

HOW TOMORROW MOVES



Intelligent Stormwater Management to Achieve Zero Discharge

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HOW TOMORROW MOVES



OUTLINE

- Site Overview
- Long Term Goals
- Existing Management
- Initial System Upgrades
- Future Improvements
- Conclusions



SITE OVERVIEW



Curtis Bay Piers – Baltimore, MD



LONG TERM GOALS

Zero Discharge to Curtis Bay

Zero Discharge of Coal Dust

Zero Usage of Potable Water

(For Dust Suppression)



Environmental Leadership

EXISTING MANAGEMENT

- Standard PLC Cabinet
- Human-Machine Interface (HMI)
- On-site sensor data
 - Pond Levels and pH
 - Bay discharge flow,
 - DSS flow rates,
 - Rainfall
 - Etc...



INITIAL SYSTEM UPGRADES

- Integration with weather forecast alerts (NOAA)
 - Precipitation
 - Wind speeds
 - Temperatures
- Use multi-variable algorithm to recommend operation modes
- Predictive vs. reactive system operation
- Interactive Internet Display



INITIAL SYSTEM UPGRADES

WHAT DOES INTELLIGENCE LOOK LIKE?



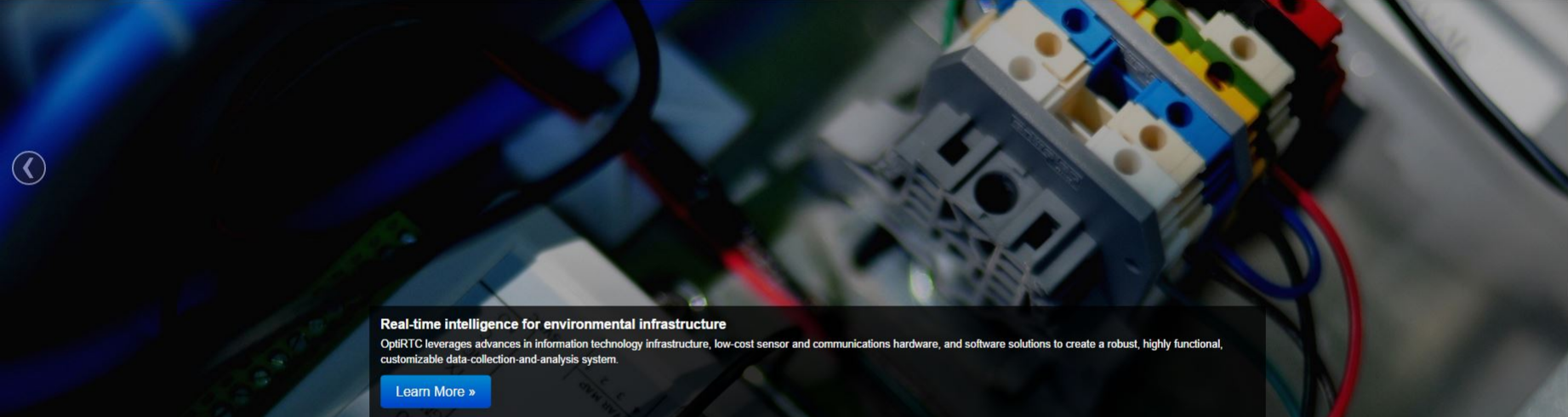
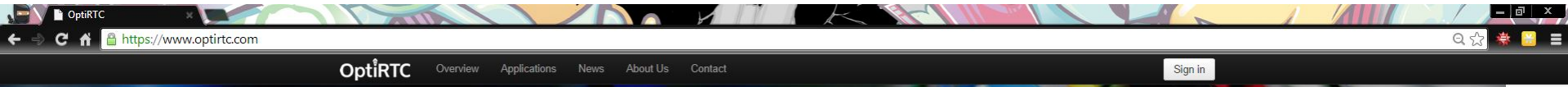
INITIAL SYSTEM UPGRADES



Internet-of-Things for Real Time Control



INITIAL SYSTEM UPGRADES



Real-time intelligence for environmental infrastructure

OptiRTC leverages advances in information technology infrastructure, low-cost sensor and communications hardware, and software solutions to create a robust, highly functional, customizable data-collection-and-analysis system.

[Learn More »](#)

Real-time consulting

OptiRTC acquires real-time data from the field, provides web-based dashboards for data visualization, and uses your data to make intelligent system control decisions.

