

Multi-agency Response to a Major Water Pipe Break

Planning, Preparation and Practice Pay Off

W-SMART 2011 International Workshop

May 12, 2011

John P. Sullivan

Chief Engineer

Boston Water and Sewer Commission

Who is MWRA

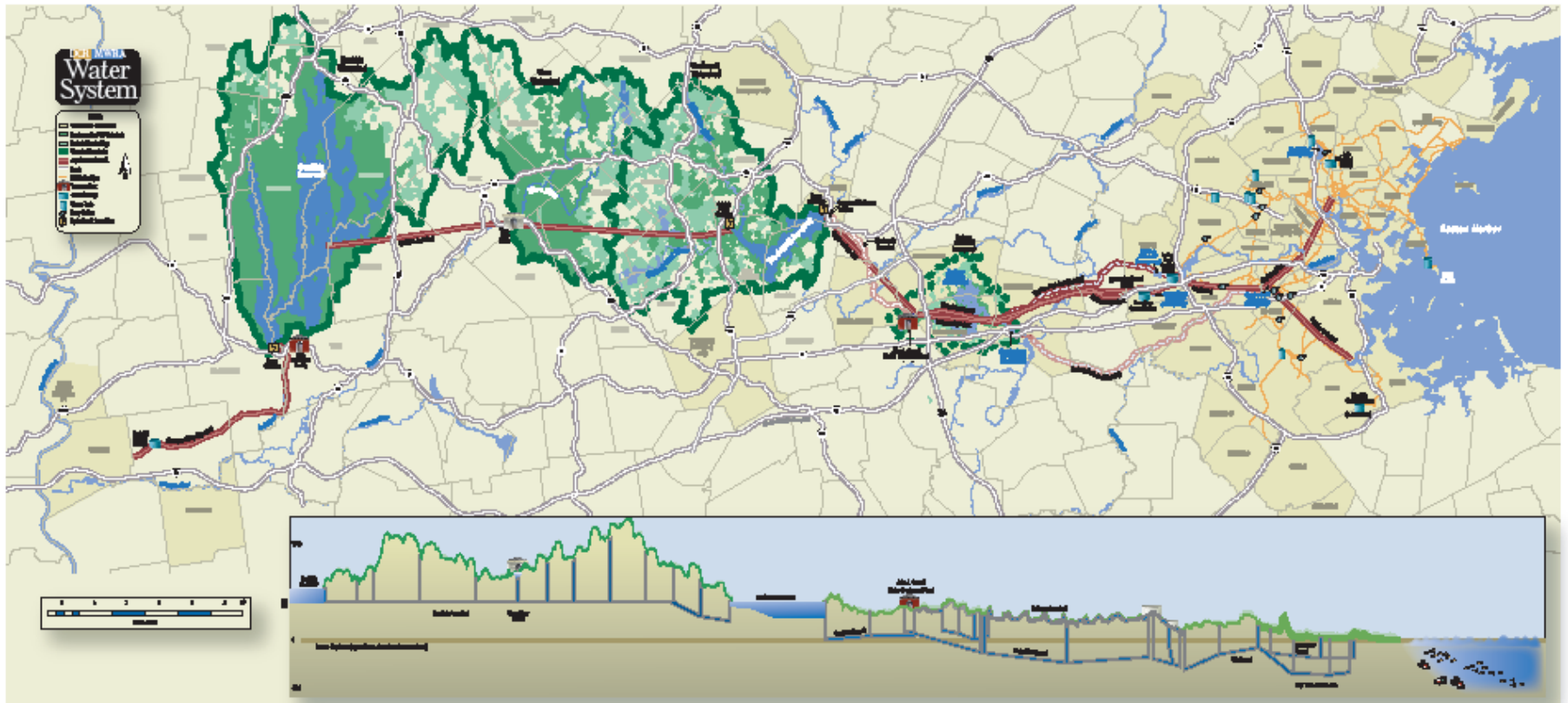
- MWRA provides wholesale water and wastewater services to over 2.5 million customers in 61 communities in eastern and central Massachusetts
- On average, MWRA delivers 200 million gallons per day to its water customers



Today's System – Back to gravity flow

Cascading reservoirs

Quabbin at 530' elevation to Wachusett at 395' to Norumbega at 280', ample for High service use



