

FEDERAL ENERGY REGULATORY COMMISSION  
Office of Energy Projects  
Division of Dam Safety and Inspections  
Chicago Regional Office  
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In reply refer to: P-10855  
NATDAM Nos. MI00197, MI83021,  
MI83022 and MI83023

October 22, 2015

Mr. Virgil E. Schlorke  
Director of Energy Supply and Resource Planning  
Upper Peninsula Power Company  
1002 Harbor Hills Drive  
Marquette, MI 49855

Subject: Fourth Independent Consultant's Safety Inspection Report for the Silver Lake Development of the Dead River Hydroelectric Project (FERC No. 10855-01) due by December 1, 2016 with revised PFMA requirements.

Dear Mr. Schlorke:

Three copies of the Fourth Independent Consultant's Safety Inspection Report (Report) for the Silver Lake Development of the Dead River Hydroelectric Project, FERC No. 10855-01, are to be submitted to this office by **December 1, 2016**. CFR 18, Part 12, Subpart D, of the Commission's regulations prescribes the scope of the Independent Consultant (IC) evaluations and field inspection, as well as the information that must be contained in the Report. An electronic version of the report in a searchable format should also be included with the submission. **To ensure that the Report will not be rejected you are encouraged to take time and review these responsibilities and our guidance as some requirements have changed.** Enclosure 1 is a bullet list highlighting the changes in the Part 12D process discussed in this letter. Your responsibilities as the Licensee, as well as those for your IC, are discussed in more detail in Enclosure 2; and the Report outline to be used by the IC is included as Enclosure 3. We recently posted an update to Chapter 14, Appendices J and K, Dam Safety Performance Monitoring Plan and Report; and encourage you to review these updated Engineering Guidelines located at:

<http://www.ferc.gov/industries/hydropower.asp>

The FERC will participate in two calls with you during the process of developing a Part 12D report to go over our expectations for the Part 12D report and that of your Independent Consultant (IC). The first call will occur shortly after you receive this letter. Having this call early in the Part12D process should help you frame the scope of work entered into with your IC. The second call will occur at least 90 days before the PFMA review discussed below and will be conducted with your IC also participating.

You are reminded that failure to conform to the requirements of the Part 12D process will result in rejection of the report.

### **Potential Failure Modes Analysis Update Requirements**

Section 1 of your Supporting Technical Information (STI) document should be a PFMA report completed during a previous submittal under the Part 12D process. During a recent FERC-wide reevaluation of PFMs, we discovered that many still do not meet the expectations that we have for complete PFMs. You should be aware that it is likely that many of the existing PFM's may require revision to more fully describe the actual mode of failure. Each PFM must have a specific loading condition, mode of failure, defined consequence to public safety, and category. To that end, we are requiring you to set up a telephone conference or a face-to-face meeting at least 90 days prior to the PFMA review with your independent consultant to discuss our expectations for the PFMA review. During this meeting, we will review the level of effort required for the PFMA review, as discussed in our first telephone call. This effort could range from simply reviewing the PFMA Report, to performing a complete revision of the PFMA process overseen by a Facilitator. Enclosure 4 provides an outline for additional topics to be discussed during the pre-meeting.

For more information on how to complete well-developed PFMs, please refer to the D2SI website at:

<http://www.ferc.gov/industries/hydropower/safety/initiatives/pfms.asp>.

For additional information regarding the entire PFMA process, please reference Chapter 14 of our Engineering Guidelines, which are available at:

<http://www.ferc.gov/industries/hydropower/safety/guidelines/eng-guide.asp>

### **Project Features**

Commission Regulations require that the project works of a development subject to Part 12, Subpart D, of the Commission's Regulations be inspected and analyzed

periodically by an IC. This includes all dams and all principal works of the development. If applicable, the IC's inspection should also include inspecting the spillway apron for undermining. The following dams and associated appurtenant water retaining structures require inspection at your project:

Silver Lake Main Dam P-10855-01-01  
Silver Lake Dam No. 2 P-10855-01-02  
Silver Lake Northeast Dike P-10855-01-03  
Silver Lake Southwest Dike P-10855-01-04

The following items, which were either outstanding from previous Part 12 Reports, previously requested by FERC letter, or became apparent during our review of existing documents, will also need to be provided to the IC and this office for review together with this Report:

- The Main Dam Seepage Remediation - Supplemental Potential Failure Mode Analysis Report, dated May 8, 2015, which was prepared by GEI, should be provided to the IC for their review in preparation of the PFMA review session.
- The Final Construction Report for the Main Dam Seepage Remediation Project should be provided to the IC for their review in preparation of the PFMA review session and inspection.

