



Real-time Compliance Assessment Systems for Sediment Remediation Projects

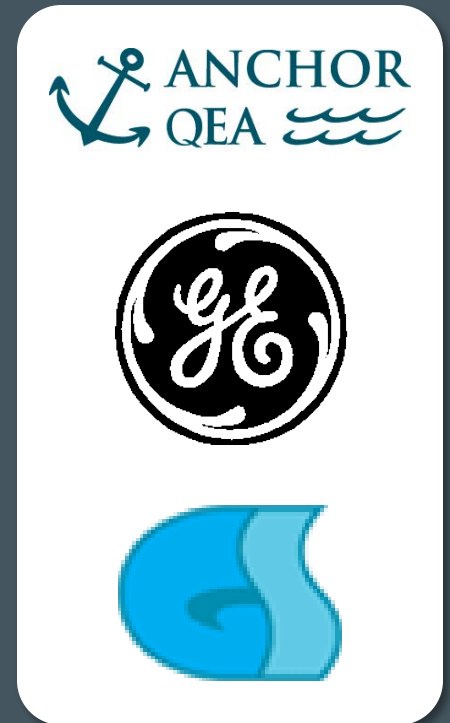
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Colleagues

- Anchor QEA
 - Mark Meyers, Jim Rhea, Chris Yates, Joe Detor, and others
- GE Corporate Environmental Programs
 - Bob Gibson, Kevin Mooney, and Andy Silber
- Gensuite[®]
 - Michael Corrigan



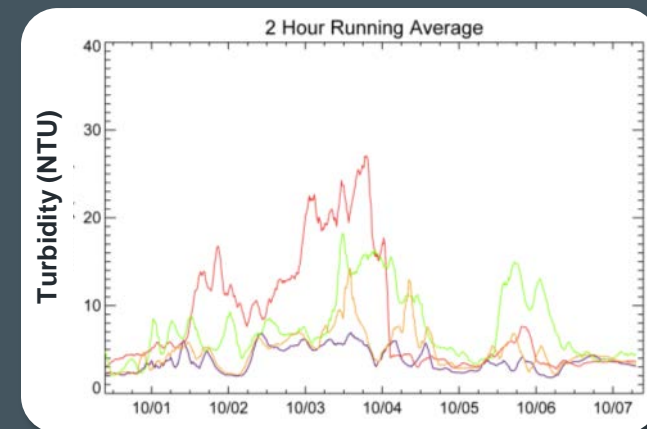
Construction Monitoring in Real-time

- Water quality requirement during in water construction
 - Detect and respond to issues early
- Performance and regulatory criteria may require continuous analysis and computation
 - Running averages, net calculations
- Need: unattended, repeated evaluations of data to assess environmental conditions in support of construction monitoring



Real-time Monitoring System Overview

- Automated monitoring platforms
 - Water quality meter with turbidity and other sensors
 - Data logger and cellular modem
 - Solar panels
- Central system data server
 - Automated data acquisition
 - Continuous data analysis
 - Automated notifications
 - Web access to real-time graphs and tables
 - Efficient reporting interfaces

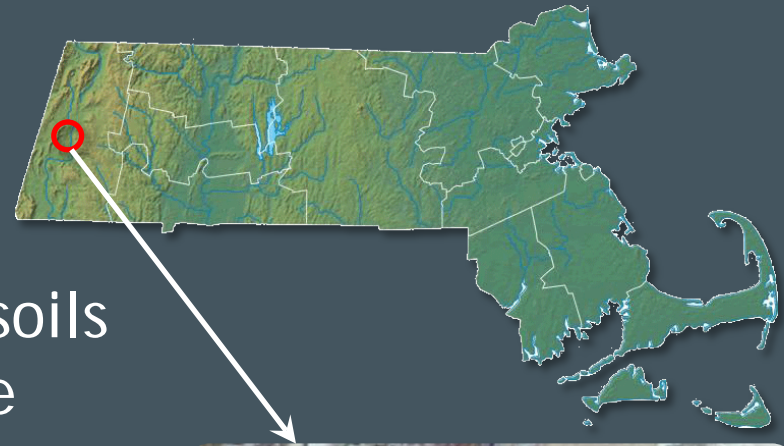


Example Projects

- Illustrate a range of real-time monitoring requirements
 - Silver Lake: 2 buoys with simple, real-time assessment
 - Onondaga Lake: Up to 10 buoys with real-time running average and net calculations
 - Hudson River: 10 to 15 buoys and 3 fixed stations with real-time computations and web-enabled data access
- Tailored solutions to meet the needs of individual projects