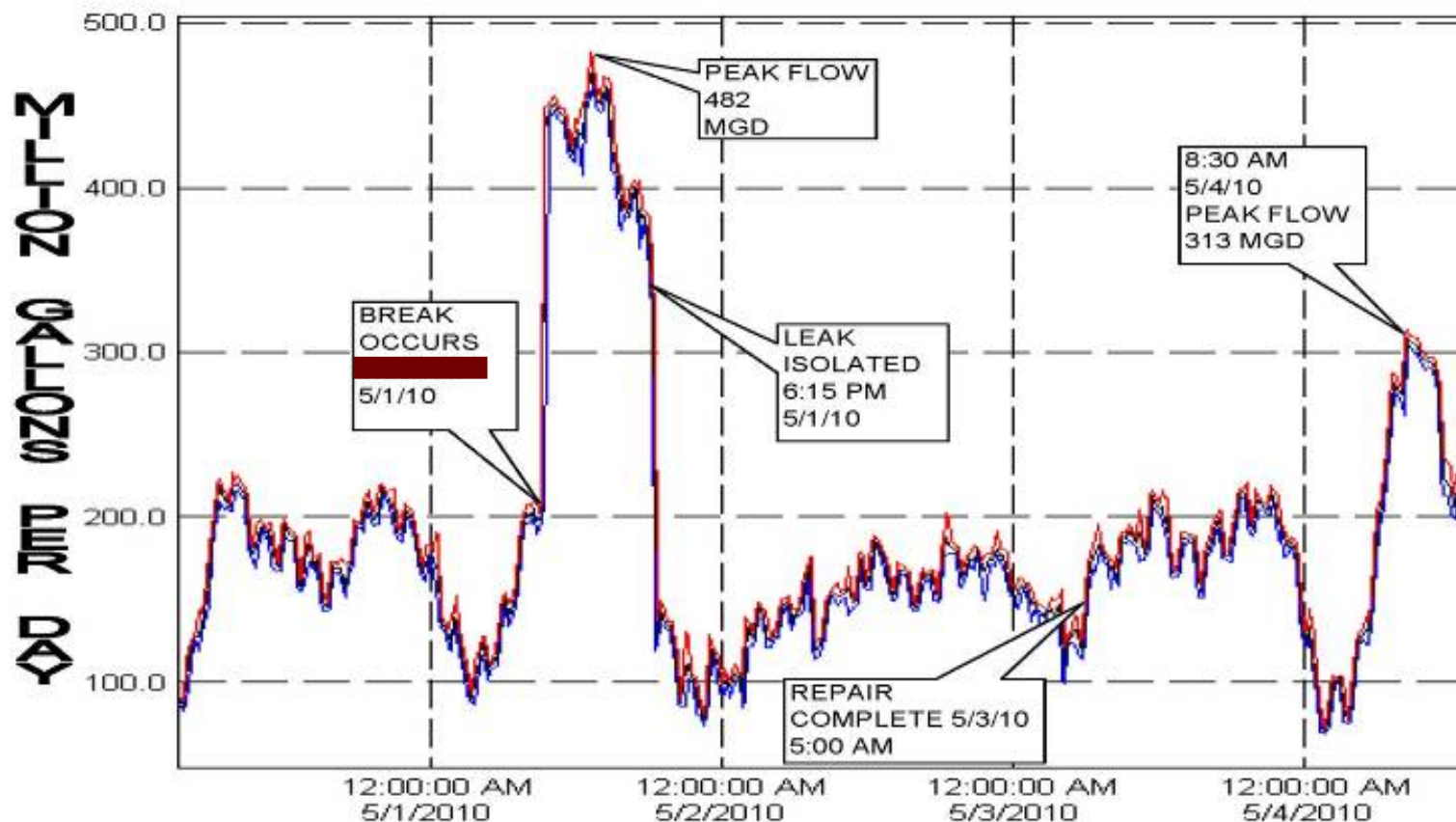
Efficiency - About 2/3 of all MWRA water doesn't need pumping, plus hydroelectricity is generated at key points

Emergency Planning

- The MWRA has developed and maintains contingency or emergency plans for a wide range of events, including:
 - 140 Individual Emergency Action Plans for each of the MWRA's facilities and events
 - Emergency Service Unit plans for responding to water contamination
 - Specific plans for reactivating backup facilities
 - Continuity of Operations Plan
 - Emergency Plans for all MWRA Dams
 - Integrated Contingency Plans for Deer Island and the Carroll Water Treatment Plant
 - Spill Control Plans

