

2012 Eighty-third Comprehensive Annual Report

For the year ended December 31, 2012



Madison Metropolitan Sewerage District
Madison, Wisconsin



Table of Contents

INTRODUCTION

The Eighty-Third Annual Report is dedicated to longtime Commissioner, Edward V. Schten. After thirty years of service to the District, including serving as the Commission President since 1995, Ed retired on October 11, 2012. During his tenure, Ed served with three different Chief Engineers, oversaw the construction and rehabilitation of many miles of interceptor sewers and forcemains, the construction and/or rehabilitation of eight pumping stations, and the planning and construction of five additions (7th through start of 11th) to the Nine Springs Wastewater Treatment Plant.

As Commission President, Ed provided direction and leadership with a keen mind towards protecting public health and the environment. During his years of service, Ed supported many changes at the District including; implementation of a computerized process control system, the addition of advanced secondary nitrification treatment, the introduction of ultraviolet disinfection, the co-generation of power using digester generated biogas, the development of pretreatment and industrial source control, the use of Metrogro storage tanks, the annexation of Verona to the MMSD service area, the advancement of biological phosphorus removal, return of effluent to the Badger Mill Creek, and certification of the Biosolids Environmental Management System.

Ed was an active member of the National Association of Clean Water Agencies (NACWA), formerly the Association of Metropolitan Sewerage Agencies. Ed attended NACWA meetings to keep abreast of national regulatory issues and advancements in the wastewater industry and he always returned eager to share what he had learned with his fellow commission colleagues.

The personal side of Ed showed his great love for the outdoors and recreation. Ed is known for his love of bicycling. For a greater part of his tenure he often rode his bicycle to commission meetings and was proud that the District had worked with other agencies to complete portions of the Capital City bike path on top of the forcemain that returned effluent to the Badger Mill Creek. In addition, Ed had often acknowledged how proud he was of the cleanup efforts at the sewage lagoons and the creation of the shorebird and wildlife habitat, which are now part of the Capital Springs Recreation Area.

The staff at MMSD will miss Ed's character, sense of humor and forthrightness. Ed was known as the "face" of the Commission at annual employee events, where he enjoyed interacting with the staff and their families. Our warmest wishes of thanks go out to Ed for his many dedicated years of service to the District.

"I have loved every minute of my experience with Madison Metropolitan Sewerage District (MMSD) - Where else do you serve where people are constrained to think fifty years in the future?"

Edward V. Schten

ORGANIZATION

Madison Metropolitan Sewerage District (the District) is a body corporate with the powers of a municipal corporation for the purpose of carrying out the provisions of Sections 200.01 to 200.15 of the State of Wisconsin statutes. It was created by judgment of the County Court for Dane County, entered on the 8th day of February 1930. Its existence was validated and confirmed by Chapter 132 of the Laws of 1969, effective August 2, 1969. The constitutionality of that Law was sustained by the Wisconsin Supreme Court in Madison Metropolitan Sewerage District vs. Stein, 47 Wis. 2nd 349, 177 N.W. 2nd 131 (1969).

Time and Place of Meetings

The Commissioners of the District meet once or twice each month, at the office of the Commission at 1610 Moorland Road, Madison, Wisconsin. Special meetings are held upon call of any member of the Commission.

Commissioners and Executive Staff

The District is governed by five Commissioners, each appointed by the Dane County Executive and approved by the County Board for five-year terms.

John Hendrick (term ending June 30, 2016)
Caryl E. Terrell (term ending June 30, 2013)
Ezra Meyer (term ending June 30, 2014)
Thomas D. Hovel (term ending June 30, 2015)
C. Topf Wells (term ending June 30, 2017)

D. Michael Mucha serves as the Chief Engineer and Director. Dave Gawenda, the Treasurer of the City of Madison, serves as Treasurer of the District. Griffin Dorschel of Axley Brynelson is Attorney for the District.

HIRES, RETIRES AND PROMOTIONS OF DISTRICT EMPLOYEES

New to the organization:

Amy Bublitz *– Business Analyst*
Marcus Canty *– Health & Safety Specialist*
Kathy Lake *– Environmental Specialist*
Jennifer Peters *– Human Resources Manager*
Dylan Bahr *– Building & Grounds*
Thomas Berg *–Relief Operator*
Gerald Poss *– Custodian*
Craig Palzkill – *Apprentice Electrician II*

Retirements:

Dan McAdams *– Mechanical Maintenance Supervisor*
Jeffrey Steven *– Research Biologist*
Curt Witte – *Information Systems & Technology Manager*
Roy Swanke *– Safety Specialist*
Ricky Neath – *Operator III*

Promotions:

Jeff Mike *– Mechanical Maintenance Supervisor*
Dan Purdy *– Electrical Maintenance Supervisor*
Raymond Schneider *– Monitoring Services Supervisor*
Gerald Poss *– Sr. Custodian/Grounds Worker*
Tom Eggert *– Sr. Journeyman Electrician II*
Steve Hering *– Sr. Journeyman Electrician*
Michael Kressin *– Monitoring Services Helper*
Aaron Dose *– Operator I*
Jeff Fuller *– Journeyman Electrician*
Art Errthum *– Apprentice Electrician II*
Steve Klein *– Apprentice Mechanic II*
Mark Ripp *– Sr. Journeyman Mechanic*
Brian Suchomel *– Apprentice Mechanic*
Randy Conway *– Relief Operator IV*

In Memory of David Helgesen *– Dave's position was that of Treatment Plant Operator. He passed away June 9, 2012 with twenty-eight years of service to the District.*

OPERATION OF WASTEWATER FACILITIES

Sources of Wastewater

The District receives and treats wastewater from the Cities of Fitchburg, Madison, Middleton, Monona, and Verona; the Villages of Cottage Grove, Dane, DeForest, Maple Bluff, McFarland, Shorewood Hills, and Waunakee; and from sanitary and utility Districts and other areas in the Towns of Blooming Grove, Burke, Dunn, Madison, Middleton, Pleasant Springs, Verona, Vienna, Westport, and Windsor. The District also accepts septic tank wastes and similar wastes from unsewered areas located primarily in rural Dane County. The total area served by the District is 182.1 square miles.

Interceptor Service

Interceptor sewer service is provided within the District through the District's main and intercepting sewers. The District operated and maintained 93.90 miles of gravity sewers and 28.82 miles of raw wastewater force main at the end of 2012. Wastewater collecting systems are owned and operated by the cities, villages and town sanitary and utility districts and are connected to the metropolitan interceptor system.

All wastewater generated in the District is treated at the Nine Springs Wastewater Treatment Plant located at 1610 Moorland Road, Madison, Wisconsin, located approximately one mile south of Lake Monona. The easterly part of the District is served by the East Interceptor, the Southeast Interceptor, the Northeast Interceptor, and the Far East Interceptor. The westerly part of the District is served by the Lower Badger Mill Creek Interceptor, the West Interceptor, the Southwest Interceptor, the South Interceptor, and the Nine Springs Valley Interceptor.

The transmission of wastewater from the metropolitan area to the Nine Springs Wastewater Treatment Plant requires the operation of 128 pumping stations, not including 417 small grinder pump installations. The following two tables list the number of pumping stations operated and maintained by individual communities and the District:

PUMPING STATIONS OPERATED AND MAINTAINED BY COMMUNITIES

Owner	Number of Pumping Stations	Number of Grinder Stations
City of Middleton	8	
City of Monona	7	
Village of Cottage Grove	4	
Village of Dane	1	
Village of DeForest	1	1
Village of McFarland	4	1
Village of Shorewood Hills	1	
Village of Waunakee	2	1
Town of Blooming Grove Waunona S. D. No. 2	1	
Town of Dunn Kegonsa Sanitary District	5	354
Town of Pleasant Springs Sanitary District No. 1	9	55
Town of Vienna Utility District No. 1	1	
Town of Vienna Utility District No. 2	1	
Town of Westport Utility Districts	10	1
Town of Windsor Sanitary District No. 1	3	
Town of Windsor Morrisonville S. D. No. 1	1	
State of Wisconsin: University of Wisconsin Campus University of Wisconsin Arboretum	 6 1	4
Dane County - Rodefeld Landfill	1	
Dane County - Vilas Zoo	1	
Total	**68**	**417**

PUMPING STATIONS OPERATED AND MAINTAINED BY THE DISTRICT

Owner	Number of Pumping Stations
Madison Metropolitan Sewerage District	17
City of Madison	29
City of Verona	1
Village of Maple Bluff	3
Town of Dunn Sanitary District No. 1	4
Town of Dunn Sanitary District No. 3	3
Town of Madison	3
Dane County Lake Farm Park	1
Total	**61**

Quantity of Wastewater

The District received 13,371,129,228 gallons of wastewater at the Nine Springs Wastewater Treatment Plant in 2012. This was a 9.7% decrease from 2011, due primarily to drought conditions. The average daily quantities of wastewater received from each municipality and through infiltration into the District's intercepting sewers in 2012 were as follows:

AVERAGE DAILY QUANTITIES OF WASTEWATER

Municipality	2012 (GPD)	% of Total
City of Fitchburg	1,981,000	5.42
City of Madison	23,619,000	64.65
City of Middleton	1,771,000	4.85
City of Monona	820,000	2.24
City of Verona	882,000	2.41
Village of Cottage Grove	612,000	1.67
Village of Dane	52,000	0.14
Village of DeForest	635,000	1.74
Village of Maple Bluff	138,000	0.38
Village of McFarland	541,000	1.48
Village of Shorewood Hills	146,000	0.40
Village of Waunakee	1,398,000	3.83
Town of Blooming Grove	5,600	0.02
Town of Blooming Grove San. Dist. No. 2	131,000	0.36
Town of Blooming Grove San. Dist. No. 10	16,000	0.04
Town of Burke Util. Dist. No. 2	4,400	0.01
Town of Burke Util. Dist. No. 6	800	<0.01
Town of Dunn San. Dist. No. 1	127,000	0.35
Town of Dunn San. Dist. No. 3	59,000	0.16
Town of Dunn San. Dist. No. 4	9,000	0.02
Town of Dunn Kegonsa San. Dist.	123,000	0.34
Town of Madison	740,000	2.03
Town of Middleton San. Dist. No. 5	23,000	0.06
Town of Pleasant Springs San. Dist. No. 1	60,000	0.16
Town of Verona	600	<0.01
Town of Verona Util. Dist. No. 1	21,000	0.06
Town of Vienna Util. Dist. No. 1	67,000	0.18
Town of Vienna Util. Dist. No. 2	22,000	0.06
Town of Westport Util. Dist. No. 1	145,000	0.40

Municipality	2012 (GPD)	% of Total
Town of Westport Util. Dist. No. 2	292,000	0.80
Town of Westport Util. Dist. No. 3	13,000	0.04
Town of Westport Util. Dist. No. 4	9,700	0.03
Town of Westport - Cherokee Golf & Tennis	7,400	0.02
Town of Windsor San. Dist. No. 1	249,000	0.68
Town of Windsor San. Dist. No. 3	400	<0.01
Town of Windsor - Illinois Foundation Seed	100	<0.01
Town of Windsor - Hidden Springs San. Dist.	3,700	0.01
Town of Windsor - Lake Windsor San. Dist.	20,000	0.05
Town of Windsor - Morrisonville San. Dist.	26,000	0.07
Town of Windsor - Oak Springs San. Dist.	22,000	0.06
Total Wastewater	34,792,000	95.23
Infiltration into District Interceptors	1,741,000	4.77
Total Received at the Treatment Plant	36,533,000	100

Wastewater Treatment

The Nine Springs Wastewater Treatment Plant is located in the Town of Blooming Grove at the intersection of South Towne Drive and Moorland Road. In 2012, the Nine Springs Wastewater Treatment Plant met all WDNR discharge limitations for the 6th consecutive year. In 2012, NACWA (National Association of Clean Water Agencies) awarded the District a platinum award for this consistent high level of performance.

