

# Blackwater-Energy and Water Interdependency Issues: Best Practices and Lessons Learned

*Summary Report of 2007 Energy and Water Interdependency Workshop and Exercise*



*Southern States Energy Board*



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## Exercise Overview

Water, energy and emergency management professionals came together over two days in April 2007 to explore responses each sector should make in times of crisis as energy facilities are impacted by weather events, leading to interruption of energy supply to water and wastewater treatment facilities and other infrastructure impacts. Some 90 representatives of electric and gas utilities; water and watershed management; state energy, environmental and emergency response officials; the U.S. Army Corps of Engineers; FEMA; and national water management associations met to review best practices and explore solutions to a series of tornadoes that moved through the city of Decatur, Georgia, up through the Atlanta region over a 24 hour period.

The highly interactive tabletop exercise included presentations on the basics of the electricity supply system, water and waste water systems, and emergency local and state energy assurance guidelines. Participants were briefed on the issues and challenges faced by agencies and private organizations during energy emergency response and coordination efforts. How does the electric utility respond to a tornado watch at 3 am? When do backup generators go online at the water utility? What priority do hospitals have as electricity and water supplies are restored following a significant storm event? How do the electric, gas and water utilities maintain coordination in the midst of chaotic events of a weather disaster? Should public policy mandate that manufactured home parks have a safe, common area? Are there evacuation and emergency responder vehicle routes that require gasoline stations with auxiliary backup energy supply so they can be operated in times of crisis? Blackwater Exercise helped its participants explore these and other relevant issues, resulting in a response team that is better prepared and ready to react when the next weather event occurs.

# Best Practices

## **DelMarVa**

The DelMarVa Emergency Task Force works to ensure that all jurisdictions on the Delmarva Peninsula are prepared for hazards, including natural disasters, such as hurricanes, tropical storms, and nor'easters; and man-made disasters involving weapons of mass destruction, or chemical and biological agents. State, county and municipal emergency management personnel from all of Delaware, Maryland's nine Eastern Shore counties, and the two Virginia counties on the peninsula plan together for a coordinated regional response, including effective communications, resource sharing, shelter and evacuation strategies, and recovery plans.

The Steering Committee coordinates the work of the Task Force, which meets quarterly. One state and one local government representative from each participating state constitute the Steering Committee. Five work groups address specific issues: Communications; Exercise Design and Evaluation; Planning and Education; Protective Actions; and Resources and Recovery. One example of the DelMarVa work is that all of the organizations have NOAA radios available so they can track storm conditions as necessary.

## **North Carolina- State Emergency Response Team (SERT)**

As a result of five Presidentially Declared Disasters, including Hurricane Fran, within a 12 month period, Governor James B. Hunt Jr. commissioned a Task Force to address the state's long term recovery effort. The Task Force set forth 84 recommendations that would enhance communication, coordination and recovery efforts reduce the impact of future storms and help provide the resources needed to respond and recover from Hurricane Fran.

When Hurricane Fran traveled across the state in September of 1996, there existed no uniform agreement among North Carolina's cities and counties to provide assistance to one another during and after a disaster. It was apparent that without pre-established policies and procedures in place to address logistics, deployment, compensation and liability issues, intra-state cooperation was limited and inefficient. One of the Task Force recommendations (Recommendation 4) outlined a state-wide mutual aid agreement to be drafted by the League of Municipalities and the North Carolina Association of County Commissioners. The multi-purpose agreement provides efficient and effective assistance among governments, faster reimbursement from the Federal Emergency Management Agency and covers liability and insurance concerns.

The State Emergency Response Team (SERT) includes representatives from many organizations including the National Guard, highway patrol, municipalities and infrastructure providers, among others, who hold frequent briefings and communicate regularly to enhance service restoration.

