



Public Health Response to Flooding Disasters



2019

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I. INTRODUCTION

Although the Upper Peninsula (U.P.) of Michigan is generally not considered a flood prone region by national standards, Marquette County is not without risk of flooding. Examples of significant flooding events that have threatened homes and damaged vital infrastructure within Marquette County include the Chocolay River flood, which occurred on October 18, 2016, and the Dead River Flood, which occurred on May 14, 2003. The Chocolay River flood was directly caused by excessive rainfall and the Dead River flood was caused by failure of the Silver Lake Dam. The cover photo of this document was taken during the Dead River Flood in 2003. The home and associated drinking water and wastewater systems shown in this photo, were forced to be elevated above the 100 year flood level by requirement of the Marquette County Health Department (MCHD), resulting in the home, drinking water supply and wastewater treatment system remaining unaffected by flood water. This serves as an example of how the application of Local Public Health policy and regulation can create valuable protections against natural disasters.

Climate change predictions indicate that the probability of weather induced natural disasters, such as flooding, will increase in the future. As a result, significant flooding events within Marquette County may become more frequent. On June 17, 2018, between the hours of 11 pm and 8 am, 7 inches of rain fell in the Houghton/Hancock area of Houghton County in the Western Upper Peninsula, with the majority of this rain falling between the hours of 2 am and 5 am. The National Weather Service considered this to be a one thousand year flood event, having a probability of occurring once in a thousand years. This rare storm is an example of such a weather-induced disaster occurring in the U.P. region.

Since June of 2017, MCHD has been working collaboratively with the Michigan Department of Health and Human Services (MDHHS), Michigan Climate and Health Adaptation Program (MICHAP), the Michigan State University (MSU) School of Planning, Design and Construction and MSU Extension on a pilot project funded by the United States Centers for Disease Control and Prevention (CDC), Climate Ready States and Cities Initiative. Marquette County was selected as a pilot rural community under this initiative with the goal of developing a host of interventions to address the interaction between climate change, health and the built environment. As an outcome of community forums held with broad stakeholder groups during this collaborative project, localized flooding emerged as a key climate related health issue to be addressed through policy development as reflected in the Marquette Area Climate and Health Adaptation Guidebook published by MSU in December of 2018.

In January of 2019, MCHD was awarded a Climate and Health Adaptations in Local Health Department's pilot project grant through the National Association of City and County Health Officials (NACCHO) to develop this Public Health based flood response plan in accordance with MICHAP project recommendations.

Sponsorship and Development

This Public Health Response to Flooding Disasters plan was developed by the Marquette County Health Department and was partially supported by Grant Number 1NU38OT000306-01-01, CFDA #93.421 from the Centers for Disease Control and Prevention (CDC) to the National Association of County and City Health Officials (NACCHO). Its contents are solely the responsibility of the Marquette County Health Department and do not necessarily represent the official views of the CDC or NACCHO.

Acknowledgments

The Marquette County Public Health Response to Flooding Disasters Plan was developed using concepts fielded from a variety of guidance documents, response plan documents, and through consultation with a variety of public health organizations both within Michigan and throughout the nation. Research, reference and consultation for this project included the following agencies:

The Western Upper Peninsula District Health Department, Dickinson Iron District Health Department and Washtenaw County Health Department of Michigan, the Ross County Health District (Ohio), Linn County Public Health (Iowa), Hennepin County Public Health (Minnesota), Public Health Seattle and King County (Washington), Harris County Public Health (Texas), the Colorado Department of Public Health, the Iowa Department of Natural Resources, the Arizona Department of Health Services, the Georgia Department of Public Health, the Oregon Health Authority, the United States Centers for Disease Control, the United States Environmental Protection Agency, the National Association of City and County Health Officials, and our partners in the Marquette County, Michigan Climate Health Adaptation Project including the Michigan Department of Health and Human Services, the Michigan State University School of Planning Design and Construction, Michigan State University Extension and local stakeholder organizations.

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A. Purpose

The purpose of this response plan is to define and outline the public health roles and duties of MCHD staff during emergency response to flood related disasters. This plan is intended to be a step-by-step guidance regarding activities conducted by MCHD staff during a flooding event.

B. Scope

1. Local Public Health Responsibilities During Flooding Events

MCHD will be responsible to assure public health during flooding events by providing Environmental Health related coordination, oversight and guidance to the general public regarding drinking water safety, food supply safety, affected on-site wastewater facilities, handling of solid waste recreational water concerns, surface water concerns, associated flood water hazards and hazards that may be encountered during homeowner clean-up.

MCHD will also be responsible for Clinical Health related duties including assessment and coordination of needs of individuals and populations affected by flooding and the provision of basic medical services when needed.

2. Roles of Public Health Staff During Flooding Events

The role of MCHD staff during a flooding event will be that of providing recommendations regarding risk and response to flood associated issues that can affect public health. MCHD staff will conduct assessments and coordination of health needs and services for populations affected by flooding to protect the health of the public. MCHD staff will assess environmental health related factors, environments and infrastructure to determine and communicate risk and mitigation strategies to the public. In some instances, public health advisories or corrective orders may be issued.

C. Types of Flooding Events

The National Weather Service defines a flood as any high flow, overflow or inundation by water, which causes or threatens damage.

Flooding within Marquette County may be caused by excessive rain, coastal flooding, frontal systems, thunderstorms, ice jams, ice jam break-up, or infrastructure failure such as dams or drainage ways.

Factors that affect flooding include precipitation intensity, storm duration, terrain, ground cover (rural vs. urban), ground saturation, surface runoff, and infrastructure capability.

Early spring is generally considered by the National Weather Service to be peak flood season in the U.P. region. However, significant amounts of rain also occur in the fall, which have led to previous flooding in Marquette County. When considering potential infrastructure failure, and expected increases in the frequency and intensity of storm events due to climate change, flooding could be a risk in Marquette County at any time of year.

