CHAPTER I

GENERAL REQUIREMENTS

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1-1 PURPOSE AND SCOPE

The purpose of this chapter of the guidelines is to establish the basis for determining the need for engineering review and studies of hydropower projects under the Commission's jurisdiction.

The Code of Federal Regulations (18 CFR Parts 1-399) and the Commission's Engineering Guidelines provide requirements and general guidance concerning: the contents, deposition, and evaluation of applications for licenses or exemption, and the supervision of existing licenses and exemptions.

1-1.1 Regulations

Application for License for Major Unconstructed Project and Major Modified Project - Subchapter B, Part 4, Subpart E, Sections 4.40 and 4.41.

Application for License for Major Project - Existing Dam - Subchapter B, Part 4, Subpart F, Sections 4.50 and 4.51.

Application for License for Minor Water Power Projects and Major Water Power Projects 5 Megawatts or Less - Subchapter B, Part 4, Subpart G, Sections 4.60 and 4.61.

Exemptions of Small Hydroelectric Power Projects of 5 Megawatts or Less – Subchapter B, Part 4, Subpart K, Sections 4.101 to 4.108.

Amendment of License - Subchapter B, Part 4, Subpart L, Sections 4.200 to 4.202.

Safety of Water Power Projects and Project Works – Subchapter B, Part 12, Subparts A–E, Sections 12.1 to 12.44

1-1.2 Engineering Guidelines

Engineering Guidelines for Evaluation of Hydropower Projects, Federal Energy Regulatory Commission, (Date varies by chapter).

1-2 HAZARD POTENTIAL CLASSIFICATION

1-2.1 General

The hazard potential classification of a dam and hydropower project determines the level of engineering review and the applicable design criteria. It is critical to determine the appropriate hazard potential classification because it determines the analyses that must be completed to properly evaluate the structural integrity of the project features.

1-2.2 Definitions

The hazard potential of a dam and hydropower project describes the potential for adverse incremental consequences in event of failure or mis-operation. Hazard classification does not indicate the structural integrity of the dam itself, but rather the effects if a failure should occur. The hazard potential assigned to a dam is based on consideration of the effects of a failure during both normal and flood flow conditions.

Three classification levels are adopted as follows: **LOW**, **SIGNIFICANT**, and **HIGH**, listed in order of increasing adverse incremental consequences. The classification levels build on each other, *i.e.*, the higher order classification levels add to the list of consequences for the lower classification levels, as noted in the table on the following page.

This hazard potential classification system should be utilized with the understanding that the failure of any dam or water-retaining structure, no matter how small, could represent a danger to downstream life and property. Whenever there is an uncontrolled release of stored water, there is the possibility of someone, regardless of how unexpected, being in its path.

A primary purpose of any classification system is to select appropriate design criteria. In other words, design criteria will become more conservative as the potential for loss of life and/or property damage increases. However, postulating every conceivable circumstance that might remotely place a person in the inundation zone whenever a failure may occur should not be the basis for determining the conservatism in dam design criteria.

This hazard potential classification system categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests. Improbable loss of life exists where persons are only temporarily in the potential inundation area. For instance, this hazard potential classification system does not

contemplate the improbable loss of life of the occasional recreational user of the river and downstream lands, passer-by, or non-overnight outdoor user of downstream lands. It should be understood that in any classification system, all possibilities cannot be defined. High usage areas of any type should be considered appropriately. Judgment and common sense must ultimately be a part of any decision on classification.

Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Dams assigned the significant hazard potential classification are those where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.

Dams assigned the high hazard potential classification are those located where failure or mis-operation will probably cause loss of human life.

Hazard Potential Classification	**Loss of Human Life**	**Economic, Environmental, Lifeline Losses**
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)

1-2.3 Determinations

In some cases, hazard potential classifications can be determined by field investigations and a review of available data, such as topographic maps. However, when the hazard potential classification is not apparent from field reconnaissance, detailed studies, including dam break analyses, are required to evaluate the incremental effects of a failure. Dam break analyses and IDF determinations are further discussed in Chapter 2 of the Engineering Guidelines.

Dam break analyses should be performed for both normal and flood flow conditions. The classification should be based on the worst case probable scenario of failure or mis-operation of the dam, i.e., the assigned classification should be based on failure consequences that will result in the assignment of the highest hazard potential classification of all probable failure and mis-operation scenarios. Each element of a dam must be evaluated to determine the proper hazard potential classification. However, there is only one hazard potential classification assigned to the entire dam. Individual elements are not assigned separate classifications.

The probable scenarios considered in the dam break analyses should be reasonable, justifiable, and consistent with Chapter 2 of the Engineering Guidelines. For example, assuming reasonable breach parameters and a failure during normal operating conditions ("sunny day" failure) may result in the released water being confined to the river channel and no probable loss of human life, indicating a low hazard potential classification. However, if the dam were assumed to fail in a similar manner during a flood condition, and the result would be probable loss of human life (excluding the occasional passer-by or recreationist) but minor economic losses, a high hazard potential classification would be appropriate. Once a project is placed in the high hazard potential classification, additional probable failure or mis-operation scenarios need only be considered if there is a need to determine if they would likely induce higher adverse incremental impacts.

