

CECW-EH-W  Engineer Regulation 1110-2-1462	Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000	ER 1110-2-1462  20 February 1991
	Engineering and Design  WATER QUALITY AND WATER CONTROL CONSIDERATIONS FOR NON-FEDERAL HYDROPOWER DEVELOPMENT AT CORPS OF ENGINEERS PROJECTS	
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DEPARTMENT OF THE ARMY  
U.S. Army Corps of Engineers  
Washington, D.C. 20314-1000

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Regulation  
No. 1110-2-1462

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Engineering and Design  
WATER QUALITY AND WATER CONTROL  
CONSIDERATIONS FOR NON-FEDERAL HYDROPOWER  
DEVELOPMENT AT CORPS OF ENGINEERS PROJECTS

1. Purpose. This regulation provides policy and guidance for incorporation of Corps water quality and water control management responsibilities and considerations into the review of preliminary permit and license applications, operating agreements and other official contacts concerning non-federal hydropower development either at or affecting U.S. Army Corps of Engineers water resource projects.
2. Applicability. This regulation applies to HQUSACE/OCE elements, major subordinate commands, districts, laboratories and field operating activities (FOA) having civil works responsibilities.
3. References.
  - a. Federal Power Act (41 Stat. 1063, 16 U.S.C. 791-823) 10 June 1920, as amended (FPA).
  - b. Executive Order 12088
  - c. ER 1110-2-1402
  - d. ER 1110-2-1454
  - e. ER 1130-2-334
  - f. EM 1110-2-3600
4. Objectives. This regulation establishes procedures to ensure that formulation, development and operation of non-federal hydropower at Corps civil works projects or at other projects do not interfere with Corps water quality and water control interests and responsibilities. This applies to storage impoundments and locks and dams and requires consideration of upstream and downstream impacts and cumulative effects. The developer must prove the functionality of the proposal and demonstrate that it will not adversely affect the operational or structural integrity of the project, including the ability to meet water quality management responsibilities and authorized purposes.

5. Authorities.

a. Corps water quality management authority is founded on the Federal Water Pollution Control Act of 1948 and its amendments up to and including the Clean Water Act of 1977 and the Water Quality Act of 1987. Executive Order 12088, Federal Compliance With Pollution Control Standards, dated October 13, 1978, requires compliance by federal facilities and activities with applicable pollution control standards in the same manner as any non-federal entity.

b. Water control management authority is contained in the specific project authorizing legislation. The ultimate responsibility to control the quantity and quality of the water at the project rests with the Corps. This is accomplished through development of water control plans and regulation of projects and reservoir systems to meet authorized project purposes and other legislated requirements.

c. The Federal Power Act, as amended, delegates certain responsibilities to the Secretary of the Army and the Commander, USACE relative to Federal Energy Regulatory Commission (FERC) administration of the act. These pertain to assuring that non-federal development is appropriate and consistent with the purposes of the federal project and will not compromise its structural and operational integrity. The Electric Consumers Protection Act of 1986 amended the FPA in part to elevate environmental considerations in the hydropower licensing process.

6. Policy.

a. The Corps supports hydropower development at its projects that is consistent with authorized project purposes and water control and water quality management objectives. This support neither relieves the developer of any risks and responsibilities nor suggests that the needs of other users be compromised to suit developer demands.

b. Federal antidegradation policy maintains and protects existing high quality waters where they constitute an outstanding national resource. Where the quality of a water resource exceeds requirements for 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 can be 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 water uses including aquatic life, assimilative capacity, water supply, recreation and future hydropower development. As steward of project resources, the Corps cannot allow water quality to be degraded below its current state except as noted above. Water quality improvement is a national goal. In cases where it does not meet requirements for instream uses and ecological integrity, opportunities to improve water quality should be identified, evaluated, and implemented where feasible.

7. Procedures.

a. General.

(1) The licensing program for non-federal hydropower at Corps of Engineers projects is administered by FERC under authority of the Federal Power Act. ER 1110-2-1454 delineates Corps responsibilities in this process as provided in the Memorandum of Understanding (MOU) between FERC and the Department of the Army. Part II of the MOU specifically declares FERC the lead agency for environmental documentation.

