



Upper Blackstone Water Pollution Abatement District

Auburn, Cherry Valley Sewer District, Holden, Millbury, Rutland, West Boylston, Worcester

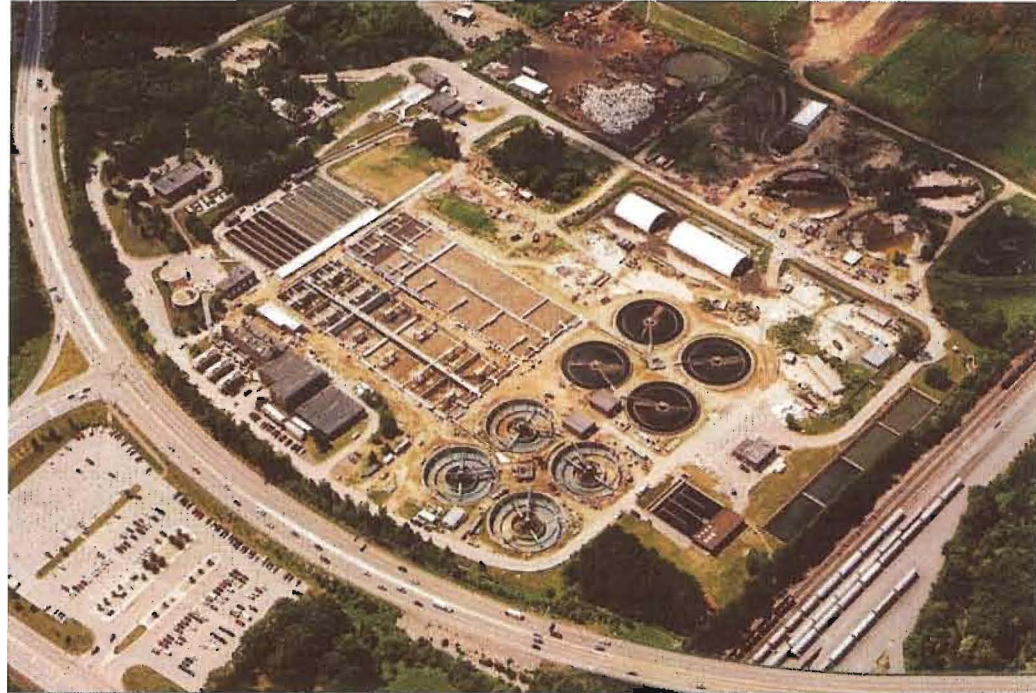
The Upper Blackstone Water Pollution Abatement District (the District) was created by the Massachusetts General Court in Chapter 752 of the Acts of 1968. Current District members include Auburn, Cherry Valley Sewer District, Holden, Millbury, Rutland, West Boylston, and Worcester. Additionally, the District serves portions of Sutton, Oxford and Shrewsbury as well as treating septage and sludge from numerous other communities.

TREATMENT FACILITIES

The Upper Blackstone Wastewater Treatment Facilities (UBWWTF) were upgraded in 2009 to provide Biological Nutrient Removal (BNR) to an average flow of 45 million gallons per day (mgd). They utilize the activated sludge process to remove over 90 percent of the major pollutants entering the plant. These facilities have considerably improved the quality of the Blackstone River and continue to protect its headwaters from contamination. Their recent performance is summarized in Table 1.

