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US Army Corps

of Engineers®

ENGINEERING AND DESIGN

DROUGHT CONTINGENCY PLANS

DEPARTMENT OF THE ARMY
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Regulation
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Engineering and Design
DROUGHT CONTINGENCY PLANS

1. Purpose. This regulation provides policy and guidance for the preparation of drought contingency plans as part of the U.S. Army Corps of Engineers' (USACE) overall water management activities.

2. Applicability. This regulation is applicable to all field operating activities having Civil Works responsibilities for each USACE project or system of projects having controlled reservoir storage.

3. Distribution Statement. This publication is approved for public release; distribution is unlimited.

4. References.

a. Section 216 of the Flood Control Act of 1970, Public Law 91-611 (33 U.S.C. 549a)

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

c. EM 1110-2-3600, Management of Water Control Systems

d. Civil Works Technical Report CWTS 2015-11. Recent US Climate Change and Hydrology Literature Applicable to US Army Corps of Engineers Missions – Water Resources Region 13, Rio Grande, USACE, Washington, DC

e. Civil Works Technical Report CWTS 2015-15, USACE Drought Contingency Planning in the Context of Climate Change, USACE, Washington, DC

5. Policy. It is the policy of the Commander (reference 3b) that water control managers will conduct recurring reviews of project operations and conditions, and, when appropriate, adjust water control plans/manuals in response to changing watershed conditions. Accordingly, water control managers will:

a. Regulate USACE projects consistent with their authorized purposes for a range of flow conditions, including droughts.

*This regulation supersedes ER 1110-2-1941, 15 September 1981

b. Identify potential modifications to project regulation that would increase each project's capability to respond to a drought under current authorities, regulations, and policies.

c. Develop drought contingency plans on a regional, basin-wide, and project basis as an integral part of water control management activities, giving due consideration to the severity and duration of potential future droughts.

d. Develop project regulation strategies for droughts, in conjunction with stakeholders in the watershed, that consider critical low-flow sequences and various drought types.

e. Make provisions for coordination with appropriate state and other Federal interests during occurrence of drought conditions as part of drought contingency plans.

6. Discussion. A drought contingency plan should be integrated into water control management plans and provide a basic reference for water management decisions and responses to water shortage induced by a climatological drought. The drought contingency plan may address the operation of a single isolated reservoir or other water management structure or a system of reservoirs or structures.

a. As a water management document, the plan should be limited to drought concerns related to water management actions. To respond fully to watershed concerns during drought situations, water control managers should reexamine regulation procedures and water use at all projects on a recurring basis. The water control plan for each project should document and incorporate metrics or triggers that identify the onset of a drought or the end of a drought and resulting operational decisions necessary to respond in order to reduce dependency on use of the deviation process described in reference 3b. Using the deviation process is an option but should be the exception and not the preferred practice during drought conditions.

b. Water control plans should reflect public needs so that USACE may optimize regulations for authorized purposes based on current conditions. Consequently, as part of overall water control management, drought contingency plans must be developed within existing authorities at all USACE projects with controlled reservoir storage. Coordination with state and other Federal interests should be part of the implementation of drought contingency plans to facilitate and improve effectiveness during water-shortage periods. Public meetings may be held at the discretion of the District Commander to inform local interest of the drought contingency plan. Internal coordination with USACE emergency operation managers to apprise them of water control activities should be included to ensure that efforts being taken by the Corps during droughts are complementary to other ongoing authorities.

c. Studies to evaluate project modifications for significant water supply reallocation requiring new authorities are not within the purview of this Engineer Regulation (ER). Permanent modifications to serve long-term water needs should be addressed under authority of Section 216 of Public Law 91-611 (reference 3a) or other authority.