## **City of Seattle**

An historic storm with rain and wind hit the city of Seattle on December 14, 2006. The storm eclipsed the impacts of many past disasters due to the intense levels of rainfall in a very short period of time followed by very heavy winds that felled power poles, large, mature healthy trees (not just diseased trees at risk). Although an inch of rain had been predicted for a 24-hour period, instead three-fourths of an inch fell in less than 45 minutes in some areas of the city. More than 1.5 million customers were without power throughout western Washington and Oregon- some for longer than a week, killing more than 60 people in 11 states.

The Special Disaster Management Committee Report examines what worked well and provides lessons learned - information key to improving Seattle's emergency response capabilities. The city conducted two tabletop exercises in the fall of 2004 to evaluate the readiness of responsible organizations to respond to major incidents and disasters affecting the City's power and water systems. A few lessons learned from the report:

- It is critical to 'get ahead' of an impending emergency if possible. Broadcast of public information messages early might have helped better prepare city residents of the onslaught;
- Proactive safety messages prepared in many locally spoken languages beyond English would be helpful;
- Coordination is the key to success and gathering representatives of all stakeholder responders would be helpful;
- Limitations inherent in city staff size and equipment should prompt examination of long-term investment priorities;
- Financial support for social services and coordination with private sector is essential in dealing with such an emergency.

Based on the report, the city of Seattle has enacted several measures including:

- an updated "311 System";
  - an outage management system;
  - emergency generator installations at fire stations; and
  - holding annual emergency management training.
- (See *December 14, 2006 Windstorm After Action Report* for additional information)

## **Other BEST PRACTICES**

There were several other 'best practices' that can be mentioned here:

- Creation of a 'cells on wheels' in order to have cell phone service in emergency outages;
- The state Department of Transportation should be included in emergency planning and coordination, particularly related to road closures, bridge openings, etc.;
- Use of ham radio operators and text messaging can be effective means of communications;
- Identify critical infrastructure needs ahead of time;
- Identify critical medical patients and notify them of procedures ahead of time and keep them informed during the event.
- DeKalb County Watershed Management has made a number of positive, pro-active changes to its operational policies as well as to its physical structures in response to various incidents in the past several years.

## **1.0 Statement of the Problem: Water for Energy – Interdependencies and Critical Infrastructure**

Major energy disruptions due to natural or man-made disasters can disrupt the lives of citizens, harm the economy, and cause cascading impacts to other critical infrastructures. Among the infrastructures that can be drastically affected by energy disruptions are the water and wastewater treatment facilities that are vital to drinking water supplies, especially in cities and areas with high population densities. In order to both prepare for such events beforehand, and to most effectively deal with this type occurrence efficiently and effectively when they do occur, stakeholders involved with all aspects of the connected infrastructures must plan, communicate,

partner, and carry out previously developed plans. As these situations occur, pre-planning and plan implementation are critical in order to minimize the impacts of such events on the wellbeing and economy of the citizens of the region affected.

The protocol, planning techniques, regional responses, resources and implementation plans of various stakeholder groups are unique, as each segment of infrastructure is impacted differently. One significant discovery in working with crisis situations and in the workshop discussions is that there is a lack of basic understandings of key issues across segments of the stakeholder responders. Electrical system recovery terminology; water infrastructure protocol for return to service; and other critical nomenclature should be understood by each of the stakeholders in order to create the most efficient and effective recovery team.

As an example of infrastructure interdependencies, in the wake of Hurricanes Katrina and Rita, energy and water supplies were disrupted so that there were disruptions in the capability to deliver potable water to consumers, in addition to the lack of energy to power the wastewater treatment facilities. And locally, occasional supply disruptions threaten citizens with disease and inconvenience. While there are multiple local, county, regional, state and federal organizations that deal with various components of such events, coordination and implementation of a plan to recover from this type event is difficult, at best.

Governor Jeb Bush, in the aftermath of Hurricane Wilma, effectively took command of the event responders to that crisis and, in effect, became the unified command focus; however, in most situations this clear direction and command is not in place. All those organizations that have a hand in solving the problems are not necessarily clear as to protocol, response, and who has final authority when facing contentious decisions as necessitated by such circumstances.