[View Details »](#)



engineers | scientists | innovators

Technology applications

OptiRTC leverages Geosyntec's technical expertise to address complex projects involving our environment, natural resources, and civil infrastructure.

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INITIAL SYSTEM UPGRADES

CBP Operations

Navigate to: [Executive](#) [Map](#) [Admin](#) [Tools](#) [Sign Out](#)

Pond Operation Mode

Pond A Pond B



Spray Sequence



Emergency Overflow



Online Status

CBP-1

Online 100%, Offline 0%

Past 24 Hours

CBP-2

Online 100%, Offline 0%

Past 24 Hours

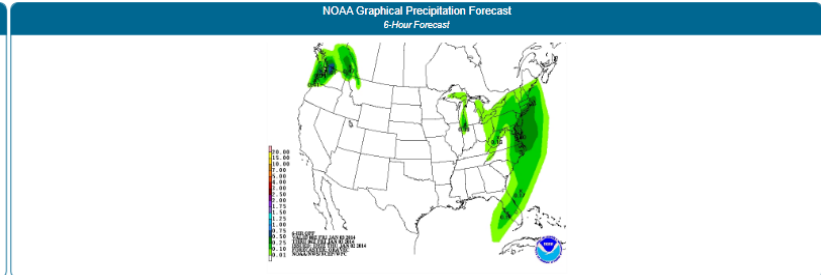
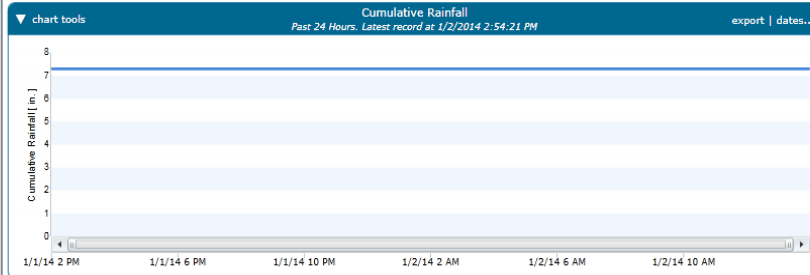
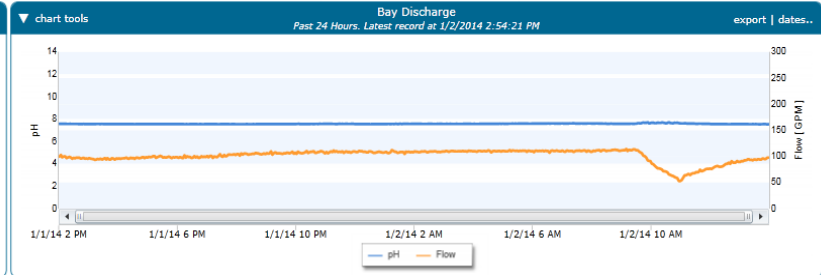
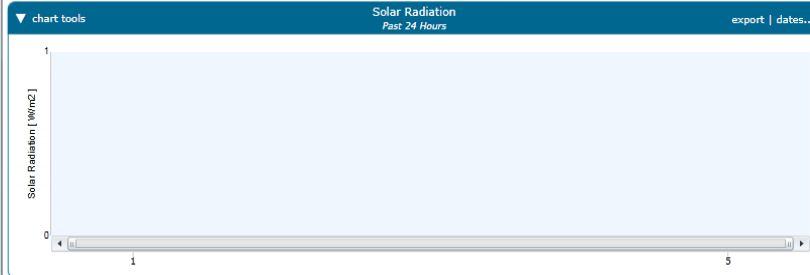
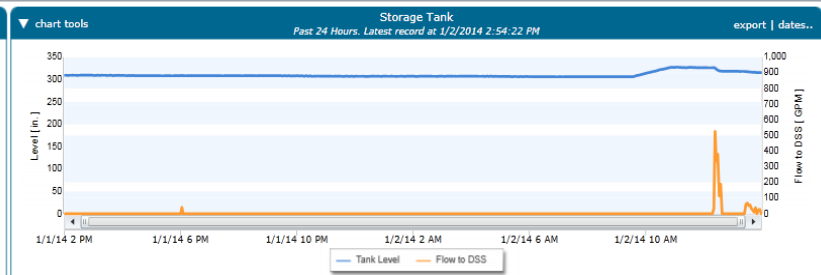
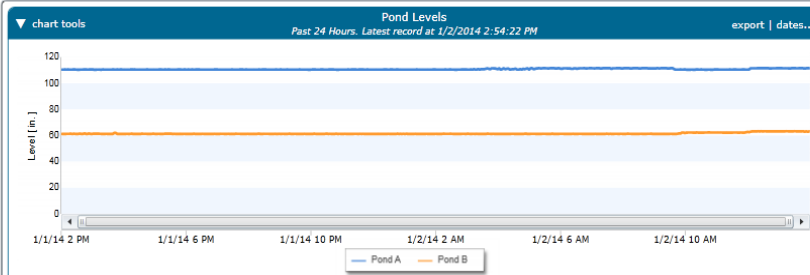
CBP-3