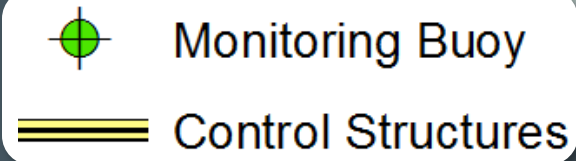
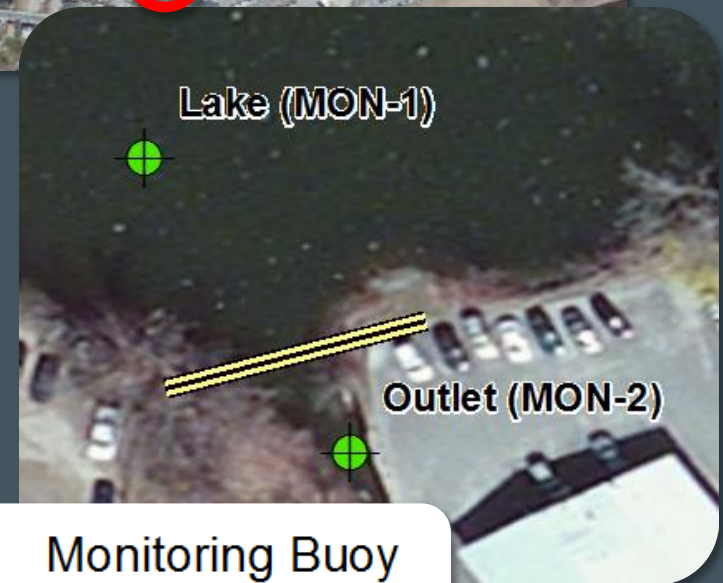
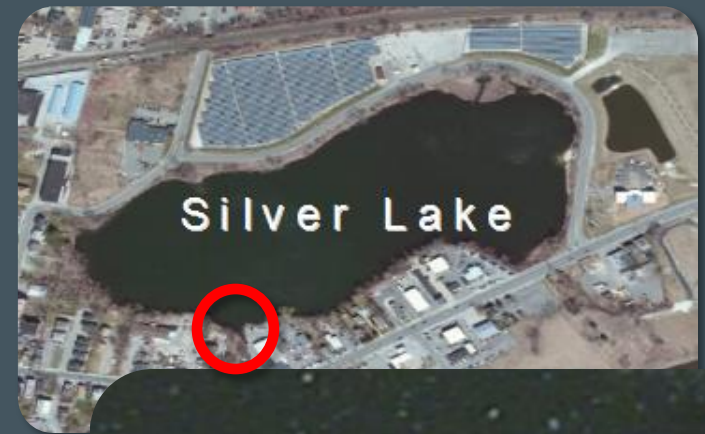
Silver Lake Project Overview

- Remediation of lake sediments and bank soils
 - Targeted removal of bank soils followed by capping of lake bottom
- Solids transport to Housatonic controlled with silt curtains and sheetpile weir
- Control measures continuously assessed through real-time monitoring