As described in an earlier report (EPA 2007), understanding the interdependencies among critical infrastructures is key to sustaining the continuity and resilience of each infrastructure component as well as the collective systems. Examples of the dependencies of the water and energy sectors include:

- Water for drinking, sanitation and heating and cooling systems is critical in hospitals, nursing homes, schools, office buildings, restaurants and other similar facilities;
- Manufacturing operations make extensive use of water and the wastewater systems;
- Water is critical to emergency response in fire fighting, for one; and supplying potable water for drinking and ice for preserving food and medicine during emergency conditions is critical as well;
- Clean water and functioning wastewater treatment systems are necessary for sanitation, preventing the spread of disease among evacuated populations and emergency responders, and the provision of temporary housing;
- Power generation and water infrastructure depend on each other. Drinking water and wastewater cannot be processed without energy to run pumps and treatment equipment. Water is used in, among other things, the generation of electricity and cooling of generators.

## 2.0 Objectives and Summary of the Exercise

Key emergency personnel at the workshop focused on appropriate and coordinated responses of each sector to crisis situations in which energy facilities are impacted by weather events leading to interruptions in energy supply to water and wastewater treatment facilities. The exercise and the facilitated discussions were intended to:

- Provide lessons learned from previous weather related situations in which water and energy infrastructure disruptions occurred;
- Highlight the importance of communications and help establish working relationships among various local, state, federal, and private organizations in advance of energy and water emergencies as a part of the planning process;
- Provide opportunities to discuss process and coordination efforts with various state and local energy and water authorities in infrastructure assurance to engaged them in reliability issues;
- Assess the technical assistance needs of local officials with regard to planning for and responding to an energy and subsequent water supply disruption;
- Provide opportunity for participants to exchange ideas and best practices for dealing with future energy emergencies that affect water supply.

The workshop participants explored best practices and solutions to infrastructure crises as a result of a series of tornadoes moving through the city of Decatur, Georgia, up through the Atlanta region over a 24 hour period.

*Scenario One:* Tornadoes touch down in Decatur in the early morning hours and early afternoon in Gainesville (northeast of Decatur). Tornado Watch had been issued in the wee morning hours before a Tornado Warning, followed by several touchdowns around 3 AM. The tornadoes caused massive localized power outages; trees were knocked down; hospitals were out of service; water supply and distribution systems and wastewater facilities were impacted, among other infrastructure effects.

*Scenario Two:* A massive ice storm blanketed the entire southeast region, resulting in downed power lines; water supply and wastewater treatment facility disruptions; inability to move emergency personnel due to road conditions; and ultimately some 7 million people in the region were affected.

Resulting effects of the weather on the water distribution and supply infrastructure in the area, particularly DeKalb County, were described and discussed. The previously mentioned presentations on water and energy issues helped set the stage for analyzing the two robust, dynamic scenarios. Finally and most importantly, representatives from each stakeholder group were asked for responses to these events from the perspective of their organization.

Mike Leonard, President of the American Water Works Association, suggested in his keynote address that the utility not only have plans but that the plans must be a living part of the organizational structure and knowledge so that in crisis mode all of the processes are in place to return the systems to normal as soon as practicable.

It was in this vein of understanding that the exercise offered a unique opportunity for participants from a variety of perspectives to learn from each other so that agencies and organizations better appreciate and understand issues and challenges faced when crisis arises.

### **3.0 Highlights of the Interactive Discussions: Findings, Comments and Recommendations:**

The following issues categorize key discussion from the workshop.

#### **Need for Backup Supply**

1. There is a need for substantial backup supply in terms of both water and energy, e. g. fuel to operate backup generators. DeKalb County, which has experienced some particular electric utility: water infrastructure problems in the past, has gone to a 10 day supply and are thus better prepared to handle future crisis situations.

#### **Need to boost telecommunications infrastructure**

1. There are substantial interactions and interdependencies within the telecommunications systems that are problematic. Participants suggested wireless, Wireless Priority Service (WPS), and GETs cards which provide land line priority service. Inability to communicate creates significant problems for responders.
2. Telecommunications Service Priority program (TSP) - registered facilities have priority over non-TSP registered facilities, even if they are not as critical to life-support as the others. The TSP Program provides national security and emergency preparedness (NS/EP) users priority authorization of telecommunications services that are vital to coordinating and responding to crises.

