

Project 5087: Implementation of Innovative Biological Nutrient Removal Processes through Improvement of Control Systems & Online Analytical Measurement Reliability & Accuracy





Northeastern University



UMass Amherst



Acknowledgments

This project synthesizes utility experiences with instrument-based BNR controls across the United States, and the PIs would like to acknowledge the contributions of the utility survey respondents and thank them for taking the time to share their insights. We want to acknowledge and thank the utility representatives who worked closely with the project team to develop the content for the case studies.

Thank you to our utility and project partners for providing project support including survey development input, survey responses, content for the case studies, equipment for field testing, and venues for training. Further, we would like to acknowledge and thank our Project Advisory Committee members who provided steady guidance and productive feedback throughout the execution of the project and our WRF Research Program Manager, Stephanie Fevig, for her effective management and unwavering support and enthusiasm for the work.

Research Team

Principal Investigators: Susan Guswa, PE Woodard & Curran Paul Dombrowski, PE, PLS, BCEE, F.WEF Woodard & Curran Maureen Neville, PE Woodard & Curran Amy Mueller, PhD Northeastern University Spencer Snowling, PhD Hatch Nicholas Tooker, PhD, PE University of Massachusetts, Amherst

Project Team:

Krista Forti, PE Jacob Fortin Alexandra Greenfield, PE Jeanna Long, PhD John Nguyen *Woodard & Curran*

Additional *Woodard & Curran* project team supporters who provided input, content, and reviews: Claudia Buchard, Olivia Chu, Sean Driscoll, Adam Fox, Jesse Freeman, Astrid Guerrero, Tiffancy Hansom, Rebecca Nissley, Scott Pappa, Greg Parks, Laurie Regemann, Dave Richardson, Rob Scott, Robert Whalen









Utility & Project Partners

Utility Partners: Clean Water Services Hillsboro, Oregon East Bay Municipal Utility District Oakland, California Metro Water Recover City of Denver, Colorado NYCDEP New York, New York City of Olathe Olathe, Kansas Town of Plymouth Plymouth, Massachusetts Silicon Valley Clean Water Redwood City, California Springfield Water & Sewer Commission Springfield, Massachusetts Upper Blackstone Clean Water Millbury, Massachusetts Veolia (Holyoke Water Resource Recovery Facility) Holyoke, Massachusetts City of Westfield Westfield, Massachusetts **Project Partners:**

BACWA San Francisco Bay Area, California NEIWPCC Lowell, Massachusetts Southwest Sensor Southampton, United Kingdom YSI (a Xylem Brand) Yellow Springs, Ohio WEF Alexandria, Virginia



Northeastern University





Case Study Partners:

Justine Abrook, Senior Operations Analyst Clean Water Services, Durham, Oregon

Sean Driscoll, Plant Manager Plymouth Wastewater Treatment Facility, Plymouth, Massachusetts

Jason Fick, Acting Operations Superintendent *City of Roseville, Roseville, California*

Jeff Gamelli, Wastewater Superintendent City of Westfield, Westfield, Massachusetts

Eric Komiega, Lead Operator Warren Wastewater Treatment Facility, Warren, Rhode Island

Matthew LaPointe, Project Manager Springfield WWTF, Springfield, Massachusetts

Ian Myers, Instrumentation Supervisor Metro Water Recovery, Denver, Colorado

Heather Phillips, Wastewater Operations Manager *City of Olathe, Olathe, Kansas*

Frank Russo, Manager, Chief Operator Meriden Water Pollution Control Facility, Meriden, Connecticut

Karla Sangrey, Engineer Director/Treasurer Upper Blackstone Clean Water, Millbury, Massachusetts

Michael Williams, Project Manager Holyoke Water Pollution Control, Holyoke, Massachusetts







Survey Respondents:

- 1. Akron, OH Water Reclamation Facility
- 2. Amherst, MA Wastewater Treatment Plant
- 3. Ashbridges Bay Treatment Plant
- 4. Ballenger-McKinney Wastewater Treatment Plant
- 5. Bethel, ME Wastewater Treatment Plant
- 6. Billerica Water Resource Recovery Facility
- 7. Blue River Wastewater Treatment Plant
- 8. Boothbay Harbor Sewer District
- 9. Brockton Advanced Water Reclamation Facility
- 10. Cedar Creek Water Pollution Control Facility
- 11. Charles River Pollution Control District
- 12. Chicopee Water Pollution Control
- 13. Columbia Boulevard Wastewater Treatment Plant
- 14. Coos Bay, OR Wastewater Treatment Plant
- 15. Deep River Water Pollution Control Authority
- 16. Douglas L. Smith Middle Basin Plant
- 17. Durham Advanced Wastewater Resource Recovery Facility
- 18. East Bay Municipal Utility District
- 19. East Greenwich Wastewater Treatment Facility
- 20. Easthampton, MA Wastewater Treatment Plant
- 21. Fairfield-Suisun Sewer District
- 22. Fox Metro Water Reclamation District
- 23. Grass Island Wastewater Treatment Plant
- 24. Great Barrington, MA Wastewater Treatment Plant
- 25. Greenville, NC Utilities
- 26. Herkimer Country Sewer District Wastewater Treatment Plant
- 27. Holyoke, MA Water Pollution Control
- 28. Hominy Creek Water Reclamation Facility
- 29. Hornell, NY Water Pollution Control Plant
- 30. Humber Treatment Plant
- 31. Hunts Point Water Resource Recovery Facility
- 32. James C. Kirie Water Reclamation Plant
- 33. JD Phillips Resource Recovery Facility
- 34. Kennebunkport Wastewater Treatment Facility
- 35. Kishwaukee Water Reclamation District
- 36. Litchfield, CT Water Pollution Control Authority

- 37. Little Creek Resource Recovery Facility
- 38. Lynn, MA Wastewater Treatment Facility
- 39. Metro Water Recovery
- 40. Meriden, CT Water Pollution Control Facility
- 41. Mill Creek Regional Wastewater Treatment Plant
- 42. Moscow, ID Water Reclamation Facility
- 43. Neuse River Resource Recovery Facility
- 44. New Century Little Bull Wastewater Treatment Facility
- 45. North Brookfield, MA Wastewater Treatment Plant
- 46. Old Forge, NY Wastewater Treatment Plant
- 47. Plant City, FL Wastewater Treatment Plant
- 48. Plainville, CT Water Pollution Control Facility
- 49. Plymouth, MA Wastewater Treatment Plant
- 50. Port Washington, NY Wastewater Treatment Plant
- 51. Princess Anne Wastewater Treatment Plant
- 52. Quonset Wastewater Treatment Facility
- 53. Rock Creek Water Resource Recovery Facility
- 54. Saco, ME Water Resource Recovery Department
- 55. San Jose Creek East Water Reclamation Plant
- 56. Sanford Sewer District
- 57. Silverton, OR Wastewater Treatment Plant
- 58. Smith Creek Resource Recovery Facility
- 59. South Hadley Water Pollution Control Division
- 60. South Windsor Water Pollution Control Facility
- 61. Springfield Regional Wastewater Treatment Facility
- 62. Stickney Water Reclamation Plant
- 63. Upper Blackstone Clean Water
- 64. Upper Occoquan Service Authority
- 65. Urbana & Champaign Sanitary District Northeast Plant
- 66. Urbana & Champaign Sanitary District Southwest Plant
- 67. Uxbridge, MA Wastewater Treatment Facility
- 68. Warren, RI Wastewater Treatment Facility
- 69. Wells, ME Sanitary District
- 70. Westerly, RI Wastewater Treatment Plant
- 71. Westfield, MA Water Recovery Facility
- 72. Yarmouth, ME Wastewater Treatment Plant



Northeastern University





WRF Project Advisory Committee

Phil Ackman, PE Los Angeles County Sanitation Districts Joe Husband, PE Arcadis Gary Johnson, PE, BCEE Retired, Connecticut Department of Energy & Environment Protection Nathan Martin Water Corporation, AUS Tung Nguyen NextGen Water, AUS Heng Zhang, PhD Metropolitan Water Reclamation District of Greater Chicago

WRF Staff

John Albert, MPA Chief Research Officer

Stephanie Fevig, PE Research Program Manager





