

Water Security Summit
Eagle Eye Conference Center
Tuesday 6/7/11

Table Top Exercise Demonstration

Bob Babcock

Water Operator Training, Certification, Security Chief

MDEQ

babcockr@michigan.gov

517 373 8566

Thanks

- To the Michigan Section of the American Water Works Association...if it weren't for you, we wouldn't be here

TTX Mantra's

- You play like you practice
- Protect people and revenue

Audience Actors Needed

- Drinking Water
- Wastewater
- Police
- Fire
- Hospital/Epidemiologist
- Acme Industries Inc.





Rationality

- The state of being rational or logical
- The possession of reason or logic

- **Water Sector
Survival**

Volunteers

- Drinking Water
- Wastewater
- Hospital/epidemiological
- Police
- Fire
- Acme Industries Inc.

Zenith City

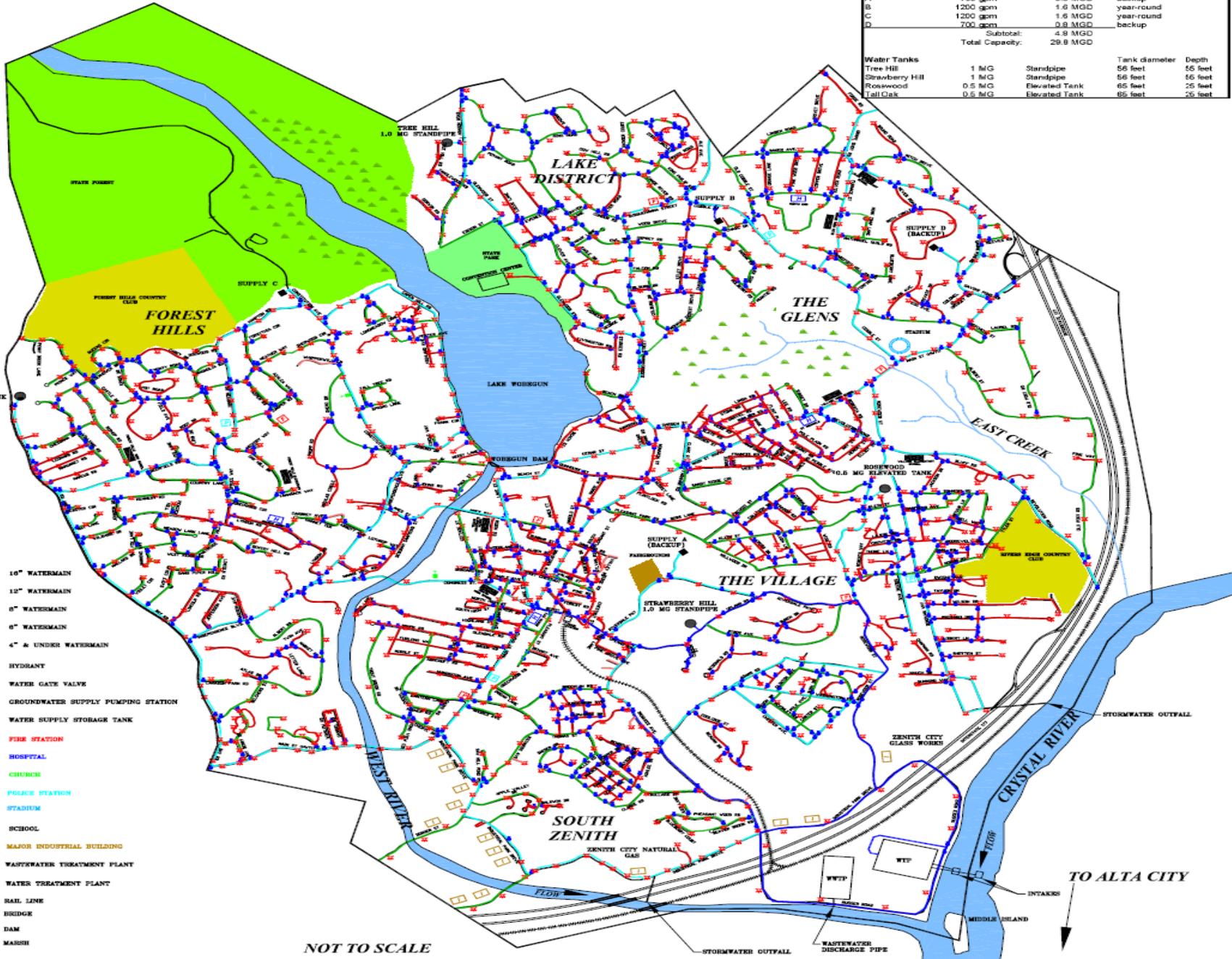
- Zenith City is a city of 100,000 population
- Zenith City operates a groundwater well drinking water system with hardness treatment, chlorine, ammonia, fluoride, and phosphate and rapid sand filters
- Zenith City operates a biological advanced secondary wastewater treatment plant

