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July 17, 2007

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Mr. Steve Scialabba
Rhode Island Division of Public Utilities and Carries
89 Jefferson Boulevard
Warwick, RI 02888

Dear Mr. Scialabba:

This letter is intended to provide the Rhode Island Division of Public Utilities (DPU) with an update of the ongoing peer review work Woodard & Curran (W&C) is completing on the proposed capital upgrades to the Philip J. Holton Water Purification Plant (treatment plant) owned and operated by the Providence Water Supply Board (PWSB). Due to the preliminary/conceptual nature of the design information which has been made available to this point, the opinions expressed in this letter may be modified based upon the future provision of more detailed or alternate design information, particularly with regard to the anticipated costs of the various components of the project.

Work Completed to Date

In June, W&C made a formal request for information from the PWSB concerning the proposed plant upgrades, including but not limited to: design drawings and specifications, studies associated with the proposed plant upgrades, other basis for the design of the upgrades, and cost estimates of the proposed work. In response, W&C was provided with the following list of documents on June 28, 2007:

1. Design Concept Report: Filtration System Rehabilitation and Improvements, Philip J. Holton Water Purification Plant, Presented by: Maguire Group, October, 2006;
2. Filter Pilot Study Final Report, by Black & Veatch, October 2004;
3. Filter Evaluation Summary Memo, by CDM, August 2003;
4. Comprehensive Plant Evaluation, by CDM, April 1997;
5. Pilot Scale Evaluation of Alternative Treatment Methodologies, by FST, September 1995;
6. Alternate Underdrain and Auxiliary Wash System Summary Memo, by FST, March 1994;
7. Raw and Finished Water Quality Data Sheets;
8. Table of Reservoir Elevations; and
9. 2005 and 2004 Annual Statistical Reports.

Due to ongoing litigation between the PWSB and a third party, W&C was permitted to review design drawings only at the PWSB office. It should be noted that the plans available were detailed to a level which might be considered a 10% Design Submission and were largely conceptual.

On June 29, 2007, two of W&C's water treatment design professionals (Mr. Ron Hidu, P.E. and Mr. Toby Fedder, P.E.) visited the PWSB offices in Cranston, RI to discuss the upgrades and review the design drawings for the upgrades. Attending the meeting from the PWSB were Mr. Paul Gadoury, Mr. Richard Razza, and Mr. Steve Soito. Also in attendance were Mr. John Bell (Public Utility Rate Analyst) and Mr. Al Mancini (Water Utility Engineer) representing the DPU. The meeting lasted approximately two hours and included a discussion of the history of the treatment plant and its current operational regimen. The development of the conceptual design for the improvements and a description of the

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manner and order of construction, as currently envisioned by PWSB, were also important topics of discussion.

Following the meeting at PWSB offices, all meeting attendees, except Mr. Gadoury, went on a detailed tour of the water treatment plant to inspect the facilities to be improved and to get a better perspective for understanding the proposed work. The tour took approximately three hours and involved a full walkthrough of all treatment processes and chemical feed related areas, as well as an in-depth examination of the filter piping gallery.

In the week following the plant inspection, W&C reviewed the documentation provided by PWSB. The opinions expressed in this letter were determined based upon the documentation we have received, verbal communications from PWSB staff, and the inspection of the water treatment plant.

Findings of Peer Review to Date

For the purposes of this letter, W&C will discuss the various portions of the proposed plant upgrades as they have been itemized by cost on Table 8-1 of the October, 2006 Design Concept Report completed by Maguire Group. Due to the limited level of design documentation made available to W&C thus far, it would be difficult to make a detailed assessment of the Maguire Group construction cost estimate provided here as an attachment.

General Discussion of the Proposed Improvements

1. Central Filter Gallery – Filters

The treatment plant currently has a total of eighteen filter beds, ten of which are more than eighty years old and sixteen of which contain their original backwash piping. PWSB proposes to replace the underdrains and filter media in all eighteen filters as well as make structural repairs and upgrades required to support the new underdrains.

The treatment plant has had several underdrain failures over the past ten years. Additionally, PWSB staff verbally indicated that the filters have a history of mudball formation within the existing filtration media. Both of these conditions are strongly indicative that the filters' existing backwashing equipment should either be modified by replacing old media with a different filtration media or replaced with an alternate backwash system. PWSB has reviewed a number of different potential backwashing systems, results of which indicate that the proposed air scour system is appropriate and effective for its proposed application.