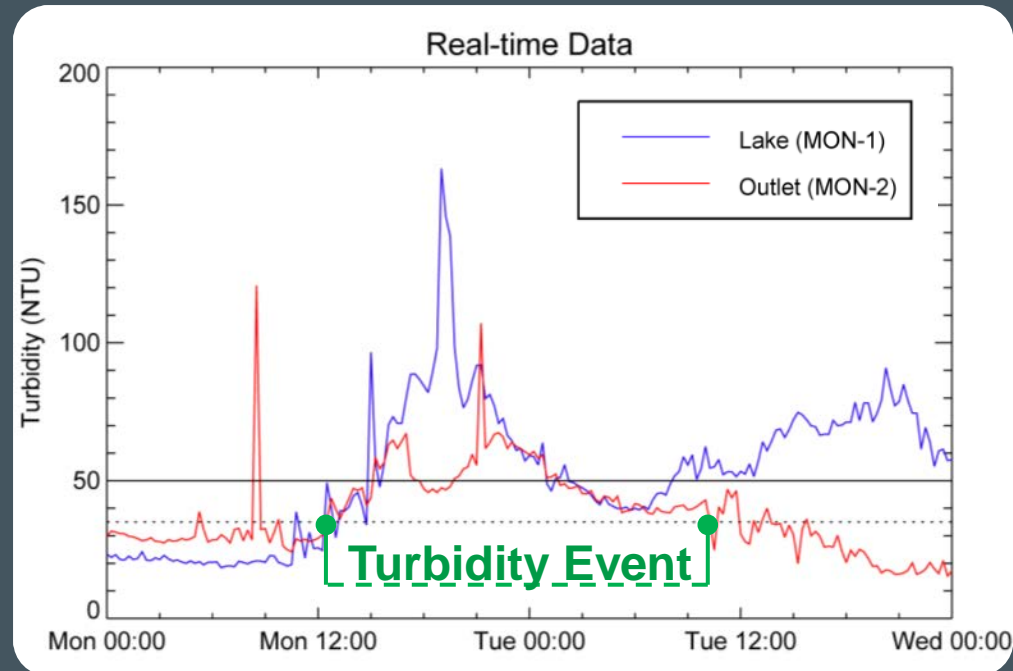
Silver Lake Real-time Monitoring

- Real-time monitoring at two locations
 - MON-1 within lake, upstream of turbidity controls
 - MON-2 in outlet channel, downstream of controls
- Turbidity continuously assessed at outlet station
 - Warning level 35 NTU
 - Action level 50 NTU



Silver Lake Real-time Data System

- Email alerts for elevated turbidity at Outlet
 - Triggered on rising limb of events
 - Status resets on falling limb
- Plots and tables help team determine cause of turbidity event
 - Published every 15 minutes to project web portal
- Data access interfaces for reporting efficiency



Onondaga Lake Project Overview

- Dredging and capping of contaminated lake sediments in New York State
- Tiered monitoring with real-time calculations
 - Near- and far-field monitoring
 - Compliance assessed on calculated values
- Simultaneous distinct monitoring operations
 - Compliance assessed on individual operations
 - Buoys repositioned frequently as construction activities change locations



Monitoring Operation Configuration

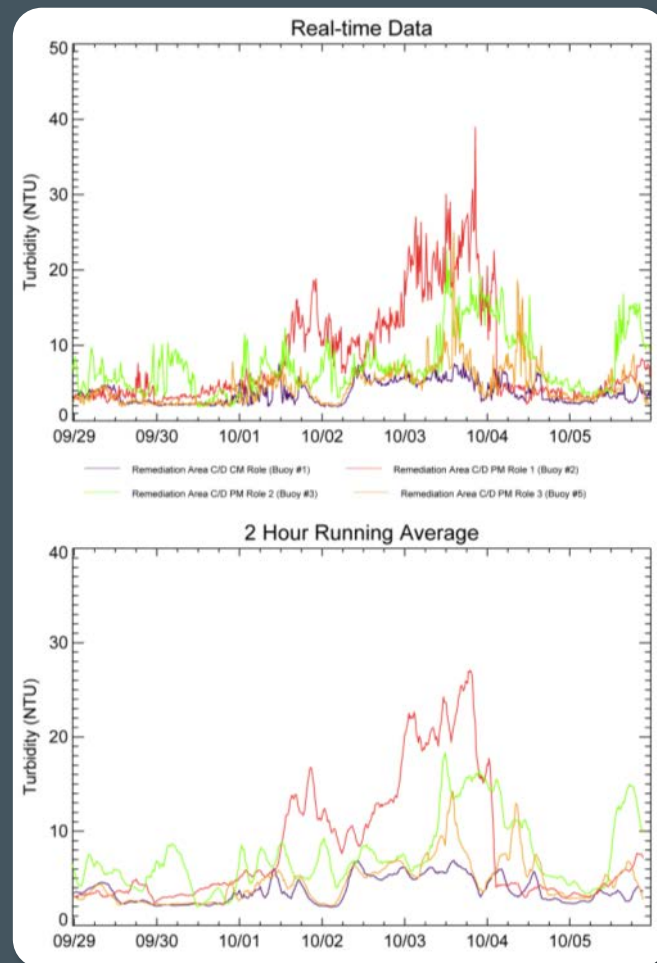
- Near-field and far-field stations
 - Near-field serves as early warning
 - Compliance evaluated at far-field
 - Criteria evaluated relative to real-time background conditions
- Concurrent activities may need separate monitoring operations
 - Stations may be shared among adjacent operations