### **IC Approval**

You must obtain approval of your proposed IC(s) prior to the initiation of the field inspection. You should send three copies of your letter requesting approval of the IC (together with the proposed IC's detailed résumé) to:

Mr. William Allerton, P.E., Director  
Division of Dam Safety and Inspections  
Federal Energy Regulatory Commission  
Office of Energy Projects  
888 First Street, N.E., Room 6N-01  
Washington, D.C. 20426

One copy of the letter and resume should also be sent to this office. By regulation, the request for the approval of the IC and the resume are to be filed at least 60 days prior to the initiation of the safety inspection. In order to allow your IC adequate time to inspect your project and prepare the Report, we request that you submit the request letter and resume by **April 30, 2016**.

The first Report for newly constructed projects or projects where a major dam safety remediation has recently been completed may be done by the design engineer or an engineer from the design engineer's firm. The next Report must be completed by a different engineer not associated with either the design or construction firm. Subsequent Reports may be completed by an engineer associated with the design, construction, or remediation work. However, an engineer or engineers from the same firm will not be approved as the IC for more than two consecutive Reports for any project. We will be contacting you shortly after you receive this letter to coordinate a teleconference or meeting prior to selecting an IC. This meeting will serve to coordinate any outstanding issues, studies, discuss the condition of the existing PFMA, and otherwise gain an understanding of our expectations for the inspection. This will enable you to better develop a complete scope of work for the IC.

Once the IC has been approved, it is your responsibility to provide the IC with copies of, or access to, all project files well in advance of the field inspection. You should include file review in your scope of work and strongly encourage the IC to adequately prepare for the field inspection by adequately reviewing all the pertinent background information for the project in advance. Inadequate preparation of your IC may result in the need to reschedule the inspection until they are properly prepared to perform a thorough inspection.

### **Report**

It is critically important that the IC review, evaluate, and comment on the appropriateness and current validity of all the previous analyses located in Sections 6, 8, and 9 of the STI. Section 7 of the Report should contain your IC's detailed assessment of the STI including the PFMA report. (See Chapter 14, Appendix H, Section 7.0, page 14-H-13) Acceptable technical criteria are prescribed in FERC's Engineering Guidelines. If needed, this publication can be downloaded from our website at:

<http://www.ferc.gov/industries/hydropower/safety/guidelines/eng-guide.asp>

The Report outline to be used by the IC is also included as Enclosure 3 and a copy of 18 CFR 12D can be obtained from the following link:

<http://www.ferc.gov/industries/hydropower/safety/guidelines/part12-regs.pdf>

## **Report Follow-Up**

If the IC makes specific recommendations in the Report, Section 12.39 of the Code of Federal Regulations requires you to submit to us, within 60 days of the date the Report is filed, your plan of action and schedule to satisfy these recommendations. It is also necessary to confirm your agreement with the IC's recommendations to continue any ongoing measures (e.g. annual settlement survey) specifically identified in the Report. Your plan of action may include any proposal, including taking no action, that you consider a preferable alternative to any corrective measures recommended by the IC in the Report. However, any proposed alternative must be supported by complete justification and detailed analysis and evaluation in support of that alternative.

## **Unresponsive Reports Will Be Returned**

We have noted several instances lately where an IC did not make “*a clear statement that they have reviewed the pertinent analyses and evaluations along with the underlying assumptions and that they have concluded that the assumptions and methods of analysis or evaluation were appropriate for the structure, were applied correctly and are appropriate given current guidelines and the state of dam safety practice*” as is required by the Commission's Guidelines. A general statement is not acceptable. The Report should indicate in each section that this review and concurrence has been completed. Please ensure that the Report fulfills this requirement, as unresponsive Reports received by the D2SI will be returned for resubmittal.

The Commission's dam safety program is a cooperative process that includes the licensee, the IC, and the FERC. The most important of the three elements is the licensee, as they operate the dam, see the dam on a regular basis, and are responsible for the surveillance and monitoring plan used to determine if a potential failure mode is developing. It is the licensee's responsibility to submit the IC's Report to the FERC and ensure that the Report meets the requirements of the Commission's Regulations and Guidelines before it is submitted. The Report is a FERC requirement and a valuable resource for you as the dam owner. Enclosure 2 provides a more complete discussion of the requirements of the Commission's Regulations and Guidelines.

