a project based on the needs of the project and the investment of resources required to meet those needs. For example, a needs assessment report should identify all the needs of a project related to its water quality and the management thereof. The report should identify problems (sedimentation, eutrophication, watershed management, erosion, fisheries, wetlands, etc.), causes, appropriate solutions and alternatives, and the costs and benefits of implementation. The reports are useful for scheduling and allocating dollar resources for their maximum impact. These reports are primarily for project managers and division and district water control\water quality managers, project operations, environmental and project offices, and interested Federal, state, and local agencies. Needs assessment reports are encouraged for all civil works projects. Care should be taken to ensure that sensitive cost information, which may be contained in these reports, is not distributed to non-Corps offices.

c. *Special situation reports.* Special situation reports summarize unique events that occur which warrant upward reporting. Examples would include fish kills, hazardous waste spills, operational emergencies, health emergencies, unscheduled endangered species actions, etc. The report must include adequate detail to

explain the event, actions taken, monitoring activities, and plans for additional action to address the event and to prevent future occurrences and an indication if there will be follow-up reports. These reports are brief, factual accounts of the situation and must be forwarded to division and HQUSACE as the situation unfolds. Districts are *required* to report on the nature and extent of special situations as they occur. Because of their time-sensitive nature, these reports must be forwarded by the fastest means available.

d. *Special study reports.* Special study reports are detailed reports that describe a special topic or specific issue and delve in depth into the significance, character, and solution of that issue. Special study reports are prepared for all activities that affect project operation or water quality performance. Typically these reports address new operating plans, changes in or new management objectives, modeling results, or other activities that may impact project performance or benefits. These reports should be coordinated with division and HQUSACE as appropriate and forwarded for information as soon as they are completed.

e. *Annual water quality reports.*

(1) The annual water quality report summarizes the water quality management program for the past fiscal year and highlights specific project information and activities of the division and districts.

(2) The report describes the goals and objectives of each division's overall water quality management program, progress made toward meeting division-wide water quality management goals, and activities that are planned for out years. Other items include changes in technical capabilities in the division and district offices, relationships between water quality and water control management activities, pertinent division regulations, laboratory facilities, data management systems, and training needs. The report must include a discussion of research and development needs, special studies completed or required, water quality coordination with other agencies, scheduling for detailed project evaluations, and problems encountered with contracted work. The divisions should identify any hindrances to meeting their goals and objectives and should propose solutions for removing them. The report should highlight special assistance from the Committee on Water Quality, from the Water Operations Technology Support Program, from the Corps laboratories, or from HQUSACE, CECW-EH-W. Other information, as requested by HQUSACE, may also be required.

(3) The report should provide a project-by-project summary of water quality conditions, problems encountered and how addressed at each project, opportunities identified and how addressed, and innovative techniques utilized to improve water quality. Special regulation activities, new or modified data collection programs, plans to address identified problems, possible Corps-wide applications of available data (e.g. R&D), and ongoing applied research should also be included. Any changes to basic information, such as project water quality objectives, regulation/operation modifications for water quality, or modifications to sampling programs and objectives, should be summarized. Tabular format is encouraged for summarizing this information.

(4) This report is mandatory. Division commanders will prepare an annual water quality report for the preceding fiscal year. This report must reach HQUSACE (CECW-EH-W) by 1 February each year.

f. HQUSACE report. CECW-EH-W will prepare an annual report summarizing Corps-wide efforts and

accomplishments. An annual report on Corps-wide water quality management activities will be prepared by CECW-EH-W and sent to division commanders by 1 April each year. This report will discuss division activities during the previous fiscal year. In addition, information will be included on policy and technical guidance, status of relevant R&D efforts, Corps-wide training, newly issued ERs, ETLs, and EMs, and water quality activities. This report will be distributed to the divisions, who in turn are responsible for distributing copies to the districts.

15. Funding

Many of the necessary water quality related activities for completed projects are clearly chargeable and should be charged to Operation and Maintenance funds. However, special studies for use in design of specific projects should be funded with planning, engineering, or construction funds.

FOR THE COMMANDER:



JAMES D. CRAIG

Colonel, Corps of Engineers
Chief of Staff