

**Emergency Evacuation Plan  
for  
Dam Failure and Flooding  
*MUSKEGON RIVER DAMS***



**Newaygo County, Michigan  
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**Information contained in the Annexes include information considered exempt from the Michigan Freedom of Information Act (MCL 15.243y). Unauthorized possession of this information to the extent that it pertains to a specific vulnerable target could constitute a violation of the Michigan Anti Terrorism Act (MCL 750.543r). The information contained in this document is intended for official emergency preparedness use only.**

## PREFACE

The worst recorded dam failure in U.S. history occurred in Johnstown, Pennsylvania, in 1889. More than 2,200 people were killed when a dam upstream from Johnstown failed; sending a huge wall of water downstream which completely inundated the town.

Dams in Michigan are regulated by Part 307, Inland Lake Levels, and Part 315, Dam Safety, of The Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. As defined the Act, a dam means an artificial barrier, including dikes, embankments, and appurtenant works, that impounds, diverts, or is designed to impound or divert water, or water and any other liquid or material in the water, and that is or will, when complete, be 6 feet or more in height, and has or will have an impounding capacity at design flood elevation of 5 surface acres or more. In Michigan there are 2,500 dams.

The DEQ also classifies dams into three different categories:

1. High Hazard Potential: Failure may cause serious damage to inhabited homes, agricultural buildings, campgrounds, recreational facilities, industrial or commercial buildings, public utilities, main highways or class I carrier railroads, or where environmental degradation would be significant, or where danger to individuals exists with the potential for loss of life. (Sec.31503 [11])
2. Significant Hazard: failure may cause damage limited to isolated inhabited homes, agricultural buildings, structures, secondary highways, short line railroads, or public utilities, where environmental degradation may be significant, or where and danger to individuals exists. (Sec. 31505 [5])
3. Low Hazard: failure may cause damage limited to agriculture, uninhabited buildings, township or county roads, where environmental degradation would be minimal, and danger to individuals is slight or nonexistent. (Sec. 31504 [2])

There are also 99 hydroelectric dams in Michigan regulated by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act. Both dams on the Muskegon River in Newaygo County are classified as High Hazard Potential Hydroelectric Dams owned by Consumers Energy and regulated by FERC.

The Newaygo County Emergency Services Department, in conjunction with the Newaygo County Local Emergency Planning Team and Consumer's Energy, have developed this evacuation plan for the affected areas downstream from both dams on the Muskegon River. This plan should be used in conjunction with the current Newaygo County Emergency Operations Plan, Newaygo County Emergency Action Guidelines 2009 Version.

**BASIC PLAN**  
**EMERGENCY EVACUATION PLAN FOR DAM FAILURE AND FLOODING**  
**MUSKEGON RIVER DAMS**

**I. PURPOSE:**

The purpose of this plan is to establish procedures for warning, evacuating, and sheltering persons who would be endangered in the event of the individual failure or combined failures of the Hardy and Croton Dams. It also addresses similar emergency response actions which might be required in the event of flooding, caused by emergency releases from Hardy and or Croton Dam spillways, turbines, and sluices. The plan is designed to accomplish these functions with minimum confusion and maximum speed.

**II. SCOPE:**

- A. This plan is local in application and pertains to possible failure or high discharge from the Hardy and Croton Dams located on the Muskegon River, north of Grand Rapids Michigan. It describes actions necessary to accomplish the warning and evacuation of areas that would be inundated in Newaygo County, Michigan.

This plan addresses emergency actions for the County of Newaygo only. A population of approximately **4,198** would be at risk in the identified inundation areas shown in Appendix B. The total property value within the inundation area is **\$234,064,600**.

The total population estimate for residents was calculated for **1,567** addresses (identified from tax data) multiplied by **2.68** persons per household. The property value is based on tax records for each parcel within affected area.

*Sources: Population Estimates Program, Population Division, U.S. Census Bureau, Washington, DC 20233 and Newaygo County Treasurer's Office.*

- B. This plan has been developed within the authority and guidance contained in the Newaygo County Emergency Operations Plan, Emergency Action Guidelines (EAG) which governs responsibility and actions of local agencies in an emergency or disaster situation and is the overall response plan for all types of disasters. The concepts, practices, and procedures contained in the Newaygo County Emergency Action Guidelines also apply to a dam break or flooding related to an emergency release from a dam. This plan emphasizes unique procedures necessary to respond to a dam emergency situation.

The plan is designed to:

1. Establish warning procedures.
2. Outline evacuation procedures.
3. Identify evacuation routes to be used.
4. Identify reception centers and shelters to be activated for the care of evacuees.
5. Identify procedures for the security of the perimeter and the interior of the affected area during and after evacuation.
6. Identify procedures for allowing evacuees to return to their homes.
7. Assign specific functions and responsibilities to state and local emergency response agencies and other organizations.

