

# AMERICAN WATER

## Missouri American Water Joplin Tornado Response

### Operational Challenges and Priorities





# 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**



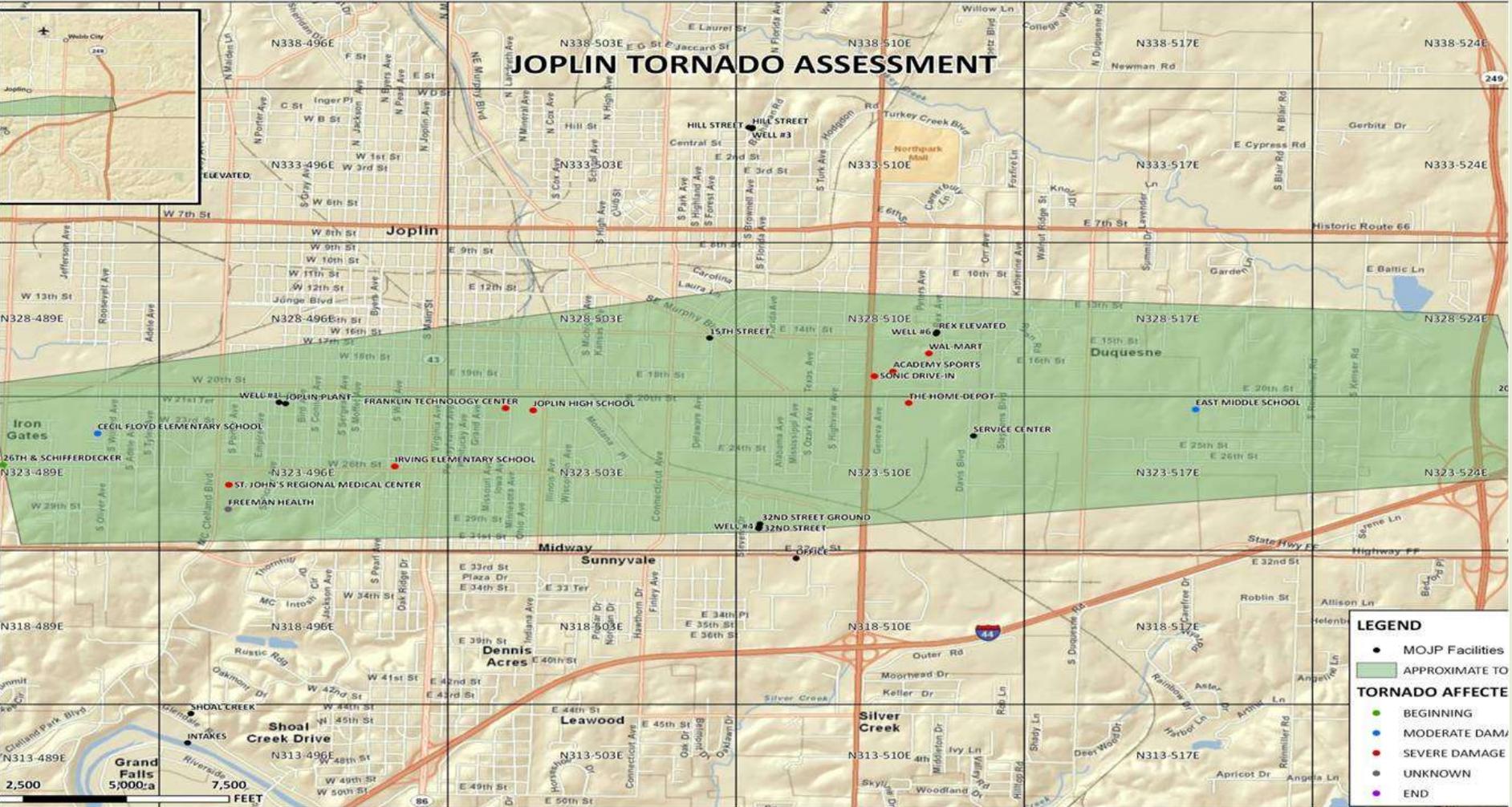


# May 22, 2011– Worst Single Tornado in U.S. History

- 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



**LEGEND**

- MOJP Facilities
- APPROXIMATE TO TORNADO AFFECTE
- BEGINNING
- MODERATE DAMA
- SEVERE DAMAGE
- UNKNOWN
- END

## 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 15<sup>th</sup> 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**

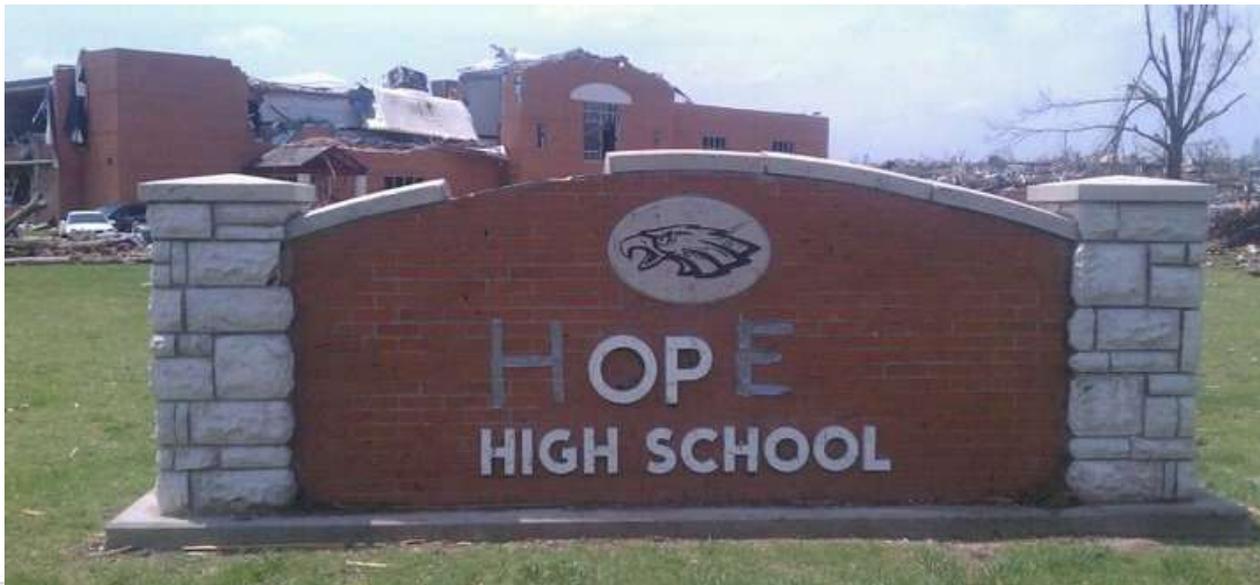


## Lessons Learned – as recovery begins

- **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