#### **Language Barrier Issues and Public Communications**

1. Language barriers- DeKalb County, e.g., a county of 750,000 people, has over 75 languages spoken within its geographic barriers of 270 square miles, as varied as Bosnian, Mandarin, Urdu, Korean, and Thai to Spanish, Italian, French and German. Could Language Banks play a key role in assisting with emergency communications?
2. For public infrastructure failures (such as sewer overflows resulting in the need for 'boil water advisory'), a well-defined, documented and practiced method for communicating with the public is critical.
3. It is essential that the public be informed about some basics following a disruption to their services including being advised of the best way to clean up after a major sewer overflow; dangers of cooking over an open flame in an enclosed building; and any other cautionary steps needed with respect to the water supply disruption.
4. Coordinating agencies need access to basic information such as that available from NOAA weather radios. Not every sector has access to this basic service.
5. Assure the community that pets will be considered in any evacuation plans.

#### **Open Planning Process and Coordination among Key Agencies**

1. Utilities seem to be forthcoming about the response systems they have in place and how they are working with the other entities to ensure preparedness.
2. There is a critical need to be prepared ahead of a crisis through MOUs and MOAs so that the various entities have a legal framework in place and a loose organizational understanding of the way in which emergency work will proceed.

3. Decision-making is not as difficult as coordination among various agencies and offices involved with response to crisis.
4. Coordination during emergency situations can take the form of ongoing briefings such as those held by the North Carolina State Emergency Response Team (SERT) which consists of representatives from the National Guard, highway patrol, municipalities, utilities, health agencies, etc.
5. Organizational partnerships and collaborations such as the WARN initiative (i.e., a mutual aid assistance program for water and waste water utilities) are critical to coordination efforts.
6. There is a need for continued coordination among agencies such as FEMA, U.S. Army Corps of Engineers, Governors' offices, utilities, etc.
7. Designation of an incident commander is important in coordinating primary response roles. In some states the Governor may lead the Unified Command; in some regions the Mayor or Office of Homeland Security or the Police/Fire Officials may act in that regard. Familiarity with the incident command system as defined in the National Response Plan is crucial.
8. Water is a critical need in fire protection and, as such, must be accounted for in the discussion, planning and implementation of a recovery plan following an emergency situation.
9. U.S. Army Corps of Engineers, who has a key role in crisis response, uses a priority assessment tool based on the following criteria for decision-making: life- saving; life sustaining; and other.
10. Coordination on opening highways is necessary to clear the way for emergency vehicles to provide for special needs patients (e.g. dialysis patients); to move emergency crews to critical areas; for fire and police responders; or for other critical infrastructure issues such as opening natural gas pipelines to provide gas to customers who do not have access to other heating resources.

### **Need for Crossover Credentials and Other Inter-jurisdictional Issues**

1. When going into other geographical areas to assist their fellow electric utility crews, there are numerous issues that create barriers to or slow down the response times of these assistance efforts. For example, when traveling from state to state, there may be weight limitations for trucks which may prohibit a utility truck from carrying the full extent of supplies needed; personnel getting into an area for work assignments may not have the proper identification as an 'emergency personnel' and thus may be denied access to that area, among other similar issues.

### **Need for a Common Language Regarding Key Basic Infrastructure Issues**

1. Proper terminology is critical as personnel from various entities work together within the Incident Command System (see, e.g., Resources and References, *Regional Disaster Resilience: A Guide for Developing an Action Plan*).
2. It is critical that everyone involved in restarting energy and water infrastructure have a basic understanding of the various elements of electricity, gas, water and wastewater facilities and operation, along with emergency organizational issues and coordination. For example, it is important to know how long it takes for the 'start-up' processes for a water distribution system or for an electrical generator to be put on line.
3. In similar workshops, when a variety of professionals are participating, there should be a common basic understanding of the critical systems that will be discussed during the exercise. Definitions and key basic information could be shared with participants

beforehand so that everyone has a basic understanding before beginning the discussions. For example, time requirements and steps to bring an oil refinery back up to operating levels following a sudden, cold shutdown could be critical information as recovery plans are made following a crisis situation.