The National Weather Service uses the following terminology to characterize flooding events:

- **Minor Flooding** – minimal or no property damage, but possibly some public threat.
- **Moderate Flooding** – some inundation of structures and roads near streams; some evacuations of people and/or transfer of property to higher elevations.
- **Major Flooding** – extensive inundation of structures and roads, significant evacuations of people and transfer of property to higher elevations.
- **Record Flooding** – flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping.

D. Notification of a Flooding Event

The National Weather Service issues public notifications for flash floods, floods (general), river floods, and storm surges based upon predictive weather modeling and river monitoring.

National Weather Service notifications are issued in the following categories:

- **Outlook** – indicates a hazardous weather or hydrologic event may develop. It is used to provide information to those needing considerable lead-time to prepare for an event.

- **Advisory** – highlights special weather conditions that are less serious than a warning. They are for events that may cause significant inconvenience, and if caution is not exercised, could lead to situations that may threaten life and/or property.
- **Watch** – indicates the risk of a hazardous weather or hydrologic event has increased significantly, but its timing, occurrence, and/or location is uncertain. It is used to provide enough lead time for those needing to set plans in motion.
- **Warning** – is issued when a hazardous weather or hydrologic event is occurring, is imminent, or has a high probability of occurring. It is used for conditions posing a threat to life and/or property.

When a flooding event occurs in Marquette County, MCHD will be notified by the County Emergency Manager making contact with the MCHD Emergency Preparedness Coordinator (EPC). The EPC will immediately notify the MCHD management team.

MCHD may also become aware of a flooding event by broadcast from the National Weather Service warning system, by information relayed through other media, or by communication received from the general population regarding direct observation of the flooding event.

II. INITIATION AND COORDINATION OF RESPONSE

A. Command and Control

1. Establishing Scope of Response Command

In the event of a flood, the MCHD Emergency Preparedness Coordinator (EPC) will communicate with the County Emergency Manager to determine if the County Emergency Operations Center (EOC) has been established. The EPC will then identify the MCHD liaison to the EOC. The EPC will also determine if a local state of emergency has been declared and verify if County Emergency Management is the lead agency.

The EPC will initiate the emergency call down procedure to assemble the MCHD Emergency Preparedness (EP) Team. The EP Team, through communication with the EOC and with use of available mapping tools, will establish the scope of public health response to the incident.

Public Health scope of response will be determined by the activities outlined in this document. The EP Team will then convene to prepare an Incident Action Plan (IAP) and target the response to affected areas and populations.

Evacuation, if needed, is coordinated and conducted by the EOC and law enforcement.

2. Communication

The EP Team will then communicate to all MCHD staff to inform them of the situation and response plan. MCHD staff will then be assigned roles within the public health response to the flooding incident.

The MCHD Public Information Officer (PIO) will coordinate with the County PIO or Emergency Manager to establish a joint information center (JIC).

The PIO, through the JIC, will assist the EOC in determining when to establish and how to establish an emergency call center. A public information hotline number and associated messaging will be established through the JIC and the EOC.

All MCHD staff will be instructed to route all public inquiries through the public information hotline number.

The MCHD PIO will coordinate a media release regarding communication of public health risks associated with the flooding event. Routine updates will be provided through media release throughout the incident. All messaging should be approved through the JIC.

Routine MCHD staff meetings including all staff, will be coordinated to keep all staff informed of the current status of the incident response and to field feedback from staff regarding individual needs.

The Health Officer may participate in the State Emergency Operations Center (SEOC) State Agency Briefing Conference Calls. Participation can be arranged by contacting the Michigan Department of Health and Human Services (MDHHS) representative.

The event activity and situational reports can be monitored by reviewing the Damage Assessment and Emergency Status Report WebEOC event site. MCHD activity and attachment of pertinent documents can be made through this website.

Radio communication should be monitored through the 800 MHZ special events channels.

The internet and social media should be monitored for event content.

The MCHD website and social media sites should be routinely updated with event information and public health advisories and recommendations.

B. Responder Health and Safety

1. Determine Organizational Responsibility

The MCHD Incident Commander, in coordination with the EOC, will identify the lead agency responsible for responder health and safety.

The MCHD IAP will include a plan to monitor the health and safety needs of MCHD staff through regular all-staff incident update meetings.

2. Determine Medical Response Roles

MCHD will assist in coordination of major and minor medical response with other agencies through the EOC. MCHD may provide minor medical care response, within the agency's ability and scope.

Advise EOC as necessary regarding sources of alternative care center supplies and maintain contact with the Region 8 Medical Coordination Center.

Advise EOC as necessary that Emergency Room (ER) bed space availability can be monitored through HAvBED.

Advise EOC that resources from the Strategic National Stockpile (SNS) can be requested if needed.

C. Sheltering

The establishment of emergency shelters throughout the county, including location and assigned agencies operating shelters, will be determined through the EOC.

1. Environmental

MCHD will meet with the assigned operating agency for each shelter to review and assess food service, water supply, sewage and waste disposal facilities, sleeping arrangement and bathing facilities employed at each specific shelter open to the public or responders.

Environmental assessments of shelters will be conducted using the CDC shelter evaluation form and associated instructions.

2. Clinical

MCHD will assist in the coordination of reporting of illness/injury, infirmary operations, medication, medical needs and access to mental health services.

3. Other

Through the EOC, MCHD will assist in coordination between shelter operators, animal shelter and animal control regarding the care of displaced pets.

D. Disaster Behavioral Health

1. Consideration

In addition to the needs of first responders and the general public, consideration must be given to the mental health status and needs of all MCHD staff throughout the course of the response. Available care coordination should be reviewed with all staff during each all staff event update meeting. Outreach can also be provided to staff via e-mail or other electronic media.

2. Coordination

Coordinate through EOC to review considerations for crisis counseling services for staff, first responders and disaster workers. The Critical Incident Stress Management (CISM) system should be considered in meeting response needs.

Local mental health authority should be utilized for the general public and survivor crisis counseling services.

