

RECOVERY PLAN FORMAT

Below is a suggested Table of Contents for an Internal Emergency Recovery (Response) Plan. *This Internal Emergency Recovery Plan (IERP) is designed as a separate document which can supplement the primary Emergency Action Plan (EAP). Whereas the primary EAP is designed to facilitate early warning and evacuation of potentially affected downstream areas, this document deals with MITIGATION AND EMERGENCY REPAIR OF AFFECTED COMPANY STRUCTURES AND PLANT FACILITIES. This plan should be utilized for any emergency arising at the site, whether from natural or manmade causes. The content of the Recovery Plan should avoid duplication of existing plans (such as the EAP) as much as possible. The Recovery Plan is intended for internal use and response only.*

Sample Table of Contents:

- I. Purpose of Internal Plan
- II. Applicable Emergency Scenarios (listed for each scenario is primary concerns, materials/equipment needed, & operating procedures)
 - A. Overtopping (including excessive inflow or reservoir displacement)
 - B. Earthquake Damage
 - C. Loss of Dam Crest Length
 - D. Slide on Upstream or Downstream Slope of Embankment
 - E. Slide on Underlying Potential Failure Plane
 - F. Excessive Settlement
 - G. Sinkhole Activity
 - H. Loss of Foundation or Abutment Material (such as landslide/rockfall)
 - I. Excessive Seepage/Piping through Embankment, Foundation, or Abutments
 - J. Failure of Appurtenant Structure Such as a Spillway Gate
 - K. Excessive Cracking in Concrete Section
 - L. Penstock Rupture/Failure
 - M. Turbine or Other Equipment Failure
 - N. Vandalism/Bomb Threat/Terrorism
 - O. Other
- III. Incident Command System (ICS) & Company Internal Assignments/Responsibilities
 - A. Incident Command System (ICS)
 - B. ICS Chart: Company Personnel Assignments
 - C. Incident Command Post and Alternate Command Post
 - D. Personnel at On-Site Incident Command Post
 - E. Main Headquarters Emergency Personnel
 - F. Media Contact (Public Information Officer)
- IV. Coordination with Local Authorities
 - A. Multiple-Jurisdiction Incident (Unified Command)
 - B. Safety/Clearance Issues & Authorization

Federal Energy Regulatory Commission
Division of Dam Safety and Inspections
DRAFT

- V. Communications, Maps, and Drawings
 - A. Communications Center
 - B. Alternate Communications Methods (cell phone, radios)
 - C. Drawings, Maps, Photographs

- VI. Vehicles, Equipment, Materials (e.g., sandbags, concrete, rip rap) & Contractors
 - A. Plant On-Site Inventory
 - B. Other Available Company Vehicles, Equipment, Materials, & Supplies
 - C. Non-Company Supplies/Materials (including helicopters if necessary)
 - D. Outside Contractors and Consultants

- VII. Response Times & Geographical Limitations
 - A. Call-out Procedure
 - B. Estimated Response Times
 - C. Primary & Secondary Access Roads & Alternatives
 - D. Staging Areas for Personnel & Equipment

- VIII. Meals & Lodging
 - A. Company Living Facilities
 - B. Local Restaurants & Motels

- IX. Internal Maintenance of Plan

Appendices:

- Appendix A: List of Company Response Personnel (internal call-out list of phone numbers)
- Appendix B: List of Contractors/Consultants (addresses and phone numbers)
- Appendix C: List of Equipment Suppliers (addresses and phone numbers)
- Appendix D: Local Restaurants & Motels (addresses and phone numbers)
- Appendix E: Other Utilities/Mutual Aid (phone numbers of key contacts)
- Appendix F: Federal/Governmental Assistance (phone numbers of key contacts)
- Appendix G: Engineering Key Drawing List (drawings are located in two secure, non-inundated areas near the facility)
- Appendix H: Highway Maps and Photos of Dam
- Appendix I: Emergency Helicopter Rescue Numbers
- Appendix J: Bomb Threat Procedures
- Appendix K: EAP Flowcharts A and B (identical to those in the regular EAP)

Guidance for the Preparation of the Recovery Plan

Sections I through IX (not including appendices) could total less than 25 pages, mostly double-spaced. This document (like the Security Plan) is not required to be actually submitted to the FERC. FERC inspectors could ask to examine the plan during the annual inspections and comment on its acceptability. The FERC suggests that this document, when prepared, be marked as “CEII.”