Ground Rules

- Audience...you should participate...learn how to fish
- No wrong answers

ZENITH CITY WATER SYSTEM

Zenith City Water System			
Zenith City Water Treatment Plant (Surface water)			
Groundwater pumping stations			25 MGD
A	700 gpm	0.8 MGD	backup
B	1200 gpm	1.6 MGD	year-round
C	1200 gpm	1.6 MGD	year-round
D	700 gpm	0.8 MGD	backup
Subtotal:			4.8 MGD
Total Capacity:			29.8 MGD
Water Tanks			
Tree Hill	1 MG	Standpipe	Tank diameter 56 feet Depth 55 feet
Strawberry Hill	1 MG	Standpipe	56 feet 55 feet
Rosewood	0.5 MG	Elevated Tank	65 feet 25 feet
Tall Oak	0.5 MG	Elevated Tank	65 feet 25 feet



LEGEND

- 10" WATERMAIN
- 12" WATERMAIN
- 8" WATERMAIN
- 6" WATERMAIN
- 4" & UNDER WATERMAIN
- x HYDRANT
- + WATER GATE VALVE
- GROUNDWATER SUPPLY PUMPING STATION
- WATER SUPPLY STORAGE TANK
- FIRE STATION
- HOSPITAL
- + CHURCH
- POLICE STATION
- STADIUM
- SCHOOL
- MAJOR INDUSTRIAL BUILDING
- WWTP WASTEWATER TREATMENT PLANT
- WTP WATER TREATMENT PLANT
- RAIL LINE
- BRIDGE
- DAM
- ▲ MARSH

NOT TO SCALE

TO ALTA CITY

Zenith City WWTP

- June 7, 2011 @ 8:30 am
- Zenith City Wastewater Treatment Plant (WWTP) detects die off of bacteria in the aeration tanks
- WWTP samples influent for toxicants
 - Results pending
- WWTP broadens sampling strategy

WWTP industries sampled

- 9:00 am
- WWTP evaluates possible upstream sources
 - Acme Industries Co. effluent sampled – Results pending
 - Pete's Pesticides Inc. effluent sampled – Results pending
 - PCB Circuit Boards Inc. effluent sampled – Results pending

People presenting at Hospital

- 9:00 am
- People presenting at Zenith City General Hospital Emergency Room
- Spike in ER visits to Zenith City General Hospital: 18 people so far

Hospital ER

- 9:00 am
- Most have similar signs & symptoms
 - Headaches
 - Nausea & vomiting
 - Bitter, acrid, burning taste
 - Weakness / dizziness
 - Shortness of breath
 - Loss of consciousness
- Blood work and urinalysis expected in ~24 hours
- Doctors treating based on clinical acumen



Hospital Epidemiologist

- Hospital epidemiologist investigates emergency room patients

Hospital ER

- 10:00 am
- Epidemiological investigation initially focuses on food
 - Food eventually ruled out
- All patients either live or work in or near Brooks Industrial Park
 - Blood work and urinalysis results still pending
- Epi investigation continues

Epi points to drinking water

- 10:45 am
- Hospital epi hypothesis now begins to focus on exposure via drinking water
 - Common factor: drinking water followed immediately by acute symptoms
 - Awaiting results of lab tests of clinical patient samples



County Health Department

- 11:00 am
- County HD notified of Epi hypothesis
 - Very concerned by implications of hypothesis
- County HD contacts drinking water authority



Utility Director

- 11:00 am
- Wastewater superintendent informs Zenith City Utility Director of the high zinc and cyanide concentrations
- Utility director copies all department heads of the high zinc and cyanide concentrations.

Water Sup't / Utility Director

- 11:10 am
- Water Superintendent confers with Utility Director about the hospital epi investigation indicating possible drinking water toxics.
- Water Superintendent informed of high zinc and cyanide concentrations in the sewers in Brooks Industrial Park.

Sewer Samples

- 6/7/11 at 11 am
- Brooks Industrial Park interceptor identified as having high zinc and cyanide concentrations

Drinking Water Samples

- Zenith City Water samples Brooks Industrial Park water main for toxics at 11:30am
- Results pending

Epi Water Nexus ? ?

