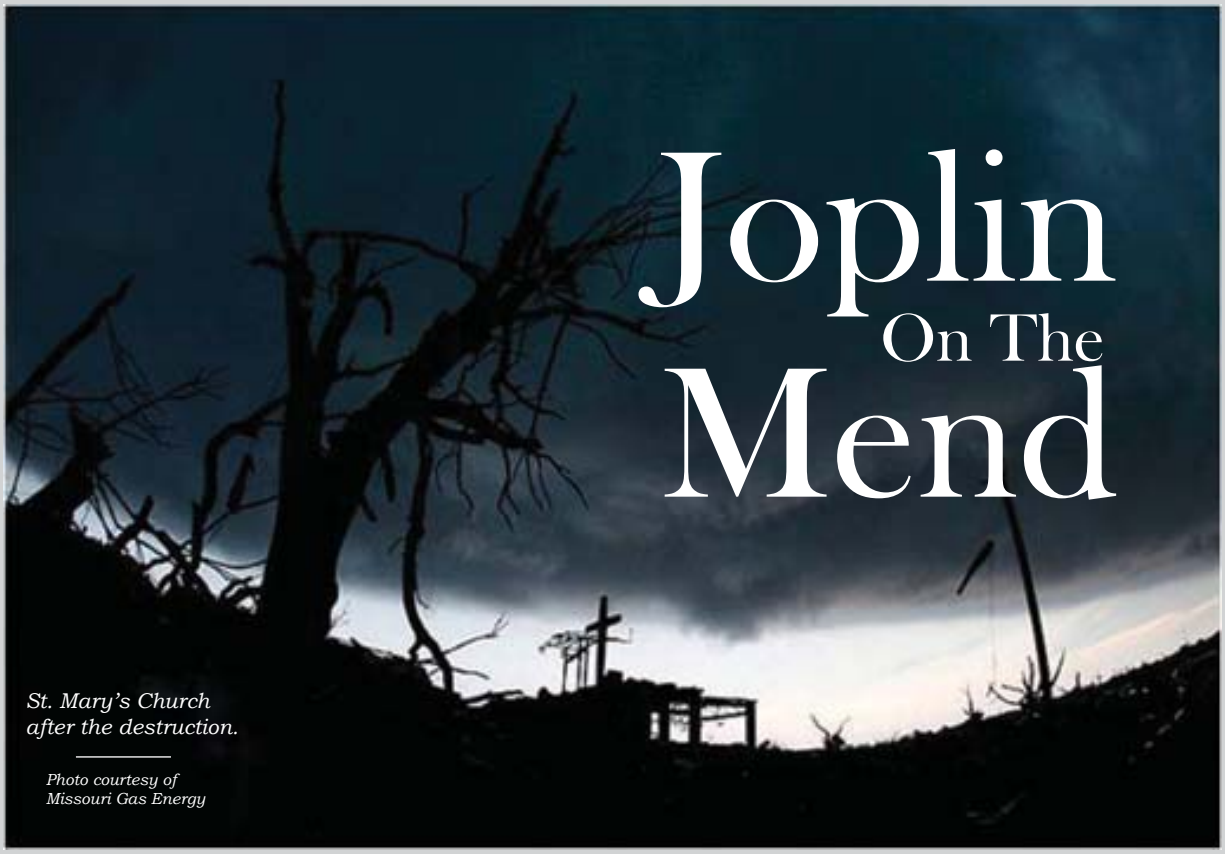

Joplin On The Mend

St. Mary's Church after the destruction.

Photo courtesy of Missouri Gas Energy

Their Lives Were Changed Forever

At 5:41 p.m. on May 22, 2011, a devastating EF-5 tornado -- with winds in excess of 200 miles per hour -- struck Joplin, continuing through Duquesne, Diamond, Granby, Sarcoxie and Wentworth. The tornado claimed 162 lives, resulted in hundreds of injuries and the loss of thousands of homes and businesses. It was the deadliest tornado since modern recordkeeping began in 1950. The storm took a direct route through much of Joplin's residential and retail district. The primary area of destruction was 6 miles long and, at the widest point, almost a mile wide.

Missourians are familiar with natural disasters. Tornadoes, ice storms, flooding and severe storms are all common occurrences in Missouri. According to the State Emergency Management Agency (SEMA), Missouri has received more than 30 federal major disaster declarations since 1990 -- with more than half of those events occurring in the last five years .

