Missouri American Water Joplin Tornado Response

Operational Challenges and Priorities
Missouri American Water

- Largest water utility in the state

- Provide water and wastewater service to 1.5 million people

- Delivering about 84 billion gallons of water across Missouri every year
Joplin Water System Overview

- Serve 24,160 customers, approximately 54,000 people
- Water Sources: Shoal Creek plus 9 wells
- 500 Miles of Water Mains
- Six Storage Facilities and Five Boosters/Pump Stations
- 32 full-time employees with an average 11 years of service
May 22, 2011– Worst Single Tornado in U.S. History

- Six mile long by half mile wide path of destruction
- Debris and traffic turned 5 minute drive to plant to 2.5 hour drive—inspections began immediately upon arrival
Joplin Tornado Path
Immediate Operational Challenges

- Immediate pressure decrease
- Two elevated storage show pressure drops in ten minutes. Empty in less than two hours after storm
- Damage to facilities ranging from minor to severe
- Plant operated on generator power for 1.5 days
Restoring the Distribution System

- 4,000 leaking customer service lines
- 25 torn fire service lines
- System pressure impossible to maintain, boil advisory issued
- Detection of zero pressure, advisory becomes boil order in conjunction with Missouri Department of Natural Resources
- Redirected flow around affected area to restore pressure
Re-establishing Pressure

- Following main shut-downs, pressure resumes in area not impacted
- Main breaks and service line repairs prioritized in impacted area
- Crews went block-to-block opening valves, putting mains back in service and shutting off individual service lines.
- Impacted area regained fire protection
Ensuring Water Quality

- Simultaneously began flushing the entire system
- Full pressure in entire system restored in two days
- Boil order lifted in 5.5 days after flushing and sampling are completed
- Equipment and manpower assistance from Missouri American Water operations in St. Louis and St. Charles Counties, Warrensburg, St. Joseph and Jefferson City
Infrastructure Damage

- Service Center and Plant Storage Buildings total losses
- Roof damage and broken windows at Water Treatment Plant
- Electrical panels at well 7 and 15th Street booster damaged
- Water tank paint compromised
- Damage to company vehicles
Summary

- Complete water system restoration in 5.5 days
- Sixty employees worked 12 and 14 hour shifts for 3 weeks following tornado
- Redirected flow around the area to stabilize system pressure
- Entire system flushed in 3 days – operating 1,800 hydrants
- Ongoing heavy workload due to:
  - Water line locations
  - Demolition permits
  - Water main repairs
  - Fire hydrant strikes during removal of debris
  - Service line and meter damage during event and during removal of debris
Timeline

• 30 minutes after tornado Missouri American established its command center and conducted its first conference call.

• Traffic congestion and debris on road caused Manager's trip from home to plant to take 2.5 hours when normally is a 5 minute trip.

• Within 2 hours following the tornado elevated tanks emptied and system pressure dropped to 0psi.

• Within 18 hours of tornado the first personnel and equipment from the St. Louis County operation arrived in Joplin.

• 24 hours following the tornado pressures had recovered in 60% of Joplin system.
Timeline continued

• 48 hours following the tornado pressures across entire system (except for the impacted area) returned to normal.

• System flushing began 2 days after the tornado and was completed 4.5 days after tornado.

• Major Leaks in impacted areas repaired or valved closed within 4 days of the tornado. Fire service fully restored to impacted area.

• All Service line leaks repaired or valved closed within 30 days.

• Boil Order lifted 5.5 days after tornado
Emergency Preparedness – before the crisis

- History of working emergency response plans at least annually
- Local management attended earthquake preparedness workshop one week prior to the storm
Emergency Preparedness – before the crisis

• Establish and maintain a broad network of emergency resources
• Emergency plan should include:
  ▪ Human resources to help restore service
  ▪ Relationships with critical vendors from outside the area
    ➢ Generators
    ➢ Fuel
    ➢ Equipment
Lessons Learned – initial response

• Communication systems are critical
  ▪ Internal -- connecting quickly with employees
  ▪ External operations
    ➢ Coordinate with Emergency Operations Center
    ➢ Badges and uniforms are essential to access
  ▪ Customers
    ➢ Radio was the key resource
    ➢ Social media – news on Facebook

• Secure logistics for emergency workers immediately
  ▪ Lodging becomes a critical shortage
  ▪ Food
  ▪ Secure base for operations – but be prepared to change it

• Deploy resources from outside the affected area
Lessons Learned – as recovery begins

- Designate backup people to support local teams
  - Equipment procurement
  - Communications to customers
  - {insurance coordination? other assignments?}
- Designate a single point of contact for communication with Emergency Operations Center
- Task local person to handle logistics full time (lodging, food, transportation, time sheets, etc.)
- Technology is vital, but sometimes initially unavailable
  - Paper maps are important at the outset
  - GPS in vehicles to find our way
  - GPS/GIS for valves and other assets
Lessons learned – as the recovery moves forward

• **Support the teams**
  - Provide a means for people to make basic decisions and purchases
  - Enforce breaks and downtime
  - Track the timeline – for lessons learned

• **A vital step – debrief/counsel teams as they leave the area**
Supporting the Community

- Missouri American Water employees initiate “New Beginnings” Program – raised $63,500 in 4 weeks
- Special billing practices for customers in impacted area
- Streamlined process created for demolition permits
- Participating in steering committee for planning Joplin’s future