Additionally, PWSB completed a study of a number of different filtration media set-ups (including dual-media, tri-media, and granular activated carbon) to assess the operational aspects and water treatment performance of each. The results of this study support the selection of the proposed dual-media filter.

Given the age and operational history of much of the equipment, it is W&C's opinion that the proposed replacement of its filters is necessary in order to maintain the plant's operational capacity.

2. Filter Effluent Piping Gallery

In the current plant set-up, filters are backwashed using a finished water storage tank located adjacent to but at a slightly higher elevation than the treatment plant. Water flows from this storage tank, through

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a 48-inch diameter backwash header which extends the full length of the pipe gallery. The originally constructed section of this backwash line is riveted cast iron. Additional sections, from 1940s and 1960s plant upgrades, are welded carbon steel. Due to the location of this 48-inch pipe, its presence in the pipe gallery creates a difficult work environment and impairs access to many pipe junctions and valves. PWSB proposes to improve this situation by placing a new 48-inch backwash header pipe outside of the pipe gallery above the plant's clearwell.

It is W&C's opinion that, with the exception of the addition of a filter-to-waste piping system, work proposed within the existing piping gallery is severable from all of the other proposed improvements. While the backwash header pipe location is problematic for operations and maintenance staff, it is W&C's opinion that the replacement of the backwash header pipe should be considered optional. Finally, W&C considers it likely that an alternate, less costly, manner of achieving a similar result may be possible by using a smaller backwash header and attaching a low head, high volume pump to overcome any increase in flow losses due to the smaller diameter.

In addition, Maquire Group's Design Concept Report identifies an alternative filter-to-waste piping option that uses the plant's existing common washwater drain conduit beneath the Central Filter Gallery. This may result in a more straightforward installation, although it would require operational sequencing modifications. It would allow extensive and complex work within the piping gallery to be avoided.

3. Central Filter Gallery – Roofs and Architectural

Currently, the central filter gallery allows for the observation of approximately 15% of each filter. The remaining 85% of the filters are under very low roofs which have less than two feet of clearance between the water level in an operational filter and the roof. This situation precludes the ability of the operators to properly observe their filters. Additionally, the low roofs have developed leaks over the years and rainwater intrusion into the filters has been observed.

To remedy these problems, PWSB has proposed constructing new, higher roofs over all filters which will allow for proper filter observation, especially during backwash when problems such as mudballs can be most readily identified.

It is worth noting that the existing configuration of the roof would not be allowed under modern design standards because of the limitations it places on the ability of the operators to conduct filter surveillance. It is W&C's opinion that raising the roof of the filter gallery is necessary and is properly timed to be included with the planned filter rehabilitation work.

4. Electrical, Instrumentation, and Controls

There are a number of different items which are addressed under the E,I&C heading, including the removal of a significant portion of the existing 600 volt equipment from the plant and replacement with equipment which operates on the current 480VAC electrical standard. If all piping modifications and their attendant valve upgrades are performed, approximately 180 valve actuators will be replaced and converted to 480 volt.

In addition, inadequate lighting and convenience outlets throughout the filter gallery and piping gallery spaces will be replaced. Deteriorated RTUs within the piping gallery are proposed for relocation and

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replacement. One significant aspect of this facet of the proposed work calls for the complete replacement of all plant instrumentation, whether functional or not. This includes:

1. 72 differential pressure transmitters;
2. 36 ultrasonic filter level transmitters;
3. 38 filter and clearwell effluent turbidity transmitters; and
4. 36 filter effluent particle counters.

Additionally, the upgrades included in the refurbishment of the filters will require upgrades to the Foxboro SCADA and filter monitoring equipment associated with operating the plant.

It is W&C's opinion that general improvements to the electrical instrumentation, and controls systems will be required if the recommended filter improvements are completed. PWSB may want to reassess whether all presently functional, non-obsolete instrumentation should be replaced as part of this project.

Closing

With available plans only developed to the planning/conceptual stage, it is difficult to give an opinion on cost since materials, methods of construction, staging/order of construction, and other items which can and will significantly affect final construction cost are not fully defined.

From the planning level, the costs estimated by Maguire Group for the filter refurbishment and replacement seem reasonable. The costs for the other portions of the project seem less developed and W&C has reservations on the costs noted for the filter gallery roof raising, the cost will largely be dependent upon the method and order of construction, about which there is little information yet available.