Preliminary treatment includes influent wastewater fine screening and grit removal. Fine screening is accomplished with three rotating band screens with 5 mm openings and a vortex grit system is used for grit removal. Variable speed drives for the band screens are used to control the influent well level and to maintain a minimum level above the influent flow meters. Grit is removed continuously from three vortex grit chambers. The dewatered grit and screenings are conveyed to dumpsters and hauled by a contractor to the landfill three to five times per week.

All material removed by the fine screens is conveyed to a screenings processing well. Two to four times a day the grit is removed from the well. The grit and accompanying rags are pumped to a separate settling basin, termed a “Snail”. The material settled in the Snail is conveyed to the larger dumpsters with grit and screenings.

Following preliminary treatment, nineteen primary settling tanks are used to remove floatable and settle-able material from the wastewater. The wastewater from primary settling is then biologically treated in the activated sludge system. The activated sludge system consists of tanks with anaerobic, anoxic, and aerobic zones configured for biological phosphorus removal, ammonia removal, and decomposition of organic material. The secondary clarifiers are a combination of center feed/peripheral draw off and peripheral feed/peripheral draw off configurations and efficiently remove the suspended bacterial solids to meet advanced secondary standards. Most of the solids, which contain the microbial culture, are pumped back

to the aeration tanks. A certain percentage of solids are wasted every day to maintain a desired bacterial growth rate. An eight to ten day solids retention time is normally maintained in the process.

During 2012, the secondary portion of the Nine Springs Wastewater Treatment Plant was operated as four separate plants. Effluent from the individual plants was monitored to ensure adequate process control and to provide information on differing operating modes.

The treated water is disinfected by ultraviolet irradiation from April 15th through October 15th and pumped to Badfish Creek and Badger Mill Creek. In 2012, approximately 33.71 million gallons per day (mgd) on average were pumped to Badfish Creek and 3.49 mgd were pumped to Badger Mill Creek.

The open-channel ultraviolet disinfection system has met the effluent fecal coliform concentration standard since start-up in 1997. All lamp banks are cleaned with citric acid in the winter months when disinfection is not required. Lamp and ballast replacement is also accomplished during this period.

The primary sludge is removed from the 19 primary settling tanks on a continuous basis and pumped to two gravity-thickener tanks. The solids concentration from the gravity thickeners averaged 5.1% in 2012. The waste-activated sludge is thickened in two dissolved-air-flotation (DAF) units. The solids concentration from these units averaged 3.9% in 2012. One gravity belt thickener is also available to thicken waste-activated sludge (WAS). From January to August, 2012, and again in December, 2012, a portion of the WAS was thickened to approximately 5.8% on the gravity belt thickener to relieve the loadings to the DAF thickeners.

The anaerobic digestion process was operated as a mesophilic digestion system throughout 2012. The feeding pattern remained in a modified single stage digestion mode, where 100% of the primary sludge and less than 50% of the WAS was fed to the east digesters which have gas mixing systems. The average detention time was approximately 16 days. The remainder of the WAS was fed to the west digesters along with approximately 50% of the effluent sludge from the east digesters. The west digesters have less capacity, but have mechanically-mixed systems less susceptible to foaming. The average detention time in the west digesters was approximately 14 days. The purpose of this feeding method was to reduce the foaming problem in the east gas-mixed digesters. All east digesters were fed and heated to a temperature of approximately 98 degrees Fahrenheit, and the west digesters were heated to between 91 and 96 degrees Fahrenheit. Foaming problems were kept in check by a combination of this feeding pattern, intermittent mixer operation, lowering the digester operating levels, and use of defoamant. A chemical defoamant was added to the east digesters from January to May, 2012, and beginning again in November, 2012. Operation in the current feeding pattern, and the addition of chemical defoamants, are expected to continue until upgrades are made to the digestion system as part of the Eleventh Addition construction project.

The digested biosolids concentration averaged 2.5% in 2012. The digested biosolids were thickened from 2.5% to an average concentration of 5.8% by the addition of polymer on gravity belt thickener # 2. An average of 21.7 tons/day of digested biosolids was thickened in 2012. The polymer used for thickening was a liquid emulsion polymer.

The thickened and digested biosolids are either pumped directly to truck loading facilities or to the Metrogro storage tanks. During the winter, all biosolids are stored in the Metrogro storage tanks. The tanks have a storage capacity of 19.5 million gallons. All biosolids are hauled and applied to cropland as a soil conditioner and fertilizer. The digested biosolids are marketed by the District under the name of "Metrogro."

As a by-product of the anaerobic digestion process, gas is produced that is approximately 60% methane. The District supplements digester gas production with natural gas purchased from Madison Gas and Electric. Digester gas usage averaged 831,000 cubic feet per day in 2012. Part of the digester gas was used to fuel boilers for plant heating and to fuel a 650 horsepower blower engine, which provides air to aeration tanks. The remainder of the gas is used to fuel two generator engines in Sludge Control Building #2. Prior to use in the engines and boilers, the gas is treated by a gas treatment system which removes moisture, hydrogen sulfide, and siloxanes from the gas. An average of 21,100 kW-hrs of electricity was generated each day in 2012; and the engine blower saved the purchase of approximately 8,770 kW-hrs per day of electrical energy.

The District takes advantage of the heat recovered from the engines to heat anaerobic digesters and most plant buildings. Jacket water heat and engine exhaust heat are recovered from all three engines when available. Lube oil heat is recovered from the generator engines, but not from the blower engine. If plant heating demands cannot be satisfied with recovered heat, there are three sets of three boilers available for satisfying the heating load.

During 2012, work continued to define monitoring and exhaust stack requirements for the plant engines and boilers necessary for an operating air permit from the Wisconsin Dept. of Natural Resources. An air permit for existing facilities was received near the end of December.

The 2012 wastewater treatment data are reported in accordance with the District's Wisconsin Pollutant Discharge Elimination System (WPDES) Permit and a summary of this information is shown in the table "Yearly Log-Plant Operations." Monitoring data for effluent metals are reported in the table "Influent and Effluent Metal Concentrations."

Madison Metropolitan Sewerage District
Influent and Effluent Metal Concentrations
2012

Date of Sample	Effluent MGD	Cadmium (T) (PPB) Inf	Cadmium (T) (PPB) Eff	Chromium (T) (PPB) Inf	Chromium (T) (PPB) Eff	Copper (T) (PPB) Inf	Copper (T) (PPB) Eff	Lead (T) (PPB) Inf	Lead (T) (PPB) Eff	Mercury (T) (PPT) Inf	Mercury (T) (PPT) Eff	Nickel (T) (PPB) Inf	Nickel (T) (PPB) Eff	Zinc (T) (PPB) Inf	Zinc (T) (PPB) Eff
1/10/12	36.46										0.898				
1/12/12	36.09	q 0.08	< 0.08	4.33	< 1.2	72.0	q 5.76	4.06	< 0.8	86.9		q 2.67	q 1.34	127	59.7
2/7/12	37.85	q 0.12	< 0.08	4.80	< 1.2	76.5	q 9.38	q 2.47	< 0.8	86.7	0.628	q 2.22	q 1.53	135	55.5
3/6/12	40.06										1.78				
3/7/12	40.03	q 0.07	< 0.06	4.25	< 1.0	63.0	q 7.18	q 2.38	< 1.4	146		q 2.34	< 0.8	109	47.3
4/10/12	37.83	q 0.16	< 0.06	3.79	< 1.0	73.0	8.84	q 2.94	< 1.4	103	1.11	q 1.70	< 0.8	142	37.8
5/8/12	43.56	q 0.07	< 0.06	6.45	< 1.0	68.9	82.8	q 2.65	q 2.93	75.3	1.41	3.49	q 0.95	127	59.1
6/5/12	37.54	q 0.14	< 0.06	q 2.90	< 1.0	74.4	6.26	q 2.56	< 1.4	141	1.23	3.58	< 0.8	131	55.5
7/10/12	37.88	q 0.19	q 0.07	3.49	< 1.0	83.4	7.66	q 3.78	< 1.4	120	1.19	q 2.31	< 0.8	147	52.0
8/7/12	37.48	q 0.19	< 0.06	q 3.20	< 1.0	84.0	8.33	q 3.02	< 1.4	145	0.971	3.39	q 2.14	156	45.5
9/11/12	36.76	0.44	0.21	3.92	< 1.0	80.4	6.07	q 1.95	< 1.4	88.0		3.25	q 1.06	152	49.9
9/12/12	37.32										1.14				
10/9/12	36.16	0.25	q 0.10	5.22	q 1.58	91.4	8.20	q 2.33	< 1.4	64.4	1.06	3.22	q 1.41	152	56.0
11/6/12	37.12	0.24	< 0.06	3.98	< 1.0	72.9	q 4.54	q 4.10	< 1.4	103	1.06	q 1.50	< 0.8	135	42.6
12/11/12	35.97	0.38	0.28	3.43	< 1.0	169	7.26	7.14	< 1.4	130	1.08	q 2.03	q 1.18	152	45.3

"<" validation code indicates that sample concentration is less than the method detection limit

"q" validation code indicates that sample concentration is less than the limit of quantitation and above the method detection limit

Madison Metropolitan Sewerage District
Nine Springs Wastewater Treatment Plant
YEARLY LOG -- PLANT OPERATIONS
2012

Month	Influent Flow (MGD)	BFC Effluent Flow (MGD)	BMC Effluent Flow (MGD)	BOD RAW BOD (MG/L)	BOD Effluent BOD (MG/L)	TSS RAW TSS (MG/L)	TSS Effluent TSS (MG/L)	Nitrogen RAW TKN (MG/L)	Nitrogen Effluent Ammonia (MG/L)	Phosphorus RAW TP (MG/L)	Phosphorus Effluent TP (MG/L)	Effluent FCOLI MPN/100 Mean(1)	Min Hr Effluent D.O. (MG/L)
Jan - 12	36.24	33.27	3.42	243	4.0	227	3.2	43.7	0.13	5.9	0.18		7.43
Feb - 12	37.12	34.44	3.19	268	4.2	257	3.7	44.6	0.13	5.9	0.16		7.37
Mar - 12	38.56	35.94	3.40	254	4.3	228	3.4	43.5	0.17	5.8	0.18		5.58
Apr - 12	37.55	34.23	3.54	257	4.3	249	3.9	43.6	0.30	5.8	0.20	49	6.72
May - 12	38.74	36.28	3.53	241	3.7	219	3.9	41.9	0.27	5.7	0.22	56	6.25
Jun - 12	36.40	33.65	3.57	271	4.7	255	6.2	43.4	0.16	6.0	0.36	129	5.23
Jul - 12	36.99	34.21	3.56	235	4.0	222	5.1	39.7	0.15	5.5	0.51	127	5.56
Aug - 12	36.05	33.11	3.58	256	3.8	247	4.7	43.8	0.21	5.9	0.28	253	5.18
Sep - 12	35.71	32.55	3.58	250	3.7	247	4.5	46.8	0.22	6.2	0.26	146	6.20
Oct - 12	37.09	33.16	3.58	281	4.3	277	4.4	46.4	0.19	6.2	0.27	137	6.46
Nov - 12	35.14	32.19	3.57	270	4.9	248	4.9	48.1	0.12	6.2	0.24		6.80
Dec - 12	34.09	31.55	3.36	296	4.8	264	4.0	48.8	0.13	6.3	0.20		5.32
Average	36.64	33.71	3.49	260	4.2	245	4.3	44.5	0.18	6.0	0.26	128	6.17

BFC is to Badfish Creek Outfall

BMC is to Badger Mill Creek Outfall

(1) Geometric mean

METROGRO OPERATION

The District recycles biosolids to agricultural land through its Metrogro Program. Summary hauling and cost information for each of the past five years is given in the following table.