Changes in Flow – Apparent Immediately on WTP SCADA

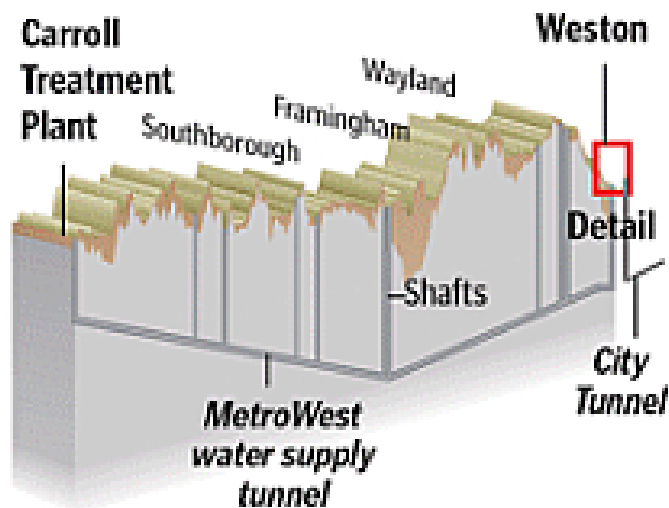
MGD vs. Time



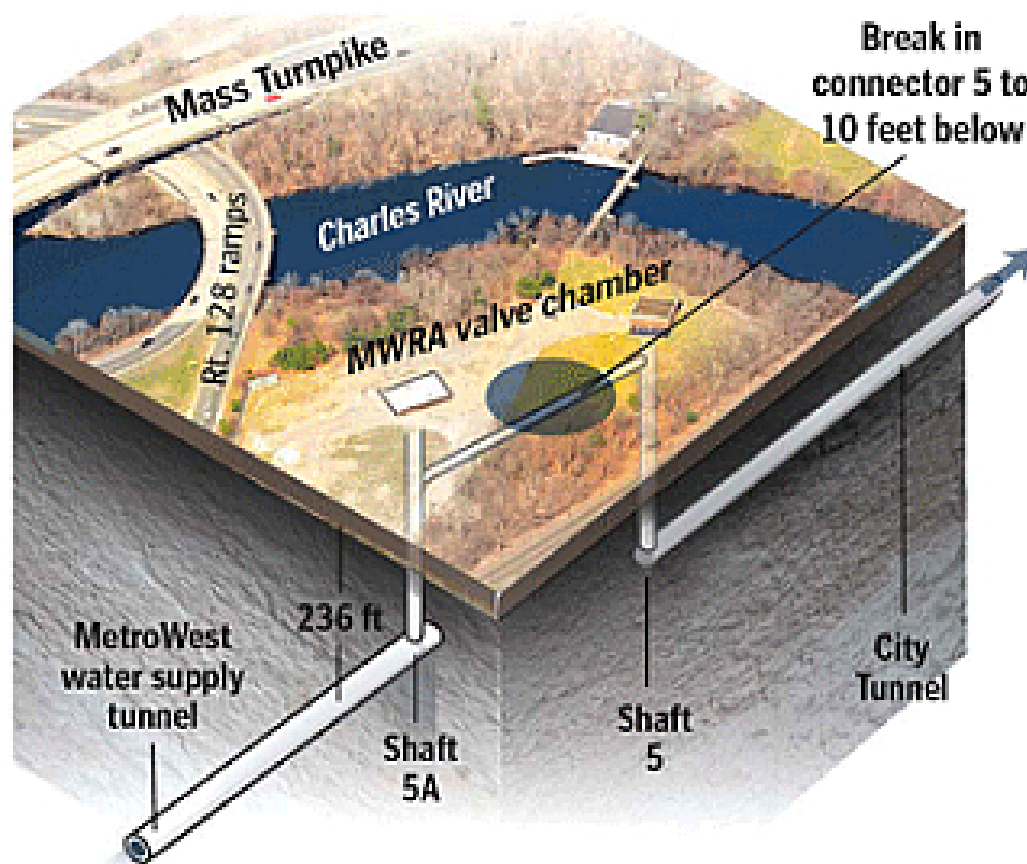
Where the Leak Occurred

THE BREACH

The rupture happened in Weston in a 10-foot-wide steel and concrete pipe connecting the MWRA's MetroWest and city tunnels

