Metropolitan Council

Metropolitan Area Water Supply Advisory Committee

Water Supply Safety and Security

July 27, 2006

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Introduction

- Focus on Short-Term Issues
- Sensitive Nature of Topic
- Presentation Outline

General Risks

- Contamination
  - Distribution system
  - Source water
- Power loss
- Natural Disasters
- Intentional Acts

Background

- **Water security/safety an issue before 9/11**

  "It has long been recognized that among public utilities, water supply facilities offer a particularly vulnerable point of attack to the foreign agent, due to it's the strategic position in keeping the wheels of industry turning and in preserving the health and morale of the American populace."

  — J. Edgar Hoover, 1941

- **Safe Drinking Water Act 1974**

- **9/11 and recent hurricanes raised awareness for:**
  - **Security issues**
  - **Emergency response - malevolent attacks and natural disasters**
  - **Contamination – intentional/unintentional**

Federal Regulations

Bioterrorism Act of 2002:

- Applied to all water systems that serve more than 3,300 people
- Required vulnerability assessments
- Required emergency response plans

Federal Regulations

Bioterrorism Act of 2002:

- **Vulnerability assessments**
  - **Determine how vulnerable the system is to terrorist or other intentional attacks that would:**
    - **Disrupt water supply**
    - **Make water unsafe to drink or use**
  - **Act did not specify assessment method but EPA guidance recommended risk-based methodology**

Federal Regulations

Bioterrorism Act of 2002:

- **Vulnerability assessment outputs:**
  - **List of potential attacks sorted by risk**
  - **(Note: Risk function of consequences and likelihood of the attack)**
  - **Recommendations for improvements:**
    - **Physical – alarms, cameras etc.**
    - **Water system improvements – redundancy etc.**
    - **Policies/procedures/training**
  - **No requirement to implement recommendations**

Federal Regulations

Bioterrorism Act of 2002:

- **Emergency response plan**
  - **Required procedures to mitigate impacts of potential attacks identified in vulnerability assessment**
  - **Did not require addressing non-intentional events (e.g. natural disasters)**
  - **Required coordination with Local Emergency Planning Committee**

Other Federal Regulations/Programs

- Homeland Security Presidential Directives (HSPD) 7 & 9 requires protection of critical infrastructure like water from terrorist attack
- EPA implementing HSPD 7 & 9 for Water Systems including:
  - Developing strategies for responding to and preparing for incidents
  - Promoting information exchange among stakeholders
  - Developing and using technological advances in water security

Other Federal Requirements

- National Incident Management System (NIMs)
  - Developed to integrate response from different local, state and federal jurisdictions
  - Unified approach to incident management and standard command/management structures
  - HSPD-5: Public entities like water systems must follow NIMs requirements and be trained in NIMs (or ineligible for grant money!)

Other Federal Requirements

- Pending chemical security legislation could:
  - Impact water utilities that store hazardous chemicals like chlorine/ammonia that could impact public if released
  - Require security upgrades
  - Require considering alternatives to hazardous chemicals

Community Emergency Planning Summary

- Reliability
- Emergency & Conservation Plans
- Sourcewater Protection
- Vulnerability Assessments
- Emergency Response Plans
- Related Regional / State Emergency Management Activities

Reliability

- How much water is “required?”
- Built in redundancies
  - Pipe networks
  - Lawn sprinkling
  - Multiple wells
  - Reaction time
- Highly trained utility staff
- Surface water systems
- Ground water systems
- Challenge to protect municipal water system

State Requirements

- Emergency and Conservation Plan (Water Supply Plan): 1995 Minnesota requirement for all water suppliers serving more 1,000 people (and all Metro area systems)
- Wellhead Protection: States required to have program under the Federal Safe Drinking Water Act. Minnesota Rules, Chapter 4720.5100 - 4720.5590
- Sourcewater Assessments: Also required by Safe Drinking Water Act for Surface and Groundwater, MDH prepared
- Surface Water Sourcewater Protection Plan: Not required. Minneapolis, St. Paul and St. Cloud voluntarily preparing

Emergency & Conservation Plans

- Adequacy of Water System
- Conservation Plan
- Emergency Preparedness Plan
  - First attempt at formalized planning for many water suppliers
  - Water Use Priorities
  - Triggers for implementing restrictions
  - Alternative supplies