(2) The Corps involvement with non-federal hydropower development at a project can be expected to span the economic life of the project. This involvement covers all phases of the development from FERC licensing through design, construction and operation of the finished facility. All phases require coordination and negotiation with the developer, FERC and other federal, state and local agencies and organizations. At any stage of the licensing process, conflicts and disagreements that cannot be resolved at the Field Operating Activity (FOA) level should be referred to HQUSACE for resolution.

b. Preliminary Permits. A preliminary permit is the initial expression of intent to develop hydropower at a project. It is typically conceptual in nature. Corps review should specify water control and water quality requirements for the project. A comprehensive response at this early stage will help prevent the developer from expending effort on a plan that early analysis indicates is not permissible. Early indication of developer interest allows the FOA to

tailor water quality data collection efforts in anticipation of the need to evaluate the effects of hydropower construction and operation.

c. License Applications.

(1) General. During the licensing process it must be clearly stated that the developer must fully satisfy the Corps with regard to the functionality of the proposal, its compatibility with authorized project purposes to include water quality, water control and other project management goals and objectives, and the absence of adverse impacts to the structural and operational integrity and performance of the project. Coordination should be established as early as possible with all appropriate agencies to assure that all concerns and issues are addressed. A clear line of communication must be established with the developer and information provided to him early in the process and on a continuing basis. Physical and mathematical modeling requirements for project aspects affecting both water quality and hydraulics, including habitat and mitigation required by resource agencies, must be coordinated and explained. Data requirements for design studies and post-construction operational monitoring to support existing uses and special operations must be identified. Federal policy on nondegradation must be stated clearly. Where existing conditions do not meet project water quality objectives, opportunities for improvement should be identified and addressed. In the formal transmittal to FERC, state that the review comments and recommended license articles are made under authority of Section 4(e) of the Federal Power Act.

(2) Storage Projects. The developer must demonstrate the effect of the facility on the water quality of the pool, the tailwater and other project areas that may be impacted. Realizing that water quality is not static but highly dynamic, this must be done for existing ambient water quality conditions, possible future conditions and extremes. New selective withdrawal or outlet structures or modifications to existing structures may be needed to meet Corps requirements for current and projected resource uses and protection. Nondegradation policy applies to in-lake as well as tailwater conditions. The blending, aeration, flow capacity and operational flexibility and redundancy of existing structures must be fully maintained to meet water control and water quality needs of the present as well as likely future needs.

(3) Locks and Dams.

(a) The reaeration productivity of locks and dams

through either weir or gate spillage must not be reduced by the addition of hydropower. Nondegradation policy as applied to navigation structures is directed at the preservation of dissolved oxygen concentrations throughout the downstream receiving pools or open river reach to protect against the occurrence of cumulative detrimental impacts throughout the navigation system. Other potential benefits of maintaining the gas exchange capacity of the structures, such as stripping of volatile organic compounds, should also be considered. Adequate spillage to maintain water quality, meet minimum flow requirements in the immediate tailwater area and minimize impacts to both upstream and downstream wetlands and threatened and endangered species and their habitats must be assured. Fixed spillage rates and flows during critical seasons are preferable to reliance on alternate mechanical reaeration devices and are preferable to operational schemes involving continuous adjustments of spillage to meet real-time water quality objectives.

(b) The hydraulic capacity of the structures and the potential effects of any increased backwater flooding due to encroachment of power facilities must be evaluated in terms of flooding impacts on upstream properties, earlier cessation of navigation, terrestrial, aquatic and wetland habitats, and the National Flood Insurance Program. No backwater is allowable where significant adverse impacts are identified. A degree of backwater may be allowed where the riverbanks are not heavily developed and navigation is voluntarily suspended, such as due to winter conditions or where traffic is very light. In this case, the amount allowed must be stipulated by the Corps and confirmed by model studies. FOA will inform the licensee, FERC and Federal Emergency Management Agency of the expected effect and the necessity for acquiring flowage easements. The only alternatives to purchasing easements are the licensee assuming liability for damages above modified ordinary high water, the Corps acquisition line, and designing the facility to eliminate backwater. The opposite effect, drawdown and associated rates of water level fluctuations, may be experienced at fixed-crest structures during low and moderate flows. Effects on navigation, wetlands, threatened and endangered species and their habitats, recreation and other interests must be evaluated and problems must be satisfactorily resolved.

d. Preconstruction/Construction Agreements. These agreements shall be prepared in consultation with appropriate federal and state resource agencies. The agreements must clearly define the developer's water quality and water

control requirements during preconstruction and construction phases to include bypass flows, pump and siphon sizing, depth of withdrawal and assurances of downstream thermal continuity and habitat suitability. They shall also address shutdown duration and frequency, evacuation procedures and transition back to Corps water control procedures, site access, inspection procedures, construction schedules, quality assurance/quality control, bonding and insurance. Construction shall be accomplished during periods least disruptive to Corps operations, and continuity of project operations and operational objectives shall be maintained. Agreements will include contingencies for extreme flow and water quality events.

e. Operating Agreement.