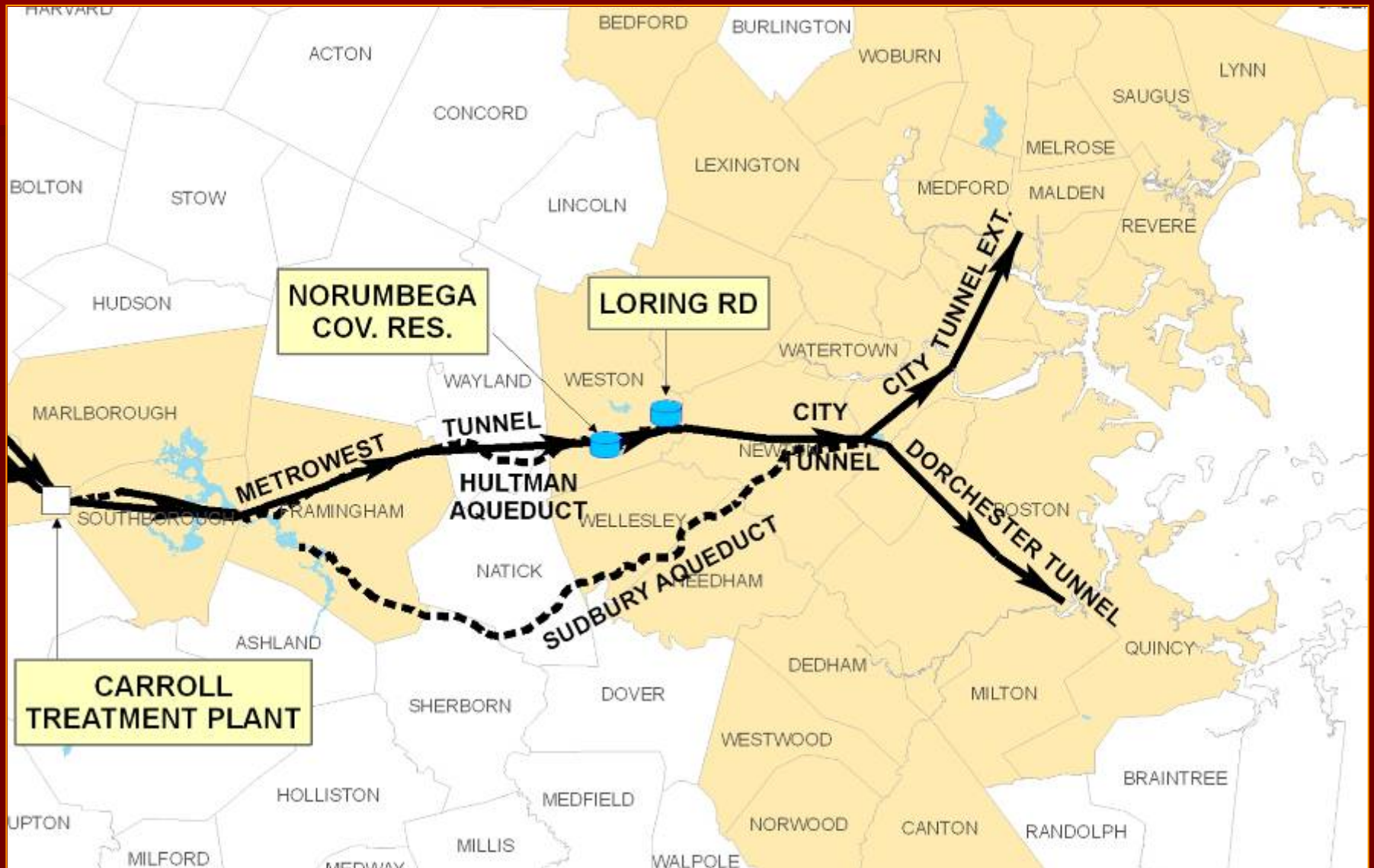


SOURCE: MWRA, Pictometry

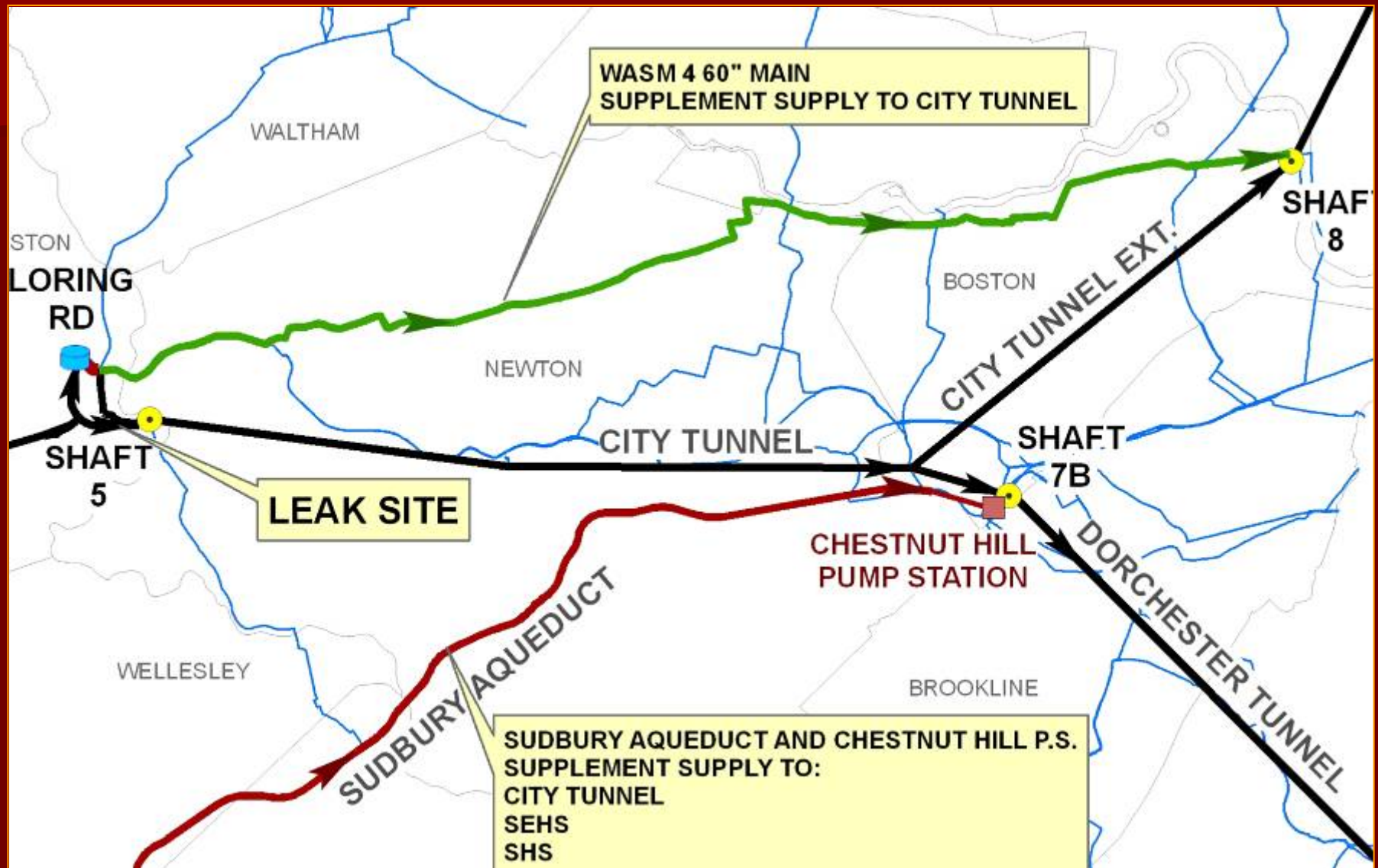


JAVIER ZARRACINA, ED WIEDERER/GLOBE STAFF

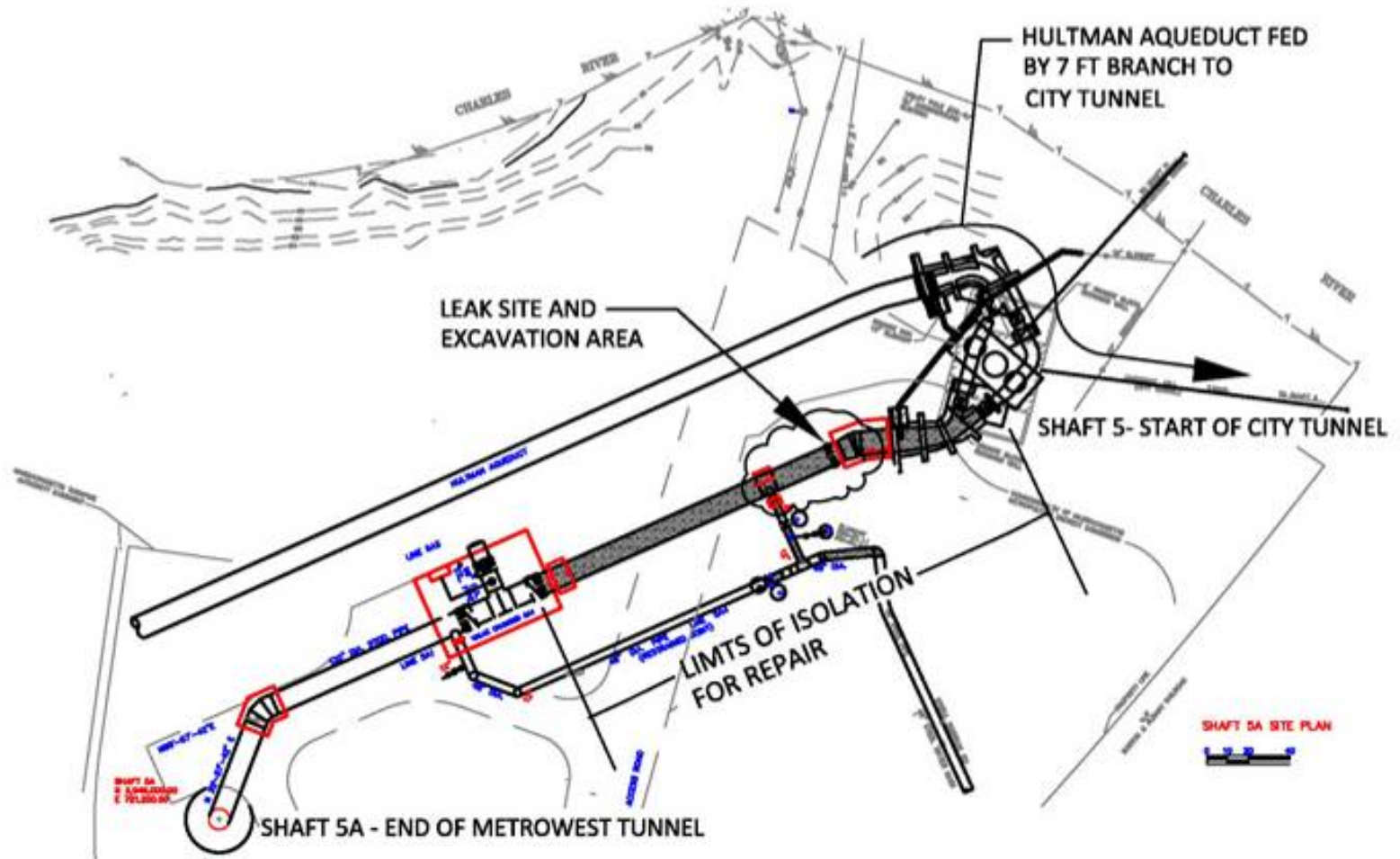
Normal Flow



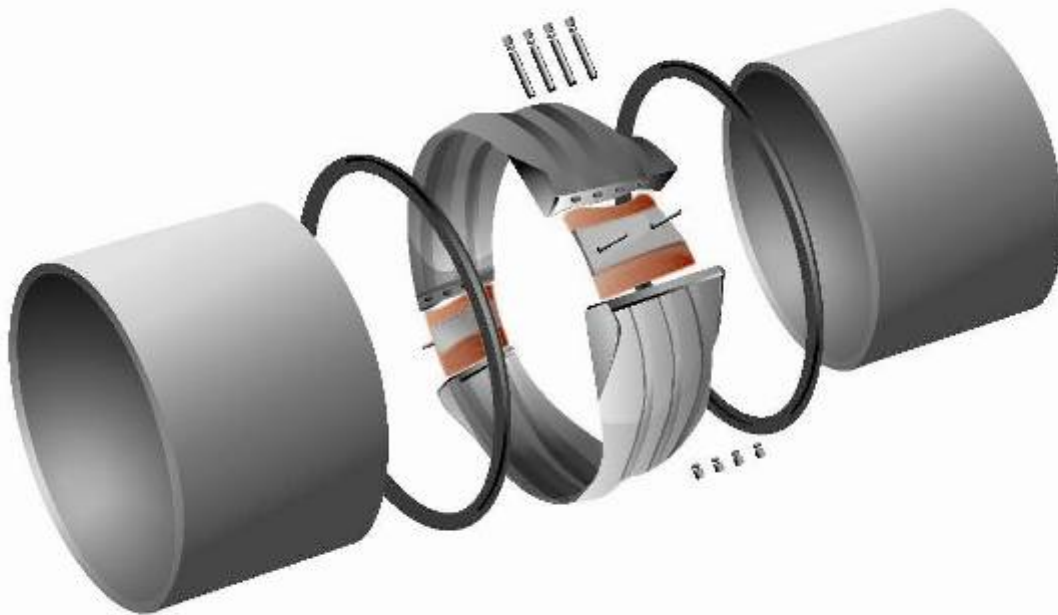
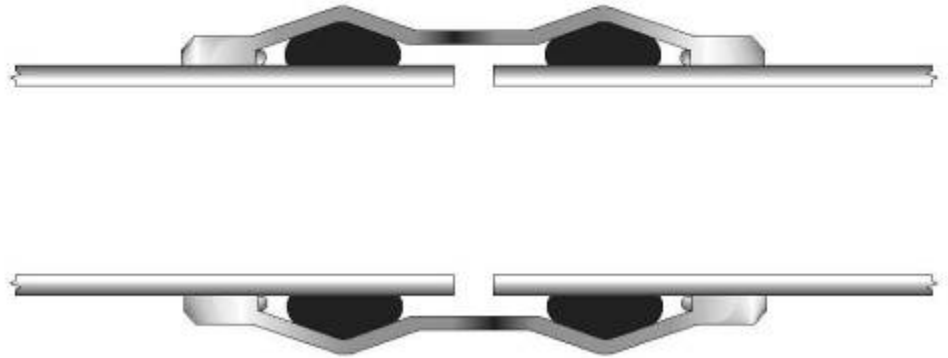
Diverted Flow After Leak



Shaft 5 Break Site



Coupling



Immediate Response

- 10:01 AM - Loss of communication alarm from Shaft 5 received at Carroll Water Treatment Plant (CWTP)
- 10:05 AM - Chelsea Security calls CWTP to report that water discharge was observed on the camera at Shaft 5
- 10:05 & following -- initial notifications to and mobilization of MWRA management, operations, engineering, construction and support staff. Flow at Shaft 5 reported to have immediately gone from 200 mgd to 450 mgd
- 11 AM + - Emergency Operations Center Open



Immediate Operational Response – Following Emergency Plan

- Metropolitan system operation stable and decision to continue flow through the break site
- Contact partial user communities and request use of local sources (Bedford, Woburn, Wakefield, Wellesley, Needham, Peabody, Wilmington, Stoughton)
- Coordinate/control tank fillings to regulate flow (Blue Hills, Loring Road, etc.)
- Begin to reconfigure system to allow shutdown
- Increase plant flows (match flow to demand) to mitigate loss of storage in the Norumbega Reservoir

