



Members of the U.S. Army Corps of Engineers Memphis District and City of Memphis officials place sandbags on a sand boil in Memphis, Tenn., in May 2011.

USACE PHOTO BY PATRICK MOES

Emergency Action Plans

As the nation's levee system ages and the risk to public health and safety mounts, communities can greatly mitigate risk through the use of a basic emergency action plan.

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When a fire bell rang, a bucket brigade formed. Long before modern fire fighting, this system worked because communities put a plan in place before the flames erupted. Communities today can take a page from this book by developing an emergency action plan (EAP) that will mitigate damage should an aging levee breach or crest.

According to the most recent American Society of Civil Engineers (ASCE) *Report Card for American Infrastructure*, “more than 85% of the nation's estimated 100,000 miles of levees are locally owned and maintained. The reliability of many of these levees is unknown. Many are more than 50 years old and were originally built to protect crops from flooding. With an increase in development behind these levees, the risk to public health and safety from failure has increased.”

ASCE points out communities are of-

ten unaware of the risk of living behind levees and the likelihood of flooding is misunderstood. As a result, little is done to mitigate risk, despite the fact that damages from flooding in levee-related areas have been substantial. The National Committee on Levee Safety documented the damages following several major recent flood events: more than \$272 million in the Midwest in 1993; \$152 million in North Dakota and Minnesota in 1997; more than \$16 billion after Hurricane Katrina; and more than half a billion in the Midwest in 2008.

The Federal Emergency Management Agency (FEMA) estimates “that levees are found in approximately 22% of the nation's 3,147 counties. Forty-three percent of the U.S. population lives in counties with levees.” Levees are either federally constructed and turned over to a local sponsor to operate and maintain or constructed by a local sponsor. This local sponsor—a municipality, county, levee district or drainage district—is responsi-

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ble for the operation, maintenance, repair and replacement of the levee and, in turn, holds the responsibility for the development of a solid EAP.

Anecdotal evidence suggests the majority of local sponsors don't have an EAP, and if they do, it is not specific to levee flood fighting. People who have spent their entire lives next to a levee and never seen it tested often have no sense of ur-

gency. Many believe their levee will never be breached. To overcome this mindset, communities must be educated on the protection their levees provide and the consequences of a levee failure.

TRAINING AND EAP COMPONENTS

Training and the development of an EAP are vital first steps in reducing the risk of levee failure and mitigating damages if failure occurs. Classes provide instruction on assigning specific responsibilities, limits of responsibility, chain of command and common terminology. In cities with emergency contact and emergency readiness centers, staff members participate in classes, while in smaller communities training is provided to members of the fire department, the chief of police, or the county sheriff. Specific training on flood fighting and directing volunteers also is available.

Once initial classes are completed, training is opened to the general public. Volunteers learn when they will be needed, receive training in proper sandbagging techniques, gain general information on how a levee operates and learn what to look for during a high-water event. Residents need to understand how a levee works. An example is sand boils; during a high-water event, water pressure creates seepage paths that begin to move levee embankment material. If left unchecked, the sand boils can continue to move material until piping through the levee causes a breach. This could happen behind someone's house near the levee and the owner could be unaware of the danger.

An EAP should be a living document that is regularly updated and improved, and it should have a basic framework similar to the following sequence:

- event detection;
- emergency level determination, with a plan that includes trigger events for each emergency level;
- notification and communication, including a notification based on the determined emergency level, a script and an updated phone tree;
- expected actions determined by emergency level; and,
- termination of the event based on predetermined criteria.

An EAP also incorporates an emergency alert system that should include phone dialer, radio and television alerts, siren, door-to-door notification for people who need protection, and drills for what to do when alerts are issued. Radio, television and phone alerts are prepared to provide forecasted flood stages, notification of when volunteer services are needed and, if necessary, evacuation alerts when the levee will be breached.

Every local sponsor should have a dedicated emergency manager or coordinator who is responsible for coordinating training and managing the EAP as well as notifying residents of upcoming flood fight training, workshops and other important levee information.

ENFORCING THE STANDARD OF DESIGN AND CONSTRUCTION

Some states require a levee district to designate a chief engineer responsible for ensuring the levee performs as intended. For instance, duties of the chief engineer, as defined in Missouri, are "accept, approve and adopt or amend any plan for leveeing, draining, reclaiming or protecting the lands and property described in the decree of the court incorporating said district..." The U.S. Army Corps of Engineers (USACE) requires local sponsors to submit all levee modifications for review and approval by USACE.

LOCAL SPONSOR RESPONSIBILITY

Along with a documented EAP and training for the community and volunteers, the local sponsor should see that levee staff and maintenance crews receive annual flood fight training. In addition, the local sponsor should ensure that he or she is in compliance with the Occupational Safety and Health Administration (OSHA) requirement that all personnel who enter confined areas (defined by OSHA under *29 CFR 1910*) complete confined-entry training and follow procedures including toxic gas testing, proper harness equipment and an emergency evacuation plan. Although levee maintenance frequently requires entry into a manhole or other types of confined areas, many communities don't realize compliance with this OSHA requirement is mandatory.

LEVEE ENCROACHMENTS

USACE provides all levee districts an operation and maintenance manual that details specific criteria for maintenance and operation of levee systems. The manual is provided to the local sponsor and addresses every level of maintenance, from the frequency of greasing sluice gates to their operation to mowing to closure structures for gaps. The manual also explains how to submit modifications to levee systems. For example, a utility company that wants to cross the levee must submit a plan to the local sponsor, who then submits the plan to USACE for approval. All levee modifications must be reviewed and receive USACE approval.

In conducting inspections, the most common threats to levee integrity are encroachments. The local sponsor must take responsibility and fight for the levee on a daily basis to prevent encroachment creep and the destruction caused by trees, utilities, buildings, fences, and so on.

TRAINING AND DEVELOPMENT

The United States Department of Agriculture (USDA) offers the public an excellent EAP example. Essentially a fill-in-the-blank document, it is one of the best ways for a community to get started in developing its plan. The USDA EAP is accessible at directives.sc.egov.usda.gov.

FEMA offers online training classes under its Community Emergency Response Team Program, and the State Emergency Management Association offers unique training for each state. Most USACE districts have an emergency management section, a resource that can provide flood fight training and technical advice for levee operation and maintenance.

Many local sponsors are under the misconception that another office is in charge of the EAP. A city may think the county has the plan and will handle any levee situation. Community stakeholders must assume that if they can't put their hands on an EAP, it doesn't exist.

TIME

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