The work associated with the extensive piping modifications within the piping gallery seems to present the greatest risk in regard to project cost projection overruns. This will be a very difficult area in which to work in terms of the demolition, the construction sequencing (while keeping the plant operational) and the installation of the new backwash header. Working with old cast iron piping, making temporary tie-ins, and routing new, large-diameter piping around existing structural elements will be perceived by contractors as high risk work and will command premium prices. Making structural changes to the clearwell roof and cover building to support a new backwash header may also involve substantially more work than presently anticipated.

Since filter upgrade work is clearly warranted, both from an operational and regulatory compliance perspective, it may be wise to separate this work from the piping gallery modifications so as not to place this portion of the project in jeopardy, should construction costs exceed current predictions and available funds. Alternatively, it may be possible to include certain aspects of the work as a bid alternate which can be accepted or rejected based on the pricing received.

Based upon verbal communication from PWSB staff, 50% Design drawings should become available in the near future, at which time a review of the anticipated construction costs can better be made.

If you have questions which have not been adequately addressed in the text of this letter, please contact me at 866-702-6371 or via email at hgordon@woodardcurran.com.

Sincerely,

WOODARD & CURRAN

Helen T. Gordon

Helen Gordon, P.E.
Senior Vice President

cc: file
Ron Hidu
Toby Fedder

Attachment

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ATTACHMENT

Table 8-1 Estimated Opinion of Probable Construction Costs

Item No.	Description of Item	Cost Total
1	**Central Filter Gallery - Filters**	
	- repair / waterproof filter boxes	
	- replace filter underdrains	
	- replace media	**$10,200,000**
	- replace filter inlet / drain valves	
	- raise filter troughs	
	- install additional backwash blower	
2	**Filter Effluent Piping Gallery**	
	- relocate backwash supply header	
	- replace existing filter effluent piping	**$8,470,000**
	- replace filter effluent valves & actuators	
	- replace filter rate-of-flow controllers	
	- improve gallery ventilation	
	- new egress stairwell	
3	**Central Filter Gallery – Filter Roofs & Architectural**	
	- demo existing filter roofs	**$3,930,000**
	- construct new filter roofs	
	- new RTU electrical room	
	- replace tile work / terrazzo flooring	
	- replace access ramp	
	- replace damaged glazed tile block	
4	**Electrical, Instrumentation, and Controls**	
	- replace 600V power w/ 480V	**$2,240,000**
	- new process instrumentation	
	- particle counters	
	- turbidity monitors	
	- filter level elements	
	- improve gallery lighting	
	- Piping Gallery	
	- improve gallery lighting	
	- Central Gallery	
	- SCADA programming	
	- field bus data control wiring	
	[1]SUBTOTAL	**$24,840,000**
	[2]Overhead and Profit	3,730,000
	SUBTOTAL	**28,570,000**
	Contingency (19%)	5,330,000
	Construction* Cost	**$33,900,000**
	[3]Construction Escalator	$2,710,000
	Total Program* Cost	**$36,636,000**

Notes:

[1]Feb 2006 ENR CCI = 7,689

[2]Use 15% for Contractor Overhead and Profit

[3]Escalation through Construction Midpoint (2 years +/-, ~4.0% per year (est.)

Note: Construction costs only – does not include engineering, legal, administrative and so forth.

Helen Gordon, PE
Senior Vice President

Professional Profile

Ms. Gordon has over 27 years of civil engineering experience specializing in the planning, design, and construction management of various water and wastewater engineering projects for municipalities. Her career has focused on upgrades to existing facilities in New England addressing constructability issues for both water and wastewater treatment and distribution and collection facilities. Her work experience includes numerous projects for State authorities such as the Metropolitan District Commission, the Boston Water and Sewer Commission, and the Narragansett Bay Commission, including: water treatment and water system computer modeling for large- and small-scale public and private systems; designing water booster pumping stations and transmission and distribution mains, as well as cleaning and lining water mains; designing wastewater treatment plant upgrades, wastewater pumping stations, grinder pumps, force mains, and gravity sewers. Ms. Gordon has presented a number of papers at regional, national, and international conferences, including serving as a delegate to the USSR to present a paper on computer modeling and water distribution systems at a water conference in Moscow.