Rapid Deployment of Pumping and Construction Crews



Top of Pipe And Cleaned Pipe Joint



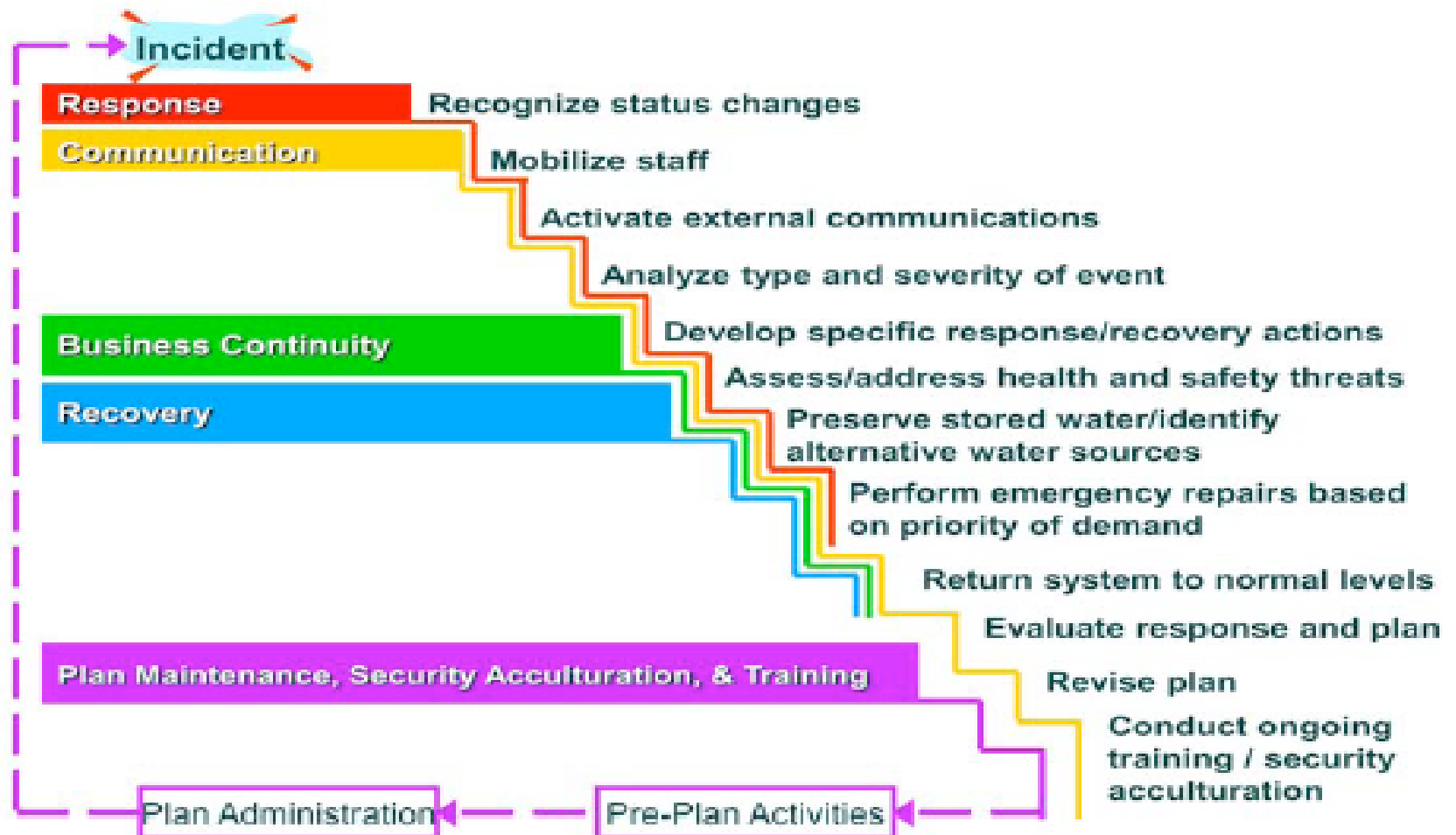
Communications – Key to Mustering All Available Resources

- Department of Environmental Protection
- Office of the Governor
- Office of the Mayor, Boston
- MWRA Board of Directors
- MWRA Communities
- Massachusetts Emergency Management Agency
- State and Local Police
- State and Local Fire
- Massachusetts Department of Public Health
- Local Boards of Health

Communication Media

- Websites
- Reverse 911
- Police Loudspeakers/visits to restaurants
- Programmable roadway signs
- Collaboration with TV, Radio and Print Media
- Emergency Call Centers (EOC, MEMA, etc)
- Twitter
- Face to Face (hospitals etc)
- Postings on public water fixtures

WRF Emergency Framework



Water Resources Foundation emergency framework.

Activated Emergency Chestnut Hill Reservoir

Approved Operating Plan for emergency source included disinfection & boil order

Saturday - May 1 --Operated for 7 hours

Sunday - May 2 -- Operated for 8 hours

Contributed about 5% on average
20+% of peak hours

Transferred approximately 90 million gallons from Sudbury reservoir



Partners used every outreach method



- Radio and TV
- Reverse 911
- Highway signs
- Subway announcements
- Police Loudspeakers
- Text and e-mails

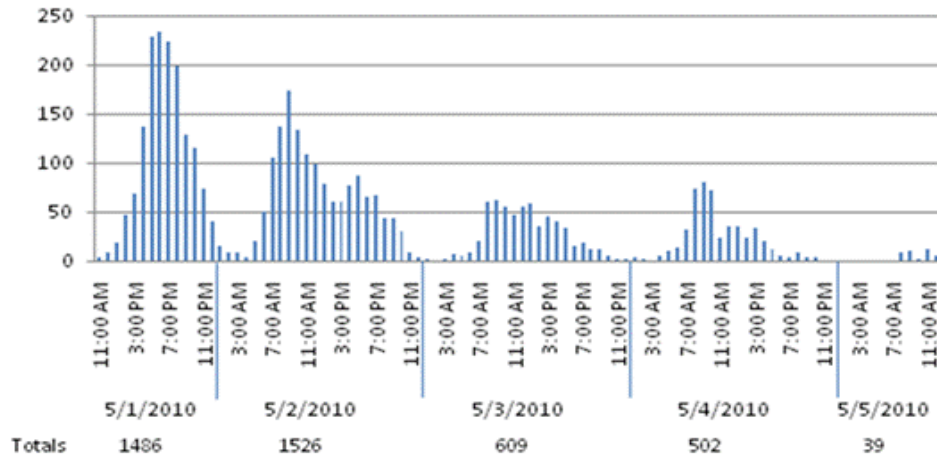
Senior State Officials Available to Press Almost Continuously