The Recovery Plan is primarily developed for the benefit of the dam owner, but also will be beneficial to the region or country in rapidly reinstating essential project benefits. Having a comprehensive plan enables licensees to more quickly mitigate, recover, and "get back on line" following a serious structural incident at a facility. It makes good business sense for a licensee to formulate a Recovery Plan for those facilities that would (if they failed) most seriously impact the licensee's generating capability and/or bottom line economic benefits. Recovery Plans are not necessarily applicable for every High Hazard Potential facility. The Recovery Plan is optional for all facilities under a generating capacity of 50 MW.

The recovery phase should begin as soon as possible after the catastrophic event (dam failure, loss or damage to powerhouse, loss of main transmission line, etc.) and usually overlaps the “response phase” of the event. Planning and actions during the “response phase” should consider any actions which might be implemented to return the development to service. Recovery phases include “initial” (within one week) and “long-term” activities (recovery could continue for months), depending upon the magnitude of impact on hydroelectric facility operations, including dams, powerhouses, and water conveyance.

Section I. Purpose of Internal Plan

This Internal Emergency Recovery Plan (IERP) is designed as a separate document which can supplement the primary Emergency Action Plan (EAP). Whereas the primary EAP is designed to facilitate early warning and evacuation of potentially affected downstream areas, this document deals with mitigation and emergency repair of affected company structures and plant facilities. A Recovery Plan should be prepared on a site-specific basis in that different facilities (i.e., dams and associated structures) will require different considerations. This is not intended to be a company-wide Continuity of Operations Plan, but rather a plan to bring a specific facility back in operation as efficiently as possible. It is intended for internal use and response only.

Section II. Applicable Emergency Scenarios

Each "Applicable Emergency Scenario" need only be one page in length, including materials/equipment needed and operating procedures. A universe of potential emergency scenarios need not be listed for each facility, but rather should be tailored to the site-specifics of the facility. For example, “Overtopping” may be a minor concern for a facility designed to accommodate flows over the entire structure. A good start in developing applicable emergency scenarios is the Potential Failure Modes Analysis (PFMA) document prepared for the facility, although all applicable scenarios, such as terrorism, may not be covered in the PFMA.

Each critical component for the applicable scenario should be identified with the likely range of potential hazards and consequences. Predict the type and magnitude of damage, and develop a list of options to minimize the consequences, either by reducing initial damage, or by limiting progression of the initial damage, or by reducing the time needed to repair the damage. Results of this effort should be consolidated into a list of recommended actions that might include procurement, stockpiling, on-the-shelf designs, or general preparedness actions. An example of

what a component analysis could entail is shown in Attachment 1.

Section III. Incident Command System (ICS) & Company Internal Assignments/Responsibilities

The purpose of this section is to describe the emergency response structure the dam owner will operate within and briefly discuss the roles and responsibilities expected from personnel internal to the dam owner's organization.

Another important consideration to address is the role and responsibility of the dam owner personnel to respond to the emergency, both in an initial and a long-term basis. Things to consider include (but are not necessarily limited to):

Initial Recovery

- If the Emergency Action Plan is still activated, determine appropriate time to terminate EAP and transition to Recovery phase. Define requirements for interim inspection and monitoring above and beyond the Standard Operating Procedures.
- Restore critical systems (generation facilities, dams, water conveyance systems, telecommunications, monitoring systems, controls, etc.) to stable and safe operations. Assure public safety and business continuity.
- Evaluate the need to continue the Emergency Management Organization (the Leadership team put in place by activation of the Emergency Action Plan), and transition back to normal organizational structure, roles and responsibilities as soon as feasible.
- Complete detailed condition assessment of all relevant facilities, equipment and operations.
- Coordination with other agencies for the mitigation of the emergency, especially for environmental concerns.
- Conduct after-event critiques and debriefings as soon as practical; provide incident reports to Company Management and Regulatory Agencies.
- Consider appointing a Recovery Team (members experienced with evaluation of structures, systems, equipment and operations; this team would develop the alternatives to be evaluated and approved for returning to normal operations) to plan and oversee the long-term recovery process.
- Establish priorities for permanent repair, reconstruction, or replacement at existing or new locations.
- Complete an assessment of losses and an analysis of costs for repairs versus replacements.
- Review and define needs for additional specialized technical resources and temporary staff, including additional security staff if necessary, and initiate procurement/recruitment process.
- Arrange for orientation and training of any temporary staff.
- Determine approximate reimbursements from insurance and other sources of financial assistance, and identify alternatives for financing residual costs.