Education

B.S., Civil Engineering, Northeastern University
Graduate Coursework, Northeastern University

Specialized Training

Emerging Technologies for Drinking Water Treatment Seminar
Steel Tank - Design, Specification and Construction Seminar
Pipe and Design Seminar
CSO and Stormwater Controls
University of RI - In-Site Wastewater Training Program

Registrations

Registered Professional Engineer, MA, 41211
Registered Professional Engineer, RI, 5926
Registered Professional Engineer, CT, 21762

Professional Associations

American Public Works Association
American Water Works Association
Boston Society of Civil Engineers, Engineering Management Committee, past chair and newsletter committee
National Civil Engineering Honor Society, Chi Epsilon
National Society of Professional Engineers
New England Water Works Association, Program Committee Member
Rhode Island Water Works Association

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Related Experience

Water Projects

Water Treatment Plant Upgrades

- Town of Cumberland, Rhode Island – Senior Project Manager – Water Treatment Plant Evaluation and Improvements, Water System Modeling and General Engineering Services. Project Manager responsible for working with the Town to provide high-quality water to its residents at reasonable rates by methodically identifying and resolving water supply, treatment, and distribution system issues. Specific tasks included an evaluation of Cumberland's 0.76 MGD surface water treatment plant to determine optimization options to address the terms of a Notice of Violation issued by the Rhode Island Department of Health. Based on the results of this evaluation, the Town satisfied the requirements of the NOV and was approved by regulators to move forward with upgrades to the filtration plant. These upgrades are currently being designed, with W&C also responsible for public bidding, construction administration and resident inspection on the project. Additional tasks included the performance of water rate studies for 2006 and 2010, a water system asset evaluation, development of a water distribution system computer model in a GIS based modeling package, and on-call engineering services related to water system operation and maintenance issues and future system planning and design needs. March, 2005 to present. Engineering fee: $475,000.

- Town of Hull, Massachusetts - Desalination Feasibility Study. Senior Project Manager for a multi-phased effort to determine the feasibility of treating ocean water to create drinking water via the process of desalination. The feasibility study investigated potential treatment, intake, and outfall sites, permitting complexities, funding services, and capital and operations and maintenance cost projections.

- Naval Submarine Base - New London, Connecticut - Water System Study. Task Leader for conducting a water system study to assess the ability of the water distribution system in providing potable drinking water to the New London Submarine Base at adequate pressure and flow during fire flow conditions. Directed staff in the preparation of the distribution system model, analysis and recommendations, and responsible for technical review.

- Town of Needham, Massachusetts - Broad Meadow Road Water Main Replacement. Project Manager for the preparation of plans and specifications to replace 3,700 feet of old cast iron water main at Broad Meadow Road with 12-inch ductile iron water main.

- Town of Randolph, Massachusetts - High Street Water Main Replacement. Project Manager in charge of preparing contract drawings and specifications for replacement of 3,400 feet of old cast iron water main with 12-inch ductile iron water main. Responsible for preparation

of Engineers Cost Estimate and responsible for coordination of all construction services.

- Town of Randolph, Massachusetts - Cleaning and Lining of Water Main. Project Manager in charge of preparing contract drawings and specifications for cleaning and lining of 11,000 feet of 6-inch unlined cast iron pipe. Responsible for preparation of Engineers Cost Estimate and responsible for coordination of all construction services.
- Town of Braintree, Massachusetts - Water System Modeling and Master Plan Report. Project Manager in charge of preparing water system model of the Town's distribution system. Responsible for coordination between Water Department and Project staff conducting the study. Prepared report on 20 year Master Plan for water system. Responsible for training of Town staff in use of model; utilized CYBERNET.
- Town of Randolph, Massachusetts - Water Distribution Hydraulic Model. Project Manager in charge of review of all physical data and preparation of all model input data (technical approach). Responsible for outline of training program and review of training procedures for town's personnel; utilized WATERCAD.
- City of Boston, Massachusetts - Long Island and Moon Island Utility Feasibility Water Distribution System Hydraulic Model. Project Manager in charge of preparing a water system hydraulic model. Responsible for overseeing the development of alternative construction methods and routes for water service to the eight Boston Harbor Islands studied. Responsible for overseeing the development of costs for each alternative reviewed and for directing water demands for current and future development.
- Town of Johnston, Rhode Island - Water Distribution System Hydraulic Model. Responsible for determination of optimal routes and facilities required to service new area outside current service area.
- Bristol, Rhode Island - Bristol County Water Authority - Shad Factory Pipeline. In charge of the hydraulic analysis of 23,000 linear feet of the Shad Factory pipeline including constructability study and permitting investigations. Responsible for the preparation of Engineers cost estimate, utilized WATERWORKS.
- Town of Walpole, Massachusetts - Water System Model & Master Plan. Responsible for direct staff in the data collection; conducting field testing program, hydrant flow tests, and pipe condition tests; preparation of field data for input into KYPIPE program; conducting detailed analysis of the distribution system; both the skeletonized system and the detailed system; preparation of a 20-year Master Plan Report to upgrade the distribution system.
- Bristol, Rhode Island - Bristol County Water Authority - East Bay Pipeline. In charge of the conceptual design of the East Bay Pipeline; preparation of base mapping for three potential routes; hydraulic analysis