### III. **AUTHORITIES / REFERENCES:**

#### A. Federal:

1. Federal Guidelines for Dam Safety, June 1979.

#### B. State:

1. The Michigan Natural Resources and Environmental Protection Act, 1994 PA 451 Part 307 and Part 315 as amended
2. Michigan Public Act 390, ie the Emergency Management Act
3. Michigan Emergency Operations Plan, 2005

#### C. Local:

1. Newaygo County Emergency Services Resolution, 2006
2. Newaygo County Emergency Operations Plan, 2009
3. Newaygo County Hazard Management Plan, 2009
4. Consumer's Energy Hardy Dam Emergency Operations Plan
5. Consumer's Energy Croton Dam Emergency Operations Plan

### IV. **HAZARD ANALYSIS:**

A. **Muskegon River:** The 227-mile river moves east to west from its headwaters near Houghton to Muskegon Lake and then Lake Michigan. Along an 18-mile stretch of the river, the company owns and operates Rogers Hydro, Hardy Hydro and Croton Hydro, which together can generate about 45,500 kilowatts and serve a community of nearly 23,000. Croton and Hardy hydros are included with Cooke Hydro and the worker's camp at Five Channels Hydro on the Au Sable River in the National Register of Historic Places.

B. **Hardy Dam:** Hardy Hydroelectric Generating Dam is the third largest earthen-filled dam in the world whose backwaters from Michigan's largest inland lake with over 50 miles of shoreline. The dam began operation in 1931. It is capable of generating 30,000 kilowatts of electricity, enough to serve a community of 16,600 people. Hardy Dam is located in Newaygo County's Big Prairie Township and is the largest earthen dam east of the Mississippi. This dam is noteworthy not only because of the large amounts of water impounded behind it, but also

because of its location upstream from the populated and agriculture areas along the Muskegon River near the City of Newaygo and in Muskegon County. A failure on this dam would likely result in loss of life and/or damage to structures, roads, utilities, crops and the environment.

- C. **Croton Dam:** The Croton Hydroelectric Generating Dam has been in continuous operation since 1907. It is capable of generating 8,800 kilowatts of electricity, enough to serve a community of about 4,900 people. The plant is located in Newaygo County's Croton Township and is the site of the great salmon migration. This dam is noteworthy not only because of the large amounts of water impounded behind it, but also because of its location upstream from the populated and agriculture areas along the Muskegon River near the City of Newaygo and in Muskegon County. A failure on this dam would likely result in loss of life and/or damage to structures, roads, utilities, crops and the environment.

#### **V. RESPONSIBILITIES:**

Consumers Energy does not have any police or civil powers; therefore, it is the responsibility of various governmental agencies and departments to provide warning, traffic control, fire protection, and other such functions. Once Consumers Energy notifies Newaygo County Central Dispatch (911), Dispatch is then responsible for providing the means for the first response organizations responding to an emergency or disaster situation.

The Emergency Action Plans are maintained by the Newaygo Emergency Operations Center. Upon notification, Newaygo County Emergency Services will respond and coordinate action for an impending or actual failure at the Hardy Dam or Croton Dam by implementing and coordinating the appropriate sections of the Emergency Action Guidelines.

#### **VI. CONCEPT OF OPERATION:**

To assure appropriate and prompt response to an emergency situation at any of the two dams, the Emergency Action Plan for Hardy Hydro Plant Project 2452 and Croton Hydro Plan Project 2468 developed by Consumers Energy and regulated by the Federal Energy Regulatory Commission (FERC), has classified potential emergency situation or conditions according to the relative urgency as follows:

##### **Condition A: Failure is Imminent or has occurred.**

Condition A will be activated where a failure either has occurred, is occurring, or is obviously about to occur. Once it has been determined that there is no longer any time available to attempt corrective measures to prevent the failure, the *Failure is Imminent or Has Occurred* warning should be issued. The Hydro Operations Supervisor will immediately notify Newaygo County Central Dispatch who will then notify appropriate local

authorities according to the Emergency Notification Flow Chart in the Emergency Action Plan for Hardy Hydro Plant and Croton Hydro Plant. Newaygo County Emergency Services Department, if not already done so, will activate the Emergency Operations Center and implement local evacuation plans.

**Condition B: Potential failure situation is developing.**

Condition B will be activated when a potential failure situation is developing which allows for further analysis/decisions to be made before dam failure is considered to be a foregone conclusion. This is a situation where a failure may eventually occur, but preplanned actions taken during certain events may moderate or alleviate failure. Even if failure is inevitable, more time is generally available than in a Failure has occurred situation to issue warnings and or to take preparedness actions.

**Condition C: Non-Failure Emergency condition.**

Condition C will be activated when the flow conditions are as such that flooding is expected to occur downstream of the dam. Use of this classification allows for early warning of downstream areas during flood conditions. While the amount of flooding may be beyond control, information on the amount of releases from the dam is provided to authorities for any decisions on the need for evacuations. Condition C is quantified by three machines are at 100% governor; three spill valves are 30% open or the equivalent percentage (7,110 cubic feet per second), and additional spill is required; and/or local run-off increases river levels downstream.

