CASE STUDIES AND BEST PRACTICES

First Water™

Atlanta UASI

Cook County Homeland Security

Somerset MEDICAL CENTER

West New Jersey Hospital Coalition

Regional Water Security Solutions

August, 2014

Introduction

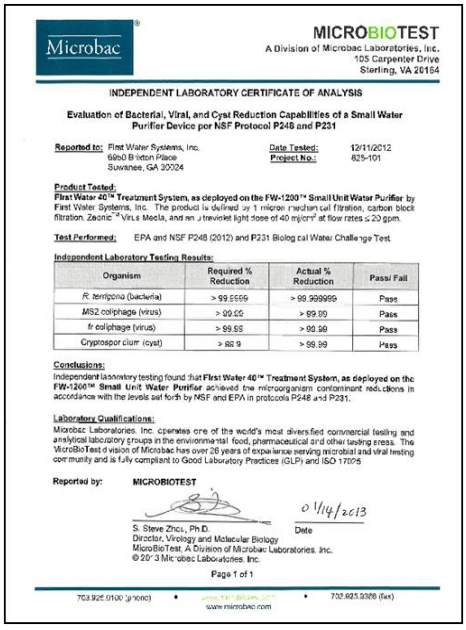
This Paper will discuss three different mechanisms being successfully implemented to provide emergency water for regional requirements. It will further discuss the different types of lead organizations and agencies, varying between fire departments, law enforcement and health care. Each has differing implementation realities and responsibilities that are met through the flexibility inherent in the First Water emergency water solutions.

About the First Water Solution

For over a decade, First Water has been supplying emergency water solutions for a wide range of applications. Over time the technology has grown to feature a patented (pending) treatment train that ensures quality potable water from virtually any compromised fresh water source.

The core of the technology is the unique 5 Stage FW-40 Filtration Process:

- Stage 1 - Mechanical Strainer to filter larger particles and debris.
- Stage 2 - Sediment Filter to filter out sands, silts and fine sediments.
- Stage 3 - Carbon Block Filter to reduce odor and taste.
- Stage 4 - Zeonic Virus Filter to reduce microbiological contaminants down to 0.019 microns.
- Stage 5 - 40 mj Ultra Violet (UV) Reactor as disinfection redundancy to the Zeonic Virus Filter. The 40 mj UV is only available from First Water because of its patent, and is the required dosage of UV to treat surface water (ref. US EPA/NSF Protocol P-231). Any less strength and water that has been previously treated by a municipality can be used as source water.



Microbac

MICROBIOTEST
A Division of Microbac Laboratories, Inc.
105 Carpenter Drive
Sterling, VA 20164

INDEPENDENT LABORATORY CERTIFICATE OF ANALYSIS

Evaluation of Bacterial, Viral, and Cyst Reduction Capabilities of a Small Water Purifier Device per NSF Protocol P248 and P231

Reported to: First Water Systems, Inc.
6950 Brinton Place
Suwanee, GA 30024

Date Tested: 12/11/2012
Project No.: 625-101

Product Tested:
First Water 40™ Treatment System, as deployed on the FW-1200™ Small Unit Water Purifier by First Water Systems, Inc. The product is defined as 1 micron mechanical filtration, carbon block filtration, Zeonic™ Virus Media, and an ultraviolet light dose of 40 mj/cm² at flow rates ≤ 20 gpm.

Test Performed: EPA and NSF P248 (2012) and P231 Biological Water Challenge Test

Independent Laboratory Testing Results:

Organism	Required % Reduction	Actual % Reduction	Pass/ Fail
R. terrigena (bacteria)	> 99.9999	> 99.999999	Pass
MS2 coliphage (virus)	> 99.99	> 99.99	Pass
fr coliphage (virus)	> 99.99	> 99.99	Pass
Cryptosporidium (cyst)	> 99.9	> 99.99	Pass

Conclusions:
Independent laboratory testing found that First Water 40™ Treatment System, as deployed on the FW-1200™ Small Unit Water Purifier achieved the microorganism contaminant reductions in accordance with the levels set forth by NSF and EPA in protocols P248 and P231.

Laboratory Qualifications:
Microbac Laboratories, Inc. operates one of the world's most diversified commercial testing and analytical laboratory groups in the environmental, food, pharmaceutical and other testing areas. The MicroBioTest division of Microbac has over 28 years of experience serving microbial and viral testing community and is fully compliant to Good Laboratory Practices (GLP) and ISO 17025.