of the East Providence transmission system, the Bristol County Water Authority transmission system and the proposed pipeline; evaluation of improvement requirements for the East Providence and Bristol County Water Authority systems to utilize the new source from the East Bay Pipeline; and reliability analysis of the transmission systems and evaluation of needed improvements to provide different margins of safety against reasonable emergency conditions.

- Town of Braintree, Massachusetts - Master Plan Improvements and Town-wide Water Main Rehabilitation. Project Manager in charge of preparing contract drawings for replacement of 15,000 of old 4-inch and 6-inch unlined cast iron water main, cleaning and lining of 9,000 feet of transmission mains. Responsible for preparation of Engineer's cost estimate and for coordination of all construction services.
- Town of Cumberland, Rhode Island - Clean Water Infrastructure Plan. Project Manager responsible for the preparation of the Draft Clean Water Infrastructure Plan for the Town of Cumberland Water Department. Work included summarizing a description of the water system, conducting condition surveys of the water treatment plant, pump stations and storage tanks. Responsible for creating a 20-year expenditure plan for facility operation, maintenance and replacement, as needed. Draft report was submitted to the State for review.
- Arlington, Massachusetts - Massachusetts Water Resources Authority (MWRA) - Spot Pond Water Pumping Station Hydraulic Transient Analysis. Project Manager in charge of review of all physical data and preparation of all model input data, determination of C factors and loss coefficients, as well as TAT report review.
- Arlington/Belmont, Massachusetts - Massachusetts Water Resources Authority (MWRA) - Arlington Spring Street Water Pumping Station and Belmont Pump Station Hydraulic Transient Analysis. Project Manager in charge of review of all physical data and preparation of all model input data, determination of C factors and loss coefficients as well as TAT report review.
- State of Rhode Island - Water Supply Analysis Study. Responsible for integrating data of 30 water utilities into a baseline information database for analysis and for interpretation of system service areas and potential future water supply sources.
- Town of Concord, Massachusetts - Water Main Design. Design of all utilities including a water main to upgrade Town system to bring water to the site and sewer design, including valve pit pump facilities and force mains for a residential development.
- Pascoag, Rhode Island - Pascoag Fire District - Water Audit and Leak Detection Survey. Prepared an Operations and Maintenance Manual for the Sodium Hypochlorite disinfection system for the town well supply. Modeled chlorine residual testing program to be instituted at the district.

Wastewater Projects

- Wheaton College - Wastewater Treatment Facility Improvements. Senior Project Manager working with the College to address violation issues at their existing wastewater treatment plant. W&C took on the operations of this aged facility while assessing the cause of the NPDES permit excursions. W&C prepared a report with recommendations for short and long term improvements. Short term improvements consisted of providing monitoring locations to react to influent upsets which in the past resulted in permit violations. Additionally equipment is being added to assist in meeting a new NPDES permit more stringent than the current permit. Also preparing conceptual design plans for a new wastewater treatment facility for a long term resolution.

- City of Gloucester, Massachusetts - Influent Screw Pump Replacement. Senior Project manager of the replacement of 15 MGD influent screw pumps at the Gloucester Water Pollution Control Facility (WPCF). Project includes evaluation of screw pump alternatives (enclosed or open flight) and lower bearing technology; considerations for intermittent surcharging of the influent chamber; replacement of influent sluice gates, walls, and decking; bypass pumping; and construction sequencing to allow uninterrupted operation of the WPCF.

