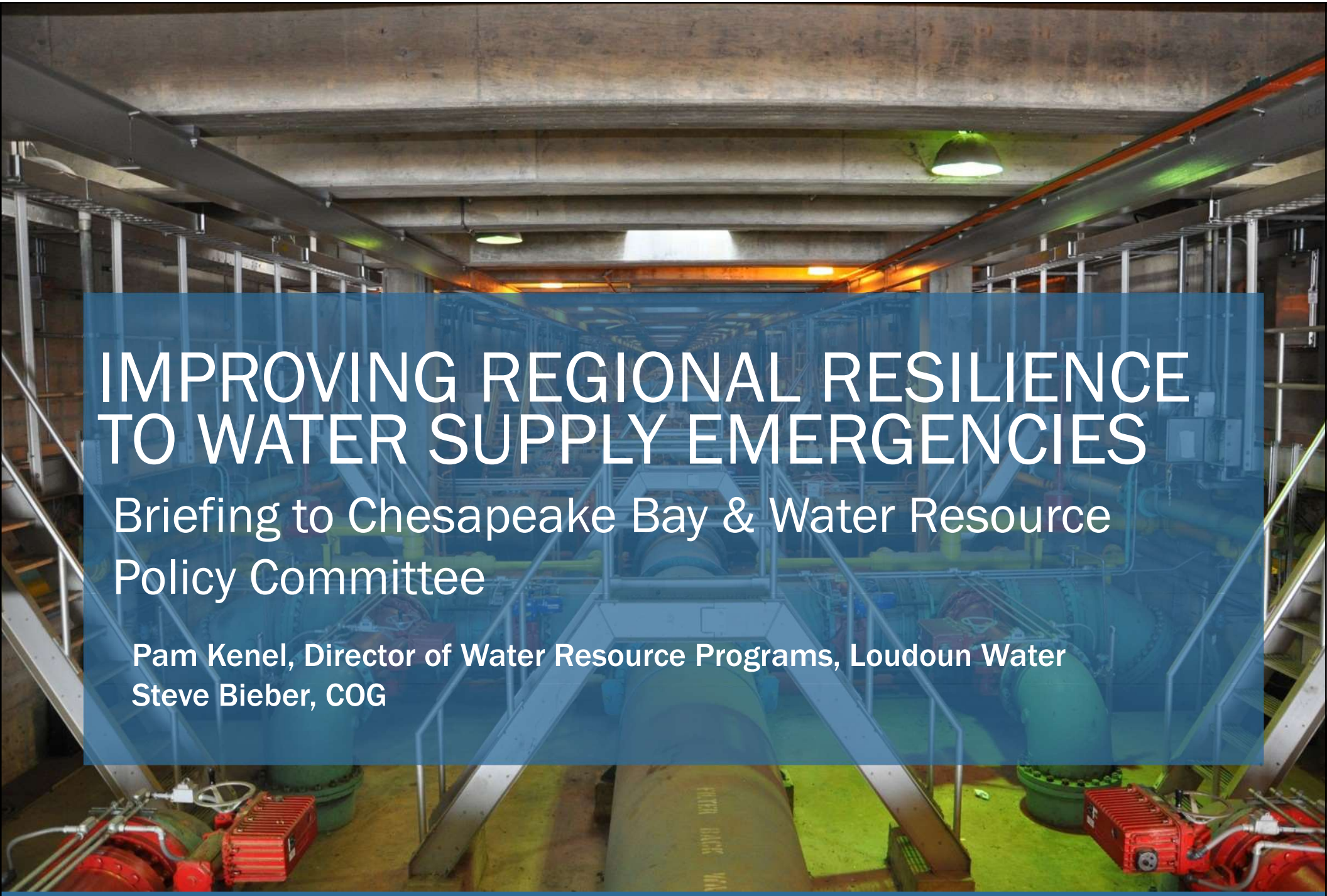


IMPROVING REGIONAL RESILIENCE TO WATER SUPPLY EMERGENCIES

Briefing to Chesapeake Bay & Water Resource Policy Committee

Pam Kenel, Director of Water Resource Programs, Loudoun Water
Steve Bieber, COG

Acknowledgments