E. Targeting Response Efforts

1. Targeting Overall Location Affected

Information regarding the geographic area impacted by flooding will be received by MCHD through the EOC. MCHD will use this information to map flood-affected areas using Global Information System (GIS) mapping software housed in the Environmental Health (EH) Division. Mapping of rivers and other waterways, combined with floodplain mapping data, where available, will be used to define the most highly impacted areas.

Infrastructure damage, including power, drinking water and wastewater systems, will determine the scope of impacted populations beyond the immediate flood zone.

2. Targeting Vulnerable Residential Areas

GIS mapping information regarding residential address locations, structure locations, and property ownership will be used to determine residences, residential areas and businesses impacted by floodwaters.

3. Targeting Vulnerable Populations

During the disaster, health data regarding vulnerable population demographics having negative health impacts due to the event may be available through the Michigan Syndromic Surveillance System.

Access to, and interpretation of, this data can be obtained through consultation with the Michigan Department of Health and Human Services (MDHHS) Region Epidemiologist. Demographic data obtained through syndromic surveillance may be used to target public health response to specific populations.

Near the end of the disaster, or when the disaster, or the effects of the disaster are ongoing for an extended period, MCHD may employ a Community Assessment for Public Health Emergency Response (CASPER) study in coordination with partner agencies through the EOC, to determine health needs, at a household level, of the communities affected. Data produced from a CASPER can be used to target the public health response to households containing individuals with special needs.

MCHD may coordinate with the Marquette County Planning Division in an effort to map communities that have been negatively impacted by the disaster event using census generated demographic data and GIS mapping technology in an effort to detect areas where vulnerable populations may have been disproportionately affected. This data will facilitate the targeting of the public health response to communities containing vulnerable populations.

III. ADMINISTRATION, FINANCE AND LOGISTICS

A. Liability Issues

Several sections of the Public Health Code, 1978 PA 368, grant immunity from liability:

- **Health Departments** – The director, or an employee or representative of the state health department or a local health department, is not personally liable for damages sustained in the performance of departmental functions, except for wanton and willful misconduct.
- **Immunization Programs** – When participating in an approved mass immunization program in this state, health personnel cannot be held liable except for gross negligence or wanton and willful misconduct.
- **Emergency Medical Services Personnel** – Immunity from liability is provided except for gross negligence or wanton and willful misconduct.

Section 11 of the Emergency Management Act, 1976 PA 390, addresses the liability of disaster relief forces.

In addition, the State Director of Emergency Management has the authority to plan for and utilize the assistance of any volunteer group or person having a pertinent service to render; and, may issue a directive relieving the donor or supplier of voluntary or private assistance from liability for other than gross negligence in the performance of the assistance.

B. Resource Management (Acquisition, Tracking, Financial Record Keeping)

A financial tracking system must be implemented during the response in order to document and track all staff time, equipment, and other use of resources. Financial documentation is necessary for payment of employees, suppliers, and the potential for cost reimbursement, depending on the nature and scope of the emergency.

At the start of the response, and during the initial management meeting to establish an Incident Action Plan (IAP), the MCHD financial staff members will be assembled to plan resource and expenditure tracking and documentation requirements for the response.

All staff will be educated and instructed regarding the resource and financial tracking requirements of the response during the initial all staff meeting. Resource and financial tracking requirements will be reiterated and updates will be provided to staff in subsequent all staff meetings.

IV. ENVIRONMENTAL RESPONSE

A. Drinking Water Response

1. Outreach

Public Health Advisory media releases and informational pages on the MCHD website and social Media pages must be developed and released to the public as early in the response as possible and should be updated throughout the response as information changes.

Public Health Advisories must inform the affected population regarding potential contamination of drinking water sources, and must advise the use of precautionary drinking water measures and alternative drinking water sources. This information should be targeted toward the general public and business owners using both privately owned wells and municipal water supply sources.

Public health advisories should also include information regarding the protection, mitigation and repair of drinking water source wells and infrastructure.

2. Public Drinking Water Supplies

Water supply facility assessments should be performed in conjunction with food service assessments, wastewater treatment system assessments, facilities assessments etc. as needed to promote efficiency and effectiveness of the public health response.

Public drinking water supplies in Marquette County are divided in the categories of Type I community water supplies, Type II non-community water supplies, and Type III non-community water supplies under authority of Michigan Safe Drinking Water Act, Act 399, P.A. 1976, amended and rules.

Regulatory oversight for public drinking water supplies is as follows:

- Type I – The Michigan Department of Environment, Great Lakes, and Energy (EGLE) Office of Drinking Water and Municipal Assistance (ODWMA).
- Type II – MCHD
- Type III – MCHD

Type I

Type I water supplies are public water supplies serving communities comprised of 14 or more residences. Generally, these supplies serve municipalities. However, facilities such as mobile home parks, apartment complexes and condominium developments may also be served by independently operated Type I community water supplies.

MCHD will review affected areas using GIS mapping tools to determine water supplies potentially compromised.

MCHD staff must contact EGLE partners to verify the status of Type I municipal water supplies that may have been affected by flooding. Type I supplies affected should be assessed for damage or floodwater inundation at the wellhead(s) and throughout the treatment and distribution system. Compromise to the system may require repair, disinfection and compliance sampling. Public Health Advisory media releases should be executed to advise the general population regarding water supply use and precautionary measures.

Type II

Type II water supplies are public water supplies that serve 25 or more people per day and that are not community water supplies.

These supplies are typically operated on privately owned wells and distribution systems and may be associated with facilities such as restaurants, childcare centers, schools, mining and industrial facilities, children's camps, motels, campgrounds, etc.

MCHD will review affected areas using GIS mapping tools to determine water supplies potentially compromised.

The MCHD Type II program coordinator will access contact information and water supply construction information using the Michigan Department of Environment Great Lakes and Energy (EGLE) Water Track database and associated program spreadsheets. The water supply operator of the affected water supply will be contacted to discuss the water supply status, required precautionary measures and water supply public health advisory postings.

MCHD Environmental Health (EH) staff will conduct a site visit to each affected Type II water supply to assess damage and vulnerability to flood water inundation.