7. Climate Considerations. Hydrologic processes important in USACE water resources management such as precipitation intensity, duration, form (snow vs. rain), ground state (frozen, saturated, unsaturated), and evapotranspiration are sensitive to changes in temperature, and thus are impacted by climate change and variability. Impacts from climate change and variability may exacerbate changes in land use and land cover, including changing agricultural practices that also impact water management activities.

a. Increasing demand for water, combined with observed and expected increases in the occurrence and severity of drought, have added new challenges for multipurpose reservoir operations. Additional complexities are introduced due to the loss of storage capacity due to reservoir sedimentation and changes in sedimentation. The overarching USACE climate preparedness and resilience policy established in 2011 and updated in 2014 requires USACE integration of climate change preparedness and resilience planning and actions in all activities to enhance the resilience of our built and natural water-resource infrastructure and to reduce potential vulnerabilities to the effects of climate change and variability. USACE must also consider potential climate change impacts when undertaking long-term planning, setting priorities, and making decisions affecting its resources, programs, policies, and operations. Because USACE manages hundreds of reservoirs that affect millions of people, it is essential that reservoir operations consider observed and expected changes in drought. Effective drought contingency planning should rely on the best available and actionable scientific information about observed and expected hydrologic changes that impact drought.

b. It is also important to understand how multiple critical changes (e.g., warmer temperatures and drier conditions) can work together to generate extreme events. Specific characteristics of the regional hydro-climate affecting projects that should be recognized in the development of a drought contingency plan include:

(1) Strong seasonality

(2) Orographic influences on precipitation and temperature patterns

(3) Seasonal variability of precipitation

(4) Changes in the snowmelt season, including snowpack volume and onset of snowmelt

(5) Potential increases in heavy precipitation that might increase flood risks, even during drought

(6) Main drivers of future drought: changes in the boundary between the subtropics and mid-latitudes; increasing temperatures driving up evaporation; and shifts in the frequency and intensity of precipitation.

c. Policy and guidance related to expected changes that impact water resources management are still evolving. Therefore, a search of USACE policy and guidance is a required

first step in updating a drought contingency plan. At a minimum, planners and engineers should consult regional climate literature syntheses; references 3c, 3d, and 3e; and the latest National Climate Assessment. A qualitative assessment of hydrologic trends including variability and potential nonstationarities should be considered at a minimum. A USACE-developed nonstationarity detection tool can be found at https://maps.crrel.usace.army.mil/projects/rcc/portal.html. Products for short-term forecasting as well as the science of long-term climate change continue to evolve as well. Consequently, USACE has recognized the necessity of using the best available and actionable science on climate impacts to water resources in updating project drought contingency plans. Furthermore, it is recognized that each project has unique requirements, so drought contingency plans must maintain some flexibility (references 3c, 3d, and 3e).

8. Procedure. To develop a drought contingency plan, strategies for project or basin-wide operating criteria should be formulated with consideration of both the severity and duration of future potential droughts. Project operating criteria may be described for various drought types and may allow for a means for balance to achieve various congressionally authorized purposes, but may not be written to substitute a non-authorized purpose for a congressionally authorized purpose. The following approach should be taken to formulate project operation strategies during droughts:

a. Undertake an initial assessment to determine whether more recent drought events have exceeded those on which the historical flow records are based, to ensure the most accurate data are considered in the development of the drought contingency plan (references 3c and 3d).

b. Select critical low-flow sequences from (historical) flow records, stochastic simulations of flows, and projected changes to flows from climate change and other watershed changes for detailed analysis. USACE has developed a climate hydrology assessment tool which aids in identifying trends that may be appropriate for incorporation into drought contingency plan development efforts; it can be found at https://maps.crrel.usace.army.mil/projects/rcc/portal.html.

c. Identify various drought types (e.g., moderate, severe, critical) from the low-flow sequences, triggers, and information types to make informed decisions during droughts. USACE has developed a drought contingency portal which may aid in this effort; it can be found at https://maps.crrel.usace.army.mil/projects/rcc/portal.html. The portal includes current drought monitors and information on what conditions prompt deviations.

d. Work with stakeholders in the watershed to develop water need priorities, considering the anticipated impact of the drought on activities and resources of the basin and how priorities may change under worsening conditions. Potential changes in priorities may include increased municipal and industrial use, competing uses among communities, and concerns related to industry, fish/recreation, agriculture, available fresh water, and saltwater intrusion. Storage reallocation and/or operational changes that constitute alteration of legal requirements would result in the initiation of additional studies which are beyond the scope of the drought contingency plan.

e. Simulate watershed response to the critical flow sequences to determine how impacts to authorized purposes may be reduced for the various drought types through evaluation of alternative water management operating scenarios; all alternative water management operating scenarios, consistent with congressionally authorized purposes, should be given consideration. The watershed vulnerability assessment tool developed by USACE can provide information on the relative vulnerability of a given watershed to climate changes using a wider variety of flow variables. It can be found at https://maps.crrel.usace.army.mil/projects/rcc/portal.html.

f. Develop tentative basin strategies based on the impact assessment and coordinate with appropriate Federal, state, and local agencies and other appropriate interests before adoption; basin strategies should consider and include legal entitlements as constraints.