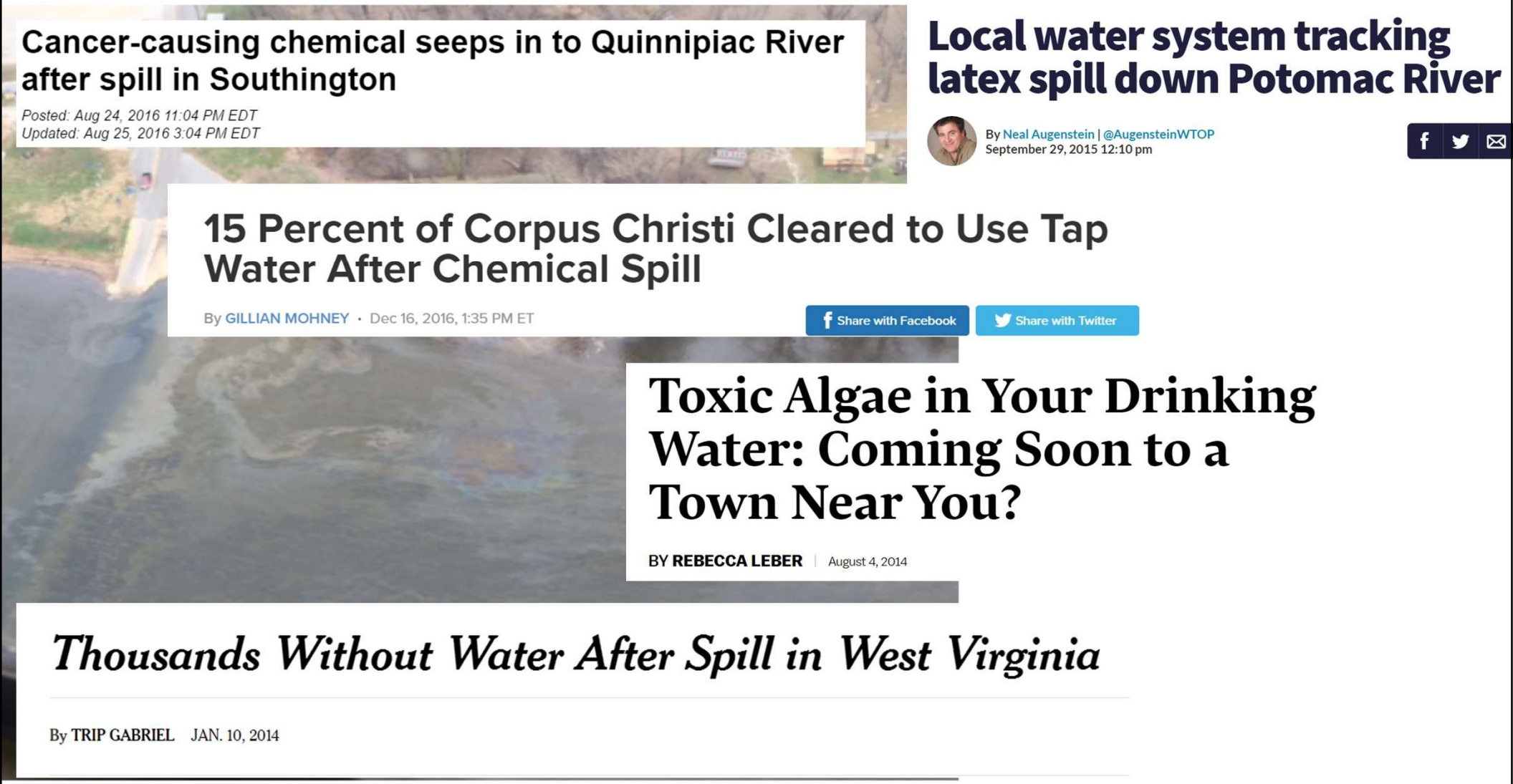
- Many thanks to our partners in this regional project
  - Arlington County
  - Washington Suburban Sanitary Commission
  - Fairfax Water
  - Washington Aqueduct
  - DC Water
  - Loudoun Water
  - ICPRB
  - Black & Veatch