Year	2007	2008	2009	2010	2011	2012
Gallons Recycled (MG)	38.2	38.1	41.5	37.5	38.4	38.2
Dry Tons Recycled	7,380	7,720	8,219	7,580	7,955	7,925
Acres Applied	4,758	4,566	5,129	4,646	4,863	4,796
Program Cost ($000)	$1,335	$1,453	$1,511	$1,364	$1,605	$1,388
$/1000 Gallons	$35.13	$38.16	$36.41	$36.40	$41.77	$36.38
$/Capita	$4.05	$4.31	$4.45	$4.01	$4.72	$4.08
$/Dry Ton	$181	$188	$184	$180	$202	$175

The District continues to produce a high quality biosolids product. Metal concentrations in 2012 were below the concentrations used by EPA to define an exceptional quality biosolid. (Note: WDNR uses the term “high quality" in NR 204).

Metrogro Biosolids Quality-2012 Average Values

Parameter	Concentration	EPA EQ Limit*	EPA Ceiling Limit	Units (Dry Weight)
Total Solids	5.04	NA	NA	%
TKN	8.1	NA	NA	%
NH3-N	3.4	NA	NA	%
Total-K	0.6	NA	NA	%
Total-P	4.0	NA	NA	%
Arsenic	4.9	41	75	mg/kg
Cadmium	1.2	39	85	mg/kg
Chromium	47.4	NA	NA	mg/kg
Copper	556	1,500	4,300	mg/kg
Lead	35.1	300	840	mg/kg
Mercury	1.0	17	57	mg/kg
Molybdenum	22.3	NA	75	mg/kg
Nickel	22.9	420	420	mg/kg
Selenium	5.8	100	100	mg/kg
Zinc	712	2,800	7,500	mg/kg
PCB	<0.0090	NA	NA	mg/kg

*EQ means “exceptional quality”
NA means not applicable
< data qualifier is used if one or more of the monthly values used to calculate the yearly average is reported as below the analytical limit of detection.

Environmental monitoring to support the Metrogro program continued in 2012. Approximately 650 water samples were collected from private wells, with samples being analyzed for a number of parameters, including nitrate nitrogen and coliform bacteria. Soil samples were also collected, with the soil test recommendations being used to determine Metrogro application rates.

Farmers are compensated for providing land for biosolids application in the late Spring and early summer months. A change was made to this compensation program in 2009 in an effort to control costs. A standard payment structure was instituted based on the date at which application to a given field is completed. Because of dry weather during the spring application season, application was completed early. This resulted in significantly lower compensation costs than were required in 2011.

MetroMix Program

The District's goal is to diversify its overall biosolids management program by developing a soil-like product(s) called MetroMix. MetroMix will be produced by combining dewatered biosolids with materials such as sand and sawdust to provide bulk and texture. Wide scale production and distribution of MetroMix will not occur until after completion of the Eleventh Addition to the Nine Springs Wastewater Treatment Plant.

The District is in the research and development phase of the MetroMix Program. The District is providing laboratory support and other in-kind contributions for a four-year field research project being conducted jointly by the University of Wisconsin-Madison, the Virginia Polytechnic Institute, and State University (Virginia Tech) that is funded by USDA. This project is evaluating use of biosolids (including MetroMix) in sod production as an alternative to traditional production systems that use commercial fertilizer.

Findings to date from the Wisconsin portion of the research project indicate that applying biosolids cake at 450 lbs/acre of plant available nitrogen, which is twice the agronomic nitrogen rate for Kentucky bluegrass, may maximize sod quality and strength. The research has also shown that blended biosolids (MetroMix) offer no advantages to cake biosolids, and often resulted in poorer sod quality compared to the cake biosolids. This finding is important as it has economic implications regarding the biosolids use for commercial turf production. Use of blended biosolids involves additional handling costs, increases the overall volume that needs to be handled, and may involve the purchase of amendments (e.g. sand and sawdust) needed to make the blended material. It is likely that a blended biosolids product will still be needed for end uses that involve direct public distribution due to handling, aesthetic and other considerations.

Overall, use of biosolids could result in savings for sod production. Preliminary calculations suggest that sod producers could save approximately $200/acre in production costs by using biosolids. Ongoing research is evaluating customer acceptance of sod grown with biosolids, quantifying the amount of soil removed during sod harvesting, and evaluating the physical and chemical properties of soil amended with biosolids.

INFORMATION SYSTEMS ACTIVITY

The District's Information Systems (IS) workgroup provides infrastructure and software support for the departments and applications listed below.

Administration:
Budgeting, Document and Records Management (OnBase), Microsoft Exchange (Outlook email and calendars), Microsoft Office applications, Pretreatment, Pump Station Billing, Rate Setting, Security, User Change Billing, Work and Asset Management (WAM), and Web Site Management.

Engineering:
Construction Administration, Construction Plan Holders, Geographical Information System (GIS), Collection System, Annexations, and Easements.

Operations and Maintenance:
Metrogro Hauling and Land Application, Operations (Regulatory) Reporting, Laboratory Analysis, Process Control Data Transfer and Analysis, Process Control System reporting, Oracle Work and Asset Management, Lock-out/Tag-out.

Information Systems Staff were also involved in the following projects and activities in 2012**:**

- Completed an upgrade to the District's Oracle Work and Asset Management System (provides tools for work orders, purchasing, inventory, timekeeping, etc.). This involved work and support for the applications, database, and hardware needed to run the system.
- Extensive involvement in the Process Control System Upgrade project especially input and recommendations for the design of the network infrastructure.
- Extensive involvement in the Data Acquisition and Reporting Center (DARC) and Metrogro Database Upgrade projects, including project management, database design, and application design.
- Design, procurement, and installation of a plant-wide wireless system that covers nearly all of the plant grounds.
- Completion of an upgrade to the District's Document Management System (OnBase), including work and support for the application, database, and hardware.
- Upgrades to District network infrastructure (hardware, cabling, servers, switches, routers, etc.), including design and implementation.
- Continuation of server virtualization and reduction of physical servers from 18 to 13.
- Upgrades to the District's Construction Administration database, so that we can more easily track change orders, daily notes, assets, and submittals related to the Eleventh Addition.
- Greatly improved our systems used to monitor and prevent spyware and virus infections. These types of problems were nearly eliminated.
- Completion of a Lock-out/Tag-out system for the Operations Department; this project included a database and applications for entry and review.

- Design changes to the District's external web site to allow for the inclusion of project related information. Examples of these are new web pages for Yahara WINS and the Pump Station 18 Construction Project.
- Hiring and training of a new Network Technician.
- Normal budgeted replacement of servers, PCs, switches, and laptops.

RESEARCH

UW Engineering Department/Poly-Aluminum Chloride Impact on Foaming

Work continued on the study initiated in 2011 to evaluate the effectiveness of poly-aluminum chloride (commonly referred to as PAX) in controlling foam in anaerobic digesters. PAX is widely known to be effective in alleviating microorganism caused foaming in activated sludge aeration basins (although the specific mechanism that achieves this effectiveness is not clearly understood), but the impact on anaerobic digester foaming from PAX carried over into the anaerobic digesters with the WAS is not known. The project team was assembled in conjunction with the University of Wisconsin-Madison, and comprised of Dr. Dan Noguera (Principal Investigator, or PI) with his graduate student Klare Keadle, and Dr. Sharon Long with her student assistant Zachary Carroll. Dr. Long's group operated the bench scale anaerobic digesters (the same bench scale digesters used in her previous study) to assess the impact of PAX on the foam from the standpoint of foam propensity and stability. Samples of the foam from these bench scale digesters and samples from the full-scale aeration basins and anaerobic digesters were provided to Dr. Noguera's group for genomic DNA analysis to positively establish the identities of the predominant microorganisms as well as to track the impact of the PAX on these populations. As a side study, Dr. Long's team operated two additional bench scale digesters with higher and lower volatile solids (VS) loading to assess the rough impact of VS loading on foam potential.

PAX addition (in the form of PAX-18) was commenced February 22, 2012 by dosing into the return sludge for "Plant #1". The PAX storage and dosing equipment was located in Aeration Control Building No. 2, and chemical dosing was accomplished by a small metering pump drawing from the bulk storage tote and releasing it into the return activated sludge well. Foam conditions of the sludge at bench scale were lower than observed in previous years, however, and this was attributed at least in part to the unusually warm and mild winter experienced. Because of this and the relatively low Microthrix counts observed, it was decided to temporarily halt feeding of PAX on Monday March 5th. After evaluation of the information, the dosing of PAX was resumed on April 2nd and continued through April 30th. The bench scale digesters were continued to be fed and operated through the 14th of June to allow the effects of residual PAX in the feed to dissipate and the sludge return to normal. Throughout this study, control sludge from Plant #4 was prepared and fed to an untreated bench scale digester in order to provide a control for comparison with the experiments described above.

Unfortunately, this study did not discover a definitive cure for anaerobic digester foaming. There were a number of interesting and useful results obtained from the study nonetheless. First and most basic, it appears that foam observations in the bench scale digester implicated heavier loadings as a contributing factor to anaerobic digester foaming.

A second area where knowledge was gained was in contributing to an understanding of the mechanism of how PAX actually functions. Two theories of how PAX functions exist, the first theory being it kills Microthrix (either outright toxicity or by interfering with the ability of the organism to intake nourishment), the second theory that it assists in flocculation of the Microthrix and thus makes it easier to remove. Because PAX is effective in aeration tanks, and is not widely used, there apparently has not been a lot of effort expended on understanding why it works, so when it was considered for alleviation of digester foaming it became clear that it could be really effective, or, it may make foaming worse by concentrating the Microthrix (depending on how it actually functioned). Based on counts of Microthrix, the data seems to favor (but not prove) PAX working as a flocculating aid.

The third and most important area of knowledge gain was with respect to if Microthrix is the primary culprit responsible for foaming in anaerobic digesters. DNA analysis confirmed Microthrix present, but high counts of Microthrix did not positively correlate to high foaming propensity, nor did low Microthrix counts correspond to low foaming propensity. It seems that while Microthrix is often present and probably a contributor, the information collected in this study tend to show Microthrix as not the probable primary cause of anaerobic digester foaming. Work done on samples in conjunction with this study, performed separately by the Madison Metropolitan Sewerage District Laboratory staff, examined the possible factor of exocellular polymer. The test for this is time consuming and that fact—combined with not starting this part with the initiation of the PAX study—meant that we do not have a lot of data points yet. What data we do have seems to indicate that the presence of excess exocellular polymeric substances (EPS) in the microorganisms in the WAS may be a major factor in anaerobic digester foaming. EPS is expected to be present in greater quantities in WAS from biological phosphorus removal facilities like Nine Springs, and could explain higher apparent foam potential since we adopted biological phosphorus removal in 1996. The laboratory continues to periodically run these tests to gain more data.