In most situations, the investigation of the impact of failure or mis-operation of a dam on downstream human life, property damage, lifeline disruption, and environmental concerns is sufficient to determine the appropriate hazard potential classification. However, if failure or mis-operation of a dam contributes to failure of a downstream dam(s), the hazard potential classification of the dam should be at least as high as the classification of the downstream dam(s) and should consider the adverse incremental consequences of the domino failures.

1-3 ENGINEERING ANALYSES AND PLANS

1-3.1 General

The Commission requires engineering analyses and plans for proposed and existing hydropower projects. Methods for performing engineering analyses of dams and other water-retaining structures are included in the remaining chapters of the Engineering Guidelines. Any engineering study should be consistent with the applicable sections of the guidelines. It is recognized that unique situations may require deviations from these guidelines; however, the guidelines are considered flexible enough to be followed for most types of reviews and studies.

1-3.2 License and Exemption Applications

Applications for licenses and exemptions should include a supporting design report to demonstrate that existing and proposed structures are safe and adequate to fulfill their stated functions. The supporting design reports should contain the information and studies described in the pertinent sections of 18 CFR Part 4. Although the supporting design report included with license/exemption applications are typically preliminary in nature, all analyses should be prepared in accordance with the Commission's Engineering Guidelines. The level of information and analysis should be commensurate with the hazard potential classification of the project.

The Division of Dam Safety and Inspections (D2SI) regional office will attempt to confirm the project's hazard potential classification during a pre-license/pre-exemption inspection. A dam break study will be required if the hazard classification cannot be confirmed by field reconnaissance or to justify changing the hazard classification previously assigned the dam.

1-3.3 Construction

An order issuing license/exemption which authorizes new construction will require final plans and specifications and a supporting design report be submitted to the Regional Engineer. These documents are expected to be in-depth and based on site-specific information. All analyses should be performed in accordance with the Commission's Engineering Guidelines and commensurate with the project's hazard potential classification. Other documents that must be submitted prior to starting construction include Soil and Erosion Control Plans, Quality Control and Inspection Program, Temporary Construction Emergency Action Plans, and Cofferdam Design/Letters of Approval. A Potential Failure Mode Analysis is also typically performed before any significant construction.

Oversight by the representatives of the licensee/exemptee during construction should be described in a Quality Control and Inspection Program. The licensee/exemptee is also responsible for providing periodic and final construction reports to the Commission.

The construction of major projects may require oversight by an independent Board of Consultants (BOC). A BOC is approved by the Director, D2SI, to review the design, plans and specifications, and construction of the project. A BOC is expected to assess the construction inspection program, construction procedures and progress, planned

instrumentation, the filling procedures for the reservoir, and plans for surveillance during initial filling of the reservoir.

Construction may not begin until the Regional Engineer has reviewed and commented on the design documents, determined that all pre-construction requirements have been satisfied, and authorized started of construction. Commission staff will perform periodic construction inspections to verify projects are being built in accordance with design documents.

1-3.4 Post-Construction

Following the construction of hydropower projects, the licensee/exemptee must continue to operate and maintain the project using sound and prudent engineering practices. The construction, operation, maintenance, use, repair or modification of any project works are subject to the inspection and supervision of the Regional Engineer or any other authorized Commission representative. Commission staff will perform periodic dam safety inspections. Typically inspections are performed annually for high and significant hazard potential structures and every three years for low hazard potential structures.

Unless exempted, licensees/exemptees must develop Emergency Action Plans in accordance with Part 12, Subpart C of the Commission's regulations. Also, Part 12, Subpart D of the Commission's regulations requires an inspection by an independent consultant every five years. This inspection applies to any project that has a dam that: (a) is more than 32.8 feet in height above the streambed; (b) impounds more than 2,000 acre-feet; or (c) has a high hazard potential and is determined by the Regional Engineer or any other authorized Commission representative to require inspection by an independent consultant.

Licensees/exemptees are responsible for making periodic submittals to the Regional Engineer to confirm the projects are being operated and maintained in a safe manner. These documents include, but are not limited to: Owner's Dam Safety Programs, Surveillance and Monitoring Plans and Reports, Public Safety Plans, EAP status reports, EAP exercise reports, Gates Test/Inspection Reports, Vulnerability and Security Assessments, and Security Plans. The applicability of these reports is dependent on the project's hazard potential classification and the consequences from a dam failure.

1-4 DEVIATIONS FROM GUIDELINES

1-4.1 Changes

Criteria and recommendations in the Engineering Guidelines which are found to be technically incorrect, or outdated, should be brought to the attention of the Director, D2SI. This shall be done in writing with the incorrect or outdated passages cited, and shall include recommendations for correcting the deficiency.

1-4.2 Deviations

Deviations from the guidelines are subject to the approval of the Director, D2SI. The procedures, or criteria, used in lieu of these guidelines shall be justified in writing.

1-5 REFERENCES

1. Code of Federal Regulations, Title 18, Conservation of Power and Water Resources, Statutes and Regulations, Federal Energy Regulatory Commission, Subchapter B - Regulations Under the Federal Power Act, Parts 4 through 12.

2. Engineering Guidelines for Evaluation of Hydropower Projects, Federal Energy Regulatory Commission, (Date varies by chapter).

3. FEMA 333: Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams, April 2004.