Reported by: MICROBIOTEST

S. Steve Zhou, Ph.D.
Director, Virology and Molecular Biology
MicroBioTest, A Division of Microbac Laboratories, Inc.

01/14/2013
Date

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703.925.0100 (p/800) • www.microbac.com • 703.925.3326 (fax)

This unique combination of filters and UV produces exceptional water, and meets both Department of Defense and civilian drinking water requirements for micro-biologically safe water. The certificate shown above right is one of many that provide the necessary documentation to trust the quality of water for use in US based emergencies. For additional information on the technology that fuels all First Water purification products, including user and training videos, please visit the company website at www.firstwaterinc.com.

Solution Driven Offerings

Producing clean water is the primary concern in delivering emergency water, but supporting products that facilitate easy distribution and flexible deployments is equally critical. Through actual use of the equipment by its credentialed Disaster Strike Team and input from dozens of customer deployments, First Water has developed solution packages to support emergency operations.

- Deployment Groups: Highly portable product groups geared towards emergency management operations that include everything required to simply move into place and begin providing victim care, including:
  - a water purification system with either solar or non-solar power supply,
  - re-usable bladders for temporary storage of clean water,
  - distribution manifolds to enable up to eight lines of people to obtain clean water, shower, hand washing stations and kitchen support,
  - 1.5 gallon sterile vessels for victims to carry water off in, etc.

- Health Care Facilities (HCF): Collections of various products configured to keep hospitals operational when source water is either compromised or unavailable. Based upon bed count, each configuration provides enough equipment for a continuity of care during emergencies, including:
  - Larger water purification systems to support drinking water and dialysis,
  - Smaller water purification systems to support specific small volume needs such as OR scrub stations, ice machines, ER, food prep, sterilization, etc,
  - Additional smaller systems to support smaller coalition partners such as Assisted Living, Nursing Homes, etc,
  - distribution manifolds to enable staff to fill up water vessels for patient rooms and anyone in need of drinking water,
  - Supply Stations that store untreated source water shuttled in by vehicles prior to purification when no water is available at the site,
  - 1.5 gallon sterile vessels for patients and anyone else needing water.

- Mobile Trailer Solutions (MTS): A custom designed trailer to transport and facilitate fast deployments of the First Water purification systems. While the trailers themselves do not clean water, they provide for organized, rapid deployments and feature:
  - Meets task force requirements,
  - Central aisle for easy unloading
  - Skid-resistant flooring

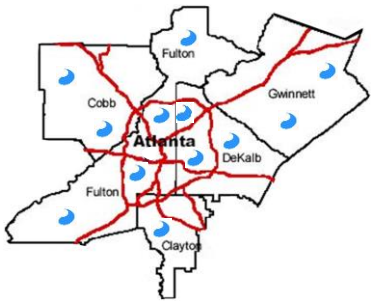
The remainder of this document will examine Case Studies of how three organizations met their specific regional challenges by utilized one of the above solution offerings. The selected approach was dictated by the type of regional requirements faced and combination of participating agencies and organizations.

Atlanta UASI, 2013
Distributed Trailer Solution

The Atlanta UASI is comprised of five counties and the City of Atlanta. The region is primarily urban, and includes the world's busiest airport, defense factories, and many high risk security locations. It also has been the victim of tornadoes, hurricanes, significant water main breaks and ice storms that have resulted in potable water supplies to be temporarily unavailable at various areas of the region.

Initiated by the local fire departments, the Region analyzed and determined that water security was a serious threat. Law enforcement agreed that the risk to security and potential civil response warranted the investment of their DHS grant funds.

<u>Regional Requirements</u>



The team quickly determined that what was required was a solution that could be decentralized and available at strategic locations throughout the Region. Further, the solutions needed to be housed at fire departments because of their roles and mutual aid capabilities.

The goals for the Program were to support a diverse potential need, including victim care at planned and ad-hoc shelters, critical infrastructure support such as hospitals, transportation hubs and correctional facilities. Ultimately it was decided that many smaller systems were required that could support as many locations as possible. However, the capacity also had to be there to handle large congregations of victims at strategic locations.

<u>Solution Package Implemented</u>

The selection of trailers distributed throughout the Region met all the deployment needs and goals. A total of twelve (12) trailers contained enough equipment to purify up to just less than 500,000 gallons per day.