From a research standpoint, the decision was made to suspend research in this area until after the Eleventh Addition is on-line. This is because there is belief in the engineering field by some who feel acid-phase digestion will reduce foaming in anaerobic digesters, and if this is the case the issue may resolve itself. It is planned to continue to monitor the WAS for EPS levels in-house, and to revisit the need for research in this area once the Eleventh Addition is far enough along to realistically estimate the impacts of these facility and process changes on anaerobic digester foaming. The results of the PAX study have been accepted for presentation at the CSWEA Annual Conference (Madison) in May and have been submitted for presentation at WEFTEC 2013 (Chicago) in October.

Prodex Testing

Early in 2012 a company called Prodex was brought to our attention that had a product that was claimed to increase gas production by enhancing digester biological activity (Biological Activity Enhancer, or BAE). BAE is basically humeric acid derived from peat, and thus is considered relatively safe. The product claims to be capable of increasing gas production 10% to 30% without negative impacts. Given that we learned of this product from reputable third parties we agreed to meet with Prodex to discuss the possibility of a trial. After meeting and discussing, we agreed to conduct a side-by-side trial of the BAE product on digesters #4 and #5. Digesters #4 and #5 were selected because they are the most similar in construction and feed

characteristics and would be fairly straightforward to conduct a side-by-side test to see if BAE had potential benefits for Nine Springs. The BAE product was provided free of charge to the District along with the dosing equipment; the District paid for shipping and provided on site monitoring of the test.

Testing began on July 10, 2012, with addition of the recommended amount to Digester #4; Digester #5 was operated as consistent as possible with the test digester, so for example any changes in mixing time for one were made to the other irrespective of need, so that the impacts of BAE could be discerned as clearly as possible with minimal outside interferences. The testing quickly ran into problems with the dosing and mixing equipment provided by Prodex, and as such the feed rates as well as the consistency of the BAE fed varied considerably. These issues prevented feeding of BAE to the digester from July 31st to August 27th (with the exception of 2 days). At resumption of testing, the dosing to the digester was done manually by Nine Springs staff. All testing was concluded on September 19th.

The overall results of the test did not indicate any discernable difference in gas production or other digester characteristics during the test. It should be noted that Prodex recommends whole-plant testing as well as much more consistent feeding and mixing of the product for best results, and that consistent introduction of BAE for 45-60 days is needed to see results. It is possible that given we did not meet these criteria Prodex did not get a fair trial. However, as of the time of test conclusion Prodex had not provided a convincing explanation of how this product enhances gas production without adding carbon or increasing volatile solids destruction. A fair statement may be that Nine Springs staff remains unconvinced of the effectiveness of the Prodex product as it pertains to solids handling operations at the Nine Springs facility.

MMSD Golf Course Demonstration Project

Working in cooperation with the City of Fitchburg and the Nine Springs Golf Course, effluent is being used to irrigate a 5,200 square foot area on the 7th hole of the golf course, which includes the former green and portions of the adjacent fairway. This demonstration project began in 2004 as part of the District's on-going effort to evaluate opportunities to promote the beneficial reuse of effluent. The following table shows various application statistics for the past six years:

Golf Course Irrigation Summary Information

General Information	2007	2008	2009	2010	2011	2012
Demonstration area (ft^2)	5,200	5,200	5,200	5,200	5,200	5,200
Irrigation period	7 May-6 Oct	16 May-27 Sept	26 June-24 Sept	11 Jun-12 Oct	09 May-08 Oct	17 May-09 Oct
Days irrigated	71	79	45	46	68	106
Total volume (gallons)	56,460	69,750	39,240	40,110	68,640	94,430
Total gallons/acre	473,000	584,000	327,000	336,000	574,990	774,310
Total gallons/acre/day*	6,662	7,400	7,267	7,305	8,456	7,305
Precipitation equivalent (in)	17.5	21.6	12.1	12.4	21.3	28.7

Commercial Fertilizer Additions						
General Information	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Total Nitrogen (lbs/acre)	33	11	174	174	0	131
Total Phosphorus (lbs/acre)	0	0	0	0	0	0
Total Potassium (lbs/acre)	8	5	87	87	87	37
Effluent Additions						
Total Nitrogen (lbs/acre)	66	77	48	48	91	124
Total Phosphorus (lbs/acre)	1.8	1.6	1.1	1.0	1.8	2
Total Potassium (lbs/acre)	54	67	38	35	62	56

A 2011 study conducted by the University of Wisconsin-Madison Water Resources Management Program that examined effluent reuse opportunities evaluated the golf course irrigation project. This study noted excess sodium has the potential to negatively impact soil structure and permeability. One measure of excess sodium is the Exchangeable Sodium Percentage (EPS). Soil cores collected during the 2011 study noted high EPS levels. However, visual observations of turf grass health and soil quality are the most effective method of evaluating potential impacts. Visual observations have noted no problems to date. EPS levels at the demonstration site point to the need for additional evaluation prior to undertaking a larger scale irrigation project.

Phosphorus-Watershed Adaptive Management Pilot Project

Watershed adaptive management is a new, innovative, and collaborative compliance approach for point-sources of phosphorus discharge in Wisconsin designed to meet regulatory requirements for phosphorus throughout a watershed in a cost-effective manner. Wisconsin is currently the only state that includes this compliance option. The District, in partnership with Dane County, Wisconsin Department of Natural Resources (DNR), and multiple cities, villages, and towns in the Yahara watershed initiated a watershed adaptive management pilot project to address phosphorus reductions required under the Rock River Total Maximum Daily Load (TMDL). This is the first project of its kind in Wisconsin. The pilot project began in 2012 and will run through 2015.

Pilot project efforts in 2012 were primarily associated with building the basic infrastructure needed to support future work. Significant activities included:

- Development and full execution of the MOU that identifies the administrative and financial framework for implementing the adaptive management pilot project.
- Development of a project website.
- Award of a $1.3-million Mississippi River Basin Initiative Grant from the United States Department of Agriculture to support phosphorus reduction practices in the pilot watershed area.
- Commencement of water quality monitoring activities including the installation of four United States Geological Survey (USGS) gauging stations.
- Commencement of multiple research projects designed to better understand phosphorus loss.

This project's strong focus in 2013 will be on inventorying current phosphorus reduction practices, implementing new phosphorus reduction practices, conducting research on phosphorus mitigation approaches, and developing information needed to make informed decisions regarding long term approaches to comply with TMDL requirements.

INDUSTRIAL PRETREATMENT PROGRAM

Pollutants in industrial wastewater may compromise the health of staff, inhibit the treatment plant processes, or lead to environmental releases of regulated substances. The national pretreatment program protects against these adverse effects through its role in implementing Clean Water Act pollutant discharge elimination requirements. The pretreatment section operates a permitting program with twenty categorical industrial users. Permits are maintained with about 50 waste haulers and non-industrial wastewater sources as well. Additionally, some pollutants are controlled at the sources through source reduction and pollution prevention programs implemented by the pretreatment section.

Industrial permits were reissued for two facilities; a new permit was issued to a pharmaceutical manufacturing facility. All industrial permittees received annual inspections, and compliance monitoring of regulated wastewater discharges occurred in both semi-annual periods. No third party or regulatory audits of the industrial pretreatment program were conducted in 2012. Four industrial permittees were cited for significant noncompliance (SNC) in the annual publication of SNC in the newspaper.

Section staff continued to perform waste acceptance reviews and to respond to non-permitted industrial, hauled waste, and other waste acceptance requests. Septage hauling permits were issued to 25 hauling companies. A new non-typical wastes permit was prepared for discharges of precipitation and other wastewater at UW-Madison cattle barns.

The section's pollution prevention efforts for mercury remained at maintenance levels while added emphasis was applied towards chloride reduction outreach and planning. The success of the mercury control program is evident in wastewater effluent testing. The annual average value of mercury in monthly testing results was 1.1 parts per trillion. The chloride program measures the presence of chloride in effluent in hundreds of parts per million (ppm) and tens of thousands of pounds. Chloride mass reduction was apparent in 2012 (annual mass was 8% lower than 2011) due, in part, to a somewhat snow free winter (2011-2012). Yet, chloride concentration reached the highest recorded annual average value (412 ppm) due, likely, to drought conditions and diminished wastewater flows that persisted throughout 2012. The addition of a department Environmental Specialist position bolstered the section with a vital chloride program planning and project implementation resource.

The success of the first five years of the Mercury Pollutant Minimization Plan allowed scaled back efforts by the section, particularly in regards to the dental sector. Dental clinic site visits were not performed in 2012; each of 104 dental clinics submitted revised best management practices reports to the District. The fifth annual report of the mercury program featured the continual improvement in wastewater effluent mercury levels.

The second chloride reduction program status report to DNR was submitted in 2012. Development of the chloride team and program planning dominated the activities of the section. Informational and educational efforts included meetings with UW-Madison, water softening companies, Kraft – Oscar Mayer Foods, preparation of a bill stuffer for the City of Fitchburg, initiation of survey work with the Madison Water Utility, and identification of new program partners.

ACCEPTANCE OF SEPTAGE AND ATYPICAL WASTES

Hauled wastes have been accepted at Nine Springs Wastewater Treatment Plant since 1986. In 2012, the District accepted wastewater from 25 permitted septage haulers and several non-typical haulers or sources. The haulers are charged a specific rate for each category of septage or type of hauled wastes that reflects the District's cost of treating the wastes. In 2012, hauled wastes revenue at $333,000 was nearly unchanged from 2011. Over 22 million gallons of wastewater were received in 2012.

The following table lists the five domestic septage categories, the number of gallons of septage received during 2012, and the percent of increase or decrease in volume from 2011 to 2012.

Domestic Septage Received

Septic Tank	Holding Tank	Grease Trap	Settling Basin	Portable Toilet
6,259,000	13,316,000	510,000	237,000	271,000
11% decrease	11% decrease	4% increase	unchanged	16% increase

The hauled wastes receiving facility is the discharge point for other wastewater not characterized by the five domestic septage categories. In 2012, other wastewater types and volumes received included:

Other Wastewater Received	Volume (gal)
Village of Brooklyn Biosolids (47 loads)	235,000
Village of Belleville Biosolids (39 loads)	195,000
Village of Oregon Biosolids (3 loads)	16,000
UW Lagoon, Mt. Horeb (21 loads)	105,000
Refuse Hideaway Landfill Leachate	269,000
Verona Landfill Leachate	39,000
Middleton Landfill Leachate	14,000
Slaughterhouse Wastewater	230,000
Sanimax Gray Water	626,000
NFP Pet Food Wastewater	105,000
Other Industrial Wastewater	10,000
Remediation Projects Groundwater	16,000
WVDL Tissue Digester Residue	18,000
Total Other Wastewater Received	**1,878,000**

LAGOON SITE SUPERFUND PROJECT

Routine Operations and Maintenance activities continued in 2012. These activities included monthly visual inspections of capped areas and containment dikes, dike stability monitoring, water management and vegetation control. The cap continues to perform as intended and routine Operations and Maintenance activities will continue in 2013. The U.S. EPA is required by law to conduct a formal review of all Superfund Projects every five years. The EPA began conducting the five year review of the lagoon site in late 2012, with a final report anticipated by the second quarter of 2013. It is expected that the review will show that the cap continues to perform as intended.