If you have any questions regarding this letter or Enclosures, please do not hesitate to call me at 312-596-4430. Your support is critically important and I am available to discuss any concerns or comments that you may have.

Sincerely,

John A. Zygaj, P.E.  
Regional Engineer

Enclosures:

1. Changes to Part 12D Process
2. Licensee and Independent Consultant Responsibilities
3. Part 12 D Safety Inspection Report Outline
4. 90 Day Pre-Meeting Agenda Conference Call

Mr. David Tripp, P.E.  
Chief Dam Safety/Generation Engineer  
Upper Peninsula Power Company  
1002 Harbor Hills Drive  
Marquette, MI 49855

Mr. John Myers, P.E.  
Director of Dam Safety  
Wisconsin Public Service Corporation  
700 North Adams Street  
Green Bay, WI 54301

### Changes to Part 12D Process

- **Page 1, Paragraph 1** - An electronic version of the consultant's Part 12D report, in a searchable format, is required.
- **Page 1, Paragraph 1** - Chapter 14 of our Guidelines: Appendices J and K have been updated and contain new requirements.
- **Page 2, Paragraph 1** - Two teleconferences with D2SI staff and management are required: 1) After you receive this letter, with your staff, to discuss our expectations of your consultant and help you develop the scope of work, and 2) At least 90 days before the Potential Failure Modes Analysis (PFMA) review, with your staff and consultant, to discuss our expectations for the PFMA review and documentation.
- **Page 2, Paragraph 3** - Note paragraph(s) summarizing specific deficiencies in initial PFMA or specific PFMs that need to be re-developed, and list of outstanding studies that need to be reviewed by and incorporated into the consultant's Part 12D report.
- **Page 5** – Unresponsive Reports will be returned

*Reminder:* The PFMA review and documentation must be thorough and complete. The consultant's Part 12D report must contain specific statements about their independent review and agreement with the analyses, evaluations, and assumptions described in the Supporting Technical Information (STI) document; and must confirm the analyses and evaluations meet current guidelines and are in accordance with current dam safety practice. *The Part 12D report will be rejected if all requirements are not met.*

## Licensee and Independent Consultant Responsibilities

The FERC dam safety process encompasses three distinct and separate entities each with their own responsibility in assuring dam safety; the dam owner, the Independent Consultant, and the FERC Division of Dam Safety and Inspections (D2SI). The triad of dam owner, Independent Consultant, and D2SI was put in place to provide three independent assessments of a dam's suitability for safe and reliable operation.

First and foremost is the dam owner. The Federal Power Act, under Section 10, places full and complete liability for the safe operation of the project on the owner; 16 U.S.C. Section 803c states that:

“the licensee shall maintain the project works in a condition of repair adequate for the purposes of navigation and for the efficient operation of said works in the development and transmission of power, shall make all necessary renewals and replacements, shall establish and maintain adequate depreciation reserves for such purposes, shall so maintain, and operate said works as not to impair navigation, and shall conform to such rules and regulations as the Commission may from time to time prescribe for the protection of life, health, and property. ***Each licensee hereunder shall be liable for all damages occasioned to the property of others by the construction, maintenance, or operation of the project works or of the works appurtenant or accessory thereto***, constructed under the license and in no event shall the United States be liable therefore.” (Emphasis added)

The owner is also liable under United States common law (see Legal Liability for Dam Failures, Denis Binder, 2009 and Liability for Water Control Structure Failure Due to Flooding, Edward A. Thomas, 2006).

The second entity, for dams which fall under the requirements of the 18CFR12D of the Commission's Regulations (Regulations – copy attached), is the Independent Consultant. The Regulations specify that dams that meet the requirements outlined in 18CFR12D be:

“... periodically inspected and evaluated by or under the responsibility and direction of at least one independent consultant, who may be a member of a consulting firm, to identify any actual or potential deficiencies, whether in the condition of those project works or in the quality or adequacy of project maintenance, surveillance, or methods of operation, that might endanger public safety.” (18CFR12.32)

The Consultant's report is submitted to the FERC by the licensee. It is the licensee's responsibility to assure that the report meets the requirements of the Commission's Regulations and Guidelines before it submitted to FERC. Although the report is required



by the FERC under the statutes noted above, the report is also a valuable resource for the dam owner, especially those that do not have the staff necessary to assure the safe and reliable operation of the dam.