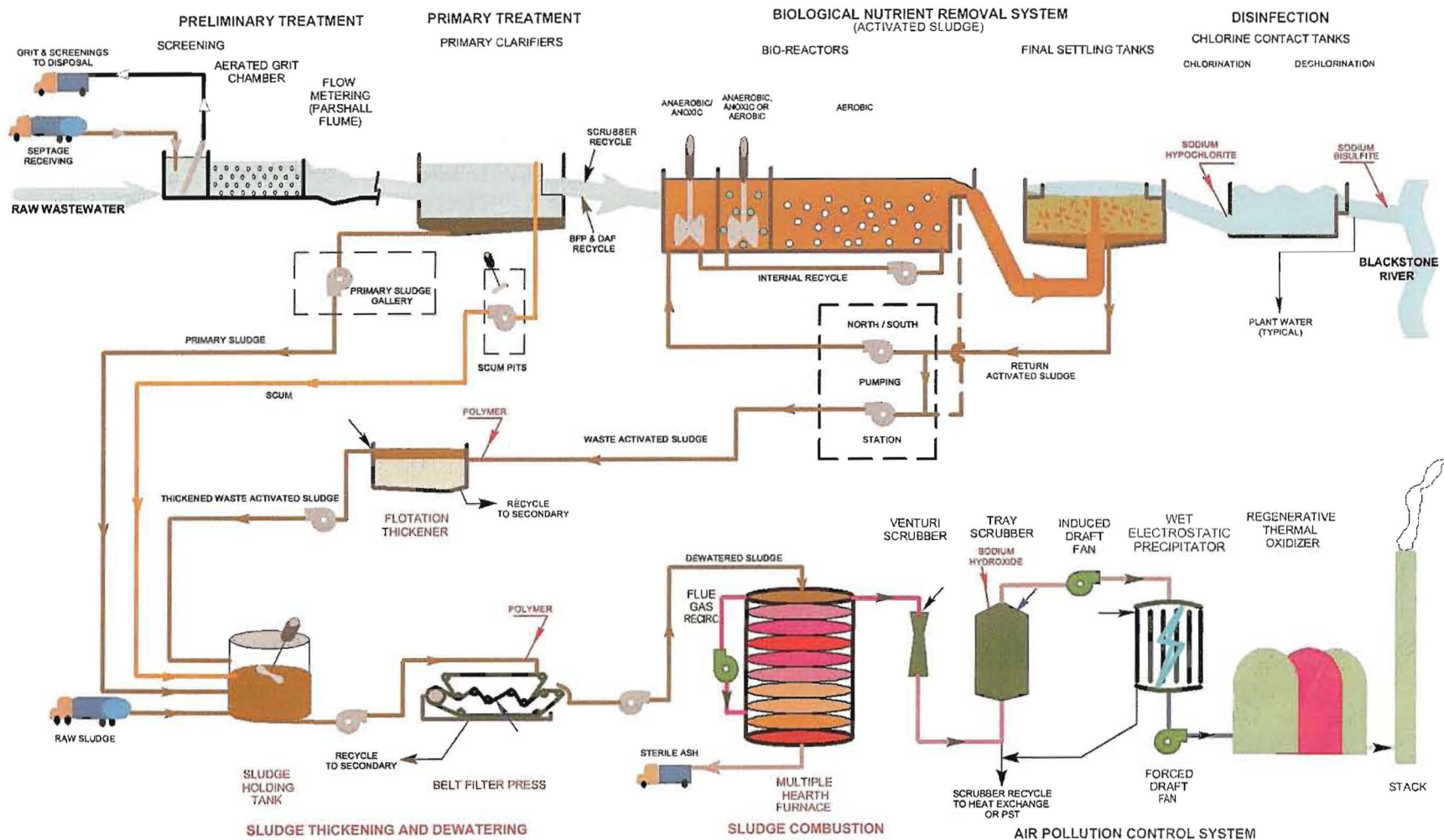
Since startup of its' treatment facilities in 1976, the District has been asked to achieve more and more stringent effluent standards as the quality of the Blackstone River is improved. The District's plant is currently achieving a higher standard of performance than was envisioned when it was designed and constructed, and must achieve even more stringent standards in the future.

Since 1997, the District has completed over \$160 million in plant improvements to help achieve modern environmental standards, and is now completing additional major improvements. Additionally, the District is currently supporting development of modeling programs to help define future water quality needs for the Blackstone River.



PLANNED IMPROVEMENTS

In order to achieve future water quality goals, and to continue to modernize our 30 year old facility, the District has initiated a \$185 million four phase plant improvement project that is now being completed. The first two phases, completed in 2009, have achieved major improvements in stormwater management, wastewater treatment, odor control, and plant instrumentation and control. Later phases of the project will build on these improvements, providing more efficient solids management and expanding plant capacity to accommodate growth in our service area.



BACKUP POWER SOURCES:

1. TWO INDEPENDANT POWER SUPPLIES.
2. EMERGENCY GENERATORS AT HEADWORKS AND AT DISINFECTION/PLANT WATER SYSTEM.

UPPER BLACKSTONE WATER POLLUTION ABATEMENT DISTRICT
PROCESS DIAGRAM
JULY, 2005

PROCESS DESCRIPTION

The UBWWTF was designed to provide secondary wastewater treatment and to incinerate the material removed during treatment. The sterile ash that is generated is landfilled, and the air emissions are treated to stringent standards.

LIQUID PROCESSES

Mechanically Cleaned Bar Screens remove large objects such as rocks, metal objects and other material that could either clog or damage downstream equipment.

Aerated Grit Chambers remove grit and freshen raw wastewater by bubbling air through the wastes helping separate dense materials such as sand from the lighter organic matter. Grit that is relatively free of organic material is removed and land-filled

Parshall Flume measures flow.

Primary Clarifiers remove approximately half of the suspended solids (SS) and 30 percent of organic material by settling. The material settles to the tank bottom, and the resulting sludge is pumped to holding tanks. Grease, oil and other floating matter (scum) are skimmed from the water surface and pumped to holding tanks.