WATERSHED PROJECTS

Watershed Monitoring Program

The District conducts monitoring activities in both the Yahara and Sugar River Watersheds to help assess the overall condition of select streams. Monitoring initiatives include the collection of water chemistry samples, and evaluating the fish and macroinvertebrate communities to determine the biological health of select streams. In 2012 District staff collected all water chemistry and macroinvertebrate samples, and assisted a contractor (Underwater Habitat Investigations) in evaluating the fish communities. All water chemistry samples were analyzed at the District's laboratory. Macroinvertebrate samples from two sites were sent to the University of Wisconsin Stevens Point for sorting and evaluation using the same laboratory that is used by the Wisconsin Department of Natural Resources. Fish data were compiled by a local company called *Underwater Habitat Investigations*.

In general, water quality as measured by water chemistry and the biological communities (fish and macroinvertebrates) is similar to the previous year, although data for macroinvertebrate comparisons was limited as of the printing of this annual report since the District was testing use of a new laboratory for macroinvertebrate identification. With regard to fish communities the number of fish species present in both Badfish Creek and Badger Mill Creek/Sugar River were down slightly from 2011, but almost identical to 2010. The slight dip in 2012 may have been due partly to the high ambient air temperatures, high in-stream temperatures and drought conditions encountered during 2012. As was the case in 2011, Green Sunfish and White Suckers were the dominant species in Badfish Creek and the White Suckers and Brown Trout were the dominant species in Badger Mill Creek/Sugar River. Researchers have proposed that a new metric be used to evaluate biotic integrity in cool and warm water streams in Wisconsin. This metric has not been tested yet on effluent dominated streams such as Badfish Creek, but if applicable would show higher in-stream quality than historical metrics.

In July 2012, a decision was made to collect water chemistry samples at select locations in the Yahara Watershed on a monthly basis during the growing season (May-October) to support decision making for a future phosphorus watershed adaptive management project in the Yahara Watershed. This frequency will continue in 2013.

The District also has joint funding agreements with the United States Geological Survey for two gauging stations in the Yahara Watershed and two gauging stations in the Sugar River

Watershed (Badger Mill Creek at Bruce Street and Sugar River at Hwy 69). Stations in the Sugar River Watershed include continuous monitoring for water temperature, dissolved oxygen and specific conductance.

In 2010 the Department of Natural Resources adopted water quality standards for temperature. The District will be impacted by these requirements when its WPDES discharge permit is reissued in 2015.

In late 2012 District staff installed continuous temperature probes at select locations in Badfish Creek and Badger Mill Creek to develop a more robust data set for temperature. Data collection efforts will continue in 2013 and the data will be used to evaluate options for complying with the water quality standards for temperature.

LABORATORY ACTIVITIES

During 2012 the District Laboratory performed a total of 50,902 analyses on 12,265 samples. These analyses included:

PARAMETERS	QUANTITY
Nutrients (TKN, TP, NH3-N, NO2-N, PO4-P, WEP)	14,530
Solids (Suspended and Total)	14,975
Biochemical Oxygen Demand	5,168
Anions (C1, NO3-N, SO4)	4,558
Field Measurements (pH, TEMP, COND, DO)	4,364
Metals	4,511
Bacteria (FCOLI, TCOLI, ECOLI, Salmonella)	1,347
Volatile Fatty Acids (VFA)	376
Misc. Testing (Alkalinity, Density, Oil and Grease, CN, WET)	1,073

The District laboratory was also involved in the following activities:

- The laboratory continued its relationship with the UW by providing analytical support for a UW research project on digester foaming. Research objectives included:
    - Evaluating the ability of polyaluminum chloride (PAX) to suppress foaming.
    - Using DNA sequencing to isolate the organisms thought to be responsible for foaming in anaerobic digesters and looking for possible correlation between foaming potential and organism numbers.
- Analysis for dissolved phosphorus in the selector basins was conducted in conjunction with an in-house study that was carried out to determine whether the PAX dose being tested would adversely impact phosphorus availability for the bio-P process. It was determined that the influence of PAX in the dosages we were testing was negligible.
- The laboratory analyzed numerous samples in support of the Yahara WINS Adaptive Management Pilot Study.
- The City of Madison Engineering Department continued to bring the lab samples from their monitoring program. The City collects samples from various points throughout the

collection system to use for billing purposes. The District analyzed 134 samples for TKN, TP, CBOD5, TSS, and pH. This partnership will continue in 2013.

- Laboratory analyses were conducted to identify sources of chloride reaching the plant, which are of importance when targeting chloride source reduction activities.

Other noteworthy activities in the laboratory during 2012 were the following:

- 100% of the results reported on the proficiency testing samples required for certification were acceptable.
- The lab submitted the documentation necessary to become a certified lab for the USGS. This certification will ensure that the data generated in support of the Adaptive Management Pilot Study will hold up to the scrutiny of the users of the data.
- Laboratory staff provided training for the Central States Water Environment Association's Operator Challenge Team that won first place at the Water Environment Federation's Annual Technical Exhibition and Conference-2012.
- Laboratory staff participated in a goal setting process to develop annual team goals for 2012. The goals that were set and accomplished for 2012 were:

    - Expand capabilities of the lab by incorporating the duties of the former research biologist into the lab. This included taking on increased water quality sampling and monitoring in addition to insect and fish sampling.
    - Ensure continued analytical capabilities in the lab with regards to analysis for mercury by evaluating prospective new analyzers, and purchase a unit to replace the existing unit that is aging and no longer serviced.
    - Updated display boards were designed to enhance the experience of tour participants when touring the laboratory.
    - Areas of the lab that are designated to be chemical and sample free have been clearly marked.

MAINTENANCE OF DISTRICT FACILITIES

The maintenance workgroups of the Operations and Maintenance Department are responsible for the maintenance of the Nine Springs Wastewater Treatment Plant, the District pumping stations, the non-District pumping stations covered by maintenance agreements, and the District's interceptor system. This work is performed by the Mechanical Maintenance Section, the Electrical Maintenance Section, the Building and Grounds Section, the Monitoring Services/Sewer Maintenance Section, and the Purchasing/Inventory Section.

Training of craftsmen continued to be an important function in 2012. Maintenance Department personnel serve on the Joint Apprenticeship Training Committee which oversees the activities of the apprenticeship programs for electricians and mechanics. Zenon Kochan completed the Maintenance Mechanic Apprenticeship program and Jeff Kroning and Jeff Fuller completed the Industrial Electrician Apprenticeship program. These men received their journey worker certificates. Steve Klein continued in the Maintenance Mechanic Apprenticeship program and Art Errthum continued in the Industrial Electrician Apprenticeship program. Jeremy Olson and Brian Suchomel entered the Maintenance Mechanic Apprenticeship program and Craig Palzkill entered the Industrial Electrician Apprenticeship program.

Additional training courses attended by Maintenance Department supervisors and craftsmen included:

- Waukesha Engine School.
- Crane Mechanical Seal School.
- Collection System Maintenance course.
- Collection System Safety course.
- Management Leadership Skills for First Time Supervisors' seminar.
- Team building, mentoring, and coaching skills seminar.
- Microsoft Word and Excel courses.
- Dealing with Difficult People seminar.
- Transition to Trainer seminar.
- Blower Maintenance Training at the Houston Services International Facility.
- PLC Troubleshooting course.
- Electric Motor and Power Transformer course.

Following are more detailed listings of the activities performed by each of the maintenance sections:

Building and Grounds Section

The section spent the majority of the year maintaining the District and non-District pumping stations, the Nine Springs Wastewater Treatment Plant buildings and grounds, odor control equipment, roads, and small equipment. Routine work includes landscaping projects, cutting grass, plowing snow, cleaning plant buildings and galleries, maintaining lagoon and dike roads, and painting and carpentry projects. This section performs preventive maintenance work on the District's electrical manholes, process tanks, roofs, and floors.

Personnel changes within the department resulted in two new employees being hired to fill vacancies that were created by Terry Gent's retirement and Mike Kressin's move to the Sewer Maintenance/Monitoring Services section. The new employees hired were Gerald Poss as a custodian and Dylan Bahr as a maintenance worker.

In 2012 Building and Grounds Crews spent time assisting the Operations and Engineering staff with projects including:

- Cleared trees off of Grass Lake Dike at Badfish Creek.
- Continued working jointly with the City of Madison on a non-intrusive well cleaning procedure. The procedure for the most part has eliminated entering a confined space, and the grease removed is taken directly to the landfill.

Major projects accomplished in 2012 were:

- Cleaned Aeration Tanks 10 through 12 in preparation for new piping and diffusers being installed by Sanitaire.
- Performed preventive maintenance on final clarifiers Tanks 17 through 19.
- Painted and landscaped at the wastewater treatment plant.

- Painted at several lift stations including repainting of outdoor electrical cabinets and staining outdoor wood structures that hold electrical equipment.
- Removed, repaired, and installed the sluice gate for final tank 5.
- Planted and maintained Metromix demonstration gardens.
- Replaced the well pump, tank, and related piping at pump station 12.
- Redesigned and improved a large landscaped area at pump station 16 to improve aesthetics and water run-off.

Contracted for the following services with support provided by the Building and Grounds Crew:

- Media blasting and recoating of the metal components for final tank #5 and #6 with "Sherglass", (a Sherwin Williams product), to extend its life.
- Replacing asphalt in front of the Operation building and the Metrogro parking and building approach areas.
- Modifying the stainless steel sluice gate for final clarifier #5.
- Repairing the concrete structure at the Dunn 4 lift station.
- Repairing the chimney at one rental property.
- Seal coating of the driveways at pump stations 4, 7, 9, 11, 12, 16, and the upper sides of the drying bed.

Mechanical Maintenance Section

The goals of the Mechanical Maintenance Section are to: 1) verify proper operation and effectively maintain the pumping stations of the District and its contract customers; 2) ensure that all collected wastewater is conveyed to the treatment plant; 3) effectively maintain and support operation of the treatment plant equipment and facilities while working with operations personnel to meet the District's goal of meeting or exceeding the District's State water discharge permit; and 4) develop section staff members to their best professional and personal ability through the District's apprenticeship program, other training programs, and wellness opportunities.

In addition to many planned and scheduled maintenance activities, major accomplishments completed in 2012 included:

- Replaced the rotor and stator on a Thermo to Meso pump.
- Replaced the blower on the gas treatment skid.
- Assisted in the testing of lower powered mixers on the aeration tanks.
- Rebuilt digester mixers 3A and 2B.
- Rebuilt the chain and rails on Headworks Screen 4.
- Assisted in the investigation of vibration problems on West Blower 3.
- Rebuilt several polymer pumps while testing parts from several vendors.
- Replaced gear box on final clarifier 5.
- Rebuilt Return Activated Sludge Pump 2 in Aeration Control Building 3.
- Rebuilt Return Activated Sludge Pump 2 in Aeration Control Building 4.
- Assisted with the contractor rehabilitation of the HVAC system in the Operations Building.
- Replaced seal and wear rings on Pump D at Pump Station 2.