Near-field buoy ●
Far-field buoy ●



Real-time Compliance Calculations

- Computes running average for each data point
 - Avoids spurious notification due to data spikes
- Identifies current background condition for each operation
 - Uses lowest value from near-field stations
- Evaluates turbidity relative to background at each station
 - Email notification if criteria exceeded in near- or far-field

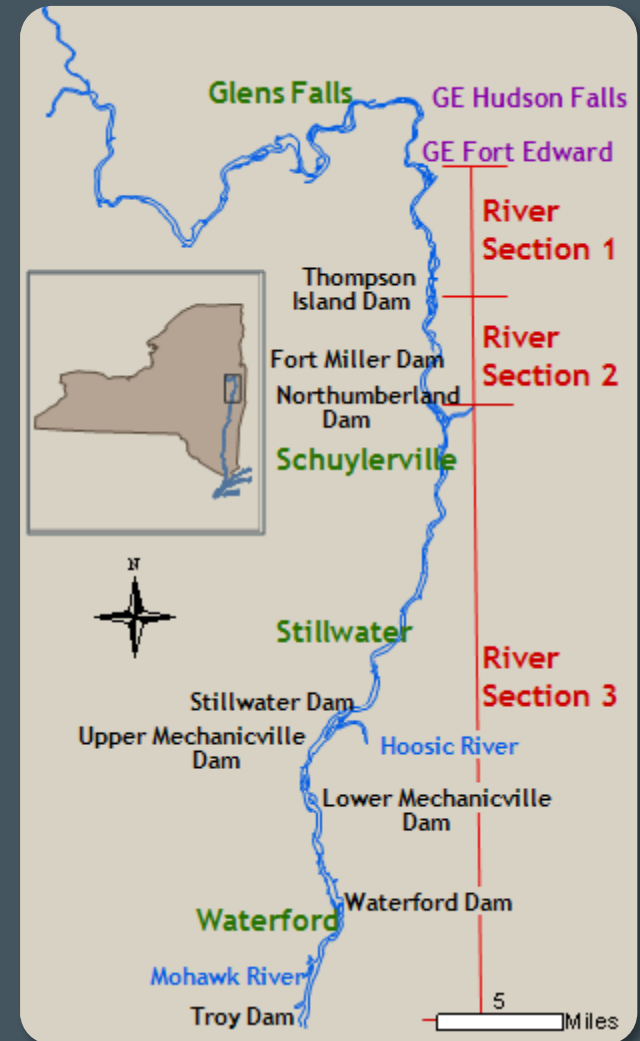


Monitoring Role Management

- Relationships between buoys and construction activities change frequently
 - Stations repositioned to track construction
 - Buoys swapped out of service for maintenance
- Data significance determined by buoy role
 - Near-field vs. far-field monitoring roles
 - Roles change in time and amongst operations
- Monitoring role data stored in software system
 - Changes communicated from field to data system
 - Role history stored for post-hoc data interpretation

Hudson River Superfund Site

- Dredging over 40 River Miles
- Governed by comprehensive performance standards
 - Real-time performance standards for several water quality parameters
 - Rapid turn-around analysis for metals and PCBs
- Centralized and web-enabled data management



