Water Utility Vulnerability and Risk Assessment: The Titusville Example

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Outline

- Municipal Water Systems Background
- Generalized Threat
- RAM-W
- The Titusville Area
- City of Titusville Water Utilities
- Conclusions
Water Systems as Targets

• 64,000 systems serve communities >1000
• None designed against conventional attack
• Some inherent “Hardness”
• Congress reacted to September 11, 2001
• SNL’s Risk Assessment Methodology – Water Utilities or RAM-W
  – Approved and Accepted Nationwide
Generalized Threat

• Al-Qaeda changing
  – Smaller teams
  – Less central direction
  – Shorter planning/operational cycles
  – Expanded its target set

• Bomb technology well developed

• Chemical/biological attack established fact
• Risk Assessment Methodology – Water Utility
  – Sandia National Labs developed
  – One of a set of standard analytical tools
• RAM-W accepted by EPA and the American Waterworks Association as the method
• DoD gave EPA $90M in FY02 to pay for analyses:
  – $54M for large systems
  – $20M for small to medium systems
  – More for FY03 - tied to Homeland Defense
• Four steps once you know who is the threat and how much damage could cost to repair:
• How well does the system detect a problem?
  – Poisoning;
  – Breaks; etc.
• How well can the system verify an attack?
• Will the system delay the attack?
  – Barriers
  – Latency in raw-to-purified water processing, storage, and distribution
• How long does it take for the system to respond to attack?
  – Own personnel
  – Law enforcement and emergency services
  – Engineering support
• If these four factors are good enough, attack may be deterred
• In any case, attack effects are mitigated
Titusville, Florida
Titusville, Florida

• Geography and Geology
  – City sits astride N-S coastal ridge between the Indian River (lagoon) and the St. Johns River
  – Soil is sand atop coquina rock
  – Elevations reach 65 feet above MSL
  – Surficial aquifers tapped for water

• Located between Orlando and Cape Canaveral/Kennedy Space Center
Titusville, Florida

- History
  - County seat, oldest city in Brevard County
  - Mostly HUB Zone
  - Mostly small industries
  - Bedroom community for KSC
  - Offices and some manufacturing for space industry on South side
  - Development/redevelopment on upswing
The Water Plant

City of Titusville
WATER RESOURCES
ENGINEERING DIVISION
2936 GARDEN STREET
Titusville, Florida 32780
(305) 888-0077

LEGEND
1. Chlorine Storage Shed
2. Anhydrous Ammonia Storage Tank
3. Hydrofluosilicic Acid Tank
4. Carbon Dioxide Storage Tank
5. Calcium Oxide Silo
6. Diesel Fuel (aux. generator)
7. Hydrochloric Acid Shed
8. Calcium Hypochlorite Shed

City of Titusville
Water Plant

Singleton Avenue
Garden Street
South Well Field
North Well Field
South Lif
North Lif
Conclusions

• Likely scenarios:
  – Large-scale bomb attack on Main Plant
  – RPG attack against various facilities
  – Poisoning via wells or pipelines

• Countermeasures:
  – Convert vehicle fleet to diesel
  – Landscape changes in front
  – Improve fences and gates
  – Wired intrusion alarm system
  – Relocate chemical tanks behind berms