The PSC's Role In Disaster Recovery

As a result of these natural disasters, electrical power, natural gas, public water and communications systems maybe damaged, causing service interruptions or failures. The Missouri Public Service Commission (PSC) works closely with SEMA, other state and federal agencies and utilities to ensure coordination of emergency response and service restoration.

Shortly after the tornado struck Joplin, PSC Commissioners and staff began internal communications and coordination efforts. Over the next several days and weeks, staff participated in daily conference calls with SEMA, the utilities, other state agencies and members of the Joplin response community.

Staff served as a liaison between affected utilities and SEMA to address issues of concern and provide updates on restoration efforts. On various occasions, all five Commissioners, some Commissioner advisors and PSC management toured the devastated areas and visited with The Empire District Electric Company, Missouri Gas Energy and Missouri American Water Company to discuss the event, restoration efforts and future plans.

In the first few days, staff also made several contacts with AT&T as communications systems played a vital role in recovery and response efforts. Members of the PSC's Manufactured Housing and Modular Unit Program spent many hours in Joplin, actively participating in the set up and inspection of Federal Emergency Management Agency (FEMA) temporary housing units and modular classrooms.

Staff continues to communicate with the various utilities and agencies involved in the recovery efforts, receiving status updates and discussing various issues as they arise. In some instances, Commission rules or company tariff requirements will need to be waived or modified to allow utilities to continue to respond to customer needs. In the future, the Commission, staff and interested stakeholders will address proper recovery of the utilities' costs associated with the tornado. Such costs could include labor and materials related to repairs to utility systems and capital costs associated with new infrastructure as systems are rebuilt.

Empire District Electric photo

Crews repair poles after the May 22 tornado.

"Whether ensuring temporary housing units are properly installed and anchored, monitoring system rebuilds or considering appropriate cost recovery, the Commission and the PSC staff continue to place a high priority on the needs of the Joplin community."

-- PSC Chairman Kevin Gunn

Empire District Electric Photo

Rows of temporary housing units just south of the city's airport.

PSC Manufactured Housing Department Assistance To Joplin Devastation

Members of the PSC's Manufactured Housing and Modular Unit Program were in Joplin throughout the summer working diligently, often in extreme heat, to assist with delivery and proper set up of FEMA homes which serve as temporary housing for families in the area.

"When I first arrived in Joplin, I could not believe the amount of destruction caused by the tornado. I had never seen anything like it before," said Ron Pleus, manager of the PSC's Manufactured Housing and Modular Unit Program.

"Entire neighborhoods were gone. Big business buildings and schools were reduced to rubble. It will take a lot of work to rebuild that area of the city, but the people of Joplin are determined to rebuild," said Pleus.

PSC staff members also met with contractors, installers, local building officials, representatives from FEMA and the United States Army Corps of Engineers (USACE) to provide assistance for the proper installation, anchoring and approvals of both FEMA homes and commercial modular units, including modular classrooms.

"The proper set-up of temporary housing was a top priority," said Pleus. "Our inspections focused on safety; ensuring each structure was properly supported and anchored. We inspected over 225 FEMA homes, or temporary housing units, and 36 modular classrooms in and around the Joplin area."

To date, approximately 500 temporary housing units have been installed at sites in and around the Joplin area. Temporary housing units have been installed in nine different locations as well as in manufactured home parks, and at two large commercial sites built by

Ronnie Mann, a PSC Manufactured Housing Field Inspector, inspects the installation of the anchors under a FEMA Home at the Joplin Airport Site.

the USACE. Approximately 193 of these FEMA houses are located at the Joplin airport. Final installation of these temporary homes was completed in mid-September.

In addition to the temporary housing units, modular classrooms were installed at seven locations throughout the Joplin School District. This year, approximately 3,500 students will attend school in modular classrooms.

The largest modular classroom, referred to as "ShopKo", is located behind the North Park Mall, and will accommodate approximately 1,200 students.

Installations In Joplin Area (June-September 2011)

Commercial Units	87
Joplin Airport Community	193
R. Hines (Park)	20
Hope Haven (Park)	152
Fountain II (Park)	53
Total Units Installed	505

"Due to the hard work and joint efforts of all parties involved, Joplin students were able to begin classes as scheduled," said Pleus.

Even though work on temporary housing units and modular classrooms is complete, Manufactured Housing and Modular Unit Program staff continue to work with manufacturers and area dealers who sell and install new or replacement manufactured homes (including residential homes and commercial modular structures, such as, fire stations, medical units, office units, and banks).