Regional Resiliency Study Funding

- Federal Urban Area Security Initiative (UASI) grant
- Metropolitan Washington Area serves 4.6M, 490 MGD
- Limited connections between water systems in metropolitan Washington to transfer raw or treated water
- Consequences of extended water outages include direct costs and related economic impacts from outage

Potomac River Drinking Water Intakes

Contamination Events are in the News



Cancer-causing chemical seeps in to Quinnipiac River after spill in Southington

Posted: Aug 24, 2016 11:04 PM EDT
Updated: Aug 25, 2016 3:04 PM EDT

Local water system tracking latex spill down Potomac River

By Neal Augenstein | @AugensteinWTOP
September 29, 2015 12:10 pm

15 Percent of Corpus Christi Cleared to Use Tap Water After Chemical Spill

By GILLIAN MOHNEY · Dec 16, 2016, 1:35 PM ET

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Toxic Algae in Your Drinking Water: Coming Soon to a Town Near You?

BY REBECCA LEBER | August 4, 2014

Thousands Without Water After Spill in West Virginia

By TRIP GABRIEL JAN. 10, 2014

Regional Resiliency Study - Overview

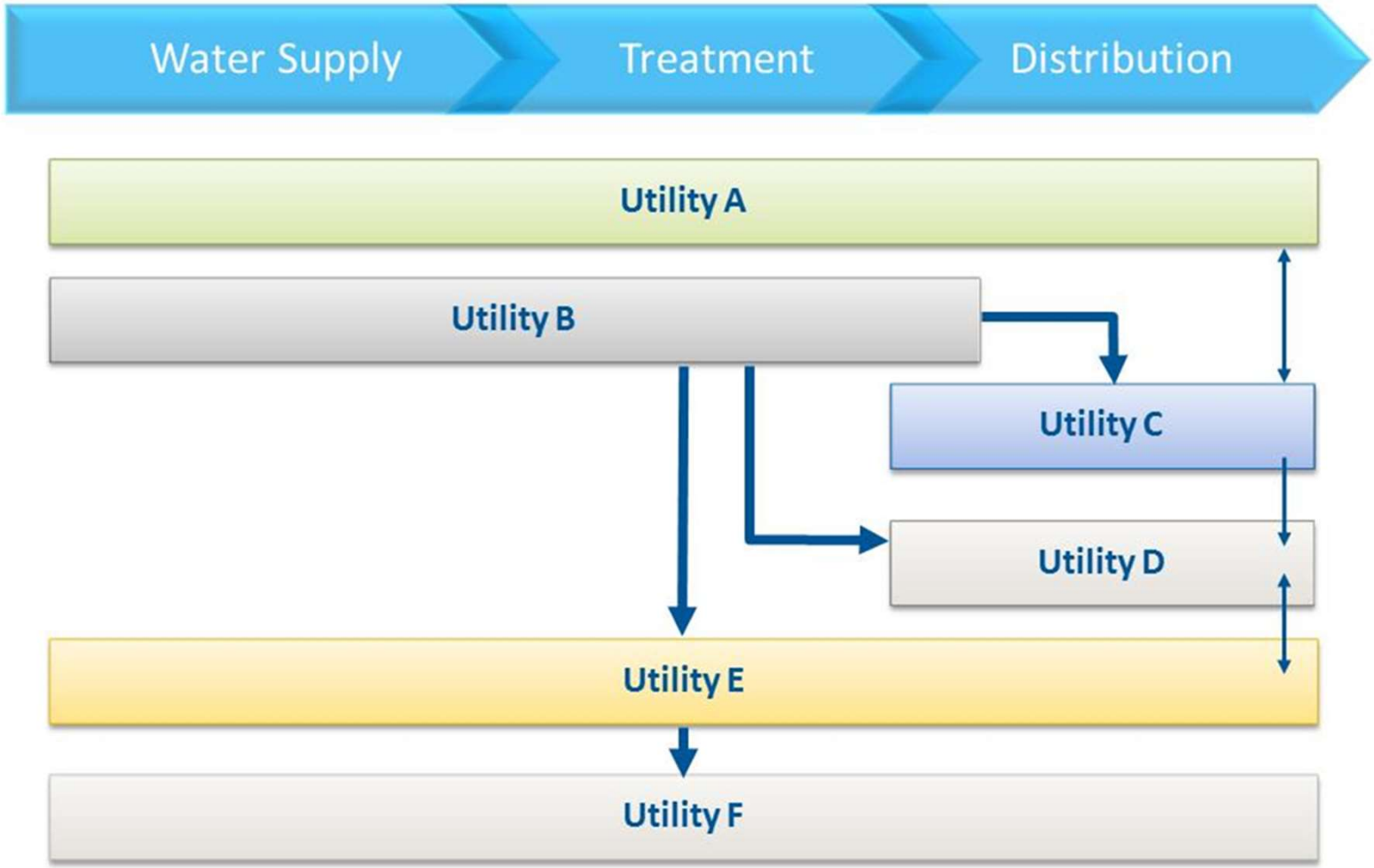
Objectives

- Evaluate ability of region's water systems to withstand regional emergencies; identify vulnerabilities.