The FERC is the third entity involved in assuring the safety of dams under Commission regulation. As the regulator, the FERC is responsible for assuring that the requirements of the Commission's Regulations and Guidelines are met and to check licensee's submissions for apparent errors or omissions. FERC's acceptance of a report is recognition that the report, at the time it was submitted, met the Commission's Engineering Guidelines. It does not imply that the report will continue to meet the Guidelines into the future as our Guidelines may change due to evolution in the practice of dam safety; loadings may change due to a better understanding of the seismic or hydrologic regime in which the dam is located, or deterioration of the dam itself.

Chapter 14 of the Commission's current Engineering Guidelines (Guidelines) requires the owner to prepare a Supporting Technical Information Document that is intended to include summaries of "all relevant reports on the safety of the development made by or written under the direction of Federal or state agencies, submitted under Commission regulations, or made by other consultants" related to the safety of the dam. Chapter 14 of the Guidelines also includes the outline for the Independent Consultant's Report. The outline requires

"in each section, where appropriate, the Independent Consultant shall make a clear statement that they have reviewed the pertinent analyses and evaluations along with the underlying assumptions and that they have concluded that the assumptions and methods of analysis or evaluation were appropriate for the structure, were applied correctly and are appropriate given current guidelines and the state of dam safety practice."

This statement is intended to fulfill the requirement in 18CFR12.37 for the report to "Analyze the safety of the project works and the maintenance and methods of operation of the development fully in light of the independent consultant's reviews, field inspection, assessments, and evaluations described in §12.35".

When the Consultant fails to "make a clear statement that they have reviewed the pertinent analyses and evaluations along with the underlying assumptions and that they have concluded that the assumptions and methods of analysis or evaluation were appropriate for the structure, were applied correctly and are appropriate given current guidelines and the state of dam safety practice," the Consultant is failing to meet both the requirements of 18CFR 12.37 to "Analyze the safety of the project works and the maintenance and methods of operation of the development fully in light of the independent consultant's reviews, field inspection, assessments, and evaluations described in §12.35" and the requirements of Chapter 14 of the Guidelines. When a

Consultant justifies the adequateness of a section in the Supporting Technical Information document by stating that the FERC conducted its own study or that the FERC had previously accepted a report submitted by the licensee, the Consultant is, in essence, attempting to delegate their responsibility to the FERC.

The necessary three parts of the dam safety process provided for assuring the safe and reliable operation of FERC regulated dams is effectively reduced to only two when a Consultant does not “analyze the safety of the project works and the maintenance and methods of operation of the development fully in light of the independent consultant's reviews, field inspection, assessments, and evaluations described in §12.35.” This is unacceptable to the FERC and should be unacceptable to any dam owner with an appreciation of their responsibility and liability.

Reports that fail to meet the requirements of the Regulations and/or Guidelines may be considered patently deficient and will not be accepted until they meet the requirements.

## **Part 12D Safety Inspection Report Outline**

### **Table of Contents**

The Table of Contents must show the initial page numbers for each section. If any subsection is not applicable, include the subsection with a statement of “Not Applicable” and an explanation of the reason(s) why.

For licensed projects that include multiple independent dam and powerhouse developments, separate Part 12D reports should be published for each development.

- 1. Findings and Recommendations**
- 2. Project Description**
- 3. Discussion of Potential Failure Modes Analysis Report**
- 4. Surveillance and Monitoring with Respect to Potential Failure Modes**
- 5. Field Inspection**
- 6. Operation and Maintenance Programs Relative to Potential Failure Modes**
- 7. Assessment of Supporting Technical Information Document**

**List of Tables** (with location)

**List of Figures** (with location)

**List of References**

### **Appendices for Part 12D Inspection Report**

#### **A. FERC Letter Requiring Part 12D Inspection**

**B. FERC Letter Approving Part 12D Consultant** - Include date of current report outline provided by FERC. Use report outline provided with FERC letter, not latest revision.

#### **C. Project Figures**

Only provide general overview drawings necessary to understand the project and items discussed in the report. If figures are placed in Section 2, provide a statement that figures may be found in Section 2. Optionally, if the STI document is bound with the Part 12D report provide a statement that figures may be found in the STI document; duplicate drawings from the STI document do not need to be included in the Part 12D report.

Detailed drawings should be included in the Supporting Technical Information document.

#### **D. Instrumentation Monitoring Data Plots**

List each figure and drawing included in the report. Optionally, instrumentation plots may be placed in Section 4 of the report and a statement included in Appendix D that the plots may be found in Section 4.