Long-Term Recovery

- Revise Operational Plans, Emergency Action Plans, and Disaster Recovery Plans and Manuals as appropriate.
- Identify any enhancements that should be made to hydroelectric facility components and/or operations, and establish strategy for long-term recovery and environmental restoration.
- Establish and maintain liaison with federal, state, and local government agencies for

Federal Energy Regulatory Commission
Division of Dam Safety and Inspections
DRAFT

- inspections, permits and reconstruction as necessary.
- Initiate permanent reconstruction of damaged facilities and replacement of damaged equipment.

Section IV. Coordination with Local Authorities

This section should briefly discuss what the dam owner needs to do to coordinate with the local law enforcement and emergency response personnel they will work with, and any special needs they have identified. The complete list of applicable agencies would be included in Appendix K, the EAP Flowcharts.

Section V. Communications, Maps, and Drawings

This section should list how communications will occur throughout the emergency, list alternate communication sources, and include a brief section with pertinent maps, drawings and photographs that would be useful to have during an emergency. Maps, drawings and photographs may be included in Appendices G and H.

Section VI. Vehicles, Equipment, Materials (e.g., sandbags, concrete, rip rap) & Contractors

This section should list all the vehicles, materials and equipment the dam owner would need to respond to the applicable emergency scenarios identified in Section II. A current list of contractors and support personnel that can be utilized during the emergency should also be listed in this section for easy reference.

Section VII. Response Times & Geographical Limitations

Anticipated response times, call-out procedures and geographic limitations should be addressed in this section. Clearly defined directions to critical areas and other locations should be included in textural and graphical format. Staging areas and security exclusion zones should also be identified.

Section VIII. Meals & Lodging

Any logistical considerations for sustaining personnel detailed to temporary quarters should be identified in this section.

Section IX. Internal Maintenance of Plan

This section should address how the Recovery Plan is maintained (updated). Internal employee training of the procedures and information contained within the Plan should also be defined.

Appendices

The most critical section of the Plan is the Appendix section (the "nuts and bolts" that helps mitigate/recover from the emergency). The appendices could probably suffice by themselves as the "recovery" plan for most licensees. They contain information that most dam owners undoubtedly (and hopefully) already have on file somewhere to mitigate an emergency. This information is simply consolidated into a single document. Appendices should be designed so that critical information contained therein may easily be verified and updated on an annual basis.

Attachment 1
Examples of Component Analysis

Component: Switchyard transformer

Likely type/magnitude of damage: Ballistic damage to shell and windings

Consequences of damage: No immediate loss of hydropower transmission, due to availability of redundant transformer capacity. Less reliable system until transformer is replaced (normal 18 month replacement time); possible power loss would represent a very small percentage of regional capacity

Options to minimize consequences:

1. Rely on existing redundant transformer capacity
2. Install additional redundant capacity
3. Emergency procurement of new transformer (9 months)

Recommended option: #1, but this will limit system reliability until a new transformer is on-line

Component: Tainter gates

Likely type/magnitude of damage: Trunion pin failure deforms gate, making gate inoperable

Consequences of damage: Until gate is replaced (normal 14 month replacement time) loss of pool, reduction of recreation, loss of power production

Options to minimize consequences:

1. Procure and store a spare gate (2 week recovery)
2. Emergency procurement of a new gate (9 months)
3. Procure and store a bulkhead to restore pool until new gate is installed

Recommended option: #3, bulkhead will be suitable for use at 5 company projects