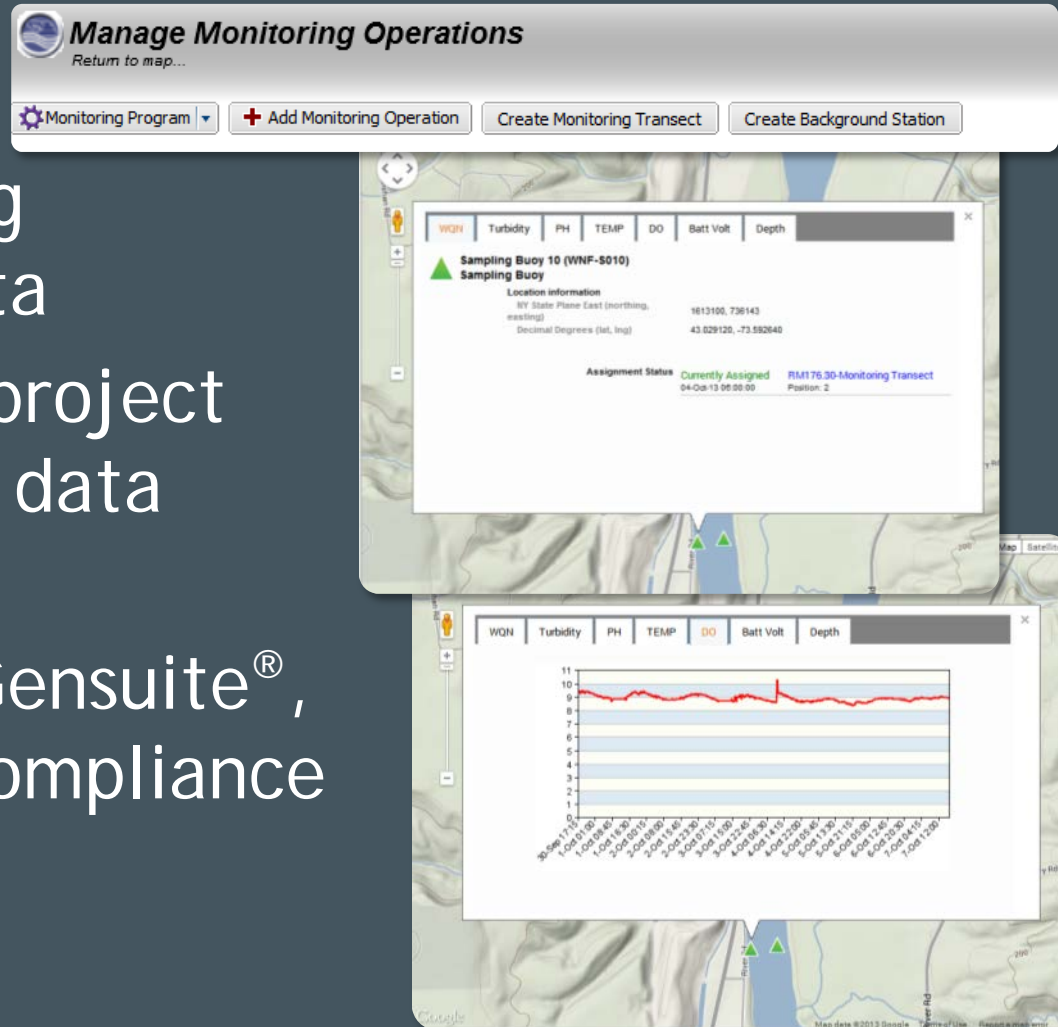
Hudson Real-time Monitoring Design

- Fixed station monitoring
 - Continuous, high-volume pumping from multiple transect points
 - 24-hour composite sampling
 - Real-time monitoring for water quality parameters
- Buoys move with operations
 - Up and downstream of operations
 - Downstream buoys deployed in transects to cover width of river
 - 24-hour composite sampling and real-time water quality