**E. Inspection Photographs**

Optionally, some or all of the photographs may be included in the appropriate sections of the report. If photographs are included within the report, provide a list of the photographs and the corresponding page number in Appendix E.

**F. Inspection Checklists and/or Field Notes (Optional)****G. Operation and Maintenance Documentation (If required)****1.0 Findings and Recommendations**

This Section includes a summary of the Part 12D Independent Consultant's findings and assessments and the Part 12D Independent Consultant's conclusions and recommendations.

**1.1 Findings**

- 1.1.1 Summary assessment of the PFMA report
- 1.1.2 Summary assessment of the Surveillance and Monitoring Plan
- 1.1.3 Summary of Field Inspection Findings
- 1.1.4 Summary of O&M status
- 1.1.5 Summary Assessment of "Supporting Technical Information" document

Note: Specifically identify any new calculations prepared subsequent to the previous Part 12D Report.

**1.2 Conclusions**

The conclusions of the Independent Consultant regarding the condition and suitability for continued safe and reliable operation of the project and specific conclusions regarding the information in each Section of this Part 12D report.

- 1.2.1 Conclusions regarding the suitability of the Project for continued safe and reliable operation.
- 1.2.2 Conclusions regarding the Project Description
- 1.2.3 Conclusions regarding the Potential Failure Modes Analysis Report
- 1.2.4 Conclusions regarding the Surveillance and Monitoring Plan
- 1.2.5 Conclusions regarding the Field Inspection
- 1.2.6 Conclusions regarding the Operation and Maintenance Programs
- 1.2.7 Conclusions regarding the "Supporting Technical Information" document.

**1.3 Recommendations**

The recommendations of the Independent Consultant to improve or maintain the condition and suitability for continued safe and reliable operation of the project and specific recommendations regarding the information in each Section of this Part 12D report.

## Enclosure 3

- 1.3.1 Recommendations regarding the suitability of the Project for continued safe and reliable operation.
  - 1.2.2 Recommendations regarding the Project Description
  - 1.3.3 Recommendations regarding the Potential Failure Modes Analysis Report
  - 1.3.4 Recommendations regarding the Surveillance and Monitoring Plan
  - 1.3.5 Recommendations regarding the Field Inspection
  - 1.3.6 Recommendations regarding the Operation and Maintenance Programs
  - 1.3.7 Recommendations regarding the “Supporting Technical Information” document
- 1.4 Certification
- Note: By signing this document, the Part 12D Independent Consultant is stating that the entire report has been developed by and under the direction of the undersigned. The Part 12D Independent Consultant shall make a clear statement that he/she generally concurs with the assumptions, methods of analyses, and results of all studies documented in the report.
- The Part 12D Independent Consultant is thus taking responsibility for the Part 12D report content as a Professional Engineer.
- 1.4.1 List of all field inspection participants
  - 1.4.2 Reference to FERC Order 122 dated March 1, 1981, and paragraph 12.37 (c) (7).
  - 1.4.3 Signature(s) of Part 12D Independent Consultant(s) and PE Stamp

See Appendix A: FERC Letter Requiring Part 12D Inspection

See Appendix B: FERC Letter Approving Part 12D Consultant - (Include date of current report outline provided by FERC)

## 2.0 Project Description

### 2.1 Brief Project Description

For each major element and ancillary structure, provide a brief description of the type of structure, general dimensions, etc. The detailed project description will be in the “Supporting Technical Information” document.

For multi-project or development licenses, include a brief outline of how this site fits with the other projects.

Include a short paragraph with very brief project history. When constructed, when modified, any incidents.

## 2.2 Hazard Potential Classification.

Based on views from the dam, other project works inspected and discussion with the licensee, document any changes in upstream or downstream conditions that might affect the Hazard Potential Classification. Review with the licensee the methods and assumptions used to develop the IDF. If the IDF is less than the PMF, the IC should confirm that the IDF is still valid based on an assessment of the downstream conditions as noted above.

## 2.3 Summary of Standard Operating Procedures

2.3.1 Purpose of Project (Run of river, storage, flow augmentation, flood surcharge storage, control reserve, pumped storage, etc.)

2.3.2 Reservoir rule curves by season (include seasonal reservoir level operating levels and restrictions of reservoir level due to safety concerns, if any)

2.3.3 Standard gate operation procedures (lead and following gates, emergency power systems, etc.)

## 2.4 Modifications Conducted for Project Safety

Document any modifications to project works since the last Part 12D inspection that have been done to improve project safety. (i.e.: spillway gates reinforced, seepage drain, berm added, crest raised, post-tensioned anchors installed, foundation drains or relief wells cleaned, etc.). In the next Part 12D Safety Inspection Report, these items will become part of Section 2.1. This information should be fully described in the updated "Supporting Technical Information" document submitted with the Part 12D report.