Online 100%, Offline 0%

Past 24 Hours

CBP-4

Online 100%, Offline 0%



On-Site Data on the Internet



INITIAL SYSTEM UPGRADES

- Why Worry over Weather Watching?
- Active Recommendations
 - High wind alert
 - Rainfall alert
 - Low temperature alert
- Automatically Emailed and Transmitted to On-Site PLC



INITIAL SYSTEM UPGRADES

CBP Forecast Alerts

Executive Map Admin Tools Sign Out

Rainfall Forecast Alerts

0-6 Hours 6-12 Hours

12-18 Hours 18-24 Hours

Low Temperature Alerts

0-6 Hours 6-12 Hours

12-18 Hours 18-24 Hours

Wind Alert

0-3 Hours

Immediate Precipitation Alert

0-2 Hours

NWS Precipitation Forecast
48-Hour Forecast. Latest record at 1/3/2014 8:58:25 AM

Forecasted Precip. [in.]

Precip. Likelihood [%]

1/3/2014 1/4/2014 1/5/2014

NOAA Graphical Precipitation Forecast
6-Hour Forecast

20.00
15.00
10.00
7.00
5.00
4.00
3.00
2.50
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.10
0.01

1/3/2014 1/4/2014 1/5/2014

Wind Forecast
24-Hour Forecast. Latest record at 1/3/2014 8:58:25 AM

Wind Speed [mph]

Wind Direction [°]

3 PM 9 PM 3 AM 9 AM

1/3/2014 1/4/2014

— Wind Speed — Wind Direction

Temperature Forecast
24-Hour Forecast. Latest record at 1/3/2014 8:58:25 AM

Temperature [°F]