If it is determined that the water supply has been compromised, MCHD will coordinate with the water supply operator and available State of Michigan licensed well drillers to arrange repairs and disinfection to the water supply.

The water supply must be posted with a public health advisory at the point of use until such time that repairs have been completed and/or the supply has been sampled and has been determined to be safe for consumption.

All corrections, postings and sampling will adhere to the requirements of Michigan's Safe Drinking Water Act.

Type III

Type III water supplies are public water supplies that do not meet the criteria of Type I or Type II. These public water supplies are privately owned and typically serve small businesses and retail operations with fewer than 25 employees or serving water to fewer than 25 members of the general public. Type III water supplies can also be public water supplies serving mobile home parks, condominium developments and apartment complexes containing fewer than 14 residential units.

MCHD will review affected areas using GIS mapping tools to determine water supplies potentially compromised.

MCHD will use GIS mapping tools and the BS&A Equalization database to determine property ownership and contact information.

MCHD will contact Type III water supply operators in areas affected by flooding to determine water supply status and to advise the owner regarding posting of public health advisories.

MCHD staff will visit each flood-affected facility to conduct a water supply assessment to determine if the water supply has been compromised by flooding damage or has been vulnerable to flood water inundation.

If it is determined that the water supply has been compromised, MCHD will coordinate with the water supply operator and available State of Michigan licensed well drillers to arrange repairs and disinfection to the water supply.

The water supply must be posted with a public health advisory at the point of use until such time that repairs have been completed and/or the supply has been sampled and has been determined to be safe for consumption.

All corrections, postings and sampling will adhere to the requirements of Michigan's Safe Drinking Water Act.

[3. Private Drinking Water Supplies](#)

Private drinking water supplies include all individual, privately owned water supplies serving individual residences and not connected to a public water supply. Residences served by private drinking water supplies include owner occupied residences, rental residences, vacation homes, camps, etc. MCHD has regulatory oversight of all private drinking water supplies within Marquette County.

MCHD will distribute a public health advisory to local media regarding precautions, concerns and measures to be taken by members of the general public whose residential private water supply may have been affected by flooding. Information regarding water supply precautions, corrections and disinfection will also be posted on the MCHD website and social media pages.

MCHD staff will use GIS mapping tools to determine residential structures and water supplies that may have been affected by flooding. GIS mapping tools and the BS&A Equalization database will be used to determine property owner contact information.

MCHD staff will contact residences in flood-affected areas to offer water supply assessment and sampling services.

MCHD will assess the wells of those residences requesting services. If damage is noted, MCHD will provide guidance and coordination for correction. MCHD will assist in water sample collection for coliform bacteria and will advise regarding the need for water supply disinfection. MCHD will assist homeowners with disinfection procedures and/or coordination of State of Michigan licensed well drillers to perform disinfection of water supplies.

In instances where a private water supply is compromised to the point of creating a public health nuisance or a threat to the ground water resource, the water supply may be ordered corrected by the department.

4. Bottled Water Distribution

In the event that drinking water supply safety is widely affected by floodwaters, MCHD will coordinate with partner agencies such as the American Red Cross, EGLE, MDHHS and/or the Salvation Army, through the EOC to locate sources of bottled water supplies.

Bottled water distribution centers will be coordinated through the EOC in an effort to maximize convenience of access to the affected populations.

B. Food Safety Response

1. Introduction

Infrastructure damage due to flooding may affect food safety on a broad scale. Interruptions in power delivery may render refrigeration equipment inoperable resulting in temperature abuse of potentially hazardous foods.

Interruption and damage to potable water supply infrastructure may result in a lack of facilities to support basic sanitation such as hand washing, cleaning and sanitization of equipment and utensils, etc. Potable water infrastructure damage may also result in contamination to water that may be used as an ingredient in food and beverages.

Interruptions and damage to wastewater treatment infrastructure may also render basic sanitary facilities within food service related businesses inoperable. Flood related damage to transportation infrastructure might also negatively affect the ability of food service related businesses to remove solid waste from their facilities.

Floodwaters may also directly damage food industry infrastructure through infiltration and physical damage to facilities directly and by direct contamination to food products making contact with floodwaters.

As a result, flood damage can have a large-scale impact on the ability of the affected community to supply safe food to the general public. Flood damage can also impact food safety within individual residences through these mechanisms.

To avoid the potential spread of food borne illnesses through populations affected by a flooding event, and to ensure an adequate supply of wholesome foods, proper education and risk communication must be provided to the food service industry and the general public.

Assessment of damage to food service related facilities and services, and their continued ability to produce and provide safe and wholesome foods to the public, must also be conducted.

To meet the potential increase in need of a safe food supply available to the public during a disaster response, food service establishments should be encouraged to remain operational using interim precautionary measures, so long as public health can be protected.

2. Outreach

a. General Population

Media releases will be generated to all media partners and the MCHD webpage and social media sites will be updated to provide guidance to the general population whose residences may have been affected by flooding.

Educational guidance will include the following topics:

- Proper temperature maintenance of foods.
- Assessment of foods that may have been directly contaminated or damaged by floodwaters.
- Potable water supply considerations.
- Proper cooking temperatures.
- Guidance regarding disposal of foods impacted by temperature abuse and/or contact with floodwater.

b. Food Service Industry

MCHD staff will determine the food service establishments likely affected by flooding through use of GIS mapping and information provided through the EOC regarding the scope of the disaster.

MCHD staff will retrieve contact information for affected facilities from the food service program inspection database. Each potentially affected facility will be immediately contacted by MCHD to discuss the scope of damage to each specific food service facility and to discuss public health related concerns regarding continued operation.

MCHD will work with the Michigan Department of Agriculture and Rural Development (MDARD) to coordinate communication to food service facilities typically under the jurisdiction of MDARD. Risk communication to facilities typically under the jurisdiction of MDARD will be conducted by MDARD. MCHD may assist in communication with MDARD facilities as needed.

MCHD staff will confirm that each food service facility operator intending to continue service through the disaster has ready access to the **Michigan Emergency Management Emergency Action Plans for Retail Food Establishments** guidance document for continued operation of food service establishments during disasters.