Do not include routine maintenance such as unit overhaul, gate painting, etc. Note that generators, transformers, and transmission facilities are excluded from the Part 12D program under 18CFR subsection 12.35.

## 2.5 Flood History

2.5.1 Flood of Record, PMF, IDF

2.5.2 Zero freeboard spillway capacity

2.5.3 Peak spillway discharge during last five year period

2.5.4 Peak reservoir elevation during last five year period

See Appendix C: Project Figures (Note: If the STI document is bound with this report, do not duplicate figures)

### 3.0 Discussion of Potential Failure Modes Analysis Report

Do not include security issues in the Part 12D report. For licensed projects that include multiple independent dam and powerhouse developments, separate PFMA studies and reports should be made for each development.

#### 3.1 General

Identify the Core Team members, and their affiliations, who developed the comprehensive Potential Failure Modes Analysis (PFMA) or its update. Note that the process was in accordance with FERC “Engineering Guidelines for the Evaluation of Hydropower Projects,” Chapter 14.

#### 3.2 Assessment of Potential Failure Modes Analysis Report

Assess the viable potential failure modes identified in the PFMA report. These would generally be Category 1 through Category 3 PFMs. Provide an assessment of the reasonableness and completeness of the failure mode scenario and whether the PFMs identified have a real possibility of occurrence. Potential Failure modes should be listed in order of importance. Each PFM assessment should include:

- A description that includes the sequence of conditions and events that would lead to the potential failure mode;
- An assessment of the risk reduction opportunities for each PFM; and
- An assessment of the Surveillance and Monitoring Plan for each PFM.

For example, the report would be formatted as follows.

##### 3.2.1 PFM 1. (i.e. internal erosion, piping)

3.2.1.1 Description of PFM (may be taken from PFMA report)

3.2.1.2 Assessment of Risk Reduction Opportunities

3.2.1.3 Assessment of Surveillance and Monitoring Plan

##### 3.2.2 PFM 2. (i.e. Seismic induced deformation)

3.2.2.1 Description of PFM (may be taken from PFMA report)

3.2.2.2 Assessment of Risk Reduction Opportunities

3.2.2.3 Assessment of Surveillance and Monitoring Plan

Etc.

- 3.3 Are there new potential failure modes that have been identified and addressed in this report or that should be assessed? If so, include the appropriate Description of the PFM, Assessment of mitigation actions and Assessment of the SMP as discussed above.

See “Supporting Technical Information” document: **Potential Failure Modes Analysis Study Report** (Update as appropriate)

#### 4.0 Surveillance and Monitoring with Respect to Potential Failure Modes

Note: Review and assessment of Surveillance and Monitoring Plans must always be done from the point of view of potential failure modes. Although the primary assessment is with respect to the potential failure modes identified in the PFMA study, the Independent Consultant must determine if there are potential failure modes not previously addressed or not adequately considered.

For the purposes of this section, a Threshold Level is the value used in the analysis or design, or is established from the historic record. An Action Level is the instrument reading that triggers increased surveillance or an emergency action.

##### 4.1 Operator's Surveillance Program

###### **Daily and weekly operator's inspections and reports.**

##### 4.2 Active Instrumentation: Include a schematic figure showing location of instrumentation (not detailed or cross section).

This will vary by project. Discuss only the instruments actually at the project. Is instrumentation in accordance with Chapter IX of the FERC "Engineering Guidelines for the Evaluation of Hydropower Projects?" Is the instrumentation functioning properly? Examples of instrumentation to be included:

- Piezometers
- Weirs
- Settlement/alignment monuments
- Crack gages
- Upstream river and/or rain gage stations
- Headwater/tailwater (alarm systems)

##### 4.3 Threshold and Action levels

For each instrument, or group of instruments as appropriate, provide a table of Threshold and Action levels as defined above.