Sourcewater Protection

- Wellhead Protection
  - Where does the water come from?
  - Geologic Vulnerability
  - Existing and potential threats
  - Management plan
- Surface Water
  - Assessments Required
  - Minneapolis, St. Paul and St. Cloud voluntarily preparing plans

Vulnerability Assessments

- Mission of Water System
  - Quantity
  - Quality
  - Pressure
  - Fire Flows
  - Critical Customers
- Critical Assets
- Design Basis Threat
- Countermeasures
- Areas outside the utility's sphere of influence

Water System Emergency Response Plans (ERP)

- Allocation (prioritization) of water
- Alternate Water Sources
- Mutual Aid Agreements
- Regulatory Planning Partnerships
- Communications
- Emergency Power
- Supplies
- Training

National Incident Management System (NIMS)

- Use of NIMS is required
- Training in NIMS is required
- In Minnesota, Division of Homeland Security and Emergency Management is responsible for implementing
- Minnesota has been using similar system for over 10 years
  - 1991 Mn. Legislation required ICS
  - State training in MIMS since 1996
  - MnIMS (Mn National Incident Management System)

NIMS: Next Steps for Water Utilities

- MnIMS Training
  - Emergency Managers
  - Public Works Staff with a “direct role in emergency preparedness, incident management, or response.”
- NIMCAST – self assessment tool
- All hazard exercises

Minnesota Department of Health

All-Hazards Response and Recovery Plan

- Organizational framework for MDH response to incidents involving public health
- Describes the capabilities and resources available to MDH to address various public health hazards.
- Multi-Agency Coordination Plan

Local Perspective

Summary

- **Good Start**
  - Staff
  - Well-developed local relationships
  - Training is underway
  - Agencies defining their roles
  - Some redundancies
- **Opportunities**
  - Alternative supplies
  - Expand relationships
  - Training

National Perspective

Vulnerability Assessments

- **Results of vulnerability assessments**
  - **Types of risks identified varied in part because of:**
    - **Assessment methodologies shortcomings**
    - **Difficulties in estimating consequences and likelihood of attacks**
  - **Utilities often lacked funds to implement recommended improvements – many choose to phase in improvements**

National Perspective

Most Significant Risks

- **Contamination continues to emerge as the highest risk because:**
  - **Contaminants can be introduced anywhere from source to tap**
  - **Consequences could be devastating**
  - **Difficult to prevent**
  - **Must detect and respond quickly to prevent potential catastrophic impacts**

National Perspective

Most Significant Risks

- **Contamination (continued)**
  - **Distribution systems generally more vulnerable than source water or treatment plants, due to fewer barriers:**
    - **Treatment**
    - **Dilution**
    - **Access and detection**

National Perspective

Most Significant Risks – Non Malevolent

- **Loss of Power**
  - **High likelihood: it has happened – 2003 East Coast Power outage**
  - **Consequences: Loss of water for drinking, fire protection, boil water notice for stored water (backflow threat)**

National Perspective

Most Significant Risks – Non Malevolent

- **Natural Disasters**
  - **Recent Hurricanes in Southeast**
  - **Flooding threat for Minneapolis Area**
- **Source water accidental spills**
- **Pandemic**

National Perspective

How are Utilities Mitigating Risks?

- **Contamination – EPA's WaterSentinel Program**
  - **Goal: A system for timely detection and response to drinking water contamination incidents**
  - **Minimize public health and economic impacts**
  - **Use multiple triggers as potential indicators to increase chances of detection**

EPA WaterSentinel Monitors Multiple Triggers that Indicate Contamination

Water quality monitoring

Consumer complaint surveillance

Sampling and analysis

Enhanced security monitoring

Syndromic surveillance

UTILITY Data Management and Integration

PUBLIC HEALTH Data Management and Integration

UTILITY Event Detection

PUBLIC HEALTH Event Detection

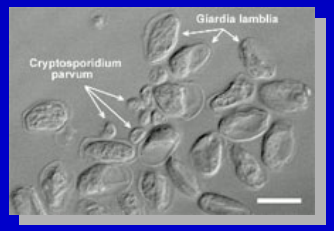
Credibility Determination

Emerging Sensors Could Provide Contamination Detection

Toxins/Chemicals

Viruses

Bacteria



Protozoa

Increasing complexity

Approach:

- **Adapt existing military and medical technologies to develop affordable, reliable instruments**

How Utilities are Mitigating Risk

- Best Management Practices for Security are continuing to evolve
- Almost all large metro areas have security programs but scope varies significantly
- Water Infrastructure Security Enhancement (WISE) Consensus Standards
  - Developed by AWWA, ASCE & WEF
  - Used accredited ANSI standard development process
  - Consensus of security experts and utilities
  - Addresses all aspects of security

How Utilities are Mitigating Risk

- **Power loss**
  - Increase backup generator capacity
  - Increase or optimize water storage volume using hydraulic computer modeling
- **Supply Water Contamination**
  - Example: Ohio River Valley Water Sanitation Commission (ORSANCO) – spill monitoring and emergency response programs
  - Mississippi River Riverine Emergency Management Model, River Defense Network

How Utilities are Mitigating Risk

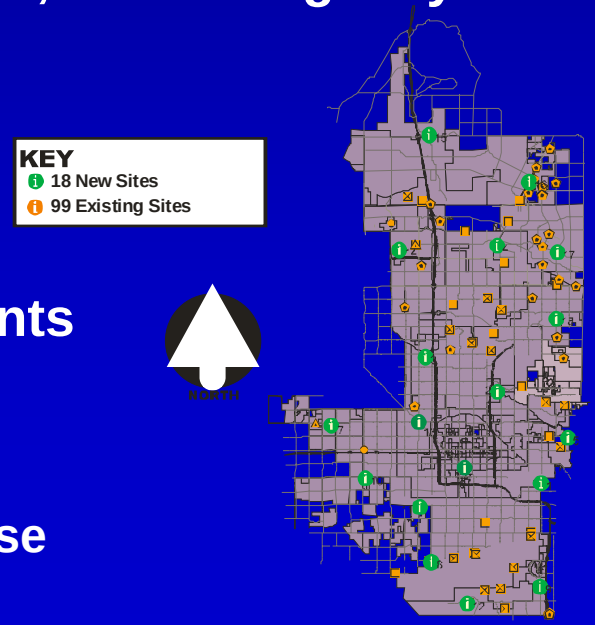
- Improving security policies and procedures
  - Cost effective risk reduction
  - Employee background checks
  - Facility access policies
  - Computer security procedures (passwords etc.)
  - Chemical delivery and handling

How Utilities are Mitigating Risk

- Improving Emergency Response Plans
  - Water/Wastewater Agency Response Network (WARN)
    - "Utilities helping utilities" concept
    - Mutual aid/assistance network to provide method to obtain emergency personnel, equipment, materials from other water/wastewater utilities
    - Interstate program – allows utilities outside immediate area not impacted by event to assist

Examples of Security Improvements in other Large Metro Areas

- Cincinnati – EPA WaterSentinel contamination warning system pilot
  - Large metro area serving 17 communities
  - Uses multiple contamination warning triggers
  - Required extensive coordination among local and state health departments, law enforcement, regulators, and emergency response managers
- Phoenix
  - Large service area – 530 sq miles
  - Significant physical security improvements
  - Contamination warning system
    - Source water and distribution system
    - > 100 chlorine residual analyzers – dual use



Examples of Security Improvements in other Large Metro Areas

- Pittsburgh – well developed contamination monitoring program
  - Accidental & intentional contamination
  - Source water and distribution system monitoring instruments
  - Pioneer of Syndromic surveillance

Examples of Security Improvements in other Large Metro Areas

- **Seattle Metro Area**
  - Regional Emergency Response Planning
  - Plans covered other non-water utilities
  - Extensive training and exercises
- **New York City**
  - Source water protection
  - Distribution system warning
  - Physical security

Opportunities

- WARN – Under development through the Minnesota Department of Health
- Data sharing for contamination warning
  - Public Health Reporting
  - Law enforcement intelligence
  - Water quality data
  - Consumer complaints
- Common Security Policies/Procedures
- NIMS Training
- Sourcewater Protection Coordination
- Support Development of Backup Supplies
- Regional Federal Homeland Security Grants