MWRA Emergency Operations Center Received Over 4,200 Calls

EOC Call Log

Calls per Hour

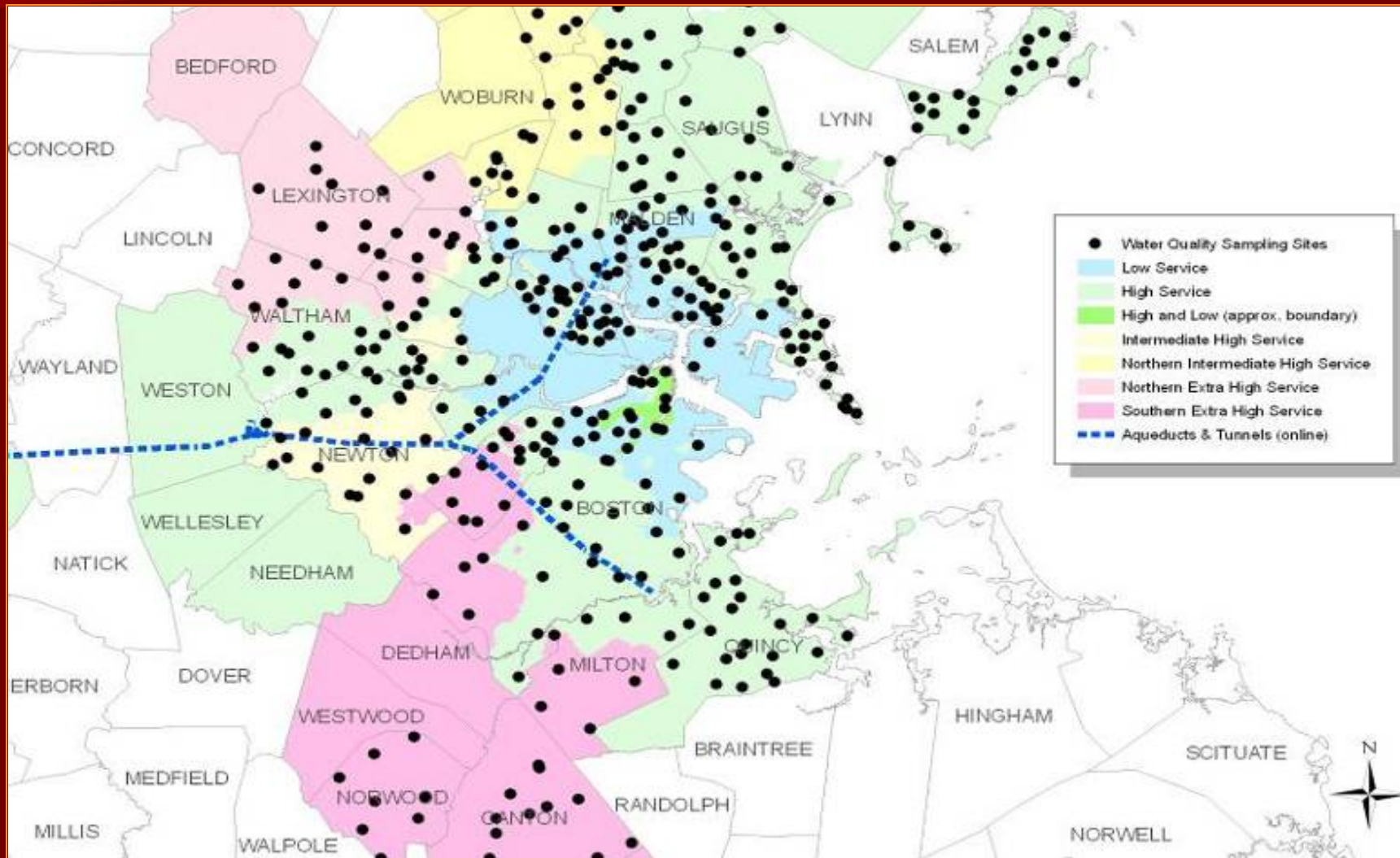


Boston EOC Received Over 40 Thousand!

Next Steps – How to Remove the Boil Order

- Separate Team Began to Focus on This Issue
- Immediately worked with DEP to determine criteria
 - Agreed to conducting two rounds of coliform sampling each Sunday (5/2) and Monday (5/3) (continuing as needed)
 - About 400 samples per round - Each round represents a normal week of sampling
 - Test results included total coliform, E. coli, and chlorine residual

Over 400 Locations – Two Rounds Daily – Over
1700 samples
Laboratory and Staffing Adequate – Just Barely



Boil Order Lifted

- Last of Sunday sample results were available at approximately 1 am Tuesday
- DEP set up emergency operations at MWRA EOC to monitor results with MDPH
- Two remaining community results (from Monday first round) available at 2:37 am and 6:30 am Tuesday
- Boil order lifted at approximately 3 am Tuesday for 29 communities
- Boil order for all 30 communities lifted at about 7 am Tuesday with Governor's press conference – Just over 62 hours

Conclusions

- Develop a "Security Culture"
- Nurture Relationships before an Event, not during an Event.
- Develop a Strong Emergency Operations Center/Incident Command

Conclusions cont'd

- Review:
- Emergency Planning and Preparedness
- Emergency Response
- Organizational Issues
- Communication Practices