- Town of Braintree, Massachusetts - Administrative Consent Order. Senior Project Manager assisting the Town in addressing an administrative consent order (ACO) focusing on water quality and sewer system capacity. The ACO has 40 separate tasks on a tight schedule. Manage the overall ACO schedule and deliverables for the Town. Tasks include developing and issuing RFPs to consulting firms; reviewing consultants' reports and construction activity for compliance with the ACO; coordinating Town departments, the Massachusetts Water Resource Authority (MWRA) and Massachusetts DEP; managing the Town's Sewer Bank and sump pump redirection program; developing and implementing a public education and community relations plan; and developing a new sewer system O&M manual.

- Town of Groton, Massachusetts - General Engineering Services. Senior Technical Reviewer for several projects focusing on long-term planning for wastewater collection, treatment and disposal needs. The town has limited capacity available in the wastewater collection system and the demand for new disposal options increased in areas exhibiting problems with onsite wastewater collection systems. The first project involves investigating alternatives to gain capacity in the existing wastewater collection system through infiltration and inflow mitigation. The long-term planning phase includes evaluation of specific needs areas known to have wastewater management issues using innovative GIS and database applications, including involvement from the general public and local citizens' organizations.

- Town of North Attleborough, Massachusetts – Five year phased Wastewater Treatment Facility (WWTF) Upgrades. Senior Project Manager for the design, construction services, resident inspection and start-up for phased improvements to the WWTF. The improvements are focused on the phosphorous process (to meet limit of 0.2mg/l) including upgrading of mechanical systems, cost analysis, review of general operation and maintenance procedures and the design and implementation of a system wide (WWTF and collection system) SCADA system.
- Town of North Attleborough, Massachusetts - Comprehensive Planning Evaluation of Wastewater Treatment Plant. Project Manager for the evaluation of the Town's wastewater treatment plant. Project objective was to assess optimization potentials of the facility, including reduction of electrical usage, reduction of chemical usage where possible, and implementing SCADA systems as needed.
- Town of Acton, Massachusetts - Middle Fort Pond Brook Wastewater Treatment Plant and Collection System Design and Construction. Senior Project Manager for design, construction services and resident inspection of a new sewer system. This project included the engineering, planning, design and construction of a new sewer system consisting of 70,000 linear feet of sewers, seven pump stations and force mains, and a 250,000-GPD expandable to 1.0-MGD, advanced wastewater treatment plant for Acton, Massachusetts. The design includes an Ethernet based communications network and SCADA system. Services include preliminary and final designs, bidding and award, construction administration, onsite observation, and operational testing and startup support.

Publications and Presentations

"Asset Management" Ongoing seminar presentations to communities in Massachusetts geared to meeting regulatory requirements such as GASB 34 and CMOM and improve reliability of infrastructure systems. Spring 2003.

"Storm Water Phase II and Your Community." Maine Wastewater Control Association. September 27, 2001.

"Comprehensive Storm Water Management Plan: Technical Advancements in Wetlands and Storm Water Management." New England Water Environment Association. January 2001.

"Phase II: What Does It Mean to You?" Ongoing seminar presentations to over 40 Massachusetts communities required to meet new storm water management regulations. Presentation team includes Massachusetts DEP representatives. 2001 and 2002.

"Modeling Water Distribution Systems." Technology Transfer. Moscow, Kharkov, St. Petersburg and Kiev, September 1989. Published in NEWWA journal in 1990.

Richard Fedder, PE
Project Engineer 2

Professional Profile

Mr. Fedder has fourteen years of experience in the civil/environmental engineering and financial management industries. He has been involved in all aspects of the assessment, design and construction of multiple types of civil and environmental engineering projects, ranging from wells and water treatment facilities, to landfills and hazardous waste/brownfields site redevelopment.