- Rebuilt Pump A at Pump Station 5.
- Began the rebuilding of Pump C at Pump Station 5.
- Replaced wear rings and troubleshot vibration problems on Pump A at Pump Station 6.
- Rebuilt Pump A at Pump Station 11.
- Replaced wear rings in Pump A at Pump Station 13.
- Replaced coupling and investigated motor mount failure on Pump B at Pump Station 15.
- Converted Pump C at Pump Station 16 from packing to mechanical seal.
- Replaced motor at Waunona Pump Station.
- Removed pieces of clay pipe from the inlet of the pumps at the Mayflower Pump Station.
- Replaced sump pump after flooding incident at the Gettle Pump Station.
- Replaced the pump discharge elbows and flanges at the American Family Pump Station.

Electrical Maintenance Section

The Electrical Maintenance Section devoted a majority of the year to providing the knowledge and skills necessary to assure a high level of electrical reliability to District facilities and the facilities owned by others and maintained by the District. This was accomplished with a mix of preventive maintenance, staff training, planned improvements, construction projects, and daily maintenance. Examples of preventive maintenance tasks developed by the section include: calibration, inspection, and cleaning of electrical and instrumentation equipment, thermographic testing of electrical devices, and testing and inspection of heating, ventilation and air-conditioning equipment. The section continued to lend its expertise to other departments to facilitate District projects and improve the treatment process. The continued use of the District's Computerized Maintenance Management System has allowed the section to identify problems by tracking equipment data, scheduling maintenance, and creating daily and preventive maintenance work orders.

In addition to normal maintenance tasks connected with the operation of the District's wastewater collection and treatment facilities, the following planned improvements or projects were completed or continued in 2012.

- Continued to assist with the Process Control System (PCS) upgrade project.
- Continued with the upgrading and documentation of electrical drawings for the District and non-district facilities.
- Provided electrical cross training to the District's mechanics.
- Continued with the in-house training of the apprentice electricians on electrical and instrumentation theory and hardware.
- Continued the maintenance of and documentation of the District's phone system.
- Operated District portable generators to provide power to various pumping stations during planned and unplanned power outages.
- Assisted the Engineering Department with submittal review for Plant rehabilitation and upgrade projects.
- Continued with the replacement of power quality monitors at the Nine Springs facility and various District pump stations.
- Continued to assist the Mechanical maintenance group with blower engine and generator engine maintenance.

- Assisted with the modifying of office spaces in the Operations Building.
- Assisted with the thermographic inspection of electrical equipment at the Nine Springs facility and District pump stations.
- Assisted with the development of the Electrical Safety Program.
- Continued to upgrade and modify existing electrical equipment at district facilities to accommodate the requirements of NFPA 70E. (Arc Flash).
- Completed the electrical/controls upgrade for City of Madison Atlas lift station.
- Completed installation of a new gas detection system in the Gravity Belt Thickening building.
- Completed the replacement of the original Effluent Building effluent well level bubbler with a dual well level bubbler system.
- Completed the rehab of the electrical controls for effluent Pump 5.
- Assisted in the completion of the Operations Building Heating, Ventilation and Air-Conditioning System Rehabilitation Project.
- Assisted the Engineering Department in the beginning design phase of Pumping Station 18.
- Completed the replacement of the Programmable Logic Controller and electrical controls modification at the City of Madison Hermina pumping station.
- Completed the installation of a plant wide wireless system.
- Completed the installations of Ethernet control panels in the Pump Room and Electrical Room of the Effluent Building.
- Completed the Programmable Logic Controller replacement for Effluent Pump 1.

Inventory Control and Purchasing

The primary goal of the Inventory Control/Purchasing Section is to centralize purchasing and inventory control functions for the District to reduce costs. One major component is the scheduling and completing of physical inventories. Partial inventory counts were conducted in April, July, and October based on usage. In December, a full physical inventory was conducted to reconcile all inventory quantities.

Grouping orders together and taking advantage of price breaks at price and quantity levels have helped to reduce purchasing costs. Internet purchasing is being used to take advantage of the latest technology. Expanding the vendor base and finding alternative sources and products for District purchases have resulted in shorter ordering times and a reduction in District inventory.

During 2012 the Inventory Control/Purchasing section performed the following:

- Purchased and inventoried all safety equipment.
- Assisted with the testing of new releases for the Computerized Maintenance Management System known as WAM.
- Attended the 2012 Oracle WAM CAB and User Group Conference.
- Increased the number of parts being manufactured by local machine shops rather than purchasing them from the equipment supplier.
- Worked with a third machine shop to manufacture replacement parts.

- Continued membership in the Madison Plant and Facilities Maintenance Association (PFMA), the International Facility Management Association (IFMA) and the Institute for Supply Management (ISM).
- Conducted WAM training for Operations and Maintenance workgroups.
- Co-Chaired the Oracle Utilities Work and Asset Management User Group.

Monitoring Services/Sewer Maintenance Section

A major portion of the work performed by this section is the collection of wastewater samples and flow information from the communities and sanitary districts that are served by the District. The crew also inspects portions of the District's collection system each year. Repair needs found by the crew are either made by the crew members or by contractors. In addition to the inspections performed by the crew, crewmembers work with contractors to televise and clean portions of the interceptor system. The crew also conducted special sampling for the District's mercury and chloride reduction programs. During 2012, the following activities were performed by the crew:

- Installed six new air release valves on the Crosstown forcemain to prevent sanitary sewer overflows.
- Inspected and maintained the air relief valves on several of the pumping station forcemains and the effluent forcemains.
- Inspected the following interceptors:

    - Baird Street Extension of the South Interceptor
    - North Basin Interceptor
    - Syene Extension of the Nine Springs Valley Interceptor (NSVI)
    - Southeast Interceptor upstream of Pump Station 7
    - East Interceptor upstream of Pump Station 6
    - Lower Badger Mill Creek Interceptor
    - Mineral Point Extension of the NSVI
    - Highway 19 Extension of the Northeast Interceptor
    - Midvale Relief of the West Interceptor
    - Door Creek Extension
    - Southeast Interceptor downstream of Pump Station 9
    - Campus Relief of the West Interceptor
    - East Monona Interceptor
    - West Interceptor Relief
    - East Johnson Street Relief of the East Interceptor
    - North Leg of the Southwest Interceptor
    - West Interceptor

- Inspected stop log and flap gate structures.
- Exercised buried valves at several pumping stations.
- Worked with a contractor to clean the siphons.
- Assisted contractor with the removal of deteriorated concrete and epoxy coating of ten manholes on the Northeast Interceptor.

- To reduce water I/I, replaced manhole covers and castings that were missing pins and had holes in their covers.
- Assisted United States Infrastructure Corporation (USIC) with the location of forcemains.
- Assisted contractor with the lining of a leaking joint near manhole 02-401.
- Relocated the vent line on manhole MHXT-03615 due to bike path relocation.

INTERCEPTOR TELEVISING AND CLEANING

MMSD's interceptor inspection program includes annual cleaning and televising of approximately 10% of this system each year. This program is intended to keep MMSD current on the physical condition and hydraulic adequacy of its interceptors and to allow for well-informed decisions regarding the need for significant underground repair or replacement projects. Part of the 2012 televising and cleaning was performed by the City of Madison and part was performed by Great Lakes Televising and Cleaning. The work performed by the City of Madison was in areas within the city that were congested and required coordination with other agencies. The following areas were cleaned and televised:

Nine Springs Valley Interceptor – 33,987 ft
Waubesa Extension – 9870 ft
Haywood Street Extension – 1,427 ft
Pump Station 16 Forcemain – 1,300 ft

USER-CHARGE MONITORING AND BILLING

User-charge billing of the District's forty municipal customers is performed quarterly using data collected at the Nine Springs Wastewater Treatment Plant and within the collection system. The monitoring services/sewer maintenance (MS/SM) crew supports quarterly billing by providing sampling and flow measurement at key points in the collection system. In 2012, the MS/SM crew and plant staff collected data and samples at 94 sampling points each quarter, thereby generating 3,079 samples throughout the year. The analysis of the user-charge field samples and Nine Springs influent samples by the District lab generated 12,316 sample results used in the user-charge billing process.

SEWERAGE SERVICE CHARGES

Prior to the beginning of each calendar year, the District furnishes a written estimate of the cost of sewerage service for the ensuing year to each municipality in the District. This estimate is based on the previous year's wastewater contributions, any anticipated changes that may alter the municipality's prevailing water use trends, and the service charge rates for the ensuing year.

The District's 2012 service charge rates, shown in the following table, were adopted on October 24, 2011.

Service Charge Rate Summary Information

Parameter	Rate	Units
Volume	$595.33	per million gallons
CBOD*	$0.14015	per pound
Suspended Solids	$0.21582	per pound
TKN-Nitrogen	$0.38269	per pound
Total Phosphorus	$2.85731	per pound
Actual Customers	$22.84	per year
Equivalent Meters	$19.32	per year

*CBOD, carbonaceous biochemical oxygen demand, measures the amount of oxygen used by microorganisms to break down the organic carbon in a waste.

The 2012 rates included a 0.77% surcharge to recover the DNR NR101 effluent fees.

Wastewater volumes, CBOD loadings, suspended solids loadings, total Kjeldahl nitrogen (TKN) loadings and total phosphorus loadings are determined each quarter for each community. These determinations are based on a minimum of seven consecutive days of monitoring data for the current quarter and previous quarter's discharge data for each community.

Meter equivalencies are based on the capacities of the different sizes of water meters used throughout the District. A 5/8-inch water meter has a capacity of twenty gallons per minute and is defined as one equivalent meter. The capacities of larger water meters are divided by the twenty-gallon per minute capacity of a 5/8-inch water meter to determine their meter equivalencies. An actual customer is defined as one water meter without regard to size. The numbers of equivalent meters and actual customers in each municipality are set by counting the number of each size of water meter in service in each municipality where water meters are used. In municipalities where water meters are not used, the number of each size water meter that would be required is estimated.

In 2012 the average annual residential service charge in the District was about $246. This amount includes $128 for services provided by the District and $118 for services provided by the municipality (e.g., the City of Madison). A survey of 176 of the nation's largest municipalities indicated that in 2012 the typical residential service charges in the District were 62% of the national average of $400.

Operating costs per million gallons of treated wastewater for the years 2008 through 2012 were as shown in the table below. In comparison with the 2011 costs, 2012 overall operating costs increased 2.8%. Administration costs increased 2.6%, collection costs increased 1.9%, treatment costs decreased 4.4%, and debt service costs increased 12.0%. The decrease in treatment costs was largely due to lower salary and electric power costs. The cost per million gallons increased by 13.4% compared to 2011 due to the overall cost increase of 2.8% and the large volume

decrease of 9.4%. The 2012 volumes are 15% lower than 2010 volumes leading to higher costs per million gallons of wastewater treated.