##### 4.4 Reading procedures/frequency

For each instrument, or group of instruments as appropriate, discuss:

- Data acquisition procedures (manual/automated)
- Data evaluation procedures (process; is data evaluated in a timely manner by a qualified engineer; are readings compared to Threshold and Action levels defined for each instrument)
- Spurious readings (are spurious readings confirmed or explanations provided)



#### 4.5 Assessment of Instrumentation Data and Surveillance and Monitoring Plans Relative to Potential Failure Modes.

Include newly identified potential failure modes

### 5.0 Field Inspection

#### 5.1 Field Inspection Observations

For each element of the project (i.e.: spillway, earthfill embankment, gravity section, intake, powerhouse, conveyance system, etc.), observe and report visual observations of the following issues as appropriate. Include pictures to document significant project features and observations. If an inspection checklist is used, include a copy of the checklist Appendix F. A site-specific inspection checklist should be formatted to include specific visual surveillance items identified in the PFMA.

The intent of this section is to highlight changed conditions for the report reviewer, not to document unimportant or minor details.

The report should be in text format by structure or element addressed individually. For each structure or element of the project, the Part 12D Independent Consultant should consider the following items as appropriate:

- Settlement
- Movement – including abutments (cracks or other signs of distress or change)
- Erosion
- Seepage/Leakage
- Cracking
- Deterioration
- Spillway gate Operation/Standby Power (At a minimum, the Part 12D Independent Consultant needs to review the licensee's annual certificates of spillway gate operation and interview project operating staff to assure that emergency backup systems work and that operating personnel know how to use them. At least one spillway gate should be operated at least one foot during the Part 12D inspection using the standby generator.)
- Outlet/Sluice Gate Operation
- Water conveyance systems (canals / flumes / penstocks / tunnels / surge chambers, emergency bypass or closure systems, etc.)
- Foundation Drain/Relief Well Operation
- Evidence of high artesian or uplift pressures (structures / foundations / abutments)
- Observations of sediment transport (piping evidence)
- Observations of seeps, wet areas, springs, green grass
- Other Pertinent Observations

#### 5.2 Status of Response(s) to Recommendation(s) in Last Part 12D Report.

### 5.3 Field Observations with Respect to Potential Failure Modes

Document field observations pertinent to each potential failure mode noted in Section 3

### 5.4 Adequacy/Operation of Public Alert Systems

Note: Are upstream spillway warning buoys, and downstream sirens and lights operable?

See Appendix E: **Inspection Pictures** (Optionally, some or all of the pictures may be included in the appropriate sections of the report. If pictures are included within the report, provide in Appendix E a list of the pictures and the corresponding page number)

See Appendix F: **Inspection Check List** (optional)

## 6.0 Operation and Maintenance Programs Relative to Potential Failure Modes

Do not include security issues in the Part 12D inspection report. If observations of significant O&M issues are made, include in report for possible new potential failure mode analysis.

### 6.1 Summary of PFMA identified O&M issues (from PFMA report)

### 6.2 Operation and Maintenance Procedures

#### 6.2.1 Communication/Response

Address adequacy and reliability of remote monitoring, communication and control systems (Operations / Instrumentation / Telemetry – Do the systems provide adequate reliability and redundancy? Can a specific spillway gate, valve or other project component be operated remotely on demand?)

#### 6.2.2 Electrical/Mechanical Systems

- Spillway Gate Motors (line/line voltage, amperage draw, motor name plate rating information)
- Standby and Redundant Power Sources
- Manual/Remote/Automatic Operation of Gates and Valves
- Gate Operation Sequence
- Icing protection (heaters/bubblers/reservoir level restriction)

#### 6.2.3 Human Factors

- Adequate Staff for Emergency Response (Multiple Sites)
- Reliable Access Routes (winter/storm conditions)
- Training
- Electricians/Mechanics/Laborers
- Adequate Time to Respond
- Call Out Systems (time for crew to reach site after call out)

### 6.3 Assessment of O&M Procedures Relative to Potential Failure Modes

See Appendix G: **Operation and Maintenance Documentation**

## **7.0 Assessment of Supporting Technical Information Document**

The purpose of this section is for the Part 12D Independent Consultant to assess the contents of the “Supporting Technical Information” document compiled by the licensee. The STI document should include information needed to understand and confirm the underlying assumptions and the conclusions of the analyses of record supporting the assessment of the safety of the Project.

In each section, where appropriate, the Independent Consultant shall make a clear statement that they have reviewed the pertinent analyses and evaluations along with the underlying assumptions and that they have concluded that the assumptions and methods of analysis or evaluation were appropriate for the structure, were applied correctly and are appropriate given current guidelines and the state of dam safety practice.