9. Plan Development/Coordination. In periods of extreme low water, drought contingency plans provide details for the proper assessment of project scheduling needs by balancing congressionally authorized purposes and project goals with regard to available water in the system and applicable water law. In general, project releases are reduced during drought conditions to preserve stored water while meeting critical downstream needs such as domestic, municipal, and industrial water supply; water quality or environmental flows; agricultural water supply; and navigation. A critical aspect of drought operations is coordination with state and local agencies or tribal representatives that may have primary jurisdiction over water use. Special local water supply requirements may be needed during drought situations that are not part of normal water management activities. These requirements and any special coordination requirements should be documented in a drought contingency plan.

a. Meeting any or all authorized purposes during drought periods may not be possible. Therefore, finding a proper balance of achieving acceptable and reasonable levels of the authorized purposes may be necessary. Identification of that balance or other watershed impacts during the drought contingency plan development process should be well documented in the plan to prevent any misunderstanding by stakeholders. The drought contingency plan should identify planned procedures and operational features that are considered integral components of the water control plan and are essential to maintaining operations during drought conditions. Development of an effective drought contingency plan and proper documentation of procedures and operations within the water control plan will minimize the need to use the deviation process defined in reference 3b.

b. As a minimum, drought contingency plans should include but is not limited to:

(1) A coordination plan, created with representatives from relevant Federal, state, and local agencies, to provide guidance for decision making during plan implementation, including a public information program,

(2) Applicable water law that governs or impacts the project’s operations,

(3) Identification of the project’s basin and water supply users,

(4) All available products to carry out short-term forecasting and evaluate current scientific data on long-term climate change for the long-term planning of the reservoir systems,

(5) Reporting requirements and location of documentation and information supporting the drought contingency plan,

(6) Impacts from previous droughts.

c. The final drought contingency plan should include the above information to identify what constitutes drought conditions and must include the specific operational actions necessary to support operations during drought conditions. The goal of the drought contingency plan is to predetermine a set of metrics or triggers that identify a drought or return to normal regulation and a framework of operational decisions to respond accordingly without resorting to use of the deviation process.

10. Additional Studies. After the drought contingency plan (within existing constraints) is developed, an initial appraisal report under Section 216 of Public Law 91-611 (reference 3a) funded under Operation and Maintenance may be initiated to evaluate whether a further feasibility study should be initiated to evaluate further actions if constraints are removed. If the determination is made to pursue a feasibility study, the study should be accomplished consistent with the Review of Completed Projects Program study management procedures using Investigations funding and should evaluate whether there is a high probability that project performance may be improved upon project modification. It should be of sufficient quality to support a recommendation to Congress for project modification under Section 216.

11. Action. A drought contingency plan within existing authorities will be developed as part of the overall water control management plan and documented in the Water Control Manual for each USACE project or system of projects having controlled reservoir storage. Since this effort involves a project-by-project evaluation, the information developed will differ among projects. The drought contingency plan should be presented in the project Water Control Manual (or in the Master Manual for basin-wide plans) in consistent with guidance in ER 1110-2-240 (reference 3b) and EM 1110-2-3600 (reference 3c). Digital copies of the manual and drought contingency plan should be furnished to Division and/or Headquarters, USACE. Manuals and drought contingency plans will be posted to a central repository for internal and external use. The Water Control Manual and the drought contingency plan at the central repository will be considered the official documents for water management and will be kept current at all times.

12. Funding. Guidance on priority of funding the development of drought contingency plans will be provided in the annual budget guidance engineering circular.

FOR THE COMMANDER:

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