MCHD staff must ensure that food service operators will be functioning in accordance with the Emergency Action Plans for Retail Food Establishments guidance. MCHD staff will provide copies of this document to any facility that does not have a copy readily available.

c. Mass Feeding Operations

MCHD will determine the locations and management points of contact for mass feeding operations via communication through the EOC. Mass feeding operations may include emergency shelter feeding operations, disaster responder/volunteer feeding operations, or any other feeding operation providing food to the general public or directly to response workers.

Emergency feeding operations are exempt from food service licensing requirements in the State of Michigan. MCHD will provide assessment, guidance and advice to managers of emergency feeding operations.

MCHD staff will contact each mass feeding operation manager individually to discuss the following:

- The source of foods served
- Water sources
- Wastewater handling
- Solid waste handling
- Time and temperature control of foods
- Transport of foods
- Health related restrictions to workers and volunteers

If foods are being catered from established food service operations within the community, MCHD staff must obtain information regarding the specific caterers. MCHD staff must then contact the specific catering operation to discuss food safety concerns surrounding production capacity of the catering facility.

3. Assessments

Food service facility assessments should be performed in conjunction with water supply assessments, wastewater treatment system assessments, facilities assessments, etc. as needed to promote efficiency and effectiveness of the public health response.

a. Food Service Industry

MCHD will work with the Michigan Department of Agriculture and Rural Development (MDARD) to coordinate assessment of food service facilities typically under the jurisdiction of MDARD. Assessment of facilities typically under the jurisdiction of MDARD will be assessed by MDARD. MCHD may assist in assessment of MDARD as needed.

MCHD staff will travel to each food service establishment potentially affected by flooding to conduct an assessment of the food service establishment's ability to provide safe and wholesome food to the public within its planned capacity. Assessments will be conducted using standard inspection forms and methodologies.

Food service operators will be advised of interim operational strategies in accordance with the **Michigan Emergency Management, Emergency Action Plans for Retail Food Establishments** guidance manual, a copy of which will be provided to operators during the assessment.

MCHD Staff will approve continued operation of flood affect facilities under interim operational strategies, as long as the health of the public is not placed at risk.

b. Mass Feeding Operations

MCHD staff will act in an advisory capacity to mass feeding operation managers.

MCHD will identify locations and points-of-contact for all mass feeding operations associated with the disaster response via communication through the EOC. Mass feeding operations include those providing food to response workers and volunteers, those providing food to emergency shelters and those providing food to the general public.

MCHD staff will travel to each mass feeding location and will conduct a food safety assessment, using standard food service program inspection forms and methodologies.

Mass feeding operation's managers will be advised of interim operational strategies in accordance with the **Michigan Emergency Management, Emergency Action Plans for Retail Food Establishments** guidance manual, a copy of which will be provided to managers during the assessment.

MCHD staff will advise mass feeding operation's managers of needed corrections as necessary to ensure the protection of public health.

MCHD Staff will approve continued operation of mass feeding operations under interim operational strategies, as long as the health of the public is not placed at risk.

C. Wastewater Treatment Response

1. Introduction

During a flooding event, facilities designed to receive and treat wastewater, including sewage, may become damaged, inoperable, or may malfunction.

Wastewater treatment systems negatively impacted by floodwater may include large wastewater treatment facilities serving entire municipalities, medium sized on-site waste water systems serving communities such as condominiums, housing developments, mobile home parks or industrial facilities and small on-site wastewater treatment systems serving single and two family residences.

Wastewater treatment systems that have been negatively impacted by floodwaters may discharge contamination that can affect surface waters and drinking water supplies. Flood impacted wastewater treatment facilities can also contribute contamination creating additional public health risk to those that come into contact with floodwaters.

Floodwater intrusion may also render wastewater treatment systems non-operational or may significantly reduce the ability of these systems to receive wastewater. Direct damage to infrastructure, such as sewer lines, may also affect the ability of wastewater treatment systems to serve the public. As a result, populations affected by flooding may have a significantly reduced ability to use, or have access to, basic sanitary facilities.

The public health response to a flooding event must assess damage to wastewater treatment infrastructure and must advise and assist in the coordination of interim measures to assure that affected populations have access to basic sanitary facilities and are aware of potential public health risks associated with malfunction of flood affected wastewater treatment systems.

2. Outreach

MCHD staff will distribute media releases, and will update the MCHD website and social media pages with public health advisories regarding the potential, and actual, wastewater treatment systems negatively impacted by the flooding event.

Public health advisories should include:

- The potential impacts to wastewater treatment systems.
- Concerns of contamination to water supplies.
- Concerns of contamination to surface water bodies and floodwaters.
- Water conservation recommendations.
- Interim measures for individuals to meet basic sanitation needs.
- Interim measures for affected businesses.
- Locations of available public facilities (when applicable).

3. Private/Small Scale On-site Wastewater Treatment System

MCHD has regulatory oversight of all private residential single-family and two-family on-site wastewater treatment systems. MCHD also has regulatory authority over wastewater treatment systems designed to handle fewer than 10,000 gallons of sewage per day that may serve businesses or small communities.

MCHD will identify residences and business where wastewater treatment systems were potentially impacted by floodwaters by combining information received through the EOC with GIS mapping tools.

a. Outreach

MCHD will inform private homeowners of public health concerns and interim measures through public health advisory media releases, website postings and social media postings.

Owners of business and community systems will be contacted individually to discuss potential impacts and interim measures. Public health advisement will be given on an individual basis and tailored to specific concerns of the given facility.

b. Assessment

Wastewater treatment system assessments should be performed in conjunction with water supply assessments, food service assessments, facilities assessments, etc. as needed to promote efficiency and effectiveness of the public health response.

(1) Businesses/Small Communities

MCHD staff will conduct site visits at businesses and small communities whose systems have been impacted by flooding, as conditions allow, to perform a risk and damage assessment.