(1) The operating agreement is perhaps the single most important document related to non-federal hydropower development. Its purpose is to clearly prescribe the procedures and protocols to be used in the operation of the facility and in coordinating operations with the Corps. It shall clearly state Corps authority to change project operating criteria at any time and to order the developer to cease operation of the hydropower facility if it is deemed to be detrimental to water control or water quality objectives of the project, personnel or project safety or other project objectives. Water quality noncompliance criteria shall be specified, including reference to nondegradation policy. Operational constraints and extreme hydrometeorologic and water quality events that affect attainment of project objectives shall be identified and incorporated into the criteria.

(2) The agreement shall specify the developer's responsibility for maintaining operational records and timely reporting of data. Costs of stream gaging associated with hydropower operations shall be borne in full or in part by the developer. Special licensee requirements and installations, such as acoustic velocity meters and related equipment needed to replace stage-discharge gaging stations negated by variable backwater and drawdown, shall be specified. Required communication lines between the power plant and Corps personnel for this and all other coordination shall be defined. Transition procedures for switching flow control between the power plant and the project outlet works shall be included. It shall also address any points that may have been missed or overlooked during the licensing process or inadequately covered in the license articles. The agreement should be reviewed at least annually for the first

two years and periodically thereafter. It shall be modified if warranted to incorporate new requirements or modify existing ones as needed to protect Corps interests.

f. Relicensing. The relicensing process presents an opportunity for the Corps to recommend or require operational or structural modifications for hydropower facilities at Corps projects and at other projects that impact Corps projects and operations. Besides obvious impacts to Corps lakes from upstream developments, the effects of downstream facilities on water quality and water control operations for target stream reaches and index points must also be considered through review of project histories and impacts. At Corps projects, structural and operational modifications to meet nondegradation standards and environmental criteria must be implemented.

#### 8. Monitoring for Compliance.

a. The developer is responsible for appropriate monitoring of the impacts of hydropower development at Corps storage projects and locks and dams. The details will be delineated in the Operating Agreement. The Agreement shall specify parameters, monitoring sites (including water column profiles, where necessary), procedures, equipment, and quality assurance/quality control protocol. The developer is responsible for transmitting data to water control elements on a real-time basis and for the costs of monitoring and data transmission. In situations where stacked hydropower and cumulative impacts are a concern, the Agreement shall include this as a specific issue and overall monitoring objective.

b. Since maintenance of remote monitoring equipment (particularly dissolved oxygen sensors) is a major problem, quality assurance/quality control procedures must specify maintenance criteria. At some locations, the monitoring of pH, conductivity and other appropriate parameters, as well as temperature and dissolved oxygen, will be required to help indicate the status of the equipment and provide better reliability regarding interpretation of the data.

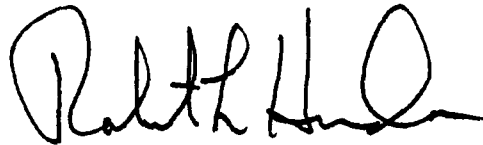
9. Cumulative Impacts. Several studies conducted by FERC demonstrate that stacked hydropower development has an accumulative impact on downstream water quality and other environmental factors. The major issue is loss of project reaeration capabilities during high temperature, low-flow events. The fluctuation of flows and navigation pool levels may have other negative impacts on water uses, including navigation. This issue must be carefully studied in order to



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develop corrective water control coordination of stacked  
hydropower and specific language for the Operating Agreement  
for each development.

FOR THE COMMANDER:

A handwritten signature in black ink, appearing to read "Robert L. Herndon". The signature is fluid and cursive, with a large initial "R" and "H".

ROBERT L. HERNDON  
Colonel, Corps of Engineers  
Chief of Staff