3 PM 9 PM 3 AM 9 AM

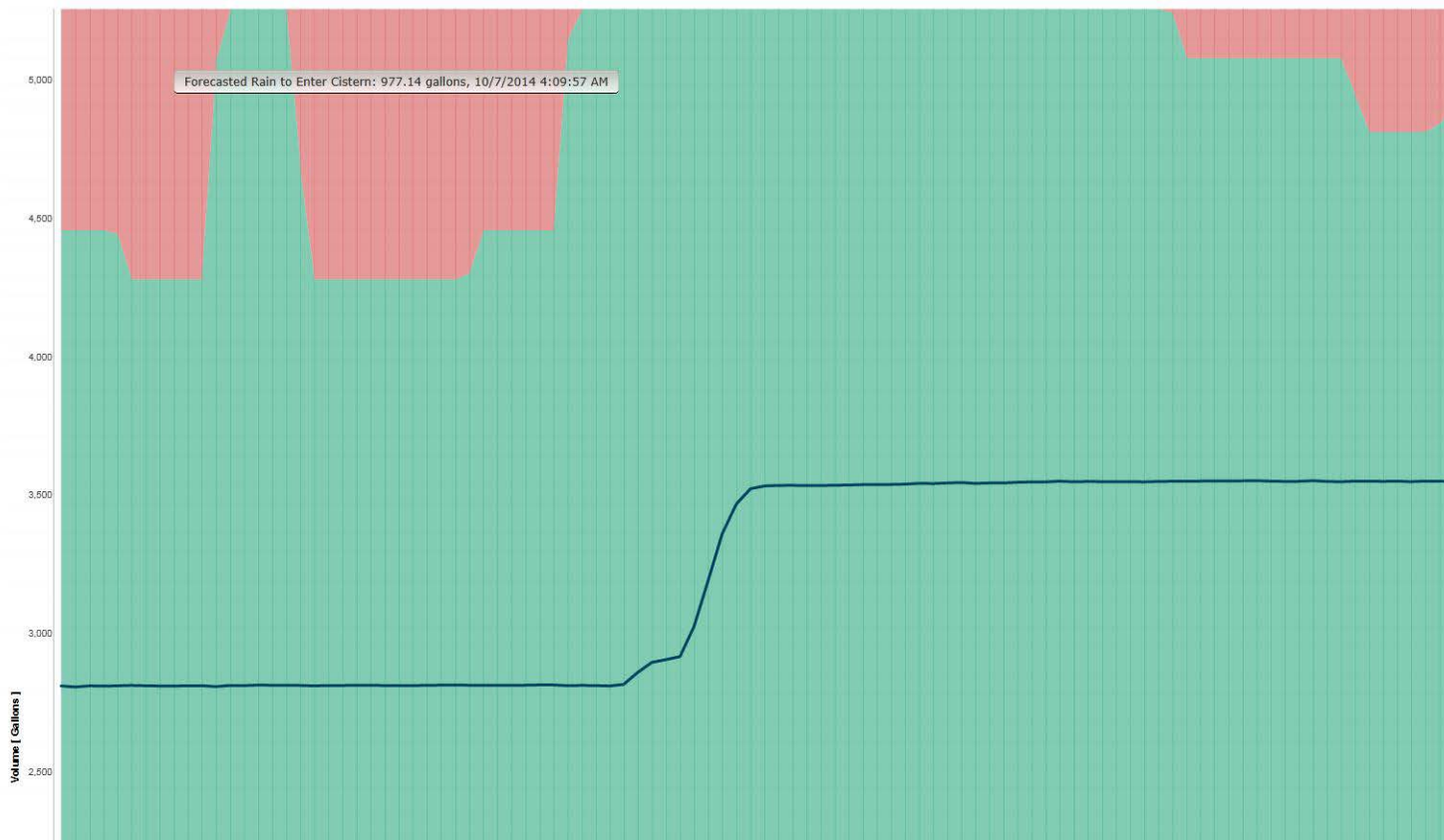
1/3/2014 1/4/2014

Forecasted Data now On-Site



INITIAL SYSTEM UPGRADES

- Standard Operation Mode
 - Plenty of capacity to “catch the storm”



INITIAL SYSTEM UPGRADES

- Water Evacuation Mode
 - Insufficient capacity to “catch the storm”



INITIAL SYSTEM UPGRADES

- Logic Considerations
 - Incorporation of Dust Suppression Demand
 - Need for Continued Operator Input
 - Protection against Remote Cyber-Attacks



FUTURE IMPROVEMENTS

HOW DO YOU MAKE “SMARTER” WORK HARDER?



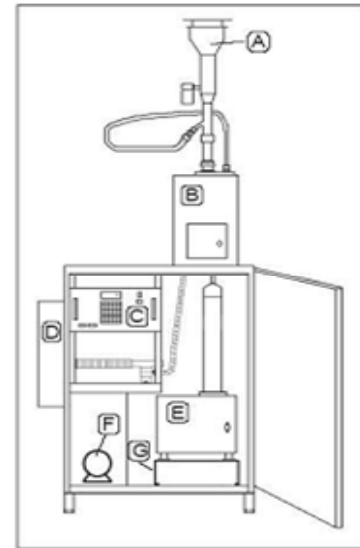
FUTURE IMPROVEMENTS

- Coal temperature to infer moisture content
- Integrate moisture with forecast alerts
 - If the moisture content of the coal pile is dropping and high winds are forecasted, activate the DSS
- Capability for extremely sophisticated logic