- Identify improvements to enhance the overall resilience and reliability of water system under emergency conditions.

System Resilience Approach to Identify and Prioritize Improvements

1. • Data Collection
   • Establish System Capabilities
2. • Establish Risk Framework
   • Define Level of Service
3. • Identify Failure Events & Likelihood
   • Define Consequence of Occurrence
4. • Identify Potential System Improvements
   • Develop Cost & Schedule
5. • Modeling & Analysis of Regional Benefit-Cost
   • Prioritization of Improvements

Understanding Existing Capabilities



Defining Risk Framework

- Target level of service
  - Ability to supply winter average demand
- Consider failure events of regional concern
- Specify likelihood of occurrence
  - 1/10, 1/30, 1/100, 1/250 years
- Consequence of Occurrence
  - People Impacted x Days
  - Direct Costs
  - Economic Value of loss of water service (source, FEMA) = $114/person per day

Inputs to Model – Failure Scenarios

Scenario	Duration, days	LOO	COO (PODs) x1000
Risk 1 – Main Break	14	1/30	435
Risk 2 – River Contamination, all intakes	28	1/100	83,000
Risk 3 – River Contamination, some intakes	3	1/30	5,400
Risk 4 – Fire at WTP	3	1/30	680
Risk 5 - Airplane Crash	0	1/250	0
Risk 6 – Reservoir Contamination	14	1/30	760

LOO: Likelihood of Occurrence
COO: Consequence of Occurrence
POD: Population Outage Days