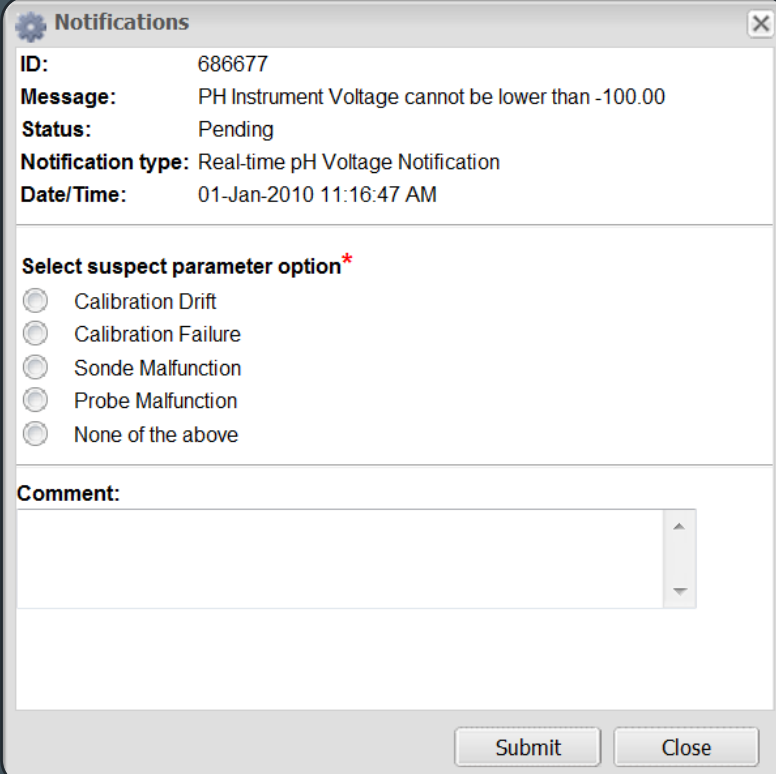
Centralized Data Management

- Single point of access for viewing and managing data
- Online access to project management and data analyses
- Integrated with Gensuite[®], an existing EHS compliance tool



Real-Time Measurement Quality Control

- Distinguish between real events and noise
 - Actual change in water quality vs. probe malfunction
- Notify field managers of aberrant values
- Qualify erroneous measurements
 - Describe malfunction in integrated data comments



The screenshot shows a 'Notifications' window with the following details:

- ID:** 686677
- Message:** PH Instrument Voltage cannot be lower than -100.00
- Status:** Pending
- Notification type:** Real-time pH Voltage Notification
- Date/Time:** 01-Jan-2010 11:16:47 AM

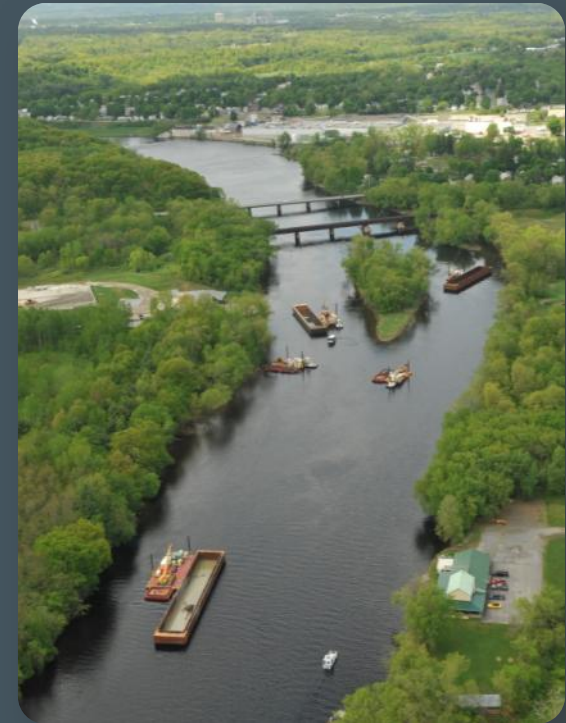
Below the details is a section titled 'Select suspect parameter option*' with five radio button options:

- ☐ Calibration Drift
- ☐ Calibration Failure
- ☐ Sonde Malfunction
- ☐ Probe Malfunction
- ☐ None of the above

At the bottom is a 'Comment:' text area with a vertical scrollbar. At the very bottom are 'Submit' and 'Close' buttons.

Summary

- Real-time water quality monitoring increasingly required during construction
- Automated data management and compliance analysis systems
 - Enable timely notifications and investigations
 - Facilitate reporting and post-hoc analysis
 - Minimize staff effort
- Scalable system design
 - Enables solutions tailored to particular projects
 - Deployable either as dedicated system or integrated with corporate EHS system



QUESTIONS?



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