Education

B.S., Civil / Environmental Engineering, University of New Hampshire

Registrations

Engineer In Training, NH, 2821
Registered Professional Engineer, ME, 10934

Professional Associations

American Society of Civil Engineers
Water Environment Federation

Related Experience

- City of Leominster, Massachusetts - Surface Water Quality Assessment and Treatment Pilot Study. Lead Project Engineer in the completion of an in-depth assessment of surface water quality within the City of Leominster's reservoir system. Among the results of the study were treatment recommendations and piloting of several water treatment technologies. Also, the study identified the challenges the City would face in meeting new regulations for water at the City's other water treatment plants.
- Central New Hampshire - Arsenic Removal of Bedrock Well. Lead Project Engineer in the development of a treatment system for the removal of arsenic from potable water in a central New Hampshire bedrock well. Challenges to completion of the project included abnormally elevated phosphate and silica levels which inhibited the chemical reactions associated with traditional removal technologies.
- Eastern Massachusetts - Bedrock Well Resource Development. Completed bedrock well siting in eastern Massachusetts. The technical work in siting the well used numerous physical and geophysical techniques, including the application of VLF, EM, and Ground resistivity studies. These studies allowed for the development of an in-depth understanding of the bedrock fractures in the area identified for well

development and allowed for the assessment of optimal locations for fracture interception.

- Southeastern Massachusetts - Overburden Potable Well Development and Permitting. Completed engineering work associated with the development and validation of MassDEP accepted Zone II delineations in many communities throughout Southeastern Massachusetts. Work included the completion of pumping tests and groundwater modeling in support of the limits of the wells' zones of contribution.
- Seacoast NH, Water Mutual Aid Study- Engineer in the development and modeling of interconnections between nine independent potable water utilities spanning twenty-five miles. Engineer leading the design of the skeletonized pipe flow including the installation of all treatment plants, well and water storage facilities. Assessments included estimations of pumping needs and water chemistry/flow impacts associated with establishing a connected system.
- Town of Seabrook, NH- Bedrock Well Assessment and Rehabilitation - Lead Engineer in the pump testing and assessment of two potable water bedrock wells in the Town of Seabrook's water system for the purpose of restoring original yields. Both wells were deeper than 450 feet and had experienced large declines in productivity since being activated. Through careful analysis of the pumping test and well recovery records, the likely mechanisms of clogging in both wells was determined. The recommended rehabilitation method included the use of phosphate and liquid carbon dioxide to remove deposits clogging the bedrock fractures contributing water to the wells.

Ronald Hidu, PE
Vice President
Project Manager

Professional Profile

Mr. Hidu is a Project Manager with 16 years of engineering experience specializing in water and wastewater system design and unit process selection. He has served as both Project Manager and Project Engineer for a number of municipal water treatment systems, industrial and municipal wastewater treatment facility design and upgrades, sewer system evaluation surveys, and infiltration/inflow/CSO projects.

Education

B.S., Geology, Rutgers University
B.S., Civil Engineering, University of Maine

Registrations

Wastewater Operator Grade 4, ME, 0653
Water Operator Grade 4T, ME, 10893
Registered Professional Engineer, ME, 6847

Professional Associations

American Society of Civil Engineers
American Water Works Association
Maine Rural Water Association
Maine Wastewater Control Association
Maine Water Utilities Association

Related Experience

- Mount Desert Water District - Award Winning Facility Upgrades - Mount Desert Island, Maine. Project manager for the award winning, $2.5 million upgrade for two 1-MGD ozone disinfection water treatment systems for the Mount Desert Water District. Negotiated and successfully met a consent agreement that allowed the District to retain its waiver from filtration status for these facilities. This rapid turnaround project was undertaken with full State Revolving Fund financing. The upgrade included new transmission lines, intakes and storage facilities in both facilities and extensive plant work including installation of new ozonation equipment to improve reliability and expand treatment capacity; conversion of both facilities to liquid oxygen feed stock; instrumentation of both facilities; installation of a comprehensive SCADA system at both facilities which allows the treatment systems to be operated and monitored from the remote district office or from a laptop computer from the homes of the District's very small staff; conversion of the facilities to full-time CT monitoring for both process

control and reporting purposes; innovative use of CT computation methods to allow for the most efficient operations; and innovative use of subsurface plug-flow contact chambers to allow the facility upgrades to take place in spite of the fact that the District owned no land at one facility, which is surrounded by a National Park; and the need to complete the work under a very tight time frame, both to meet consent agreement milestones and to work around a seasonal tourist influx.