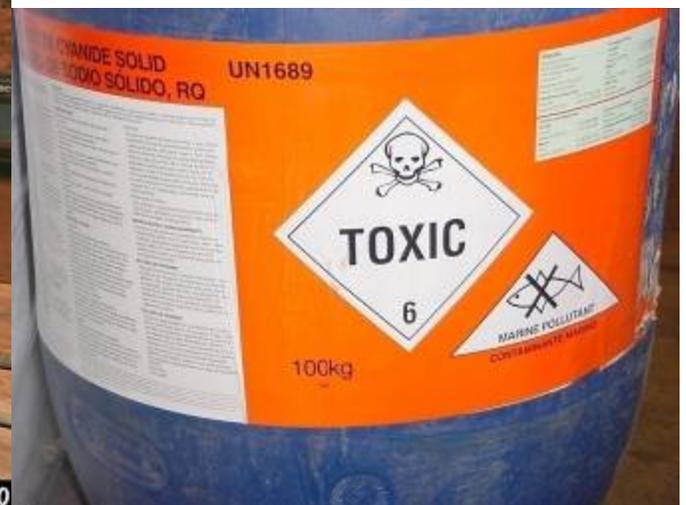
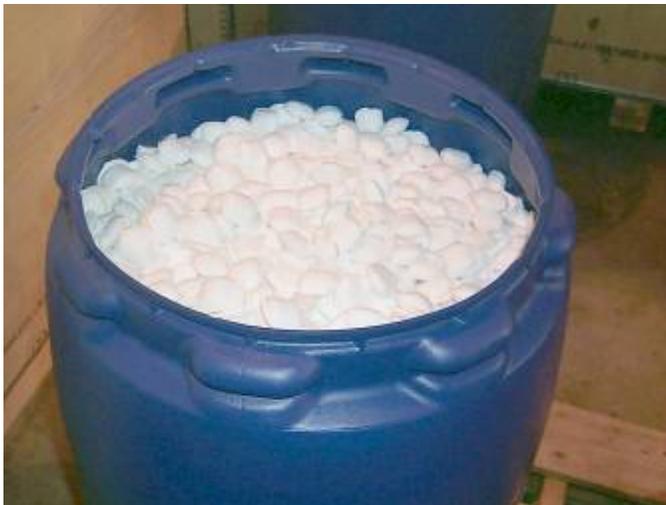
- 12 noon
- Epi investigation establishes drinking water as the source of the outbreak
 - Potassium cyanide [KCN] confirmed in clinical samples
 - Hi zinc concentration also identified
- County HD in contact with water utility
- Water utility lab does additional testing
 - Finished water w/in allowable parameters !
 - Raw water also w/in allowable parameters !
- No natural explanation for events ? ?

Technical Info

- Potassium Cyanide (KCN) is widely used in electroplating baths in addition to cyanides of the metal to be deposited in order to:
 - Facilitate anode corrosion
 - Help maintain constant metal ion level
 - Contribute to conductivity
- Other KCN uses:
 - Circuit board manufacturing
 - Metal extraction from ores
 - *Livestock protection collars* and other forms of predator control

Technical Info

KCN is generally shipped in 100 kg quantities in blue polyethylene drums or steel, plastic-lined ISO containers



Technical Info

- 100 kg (220 lbs.) of KCN will contaminate 600,000 gallons of water to LD_{low}
 - = 44 mg/l (ppm)
- Average person drinks $\frac{1}{2}$ gallon water/day
 - Average person uses ~2 gallons of water/day for drinking and cooking
 - Average person uses ~100 gallons of water/day for all purposes

Brooks Industrial Park (BIP)

- 2:00 pm
- General location of the zinc cyanide contamination plotted from human Epi data, water system samples and wastewater system samples to be the Brooks Industrial Park
- Both water and wastewater personnel are now jointly inspecting all industries in Brooks Industrial Park

Acme Industries

- 3:00pm
- Inspection of Acme Plating Inc. in BIP shows a backflow preventer has been modified by disgruntled employee.
- A pump is found pumping zinc cyanide plating solution into a 3/4" water line at the zinc cyanide electroplating tank.
- Zenith City police are called and apprehend the employee. Criminal investigation pursued.

Technical Info

- KCN quickly metabolizes out of the body and may be impossible to detect >24 hours
 - True extent of contamination / intoxication may be impossible to determine
- Studies indicate that only ~25% of people who feel sick actually go to a hospital
 - 75% of people who feel sick don't!
- The total number of actual victims may never be known!