4. In addition, in real world situations, key stakeholders need this same basic knowledge base for better communications.

### **Policy Issues**

1. Should every residential manufactured home park have access to at least one community shelter that could be used in case of emergency?
2. Is there a policy requirement that certain route-critical gasoline stations have backup electrical power generation so they can continue to pump gasoline for those who may be servicing water and waste water facilities, maintenance crews, or for evacuation routing.
3. Are there potential design changes to water and wastewater treatment facilities to mitigate or minimize effects of flooding and other natural disasters?
4. It is important for electric and water utilities to know which customers are 'critical' for reasons beyond health and safety. For example, if a particular location houses a key financial center or telecommunications establishment, those businesses are likely critical for responding to weather-related crises.

### **Public Awareness and Education**

1. The public has a role in preparation for emergency events including having a level of public awareness and a degree of self-sufficiency.

### **Training and Preparation**

1. The city of Seattle had major issues with electrical system outages last year following a weather event and have since instituted key changes to their emergency preparedness. They have updated their 311 call system; developed a coordinated outage management system; provided emergency generators at fire stations; and they hold annual emergency management training sessions.
2. The DELMARVA emergency response coordination group meets routinely to discuss, coordinate, train and organize an effective response to multi-state or multi-region events.
3. California has a utility emergency association for cross-discipline exercises and planning that includes the water, electric, and petroleum sectors, nuclear and telecommunications, and others.

### **Organizational Actions Based on Exercise:**

Several respondents to the Feedback Survey replied that they would make changes based on what they had learned at the exercise. Among the ideas organizations indicated they would consider:

1. Promote additional energy and water emergency drills and exercises.
2. Develop dedicated staff team to update, create and coordinate Emergency Operations Personnel (EOPs) as they consider dealing with emergency scenarios affecting water and energy infrastructure.
3. Water representatives will be added to the team of key personnel involved in emergency management functions.
4. Conduct table top exercises such as this one in the local planning teams.
5. Review energy assurance plans for applicability to local situations.

6. Develop an outreach plan to collaborate with various key stakeholders identified in this exercise.
7. Upgrade UPS for SCADA;
8. Introduce local ordinances requiring hospitals to have roof-top water reserve tanks.

### **Consistency with Regional Disaster Resilience Action Plan**

In its action plan to deal with regional disasters, The Infrastructure Security Partnership (TISP) outlined a number of fundamental assumptions underlying an exhaustive action plan. Some of these assumptions are spot on with respect to comments received during this Blackwater Exercise including:

1. Infrastructures are increasingly complex and interconnected and stakeholder organizations are becoming more aware of these interdependencies. They need to broaden their knowledge of the extent of these linkages and their effects on responsibilities, operations, and business practices.
2. The creation of regional public-private partnerships is necessary to bring together key stakeholders to build trust, foster information sharing and coordination, identify and assess vulnerabilities and other preparedness need, and develop and implement solutions. Such partnerships should include all levels of government, utilities and other service providers, commercial enterprises (including businesses essential to localities; manufacturers; producers; processors; and distributors of important commodities and products), nonprofits, and community and academic institutions.
3. Because of infrastructure interdependencies, protection of critical assets by means of physical security is only one important element of the holistic approach necessary to ensure essential services and products. There is also a need for cost-effective mitigation of potential and actual damage from disruptions, particularly those causing cascading effects that can incapacitate a region and impede rapid response and recovery.
4. A major challenge is obtaining necessary data on infrastructure interdependencies to enable the development of assessment and decision tools to provide greater understanding of vulnerabilities and how best to minimize them. Cooperation and information sharing among stakeholders is key in regional disaster preparedness.
5. Development and maintenance of mutual assistance agreements, user agreements, memorandums of understanding, and other similar cooperative arrangements are essential to sound preparedness planning and disaster management. These mechanisms allow stakeholders to resolve resource requirements and allocations, information sharing and cost reimbursement among others.
6. Disaster response, recovery and restoration are local and state missions, not federal responsibility.
7. Defining roles and responsibilities, including determining who is in charge of particular functions, is fundamental to ensuring effective disaster preparedness, response, recovery and restoration.
8. Communication channels must include representatives from all key stakeholders; must be tested frequently; must be maintained efficiently and regularly to ensure availability when needed; and must be owned by a well-established and defined entity with responsibility for administration and ongoing operations (TISP 2006, p. 3).