- 7.1 Potential Failure Modes Analysis Study Report (Include a statement referring to Section 3 for a discussion of the Potential Failure Modes Analysis)
- 7.2 Description of Project
- 7.3 Construction History
- 7.4 Standard Operating Procedures
- 7.5 Geology and Seismicity
- 7.6 Hydrology and Hydraulics
- 7.7 Surveillance and Monitoring Program
- 7.8 Stability and Stress Analyses of Project Structures
- 7.9 Spillway Gates
- 7.10 Pertinent Correspondence Related to Safety of Project Works
- 7.11 Status of Studies in Process and Outstanding Issues
- 7.12 References
- 7.13 Conclusions

## APPENDICES

**List of Tables** (with location)

**List of Figures** (with location)

**List of References**

### A. FERC Letter Requiring Part 12D Inspection

**Note:** May include specific FERC concerns to be addressed by Part 12D Independent Consultant.

### B. FERC Letter Approving Consultant

**Note:** Include date of report outline provided by FERC.

### C. Project Figures

This Appendix should include the following figures as appropriate. All Figures should be consecutively numbered. Figures should be general without excessive detail so as to be clearly legible. Figures should include documentation of significant changes since last Part 12D report. If STI document to be directly bound in this report, do not duplicate the figures. FERC Exhibit and relicensing drawings can be used.

- Location map with project facilities located including conveyance systems and access routes from main roads and nearest town
- Plans of project facilities
- Typical sections and profiles of key project features (dams, spillways, powerhouses, intakes, emergency/fuse plug spillways, chute profiles, etc.)
- Profiles and typical sections of water conveyance systems (canals, tunnels, penstocks, flumes, surge chambers, etc)
- Satellite or aerial picture of project and downstream area
- Spillway and tailwater rating curves

### D. Instrumentation Monitoring Data Plots

Note: Plans and cross-sections with locations of each instrument, including design phreatic surface or uplift pressure profile, and tabulated data for each instrument are included in the "Supporting Technical Information" document only. See Chapter IX, Instrumentation and Monitoring, of the FERC Engineering Guidelines for the Evaluation of Hydropower Projects for additional information. Only time versus reading graphs are included here as NEW information. Tables of data should be provided on a CD bound into the Part 12D report

If data plots are included in Section 4 of the Part 12D report, a statement should be provided here directing the reader to Section 4 for the information.

- Time versus Reading data plots

## Enclosure 3

- Plot all data to date, not just last five years (alternative is to plot last 15 years and note historic range for each unit)
- Do not put too many instruments on one plot
- Try to put all instruments from one section or profile on the same plot
- Mark tip elevation, unscreened length, ground elevation and top of piezometer elevation for each piezometer on the data plot. This information can be provided in a Table to enhance legibility of the graph.
- Use symbols and/or different line types for each unit, not just colors (colors do not reproduce in black and white and some people are color blind - Note that yellow and blue do not reproduce on certain copiers)
- Include headwater and tailwater levels on each plot
- Force all time scales to show full year cycles from January through December
- For multiple plots for the same project, force vertical and horizontal scales on all plots of the same type to have the same scale or total range so plots can be directly overlaid
- Mark threshold values
- Show monthly precipitation on one sheet
- Mark action levels requiring emergency response

**E. Inspection Pictures****F. Inspection Checklist (optional)****G. Operation and Maintenance Documentation (if required)**

**90 Day Pre-meeting Agenda Conference Call**

1. Purpose of call
  - a. To discuss what is expected from the Owner.
  - b. To discuss what is expected from the P-12 Consultant.
  - c. To discuss what is expected during the PFMA review.
  - d. To discuss outstanding studies and items of special interest.
2. Owner
  - a. The Owner should provide a copy of the STI, 3 past Part 12D Reports and any items of special interest to the IC well in advance of the inspection.
  - b. All portions of the site must be readily assessable and cleared of excessive vegetation. If a complete visual inspection cannot be completed the IC will need to re-inspect before the Part 12D Report is submitted.
3. P-12 Consultant
  - a. Must review the STI including the PFMA report and the past Part 12D Inspection Reports prior to the inspection.
4. Discussion of the PFMA Report
  - a. FERC to review and provide clarification as to the PFM categories.
  - b. Discuss current PFMs and the level of effort that may be expected to review. This may range from a review of the PFMA report to a complete revision of the PFMA process including a facilitator and full document review.
5. Items of special interest
  - a. Outstanding studies.
  - b. Past Part 12D recommendations that have not been fulfilled.
  - c. Schedule for inspection.
  - d. Any other items of interest.

Document Content(s)

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