Costs per Million Gallons of Wastewater Treated

District Function	2008	2009	2010	2011	2012
Administration	$165	$203	$218	$227	$257
Collection	118	129	122	125	141
Treatment	544	603	641	674	711
Debt Service	408	459	488	543	672
TOTAL	**$1,235**	**$1,394**	**$1,469**	**$1,569**	**$1,781**

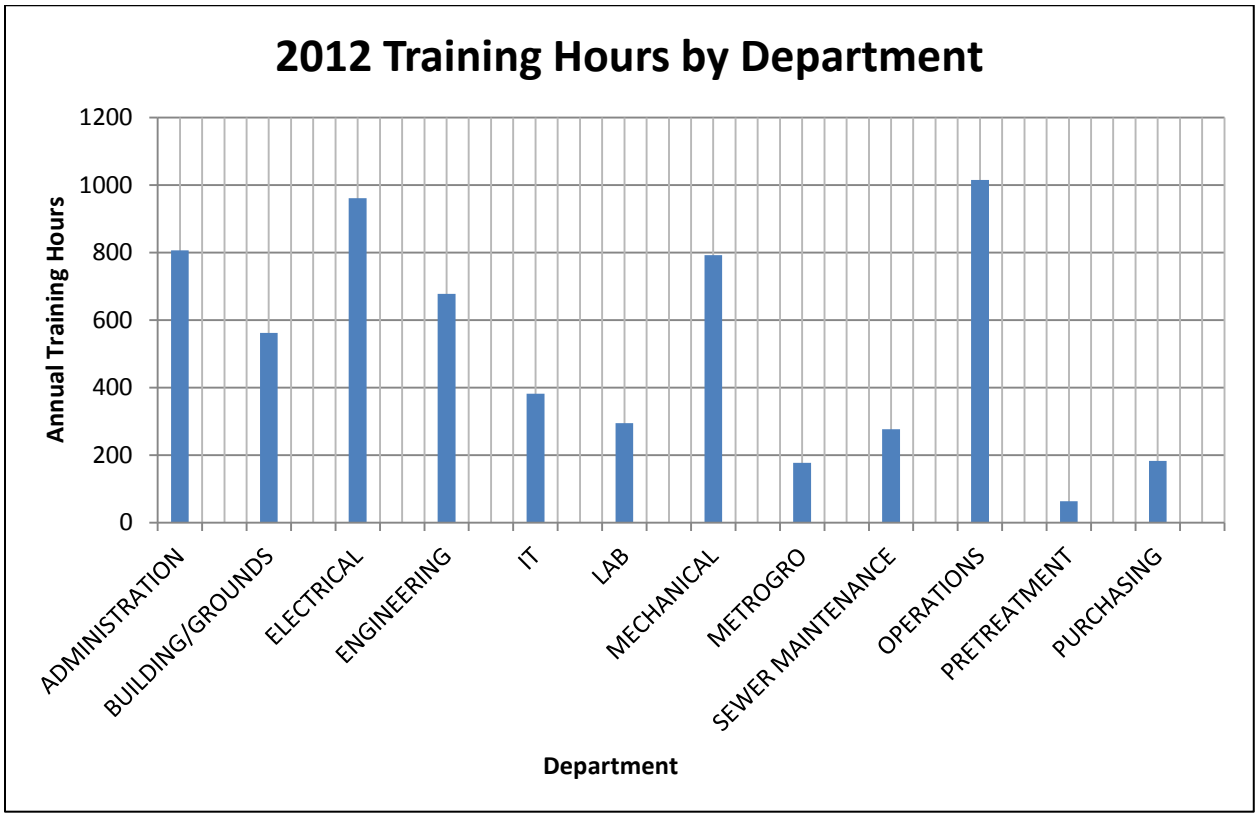
TRAINING ACTIVITIES

During 2012, District employees completed over 6422 hours of training. As a whole District employees averaged over 67 hours of training per employee during the year.

Notable training during 2012 includes:

- During 2012, supervisors received weekly training on the District's Computerized Maintenance Management System, WAM.
- The District continued the Leadership Mastery series conducted by Dr Eric Allenbaugh. All District employees attended the three-day workshop which the course objectives included:
    - Building clarity of mission, vision, and values in mobilizing people and other resources to achieve extraordinary results.
    - Empowering others with accountability to function at their best in service to the team, the organization, and their customers.
    - Honoring individual differences while building collective team synergy in co-creating a results-oriented climate.
    - Creating a win-win spirit of teamwork and partnership in working together for mutual gain.
    - Linking individual with organizational vision and values to mobilize talents in the service to the organizational mission.
    - Developing methods to sustain higher levels of individual, team, and organizational performance.

2012 Training Hours by Workgroup



PUBLIC EDUCATION

MMSD 2012 Tour Summary

In 2012, 48 tours took place with a total of 1507 total participants, which is down from 2011 when there were 62 tours with a total of 1948 total participants. Helping with our public education efforts by serving as tour guides were: Paul Nehm, Roy Swanke, Steve Reusser, Jim Post, Michael Mucha, Ralph Erickson, Matt Allen, Dave Taylor, Mike Northouse, Jeff Brochtrup, Kathy Lake, Jeff Mike, Tom Schlangen and retiree Glen Smeaton. Brad Walker, Gerald Poss and others in the Building and Grounds crew assisted tour efforts by setting up the Multi-Purpose Room for tours and by keeping the facility "Park Like and Parlor Clean." Rhonda Riedner, Monty Baker, Josh LeMoine and others in the Lab helped by setting up the Lab display and exhibits.

The tours begin with a video presentation, question and answer session in the Multi-Purpose room. Tours visit several different areas of the plant to highlight process activities at each location. The operators control room, laboratory, headworks, Metrogro storage tank viewing area, primary treatment tanks, west aeration tanks, west aeration gallery, final clarifiers and effluent building are usual stops on the general tour. Additional stops on the solids handling side of plant are arranged on a case by case basis depending on the needs of each group.

The tour area (Fish Room) displays pictures of the many species of fish and insects found in the effluent receiving streams by retired biologist Jeff Steven. This display provides testimony to the highly treated effluent that is produced by Nine Springs Wastewater Treatment Plant. Caretaking duties of the 50-gallon, flow-through aquarium is handled by the Operations group. The aquarium contains Green Sunfish a species that is commonly found in the receiving streams. Effluent flows through the aquarium prior to being pumped to Badfish Creek and Badger Mill Creek. Survival, growth rates, and activity of the fish, which are living in 100% effluent, continued to be normal. The display area is a favorite attraction of the many tour groups that routinely visit the Nine Springs Plant. It also provides a "canary in the mine shaft" scenario to see if the effluent is acutely toxic to some of the biological inhabitants prior to the effluent's discharge to the receiving streams. Tourists receive a pencil labeled with "*Clean Water It's Up To Me*" as a reminder that we all have a stake in the clean water effort. Tour groups are asked to keep inorganic wastes, chemicals, mercury, and unused medicines out of the wastewater stream to help protect the environment and reinforce the concept that "a toilet is not a trash can". During each tour time is spent encouraging tourists to consider their use of water and ways which they can conserve this precious resource by continuing their education and considering apprenticeships and careers in the environmental field.

ENGINEERING AND CONSTRUCTION IN 2012

Eleventh Addition to the Nine Springs Wastewater Treatment Plant

In 2008, the District embarked on a Solids Handling Facilities Plan. The primary objectives of the Solids Handling Facilities Plan were to review available solids handling process alternatives and provide detailed recommendations of facilities necessary to assure a reliable and sustainable digestion process capable of producing Class A biosolids.

The Solids Handling Facilities Plan was completed in late 2009 and detailed design of the Solids Handling Facilities Plan recommendations began in late 2009. Since the scope of the work was extensive, the project name was formally changed to the 11th Addition to the Nine Springs Wastewater Treatment Plant. Design of the 11th Addition continued throughout 2010 and 2011, and included the following facilities:

- Two (2) acid digesters.
- Two (2) anaerobic digesters.
- A new Sludge Control Building (SCB #3).
- A Waste Activated Sludge thickening facility.
- A struvite harvesting building.
- A major renovation of Sludge Control Building #1.
- A new electrical substation.
- Several new utility tunnels.
- Other miscellaneous plant improvements.

Detailed design was completed in October of 2011 and bids were opened on November 17, 2011. On December 1, 2011, the contract was awarded to C.D. Smith Construction, at their low bid price of $39,447,000.00. Construction activities began early in 2012 and continued throughout the year. As of December 31, 2012, work was approximately 74.3% complete. Work is expected to continue until late 2014.

Process Control System Upgrade

The process control system, which is the computer network that controls plant operations, was originally installed as part of the Ninth Addition in 1996. Although still fully functional, much of the system is obsolete and requires upgrades to both software and hardware (computers, etc.).

In 2009, the District began a long-range plan to evaluate the process control system and to replace components as required. This included a facility planning phase, where overall needs were evaluated along with potential system vendors. This work was completed by CDM, in conjunction with MMSD staff, in 2011. Following completion of the facility plan, detailed design began. This was completed in late 2012 by MMSD staff and Donohue & Associates. At the end of 2012, the work was in the bidding process and construction is anticipated to begin in early 2013.

Operations Building HVAC Rehabilitation

Portions of the heating, ventilating and air conditioning (HVAC) system in the Operations Building were thirty-years old and had reached the end of their useful life. In addition, the system had suffered numerous operational problems, which lead to improper temperature control and poor working conditions within the building. Because of this, it was decided to fully evaluate the system and determine needs for improvements.

In 2010, Affiliated Engineers performed a comprehensive review of both the mechanical and electrical systems associated with the Operations Building HVAC system. They determined that significant portions of the mechanical and electrical systems were deficient and needed to be replaced. Also, major improvements were required to upgrade the condition, capacity, and reliability of the HVAC system.

Affiliated Engineers completed planning and design associated with the HVAC system improvements during late 2010 and early 2011. Bids for construction were opened on June 16, 2011, and the contract was awarded to the low bidder, Mechanical Inc., at their low bid price of $2,490,000.00. Construction activities began in the fall of 2011 and continued throughout 2012. At the end of 2012, work was approximately 97.3% complete and is expected to be complete by the middle of 2013.

West Interceptor in Old University Avenue (MH02-038 to MH02-513 Liner)

Routine televising of the West Interceptor in Old University Avenue revealed numerous cracked pipes and offset joints. The vitrified clay pipe, originally installed in 1916, had reached the end of its useful life and was in need of repair or replacement. To limit disruption to residents and motorists, MMSD decided to line the sewer in conjunction with a City of Madison road reconstruction project. Approximately 3,150 feet of 18-inch through 21-inch sewer, from MH02-038 to MH02-513, was lined while the street was closed for reconstruction.

Planning and design were completed by MMSD staff in early 2011, and the project was bid on March 10, 2011. The Commissioners awarded the contract to McCann's Sewer & Drain, dba McCann's Underground, on March 14, 2011, at their low bid price of $276,340.00. Construction

was completed during the summer and fall of 2011, and work was accepted by the Commissioners on January 19, 2012. The final contract amount, including all changes orders, was $301,403.75.

East Interceptor- MH06-204 to MH06-209 Liner

Television inspection of the East Interceptor-Fair Oaks Extension from MH06-204 to MH06-209 revealed deterioration of the 85-year old pipe. Plans for lining approximately 1,320 feet of the 14-inch cast iron and 15-inch vitrified clay interceptor were completed by MMSD staff in 2011.

The project was bid on August 8, 2011. On August 22, 2011, the Commissioners awarded the contract to Insituform Technologies USA, at their low bid price of $109,228.00. Construction was completed in early 2012, and work was accepted by the Commissioners on March 15, 2012. The final contract amount, including all changes orders, was $109,228.00.