Risk and damage assessment site visits will be prioritized based upon the type of business or small community affected and the relative risk that continued operation will pose to public health. Priority will be given to healthcare related facilities and food service related facilities.

Wastewater treatment system owners/operators will be advised regarding public health concerns, interim operational measures and any future corrections or repairs that may be required.

(2) Single and Two-Family Residential

After the disaster event has stabilized and floodwaters have receded, MCHD staff will conduct on-site assessments of flood impacted residential on-site wastewater treatment systems.

Assessments will determine the scope of damage to systems and may recommend operational considerations and repairs needed to protect public health and the environment.

MCHD may order correction of wastewater treatment systems of which continued operation constitutes a threat to public health or the environment.

4. Municipal/Community Wastewater Treatment Systems

Regulatory oversight of wastewater treatment systems serving communities, and with a design capacity of 10,000 gallons per day or more, lies with the Michigan Department of Environment, Great Lakes and Energy (EGLE). These wastewater treatment systems are primarily those that serve municipalities.

MCHD staff will coordinate with EGLE partners and Wastewater treatment facility operators to determine the operational status of large community/municipal wastewater treatment facilities.

a. Outreach

MCHD will provide public health advisory media releases, website postings and social media postings regarding public health concerns and interim measures.

Public health concerns may include:

- Sewage overflows and potential impacts to surface water and floodwaters
- Potential impacts to recreational water
- Potential limitations to service areas
- Water conservation strategies
- Interim strategies for sanitary needs
- Availability of public sanitary facilities

EGLE staff will outreach directly to wastewater treatment facility operators regarding operational concerns and corrections. MCHD staff will assist as requested by EGLE.

b. Assessment

MCHD will communicate with healthcare facilities and with food service related businesses within the service area of the affected wastewater treatment facility to determine wastewater system functionality for the given facility. MCHD will make recommendations to facility operators regarding interim measures and will assist in coordinating wastewater needs. Wastewater handling issues noted during facility assessments will be communicated to the EGLE and wastewater facility operators for correction.

Assessment of damage and functionality of wastewater treatment systems and associated infrastructure is coordinated and conducted by EGLE and the associated municipalities. MCHD may assist as requested.

D. Solid Waste Management Response

1. Introduction

During a flood, the infrastructure that routinely deals with the storage, collection and disposal of solid waste (i.e., non-hazardous residential, commercial and industrial waste) may be interrupted anywhere from a few days to several months. Damage to roads and disruption of basic transportation routes is an example of infrastructure damage that can interfere with the proper handling of solid waste.

There are two basic categories of disaster impacts regarding solid waste management:

- The disruption of the solid waste storage, collection, and disposal system that affects the ability for ongoing generation of solid waste to be managed properly.
- The management of large quantities of debris that may result from widespread infrastructure damage and damage to residences.

The inability to efficiently manage solid waste can create public health nuisance conditions within affected areas and may lead to physical, chemical and biological hazards within affected communities and the environment.

Types of solid wastes that may be of concern during a natural disaster, such as a flood, are listed in the following table.

Type of Waste	Description of Waste
General Solid Waste	Food, packaging, clothing, appliances, furniture, machinery, electronic equipment, garbage, plastic, paper, bottles, cans, loose carpet, paper products, scrap tires, street dirt, dead animals. Items in this category that have been contaminated with hazardous waste would be disposed of as a “hazardous waste.”
Agricultural & Vegetative Waste	Vegetative or woody waste, tree limbs, brush, shrubs (does not include buildings, dead animals, or vehicles). Items in this category that have been contaminated with hazardous waste would be disposed of as a “hazardous waste.”
Construction & Demolition Debris (CDD)	Brick, stone, mortar, asphalt, lumber, wallboard, glass, roofing, metal, piping, fixtures, electrical wiring, heating equipment, insulation, carpeting attached to structures, railroad ties, utility poles, mobile homes. Items in this category that have been contaminated with hazardous waste would be disposed of as a “hazardous waste.”
Clean Hard Fill (a subset of CDD)	CDD which consists only of reinforced or non-reinforced concrete, asphalt concrete, brick, block, tile, and stone which can be reused as construction or fill material. Items in this category that have been contaminated with hazardous waste would be disposed of as a “hazardous waste.”

Medical/ Infectious Waste	Needles and medical related glass, syringes, blood containing or saturated items including tubing, clothing, bandages, etc. Items in this category that have been contaminated with hazardous waste would be disposed of as a “hazardous waste.”
Hazardous Waste/ Household Hazardous Wastes	Flammable materials (fuels, gasoline, kerosene, propane tanks, oxygen bottles), explosives, batteries, household chemicals (cleaners, solvent, mercury, paint), industrial and agricultural chemicals, cleaners, solvents, fertilizers, etc.
Radiological Wastes	Nuclear medicine materials and associated patient wastes, certain monitoring equipment.

2. Coordination and Planning

MCHD will coordinate with municipalities of flood-affected areas and with the Marquette County Solid Waste Management authority, through the EOC, to facilitate the safe and proper handling of solid waste during and following a flooding event. A coordinated effort will be used to establish solid waste staging and storage areas for specific waste material types and to arrange for the transportation and removal of solid waste. Solid waste staging or “drop off” areas should be made convenient to the communities in need to encourage and facilitate proper handling of waste.

3. Outreach

MCHD will assist in developing media releases and will post information on the MCHD website and social media pages directing homeowners, businesses and the general population regarding proper handling of solid waste. Messaging will include the potential health, safety and environmental hazards associated with the mismanagement of solid waste and will instruct the population regarding the location of solid waste drop off locations and the handling of specific waste types.

E. Recreational Water Response

1. Introduction

Floodwater may impact recreational water used by the general public by damaging associated infrastructure and operational systems, contamination of source water supplies or direct contamination of manmade or natural recreational water bodies. Floodwater impacts to recreational water bodies can create biological, chemical or physical hazards creating risks to public health.

MCHD staff will review flood-affected areas using information received through the EOC and GIS mapping tools to determine public swimming pool and spa facilities and natural recreational water bodies potentially affected by floodwaters.