## 4.0 ACTIONS to Improve Energy:Water Relationships and Responses to Critical Situations:

Issue	Response / Organization
Need for backup fuel supply to operate backup generators	-Increase backup fuel supply at waste-water facility and other related facilities
Need improved telecommunication infrastructure	-Explore use of wireless, Wireless Priority Service (WPS) and GETs cards (providing land line priority service) -Explore Telecommunications Service Priority (TSP) program
Language barrier issues exist within public communications, especially in metropolitan areas with large immigrant population	-Use language banks to help real-time communications -Use language banks and professional translations to develop brochures and educational tools for various languages -Public announcements must be made in multiple languages and on the media that reaches most people
Public communications should be thorough and simple for the public to understand	-Public must be provided basic information and advice following disruption to services -Coordinating agencies need access to basic information such as NOAA weather information -Inform public about their pets and how to care/evacuate them if needed
Planning processes and agency coordination is inefficient or ineffective	-Utilities should provide leadership and offer full response plans -Develop MOUs and MOAs with various entities so the legal framework is available when emergency needs arise -Use ongoing briefings including representatives from key players in disaster response (highway patrol, National Guard, municipalities, utilities, health agencies) -Develop continual coordination and training processes among agencies such as FEMA, US Army Corps of Engineers, Governors' Office, utilities -Designate and develop an 'Incident Commander' system (such as that in the National Response Plan) -Water as crucial to fire protection must be considered in recovery plans -Develop priority assessment tool similar to US Army Corps of Engineers for decision-making: life-saving; life sustaining; other. -Ensure highway patrol coordinates highway openings to clear way for emergency vehicles, fire and police responders or other critical infrastructure issues

Need for crossover credentials and other inter-jurisdictional issues	-Develop processes for inter-agency, inter-state regulations and procedures to allow access to critical areas. State emergency officials to coordinate this process overview.
Need for common language regarding infrastructure basics	-Develop ‘dictionary’ of common terms that everyone involved in infrastructure ‘rescue’ is familiar with -Continue to have ongoing educational activities for those from various agencies to be briefed on basics of various aspects of infrastructure
Some issues are better dealt with at the policy level	-Review zoning requirements regarding mandatory access to at least one community shelter in each residential manufactured home park -Develop a system of ‘route-critical’ petroleum stations with backup electrical power so they can continue to pump fuel for emergency care -Review water:wastewater facility designs with respect to flooding and other similar disasters -Develop system of identification for ‘critical’ customers (such as financial center or telecommunications center) who will likely be responding to weather-related crises
Public Awareness and Education	-Promote public awareness of their responsibility in emergency situations and to prepare a minimum-self sufficiency ‘kit’
Training & Preparation	-Review and continually monitor status of emergency infrastructure communications and response capabilities including emergency generators at public locations (fire stations, e.g.) -Develop ongoing, routine coordination group meetings for discussion, training, organization of effective multi-state response
Organizational Actions (based on workshop exercise)	-Promote additional energy and water emergency drills and exercises -Develop dedicated staff to manage Emergency Operations Personnel -Add water representatives to team of key personnel involved in emergency management functions -conduct table-top exercises locally -review energy assurance plans for local applicability and need for updates -develop outreach plan -upgrade UPS for SCADA -Introduce local ordinances requiring hospitals to have roof-top water reserve tanks.