New structures will be required to meet site-specific residential and commercial building codes. Staff inspections will be conducted to make sure new structures are properly installed and anchored.

The Empire District Electric Company's Response[1]

In the first few moments and hours after the storm passed, and as residents, including many Empire employees, emerged from the wreckage, the mobilization process to assess the damage began. Empire's initial course of action was to provide for the safety of the public and those working in the impacted area by ensuring lines were de-energized. Once completed, the damage assessment and restoration process began in earnest. Critical services were at the top of the list. St. John's Hospital was destroyed, and the main feeder and back-up lines to Freeman Hospital were down.

Photo by Jeannette Eaves

A view of the destruction in Joplin.

Vegetation management and line crews worked to clear a path and connect an alternate feeder line to return power to Freeman Hospital before the morning of May 23. Additional vegetation crews worked through the night to help clear alleys and streets to allow access for emergency vehicles and to prepare for the power recovery process. Electricity was restored to Joplin's major water and sewer services within 24 hours.

Unlike an ice storm where many lines can be raised and reconnected, wires and equipment were mangled amidst debris during the tornado rendering them unusable. Much of

Footnote

[1] The information provided came from the June/July 2011, Vol. 34/No. 4, Empire Dispatch, the Empire District Electric Company's newsletter.

Empire District Electric Company photo

The substation at 26th and Pearl was totally destroyed.

Logistics for Empire Recovery Effort

2,400 room nights to house workers
13,000+ meals provided to workers
2,700 pounds of worker laundry

"Feeding and housing additional workers is not an easy task but it is a vital part of an overall plan to restore utility services as quickly as possible," said Lena Mantle, Manager of the PSC Energy Department.

the early assessment process was conducted on foot, as debris limited vehicle access. Estimated losses due to the storm included 4,000 poles, 1,500 transformers, 110 miles of line, and one entire substation.

Traffic in the devastation and reconstruction areas created major challenges. To avoid work delays, 12 pole and material staging sites were established throughout the area. Pole drops took place at night and materials were pulled and ready for crews at first light. More than 280 personnel were brought in to help, including crews from Kansas City Power & Light Company, City Utilities of Springfield, rural electric cooperatives and several contractors.

While much has already been accomplished, there is still work to be done. It is estimated that 3,000 to 4,000 structures were completely destroyed and will have to be rebuilt. Customers continue to return to service each day as debris is removed and properties are repaired and rebuilt.

Missouri Gas Energy's Response

"It was a sobering sight that helped put the magnitude of the tornado damage in perspective," said Bob Leonberger, Supervisor of the PSC's Gas Safety/Engineering Staff.

"As we entered the MGE Service Center in Joplin, there was an enlarged map on the wall showing the area of damage caused by the tornado. The map was about 5'-6'tall, covered almost one full wall (about 20'-25') and continued for a short distance on another wall. The area of destruction to MGE facilities by the tornado was marked on the map and shaped like an elongated football (narrower at the ends and wider in the middle)."

In practical terms, the map showed the location of MGE facilities affected by the tornado for coordination purposes.

The immediate problem for MGE was responding to (and making safe) leaks, caused by above-ground service line piping that had been broken when the structures were destroyed, and damage to regulator station piping. MGE personnel responding to the devastation had to contend with debris blocking the roadways, lack of street signs and landmarks, and misplaced residents.

MGE could not shut off sections of mains to some damaged areas because those mains also served critical infrastructure and areas that were not damaged, such as Freeman Hospital, so service lines had to be shut-off to the individual damaged structures.

Another unforeseen problem was communication. Cellular telephone and radio service was disrupted following the storm. Numerous service personnel went to the Joplin emergency operations command center to be dispatched to areas with reported leaks until cellular and radio communications infrastructure was repaired.

Missouri Gas Energy photo

St. John's Regional Medical Center felt the force of the storm.

Empire District Electric Photo

The May 22 tornado left a patch of destruction that was a mile wide and six miles long.

After the initial response to critical infrastructure issues, MGE decided to shut off entire sections (blocks) of the natural gas distribution system by exposing, cutting and capping mains and individual service lines. This operation was hampered by having to remove debris. MGE made the decision to cut off structures based on its assessment the structure was damaged to the point of being uninhabitable. As structures were officially inspected, some of these areas were re-visited by MGE.