2. Public Swimming Pools/Spas

a. Outreach

MCHD staff will initially contact the operator of each potentially impacted facility to determine the operational status of the facility and whether the facility should remain open to the public. If a facility should remain closed to the public, the operator will be instructed to post a sign on the entrance of the facility to inform the public.

b. Assessment

MCHD staff will visit each potentially affected licensed public pool and spa facility to determine the functionality of pool pumping, filtration and disinfection equipment. Impacts of floodwater intrusion to the pool/spa and to the pool/spa's water source will be evaluated. The pool/spa water will be sampled for coliform bacteria, disinfectant residual and pH. If the source water supply is suspected to have been impacted, a source water sample will also be collected for coliform bacteria.

Any deficiency identified will result in the closure of the facility to the public until corrections have been made and verified. MCHD staff will instruct facility operators regarding corrective actions and will ensure that the facility is posted as closed.

MCHD staff will use standard EGLE pool/spa inspection forms and facility closure forms to document the process.

3. Public Bathing Beaches/Surface Water

a. Outreach

MCHD will issue public health advisory media releases and post to the MCHD website and social media pages. Public health advisories will instruct the general public of the potential health and safety risks associated with the entrance into, or swimming in, surface water bodies that have been impacted by floodwaters and runoff. The public will be advised to avoid contact with flood impacted surface water bodies until further notice.

MCHD will contact all municipalities within Marquette County having designated surface water swimming areas and will instruct these municipalities to close designated swimming areas until water sampling has determined body contact to be safe in accordance with State of Michigan standards.

b. Assessment

MCHD staff will assist municipalities in water sampling compliance efforts in the assessment of designated surface water body swimming areas impacted by floodwaters. MCHD staff will visit impacted designated surface water body swimming areas to ensure that beach closure and/or public health advisory signage has been posted by the municipality in ownership.

Upon meeting State of Michigan water quality standards for bathing beaches, public health advisories and closures of designated surface water body swimming areas will be lifted.

F. Carbon Monoxide/Utility Hazards

1. Introduction

Power outages may be experienced during flooding events, resulting in an increased demand for the use of power-generating equipment by businesses and members of the general public. Improper use of power-generating equipment has been shown to increase the risk of injury and death due to carbon monoxide poisoning and electrical shock.

Health and safety hazards associated with utility infrastructure damage, such as downed power lines and gas leaks, may also occur.

2. Outreach/Risk Communication

MCHD will coordinate through the EOC and the JIC to ensure that media releases, website postings and social media postings are made regarding the health and safety risks associated with the use of independent power generating equipment. Public information will also include guidance and warnings regarding utility, and other hazards associated with entering floodwaters.

G. Homeowner Clean-up

1. Introduction

During a major flooding event, floodwaters can be expected to cause significant damage to homes. As residents attempt to clean up their homes, they may be exposed to a variety of health hazards including mold, potentially contaminated food, contaminated water, utility hazards etc.

To avoid health and safety hazards, homeowners must be advised regarding appropriate methods and personal protective equipment to be used when cleaning and repairing their homes. Homeowners must be advised of methods to prevent mold growth after floodwaters recede and when, where and how to dispose building materials and solid wastes.

2. Outreach/Risk Communication

MCHD staff will issue public health advisories through media releases and posts to the department website and social media pages regarding the risks and health considerations of reentering and attempting repairs to flood damaged homes. MCHD will provide guidance to homeowners regarding home reentry, remediation and repair activities. Guidance will also be provided regarding the handling of solid waste and considerations regarding water supply and wastewater treatment services.

H. Mosquito/Vector Control

1. Introduction

Disasters frequently create conditions that result in population increases in rodents or increased contact between humans and vector/nuisance species. In such situations, the chances of disease transmission increase sharply. Floodwaters and heavy rains will create new mosquito breeding sites in disaster rubble and/or standing water. If sewage systems are disrupted and riverbanks are disturbed, rodents will leave these areas and head for other sources of food and harborage. After a disaster, there may be a considerable amount of solid waste including food waste that can serve as a food supply for rodents and insects like houseflies.

In addition to disease hazards posed by insects and rodents, pests can contribute to psychological stress by being a major nuisance in a disaster situation.

2. Outreach/Risk Communication

MCHD staff will issue public health advisories through media releases and MCHD website and social media postings including:

- Disease transmission risk
- Environmental methods to reduce pest and vector populations
- Safe use of insecticides and repellants
- Methods to reduce exposure to potential disease-carrying vectors

- Disease symptoms to monitor

3. Assessment/Coordination

MCHD staff will assess conditions in the disaster area that may increase pest or vector populations. Coordination through the EOC will occur to address identified concerns where possible.

V. CLINICAL RESPONSE

A. Basic and Special Medical Needs Assessment and Coordination

In the early stages of the disaster, MCHD will coordinate with local medical provider agencies through the EOC to gain current information regarding the basic and special medical needs of the community. MCHD nursing and medical provider staff will be present at emergency sheltering locations to survey affected populations regarding individual basic and special medical needs.

MCHD will coordinate with the Michigan Department of Health and Human Services (MDHHS) Regional Epidemiologist to surveil for current illness trends through the Michigan Syndromic Surveillance System. The MCHD Medical Director will consult with the Regional Epidemiologist regarding interpretation of Syndromic Surveillance System data to direct public health response and public health advisory messaging.

MCHD may use current clinical service locations throughout the county to provide basic medical care to those in need where possible. MCHD staff may assemble clinical service locations within sheltering locations to provide basic medical services as needed. MCHD staff will coordinate with area medical providers through the EOC to arrange referrals to individuals identified to have medical needs exceeding the capacity and ability of MCHD.

Dependent upon the scope of the disaster, a more targeted and robust health surveillance effort may be conducted using the Community Assessment for Public Health Emergency Response (CASPER) process per CDC guidelines. CASPER survey methods can assess basic and special medical needs of a community to a household level.