Example: Significant Contamination Event

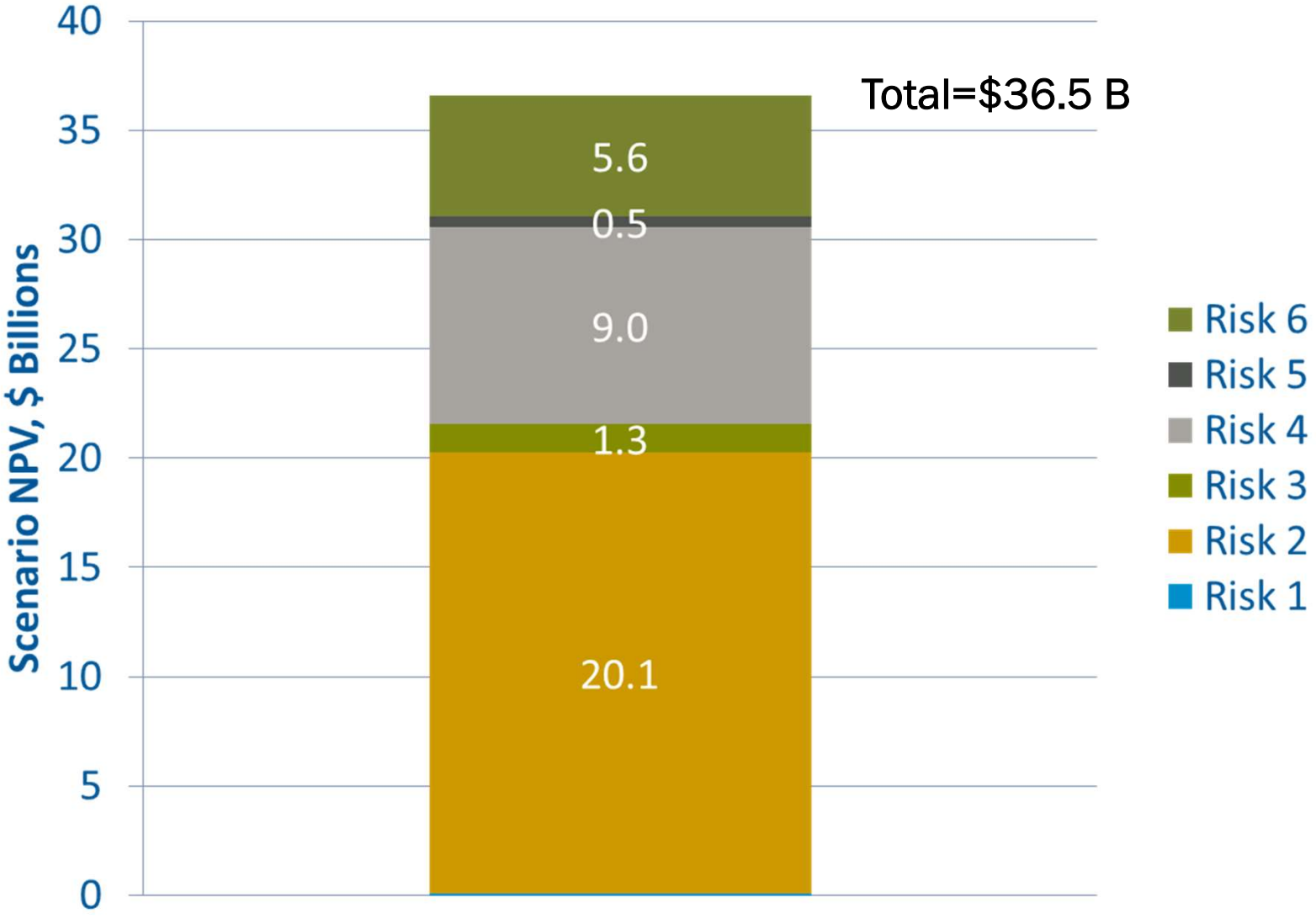
- Contamination of Potomac affecting both sides of river.
- WSSC, Fairfax Water Washington Aqueduct close their Potomac intakes for 28 days.
- Winter average demand is 510 mgd
- Available water supply is 232 mgd from WSSC-Patuxent, FW-Griffith and LW-Trap Rock.
- 3 million people are estimated to be out of service.

Impacts:

- DC and Arlington are impacted 100%, 125 mgd combined.
- WSSC has over 100 mgd shortfall.
- Fairfax Water has 40 mgd shortfall.
- Loudoun Water can satisfy winter-average customer demand.

~3 Million people x 28 days out of service = 83 M people-outage days

Baseline Risk to the Region



Contamination events account for greater than 80% risk carried by the region.

Regional Resiliency Study Conclusions

- River contamination events are responsible for a substantial amount of total regional risk.
- Raw water storage and water transfer improvements are effective for risk-reduction.
- Establish the long term vision – long-lead time needed.
- Seek balance of risk reduction and cost.

Regional Resiliency Study Investment Recommendations

- No regrets type improvements (short term implementation)
  - Upgrade inter-system interconnections
  - Terminal reservoir bypass
- Off-river raw water storage (long term implementation)
  - Quarry Reservoir in Maryland
  - Quarry Reservoirs in Northern Virginia
- Treated water interconnections (coordinate with long term storage)
  - Additional connections between WSSC and DC Water

How Can We Advance the Projects?

- Coordinated regional-level planning
- Relationship building with different partners
- Conveying the purpose and need for the projects
- Significant investments required to reduce risks; identify funding opportunities
- Advocacy for action

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Metropolitan Washington
Council of Governments

Metropolitan Washington Area:
4.6M served population,
490 MGD annual average demand