Biological Nutrient Removal System removes such contaminants as fine solids, organic material, nitrogen, phosphorus, and some dissolved metals. The system includes bio-reactors and final settling tanks.

Bio-Reactors provide an environment in which living organisms, including bacteria and plankton (termed activated sludge) remove pollutants from the wastewater by feeding upon the organic matter and by absorption. Mechanical aerators and air diffusers provide oxygen to the organisms.

Final Settling Tanks allow the activated sludge formed in the aeration tanks to settle, removing the material from the treated water. Most of the settled sludge is then returned to the aeration tanks by sludge recirculation pumps, and a portion is wasted to flotation thickeners for further treatment.

Chlorine Contact Tanks provide sufficient detention time for the treated wastewater to be disinfected using chlorine. Following disinfection, the treated effluent is dechlorinated using sodium bisulfite prior to discharge into the Blackstone River.

SOLIDS PROCESSES

Flotation Thickeners (DAF) reduce the water content of waste activated sludge (from the final settling tanks) concentrating it for further processing. In this operation, dissolved air flotation enhanced by polymer addition thickens the sludge while excess liquid is returned to the liquid process for treatment.

Sludge Holding Tanks provide storage and blending for the thickened waste activated sludge, primary sludge, imported sludges, and scum before further proc-

Belt Filter Presses further reduce the water content of sludge so that it may be efficiently burned, forming a cake of 20 to 25 percent solids. Polymers are also used here to enhance process performance. Excess liquids are returned to the liquid process for treatment.

Multiple Hearth Furnaces thermally reduce the filter cake to an inert ash, which is then disposed of at our on-site landfill. Excess heat from this system is used for building heat.

AIR POLLUTION CONTROLS

The contaminants in the exhaust from the multiple hearth furnaces are removed in an air pollution control system. The system is a state of the art process in which particulate matter, acid gasses, metals, and volatile organic compounds are either removed from the gas stream or thermally destroyed.

Venturi Scrubber removes some particulate matter and volatile metals by liquid contact and condensation.

Spray Tower Scrubber removes acid gasses and additional metals by liquid contact, absorption and chemical neutralization in a caustic spray system.

Wet Electrostatic Precipitator (WESP) removes additional amounts of fine particulate matter and associated metals not removed in the venturi scrubber by electrostatic precipitation.

Regenerative Thermal Oxidizer (RTO) thermally converts volatile organic compounds to carbon dioxide by combustion of gasses at 1,500 degrees Fahrenheit (F).

Stack assures dispersion of off gasses by discharge through 125-foot high exhaust stack.

OTHER PLANT FACILITIES

Chlorination facilities for safe receipt and storage of liquid chlorine.

Plant Water and Emergency Pumping station houses pumps for the plant water supply. Sodium bisulfite storage and feed is also housed here.

Maintenance Building houses the machine shop, parts storage, garage space, a lunchroom, a locker and shower room, and offices for maintenance personnel.

Administration Building houses the administrative and engineering staff, the laboratory and the board room.

TABLE I

FISCAL YEAR 2009 PERFORMANCE SUMMARY
Plant Under Construction

Influent/Effluent

Average Daily Flow, mgd 34.6
 Average Raw BOD, mg/L 125
 Average Final CBOD, mg/L 8.5
 BOD Overall Removal, % 95

Average Raw SS, mg/L 125
 Average Final SS, mg/L 10.5
 SS Overall Removal, % 92

Primary Treatment

BOD Removal, % 26
 SS Removal, % 35

Residuals

Screen & Grit, cu yds/day 4.0
 Ash, cu yds/day 16.3

Solids Handling

Solids to Belt Filter Press (BFP), % 4.1
 BFP Cake Solids Content, % 24.0
 BFP Cake to Incinerators, tons 57,7.6
 BFP Cake to Inc, Tons/operating hr. 1.64

Disinfection

Average Chlorine Dosage, mg/L 3.2

Other Information

Total Full Time Staff 51
 Electrical Energy used, Million KWH 16.7
 Natural Gas used, Million cu. ft. 60.7

Board of Directors

Robert L. Moylan, Jr.	Chairman	Worcester
J. Bradford Lange	Vice Chairman	Millbury
Mathew Labovites	Secretary	Worcester
Jeff Mitchell		Auburn
Donald Manseau		Cherry Valley Sewer District, Leicester
James Shuris, P.E.		Holden
Gary Kellaheer		Rutland
John K. Westerling		West Boylston
Philip Guerin		Worcester
F. Worth Landers		Worcester
Steven F. O'Neil		Worcester

Senior Staff

Thomas K. Walsh	Engineer - Director / Treasurer
Paul A. Caron	Plant Manager
Karen A. Boulay	District Clerk / Administrative Assistant