MGE shut-off service to approximately 3,500 customer locations. After the storm, Jasper County personnel took electronic aerial photographs of the damaged area. MGE was able to compare these photographs with maps to identify damaged structures that required action.

In the days and weeks following the tornado, MGE used the wall map to coordinate efforts to abandon mains and service lines in the heavily damaged area. The company divided the damaged area into 40 grids to conduct systematic street-by-street walking surveys to visually assess the mains and service lines ahead of the demolition and debris removal operation teams.

Continual assessment of the damaged area was necessary to avoid additional damage or injury from ruptured natural gas facilities. MGE concentrated its efforts in these areas ahead of the debris removal teams. Outreach efforts were made to the Joplin emergency operations command center to communicate to contractors to make sure natural gas service was abandoned before debris was removed.

Additional company and contract personnel assisted in the Joplin area. At the height of the recovery efforts, MGE had approximately 75 additional personnel in Joplin.

Missouri-American Water Response

After the tornado moved through Joplin, Missouri-American Water Company (MAWC) started the difficult task of ensuring the production and delivery of safe and adequate service to its customers in Joplin. Fortunately, a majority of MAWC's transmission and distribution system infrastructure in Joplin is located underground. In addition, major MAWC stand-pipes, water towers, and treatment facilities in Joplin were in areas not affected by the tornado.

Upon realizing the level of devastation that hit the Joplin area, MAWC went into emergency mode. MAWC put its employees on alert and had technicians from other service territories, such as St. Joseph, Warrensburg, Jefferson City, and St. Louis, assist in the recovery and rebuilding phase. MAWC also notified the PSC staff to give it an update as to what happened and MAWC's planned response efforts.

Initially, the major issue for MAWC was the loss of pressure throughout the system. Even though the transmission and distribution is

underground, the system was damaged due to the destruction that occurred above ground. Uprooted trees damaged mains and service lines and caused leaks.

Approximately 4,000 leaks were discovered throughout the system, as well as 25 torn fire service lines. Due to the multitude of leaks, pressure throughout the entire system dropped to levels below standard and even briefly approached zero. Since pressure approached zero, MAWC, in conjunction with the Missouri Department of Natural Resources, issued a boil order.

As a point of reference, about ten minutes after the damage, two elevated storage tanks showed a drop in pressure. Less than two hours after the storm, the storage tanks were empty. Full pressure was restored in two days and the boil order was lifted on Saturday, May 27, after a complete flushing of the system and sampling of the water to ensure it was safe to drink.

The MAWC crews in Joplin initially focused on finding and repairing damage to mains and service lines to increase water pressure. The company also redirected the flow of the system around the affected area to help restore system pressure. MAWC systematically shut-down its mains to help re-establish pressure to the areas that were not directly impacted by the tornado.

The company prioritized repairing the main breaks and service lines in the impacted area. This was a tedious process as crews had to go block to block opening valves, getting the mains back in service, and shutting off individual service lines to structures that were destroyed. A high priority for MAWC was to restore fire protection services to the impacted area.

Besides underground infrastructure damage, MAWC sustained damage to other facilities. Its service center and plant storage buildings were completely destroyed. There was roof damage and broken windows at its water treatment plant. Electrical panels at one of its wells and at the 15th Street booster station were damaged. Several company vehicles were also damaged.

After the initial work to get the system operable, there was still a heavy workload for the crews in Joplin. Water line mark-outs had to be performed. Demolition permits were required for the demolition and removal of debris. Water main repairs were ongoing and some fire hydrants, struck by debris removal, needed to be replaced.

Crews from Missouri-American Water Company work on a water line.

Missouri-American Water Company Photo

Related Issues Affecting All Utilities

In addition to the immediate and on-going response efforts, the utilities had to decide how to address issues such as customer billing, reconnection, tracking customer locations, zoning and planning laws, etc. A primary focus for all the utilities and the Commission is to be cognizant of the needs and sensitivities of customers and the community. The utilities worked together to assist in damage assessment, worked together to get information to customers, and worked with the PSC to make the transition as smooth as possible while working within the structure of existing regulations.

*Major contributors to the article include **Natelle Dietrich** (Director Tariff, Safety, Economic & Engineering Analysis); **Lena Mantle** (Manager-Energy); **Ron Pleus** (Manager-Manufactured Housing); **Jim Busch** (Manager-Water & Sewer); and **Bob Leonberger** (Supervisor-Gas Safety/Engineering). All are with the Public Service Commission staff.*