The Region developed a Strike Team capability within the member jurisdiction that provided the following benefits:

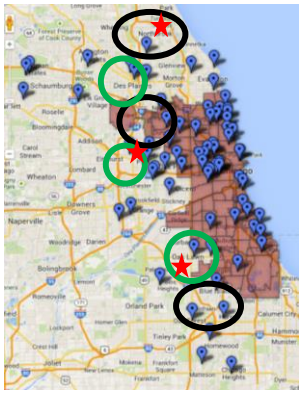
(1) Quick emergency deployments of all equipment locally at each individual jurisdiction , as well as virtually anywhere in the Region for a widespread event,
(2) Task-Force capable trailers that facilitate deployments to areas outside the Region through EMAC or formal requests,
(3) Storage for all the equipment inside the trailers and outside of rare office or warehouse space,
(4) An equalization of equipment among all jurisdictions, enabling cross training and identical response vehicles between jurisdictions.

Cook County Homeland Security, 2014
Emergency Cache Solution

Cook County is the county that encompasses the City of Chicago in Illinois. It is exclusively urban and dense urban, with extremely limited natural water sources. The Department of Homeland Security has developed and outfitted three Emergency Response Centers (ERC's) where many assets are stored and ready for deployment throughout the region.

The goal of the County was to utilize its UASI grant funds to ensure it had adequate water purification capacity for delivery of emergency water to support both victim care and hospital coverage. However, the department did not have the resources to adequately model and determine the need and optimum deployment scenarios.

Formal Consulting Engagement



Cook County Homeland Security utilized the First Water Consulting Team to develop a *Fit Analysis* that analyzed the Region with regard to water security vulnerabilities. Working extensively with various responsible persons for Planning, Operations and Logistics, a concise document was prepared delivering the following:

- Regional Vulnerability Analysis – a review of those areas that would be considered critical to support if the water supply were to become compromised or unavailable based upon documented historical event information.
- Likely and Critical Deployment Scenarios - multiple deployment scenarios that will likely face the County, including localized, regional and multi-regional events, and the amount of water required for each.
- Solution Requirements and Budget – recommendations for the optimum product strategy to cost effectively deliver the greatest amount of resources, and detail budget.

Solution Package Implemented

The results of the *Fit Analysis* were funded in their totality and the three ERC's were outfitted with equal amounts of equipment to provide up to just less than 500,000 gallons per day. The ERC solution approach provides the management benefit of central caches, coupled with the deployment flexibility of three geographic locations.

The professional services relationship with the Department continues as First Water duplicates its national credentialed Water Disaster Strike Team at the County, providing a local team of emergency water deployment experts comprised of County staff. The First Water Team is planned to provide supporting backup role, if requested.

West New Jersey Health Care Coalition, 2014
Hybrid Facility Distributed Solution

The Coalition is comprised of six (6) acute care hospitals and forty nursing homes, assisted living and senior care facilities. The goal of the Coalition was to provide an emergency water purification capability that satisfied the hospital requirements of the Joint Commission, as well as provide the ability to additionally support the smaller facilities that are part of the Coalition.

Super-storm Sandy was a watershed event that reinforced the need for healthcare to be adequately prepared for potable water disruptions during major events. However, frequent water main breaks due to aging infrastructure were also a driving force in the decision to proceed.

The Coalition joined two others in the state (East and North New Jersey) that have taken this step to provide emergency water for their health care network. By utilizing the same equipment and conducting joint and cross training among regions, the state will benefit from the ability to move equipment and people wherever and whenever the need presents itself.

Maximum Deployment Flexibility

Critical to the Coalition was the expectation that with very little notice the equipment could be delivered from its storage at the six primary hospitals to the others in the Coalition. This necessitated the provision of a larger number of smaller purification systems than would normally be required to sustain a hospital for their operational needs. Because the systems are the size of a briefcase, they can be easily transported anywhere in the region by automobile.

Solution Package Implemented

The solution implemented in the Region included a large complement of small purifiers that treat up to 60 gallons per hour and come in a wheeled rugged Pelican case. The units can all be powered exclusively by solar power, enabling use at smaller facilities that may not have adequate generator power to run non-solar systems.

Also implemented is the FW-300-M system that has been developed to provide a large volume of water, up to over 7,000 gallons per day, but comes housed in a rugged Pelican case. While the unit requires two persons to lift, it fits in the back of most SUVs and vans, and can easily be moved by one person. It has the largest water cleaning capacity available in a mobile case, and can accommodate the needs of both smaller hospitals and larger care facilities.

References and Contact Information

Due to the sensitive nature of the Homeland Security agencies highlighted in this document, references that are regularly provided with our Case Studies and Best Practices documents are not being provided herein. However, please contact the author, and any request for contact with any of the highlighted agencies will be forwarded to them for reply. We are sorry for the inconvenience, and thank you for your interest in regional water security solutions.

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