Consumer's Energy required hydro operators to be certified through the Hydro Operator Certification Program which qualifies operators to detect, evaluate, and classify emergency situations. An operator is responsible for monitoring, recording, and interpretation of changes to dikes and flows. Operators are also trained to analyze, evaluate, and initiate corrective action for station alarms and emergency response procedures.

Any unusual situations for data detected or observed will be reported by the operator to the Hydro Supervisor. The supervision staff will immediately become involved in the evaluation of any detected abnormalities. The Hydro Operations Supervisor, in the event of any emergency, will take immediate action necessary to prevent failure and to prevent or minimize loss of life and property. He/she will initiate emergency notification procedures base on conditions as follows in the Emergency Operations – Warning and Evacuation section.

**VII. EMERGENCY OPERATIONS -- WARNING AND EVACUATION:**

Local warning and evacuation operations will be conducted by Newaygo County and will be carried out in accordance with procedures established in Annex I Tab C of this plan.

**There is a Public Warning System installed downstream of Hardy dam. The system is comprised of four sirens below Hardy and four sirens below Croton that are activated, when required, by Newaygo County Central Dispatch. The system is capable of siren sounds and live or recorded messages to allow the county to immediately notify residents and visitors if an emergency exists at the Hardy and Croton Hydro Plants.**

**In addition, Newaygo County also maintains a CityWatch Alert and Notification System, which can send out a message to residence in a specific geographical area designated by the originator of the message to give specific instructions to the residences and businesses in the area.**

The following guidelines apply to local actions in an emergency situation.

- A. In a **Condition C: Non-Failure Emergency Condition and Condition B: Potential Failure situation is developing**, Consumers Energy will place the agencies on an initial alert and provide periodic updates on the situation as it develops so that the agencies can assess when and if they should implement their evacuation procedures. The situation will be closely monitored by local emergency response personnel and Newaygo County Emergency Services Department. The Local Emergency Operations Center will be activated as needed. The Newaygo County Emergency Services Director will maintain close contact with the Hydro Dam Operations Supervisor or Consumer's Energy Emergency Planning Administrator. All contact information is listed in the Emergency Notification Flow Chart in the Emergency Action Plan for Hardy Hydro Plant and Croton Hydro Plant.
- B. In a **Condition A: Failure is Imminent or Has Occurred**, Consumers Energy will initiate the notification flow chart for Condition A and activate the plant siren once a Incident Action Plan has been established. Hydro Dam Operators, as conditions allow, will regulate generation and spill as needed to maintain the integrity of the plant and public safety as long as operator's safety will allow. The Newaygo County Emergency Operations Center will be activated and a representative from Consumers Energy will be present in the EOC to assist with decisions of making emergency population protection measures and orders.

**Evacuation may be recommended or ordered by local Emergency Operations Center Officials as a precautionary measure if the situation continues to deteriorate on any Level of classified Condition.**

Times available for evacuation at various locations along the river are shown on the inundation maps through the flood wave arrival time and the maximum river elevation in Annex 1 Tab A and B of this plan.

#### **VIII. POST EMERGENCY OPERATIONS:**

- A. Time required for flood waters to recede to normal levels after dam failure will vary depending upon distance downstream and the extent of failure. This time can be estimated for a given location (river miles) by adding 48 hours to the peak time shown on the inundation maps.
- B. The situation will be monitored by local authorities in order to determine when residents may safely re-enter areas which were flooded. Normally, clearance for re-entry will be issued by Newaygo County Emergency Services Department in coordination with local governments based on recommendations from the Department of Human Resources (DHR), and the Department of Natural Resources (DNR). Instructions concerning re-entry will be broadcast over the EAS station for the area and disseminated by local officials as required. These advisories will include safety and health information provided by state and local authorities.
- C. Damage assessment and determination of disaster/emergency declaration eligibility will be in accordance with the Newaygo County Emergency Operations Plan, Emergency Action Guidelines, as well as other appropriate state and federal regulations.

#### **IX. PUBLIC INFORMATION:**

All Public Information will be managed according to the public information strategy, guidelines, and Standard Operating Procedures established by the Newaygo County Emergency Action Guidelines. All public information officers, both public and private, will work in coordination with the lead Newaygo County Public Information Officer through the Joint Information Center. All information will be cleared through the Newaygo County Board of Commissioners Chief Elected Official, Incident Commander, and Consumers Energy.

The Consumers Energy News and Information Department has a standardized media contact list which will be utilized to notify the media of the situation and how public information will be handled. Consumers Energy News and Information Department will have a dedicated official appointed to the Joint Information Center and will secure ongoing and frequent updates from the designated onsite supervisor to provide information to the media.

#### **X. Review / Revision:**

This plan will be reviewed annually and revised as necessary by the Newaygo County Emergency Services Department.

**XI. Effective Date:**

This plan is effective immediately and will be activated upon the direction of the heads of local government through the Emergency Operations Center.

ATTEST: This \_\_\_\_\_ day of \_\_\_\_\_, 2009.

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CEO, Newaygo County Board of Commissioners

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Clerk, Newaygo County