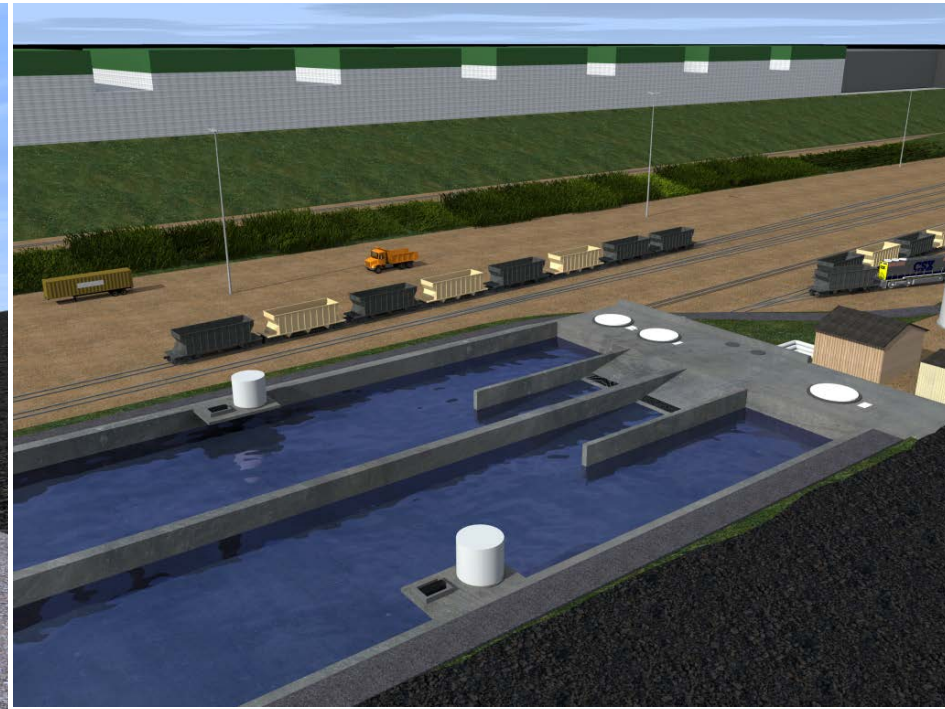
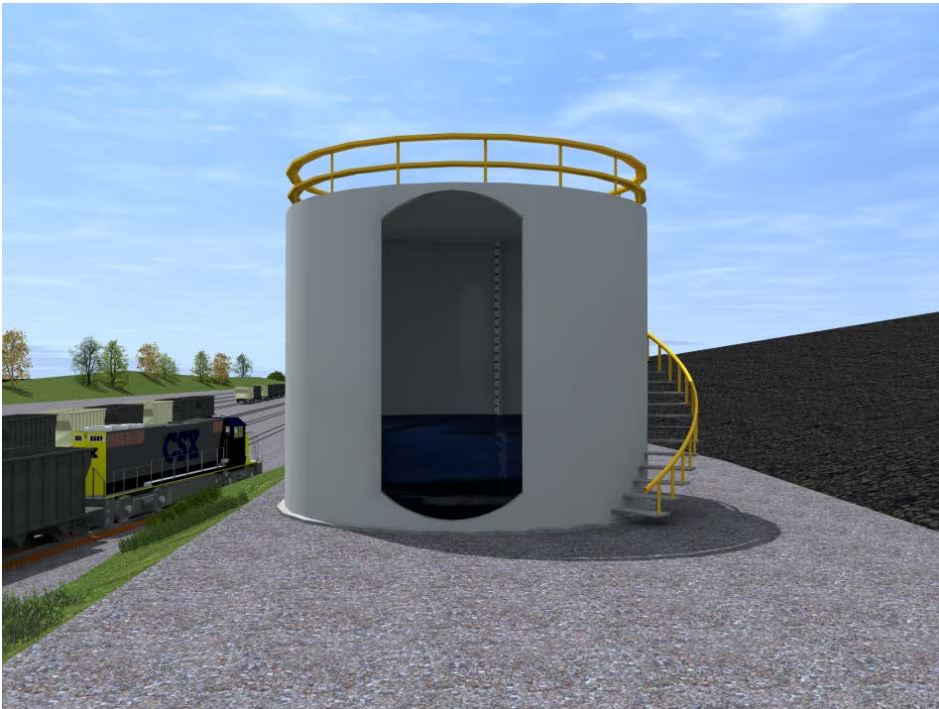
FUTURE IMPROVEMENTS

- Correlate dust concentrations and coal moisture to facility activity and weather
- Used to optimize water spraying
- Full Coal Pile Perimeter Measurement Coverage
- Not designed for direct compliance (environmental) monitoring



FUTURE IMPROVEMENTS

- Professionally rendered “remote reality”



CONCLUSIONS

- Enhance existing control systems
- Automate routine tasks
 - Focus on tasks that matter
- Implement highly intelligent logic
 - Integration with Internet
 - Development of complex algorithms



CONCLUSIONS

Zero Discharge to Curtis Bay

Zero Discharge of Coal Dust

Zero Usage of Potable Water

(For Dust Suppression)



Environmental Leadership

HOW TOMORROW MOVES