- Consumers Maine Water - Disinfectant Alternatives Study - Millinocket, Maine. Project manager for Consumers Maine Water's Millinocket Division study and conversion to alternative disinfectants. This project piloted pre-oxidation using chlorine dioxide in place of sodium hypochlorite in order to reduce the formation of disinfection by-products. It also involved the conversion from free chlorine to chloramines for use as a secondary disinfectant for maintaining system residuals.
- City of Gardiner, Maine - Wastewater Treatment Facility Study. Project manager for providing "Value Engineering" to the City of Gardiner's wastewater treatment facility as it considered consultant recommendations for major treatment plant upgrades in order to treat stormwater and combined sewer flows at the plant.
- Interface Fabrics - Comprehensive Plant Evaluation - Elkin, North Carolina. Project manager for a Comprehensive Plant Evaluation (CPE) of Interface Fabric's Chatham Mill wastewater treatment facility. This textile mill had been recently purchased by Interface and was looking for an integrated planning document for upgrading its treatment facility in Elkin, North Carolina.
- City of Bangor, Maine - Pump Station Upgrade. Project manager for the upgrade of the Hildreth Street wastewater pumping station for the City of Bangor's wastewater treatment facility.
- City of Bangor, Maine - Wastewater Treatment Facility Upgrades. Project manager for upgrades to recirculation pumping at the City of Bangor's wastewater treatment facility, including installation of variable frequency drives and instrumentation to a battery of six pumps. This allowed the facility to better control treatment and significantly reduce its consumption of hypochlorite.
- City of Ellsworth, Maine - Wastewater Treatment Facility Operations. Operator-in-responsible-charge of the City of Ellsworth's wastewater treatment facility for a multi-year period during which City staff obtained operator certification.
- Consumer Maine Water, Skowhegan Division - Evaluation - Skowhegan, Maine. Project manager for Consumers Maine Water's Skowhegan Division evaluation of flow distribution through existing sedimentation basins. This evaluation considered the size and placement of headwall and mid-point baffles within the existing tanks in order to improve settling performance.

- Bath Water District - Comprehensive Plant Evaluation and Upgrade - Bath, Maine. Senior technical coordinator for the Bath Water District's comprehensive plant evaluation and upgrade. Among the components of this upgrade are the installation of freeze-thaw residuals settling lagoons, and the conversion to Ultraviolet Light for primary disinfection. Plant chemistry and hydraulic operation changes were also proposed.
- Bar Harbor Water Company - Potable Water Intake Extension - Bar Harbor, Maine. Project manager for 3 MGD potable water intake extension. This HDPE intake extension allowed the Bar Harbor Water Company to maintain its excellent water quality and retain its waiver from filtration status.
- Bar Harbor Water Company - Water Storage Tank - Bar Harbor, Maine. Project manager for the permitting, design and installation of a 500,000 gallon, below-grade, cast-in-place treated water storage tank for the Bar Harbor Water Company. This tank was constructed on land leased from the National Park system, and allowed the water company to retain its waiver from filtration status.
- Mount Desert Water District - Potable Water Intake Replacement - Seal Harbor, Maine. Project manager for 1 MGD potable water intake replacement. This new ductile iron intake allowed the District to regain flow capacity, which was lost due to the poor condition of the original intake.
- Consumers Maine Water, Bucksport Division - Water Treatment Facility - Bucksport, Maine. Project manager for 0.75-MGD upflow adsorption clarifier/rapid filtration facility installation for Consumers Maine Water, Bucksport Division. A design-build cooperative project involving the owner, contractor, and engineer.
- Bar Harbor Water Company - Treatment and Distribution Facility Upgrades - Bar Harbor, Maine. Project manager for treatment/distribution system upgrades for Bar Harbor Water Company. System supplies up to 2.75-MGD of water under waiver from filtration providing disinfection and contact within a transmission line.
- Bangor Water District - Engineering Services - Bangor, Maine. Project engineer for Bangor Water District. Open-ended contract for miscellaneous engineering related to storage facilities, transmission lines, and pump stations.
- Town of Newport, Maine - Slow Sand Filtration Plant. Project engineer for 0.5-MGD slow sand filter plant for Newport, Maine.
- Mount Desert Water District - Water Treatment Process Services - Seal Harbor and Northeast Harbor, Maine. Project manager for process evaluation and modifications for Seal Harbor and Northeast Harbor Water Companies.

- Town of Castine, Maine - Treatment Plant Process Analysis and Evaluation. Project engineer for process analysis and evaluation of treatment plant rehabilitation needs for Castine Pollution Control Facility.

Publications and Presentations

"Advancements in Ozone Disinfection as Applied at the Mount Desert Water District," presented at the New England Water Works Association Conference, April 2000.