B. Immunizations: Tetanus and Hep A

1. Introduction

It is a common misconception that exposure to floodwater increases risk of contracting tetanus and/or hepatitis A. Per the CDC, floodwater exposure to wounds does not increase risk of contracting tetanus for those that are current on their vaccines (i.e. have been vaccinated within the last 10 years). Although floodwaters may be contaminated with sewage or other sources of fecal matter, per CDC, there is no increased risk of contracting hepatitis A through floodwater exposure to skin. Fecal contamination would need to be orally ingested to increase risk of contracting hepatitis A.

2. Risk Communication

MCHD may decide it is prudent to issue a public health advisory media release and post information to the organization's website and social media pages. Public health advisories should include statements of lack of increased risk to those who are current on vaccinations and should direct the public to verify their vaccine status and seek vaccines when warranted. Public health advisories should direct the public to locations where immunization services are provided.

3. Immunizations

Depending upon public demand, MCHD may offer immunization clinics at established clinic locations throughout the county, and at make shift clinics at emergency shelters, to ensure that the public is up-to-date on tetanus vaccines.

MCHD may also take the opportunity to screen the public attending emergency shelters for general immunization status and offer immunization updates and immunizations of other sorts such as flu vaccine and hepatitis A to individuals in attendance.

C. Mental Health Services Needs

1. Introduction

Emergency planners and responders recognize that disaster mental health is an integral part of the overall public health and medical response to any emergency event. The disaster mental health response addresses the psychological, emotional, cognitive, developmental, and social impacts that disasters have on survivors and responders as they respond and recover.

The goal of disaster mental health response is to provide mental health support to disaster survivors and responders across the disaster continuum of preparedness, response and recovery.

It is important to recognize that in addition to the mental health of first responders and the general population affected by the disaster event, attention must be paid to public health staff and volunteers involved in the response. Staff members or colleagues may be dealing with compromised home environments and additional stresses related to injury, illness or disruption within their families.

2. Coordination

Although MCHD does have a limited number of mental health providers on staff, coordination with outside agencies will be necessary to meet the demands for mental health services across the community during a disaster event.

Through the EOC, MCHD will coordinate with the American Red Cross Disaster Relief Services, Pathways Community Mental Health, and U.P. Health Systems Behavioral Health to establish mental health related screening protocols and provider locations specific to the disaster response at hand.

3. Outreach

MCHD will assist in the coordination and development of outreach through the EOC with other mental health provider organizations.

Specific outreach will be targeted at first responders and the general public through communication directly through the EOC and through media releases and postings to organizational websites and social media pages.

MCHD staff will assist with mental health needs screenings and referrals for individuals using emergency shelters.

MCHD staff will be advised of services available during each full-staff response update meeting. Staff supervisors and team leaders will remain vigilant for signs of stress or mental health care needs among staff offering assistance and referrals where needed. MCHD may also use staff mental health professionals to routinely outreach to staff and surveil staff for potential need and provide services and referrals as needed.

D. Community Assessment for Public Health Emergency Response

1. Introduction

The Community Assessment for Public Health Emergency Response (CASPER) is an epidemiologic technique designed to provide quick and low cost household level health information about a community following a community wide disaster. Developed by the Centers for Disease Control and Prevention, CASPER provides a toolkit to assist local public health agencies in conducting a rapid and low cost assessment of a community to determine the health status and basic needs following a disaster such as large scale flooding. The CASPER toolkit uses valid statistical methods to assess the health status and basic needs of a community allowing public health to target resources to realistic community needs and health outcomes.

The primary goals of CASPER are to obtain information rapidly about the needs of an affected community and to monitor changes of needs during the recovery period.

In the disaster setting, the main objectives of CASPER are to:

- Determine the critical health needs and assess the impact of the disaster,
- Characterize the population residing in the affected area,
- Produce household-based information and estimates for decision-makers, and

- Evaluate the effectiveness of relief efforts through conducting a follow-up CASPER.

While CASPER is a quick, reliable, and accurate technique that provides household-based information about a community's needs, it is not intended to provide direct services to residents (such as cleanup or home repair) or to deliver food, medicine, medical services, or other resources to the affected area. However, some households in need of services might be identified by use of CASPER and referrals made. CASPER also cannot determine why people are not returning to their community, nor can it establish current population estimates.

2. Determine need for C.A.S.P.E.R.

During a disaster, the local, state, or regional emergency managers or health department officials may decide to initiate a CASPER when:

- The effect of the disaster on the population is unknown,
- The health status and basic needs of the affected population are unknown, or
- The response and recovery efforts need to be evaluated.

It is important to know the purpose, setting, and availability of resources before making the decision to conduct a CASPER.

Through the EOC, MCHD will coordinate with the Marquette County Emergency Manager and State agencies involved in the response to determine the need to conduct a CASPER based upon:

- Scale of damage to the community,
- Type and level of infrastructure damaged,
- Type and level of interruption of service,
- Demographic affected,
- Expected health impacts,
- The purpose of conducting the study, and
- Available resources.

3. Performing C.A.S.P.E.R.

The CDC "CASPER Toolkit" will be used as a reference guide in performing a CASPER. MCHD will coordinate through the EOC to pool resources.

Guidance and assistance in the technical aspects of conducting a CASPER will be sought from the CDC Division of Health Studies. CDC assistance in conducting a CASPER can be requested by emailing CASPER@cdc.gov. Additional CASPER resources can be found at the following link: <https://www.cdc.gov/nceh/hsb/disaster/casper/resources.htm>

It will be necessary to pool staffing to form survey teams which should include the mental health profession. Use of GIS mapping of census and housing information is also a component of survey design. MCHD will coordinate with the Marquette County Planning Division to conduct mapping of housing clusters using GIS tools and census data to determine community survey locations.

Assistance will be sought through the CDC for survey design and statistical analysis.

VI. CHECK LIST/INSPECTIONS FORMS / PUBLIC INFORMATION AND ADVISORIES

The “Marquette County Health Department Flooding Response - Checklist of Considerations” document, available through the following link, contains inspection forms and associated public information and advisories as embedded documents.



Flood Response
Checklist.docx