Pumping Station 18

Analysis of the eastern and northern portions of the District's collection system showed that existing Pumping Station #7, which serves this area, would reach capacity shortly after 2010. Years earlier, the District had prepared for this, purchasing land for a future pumping station near the intersection of Broadway Avenue and Highway 51. The station, called Pump Station #18, would provide capacity relief for Pumping Station #7 and the Southeast Interceptor between the proposed Pumping Station #18 and existing Pumping Station #7. The station would also add much needed redundancy to the MMSD east-side collection system, as the new Pumping Station #18 and existing Pumping Station #7 could serve as back-ups to each other during average flow conditions.

In May of 2011, the District embarked on the planning and design of new Pumping Station #18. The consulting firm of AECOM was retained to perform the planning and design associated with the new station. As of the end of 2012, planning work was complete and detailed design of the pumping station was in progress. Design is expected to be complete by the middle of 2013 and construction is anticipated to begin in the fall of 2013 and continue throughout 2014. The estimated construction cost of the pumping station is $14M.

Pumping Station 18 Forcemain

In conjunction with proposed Pumping Station #18, a forcemain will be needed to convey the flow pumped from this station. The forcemain will be 48-inch diameter and will stretch approximately 15,500 lineal feet from the proposed Pumping Station #18 site to the Nine Springs Treatment Plant.

Since the forcemain and proposed Pumping Station #18 are dependent on each other, AECOM was retained to perform forcemain planning and design. Initial planning for the forcemain began during the same timeframe as the pumping station. Planning for the forcemain, which included route selection, surveying, and a preliminary design report, was completed in 2012. Detailed design of the forcemain, which includes difficult crossings of the Yahara River and the Beltline, will be completed by the middle of 2013. The project is expected to be bid in late 2013, with construction to follow throughout 2014, at an estimated cost of $12M.

Northeast Interceptor-SEI to FEI Relief/Replacement

This is the third project related to Pump Station #18 work. The Northeast Interceptor, from the Far East Interceptor junction to the connection with the Southeast Interceptor, lacks sufficient capacity to convey peak flows. The existing Northeast Interceptor in this area is 48-inch reinforced concrete which extends approximately 6,200 lineal feet. Additional capacity will be added via a second parallel relief interceptor or a larger replacement interceptor. A portion of the flow in this interceptor (which currently travels to Pumping Station #7) will be diverted to Pumping Station #18 and pumped to the treatment plant, thus relieving the Southeast Interceptor, Pumping Station #7, and the Pumping Station #7 forcemains.

As with Pumping Station #18 and the associated forcemain, AECOM was retained to perform planning and design of this project. Planning and design commenced in the spring of 2011 and were completed in late 2012. Bids were opened on December 4, 2012, and on December 13, 2012, the Commission awarded the contract to Merryman Excavation at their low bid price of $7,298,198.30. As of the end of 2012 construction had not started, but is anticipated to start in early 2013 and be complete by the end of the year.

Preliminary Nutrient Removal Cost Study

The Nine Springs Treatment Plant employs an activated sludge system for nitrogen and phosphorus removal prior to UV disinfection. Future regulations will require MMSD to further reduce effluent phosphorus and nitrogen concentrations to meet new administrative rules. Compliance options to meet new limits include adding advanced treatment at the Nine Springs Plant, funding nonpoint source reductions through water quality trading/the watershed adaptive management option for phosphorus, or a combination of these approaches.

To evaluate the costs associated with advanced treatment options required to meet the lower limits, CH2MHill was retained to perform a cost study of the improvements required. CH2MHill analyzed nine different scenarios of more stringent combinations of effluent phosphorus and nitrogen limits. During the process, they identified all process modifications required, including new tanks, new equipment, buildings, energy costs, etc., and arrived at a total cost to implement the required modifications. The costs could then be compared to costs for other methods to meet the lower limits, such as trading or adaptive management.

CH2MHill completed their cost study in late 2011 and the final report was received in early 2012.

Nine Springs Valley Interceptor-Morse Pond Extension

This Nine Springs Valley Interceptor (NSVI)-Morse Pond Extension project will extend sanitary sewer service to undeveloped lands near the intersection of County Highway PD and County Highway M. The proposed interceptor will serve City of Verona lands south of County Highway PD and City of Madison lands north of County Highway PD. It is anticipated that the new sanitary sewer will be located along Raymond Road and will extend approximately 3,150 lineal feet from the District's NSVI-Midtown Extension to the southwest corner of County Highway PD and County Highway M.

Preliminary planning work for the interceptor is being completed in conjunction with planning for the reconstruction of County Highway M. This work is being completed by MSA Professional Services and is expected to be complete in 2014. Construction of the new interceptor is currently anticipated to occur with County Highway M road reconstruction in 2015.

Space Needs Study

Existing "non-process" buildings at the Nine Springs Treatment Plant were determined to no longer meet the needs of the Operations and Maintenance Department. They lacked adequate space to properly perform required maintenance functions and did not include the necessary restroom, locker room, and wash-up facilities. Nearby buildings associated with maintenance were also identified as being over-utilized, under-utilized, or near the end of their useful life.

In addition to Maintenance areas, select Operations Building spaces needed evaluation to determine how the building could best serve the long-term needs of the District. This included evaluating public entrance to the building, determining future training and office space needs, and assessing Commission meeting space requirements.

To accomplish this, a comprehensive space needs and planning study was initiated in 2012. The study will identify and evaluate alternative methods to meet present and future District space requirements. The study will survey space needs of District departments, analyze various alternatives, and provide a conceptual recommended design.

In mid-2012, Bray Architects was retained to perform the Space Needs Study. As of the end of 2012, the study was underway, and is expected to be complete in mid-2013. Detailed design of recommended improvements will occur in 2013-2014, with construction anticipated in 2014-2015. A total of $7.4M has been budgeted for improvements. This will be updated once the final recommendation is determined.

CLEAN WATER FUND LOANS

In 1989 the State of Wisconsin replaced the Wisconsin Fund Grant Program with the Clean Water Fund Loan Program. The Clean Water Fund is a state revolving loan fund that was capitalized initially with grants from the U.S. Environmental Protection Agency and by bonds issued by the State of Wisconsin. The District has issued general obligation bonds and notes to the State of Wisconsin for 15 loans under this program. The total amount financed through these Clean Water Fund loans is $145.6 million.

The District had two Clean Water Funds loans in 2012 for which the final disbursement had not been received by the end of 2011. The status of those loans is as follows:

Eleventh Addition to Nine Springs Wastewater Treatment Plant

The District issued General Obligation Sewerage System Promissory Notes, Series 2012A, on February 22, 2012, to the State of Wisconsin Clean Water Fund (CWF Project 4010-34). These bonds are for an aggregate amount not to exceed $50,362,380 and are to be repaid at an annualized interest rate of 2.518%. The first interest payment on the loan was made on May 1,

2012. The first principal payment will be made on May 1, 2015. The final bond payment will be made on May 1, 2031.

Operations Building HVAC Rehabilitation

The District issued General Obligation Sewerage System Promissory Notes, Series 2012B, on May 23, 2012 to the State of Wisconsin Clean Water Fund (CWF Project 4010-38). These bonds are for an aggregate amount not to exceed $2,955,949 and are to be repaid at an annualized interest rate of 3.000%. The District also received an additional $328,439 for this project as part of a principal forgiveness program that is not included in the loan amount. The first interest payment on the loan was made on November 1, 2012. The first principal payment will be made on May 1, 2013. The final bond payment will be made on May 1, 2031.

NINE SPRINGS ENERGY USE PROFILE

This table shows an estimate of the total amount of electric and thermal energy used at the Nine Springs Wastewater Treatment Plant and the division between purchased and renewable (primarily self-produced) power. From 2008 to 2012, renewable energy used at the Nine Springs Wastewater Treatment Plant provided roughly 37% of the Plant's energy needs and had an estimated value exceeding $6.0 million.

Notes:

1. The District fuels three large gas driven engines from its anaerobic digestion process. Two of these engines drive electric generators while one powers an aeration system blower.

2. To correct engine problems caused by siloxanes and moisture in its digester gas, the District installed a gas drying system in 2007 that in addition, helps remove hydrogen sulfide from the gas.

3. The District made subsequent repairs and rebuilds to its gas engines during 2008 to 2010.

4. Power use was up in 2008 due to the higher flows that followed the June rainstorm events.

5. Near the end of 2010, the District removed its three gas engines from service pending resolution of the District's air quality permits with the Wisconsin Department of Natural Resources (DNR). The District tested its emissions in early 2011 and determined they were not appreciably different than the emissions from flaring its gas, and therefore returned its generators to service in March 2011.

6. The District and the DNR resolved the District's air quality permits in 2012. The District will need to address exhaust stack heights and oxidation catalysts for its gas engine driven equipment as part of its permit.

Annual Energy Use Summary

Electric Energy	2008		2009		2010		2011		2012	
	kWhrs/ day	% of Total	kWhrs/ day	% of Total	kWhrs/ day	% of Total	kWhrs/ day	% of Total	kWhrs/ day	% of Total
Commercial Service Purchased from MG&E	78,032	83.1%	70,804	77.6 %	70,232	78.3%	67,856	79.2%	58,051	65.2%
Wind Power Purchased from MG&E	37	0.0%	39	0.0%	39	0.0%	16	0.0%	16	0.0%
Generated from Digester Gas	6,509	6.9%	10,468	11.5 %	14,278	15.9%	14,469	16.9%	21,096	23.7%
Avoided Purchase Due to Blower Gas Engine	9,350	10.0%	9,892	10.8 %	5,098	5.7%	3.357	3.9%	9,841	11.1%
Total Used & Avoided	**93,929**		**91,202**		**89,648**		**85,697**		**89,003**	
Average cost of purchased power (dollars/kWhr)	$ 0.0735		$ 0.0739		$ 0.0779		$ 0.0804		$ 0.0836	
Estimated total monthly value of energy used	$210,452		$205,123		$212,330		$209,684		$226,291	
Estimated monthly value of renewable energy	$35,617	16.9%	$45,879	22.4 %	$45,986	21.7%	$43,654	20.8%	$78,912	34.9%
Thermal Energy	**2008**		**2009**		**2010**		**2011**		**2012**	
	therms/ day	% of Total	therms/ day	% of Total	therms/ day	% of Total	therms/ day	% of Total	therms/ day	% of Total
Generated from Natural Gas	637	28.8%	283	15.0 %	273	14.2%	145	7.5%	306	15.0%
Generated from Digester Gas	813	36.8%	552	29.2 %	544	28.2%	552	28.6%	18	0.9%
Recovered from Gas Engines	760	34.4%	1,055	55.8 %	1,110	57.6%	1,236	63.9%	1,721	84.2%

Total hot water energy used	**2,209**		**1,890**		**1,928**		**1,932**		**2,045**	
Average cost of purchased gas (dollars/therm)	$ 0.9432		$ 0.8273		$ 0.7258		$ 0.6753		$ 0.5352	
Estimated total monthly value of gas used*	$84,505		$63,409		$56,746		$52,928		$44,380	
Estimated monthly value of renewable energy	$60,151	71.2%	$53,918	85.0 %	$48,701	85.8%	$48,960	92.5%	$37,743	85.0%

Total Energy Use	**2008**		**2009**		**2010**		**2011**		**2012**	
	$ per month	% of Total	$ per month	% of Total	$ per month	% of Total	$ per month	% of Total	$ per month	% of Total
Total Estimated Value of Energy Used	$294,957		$268,533		$269,076		$262,612		$270,671	
Estimated Value of Renewable Energy Used	$95,768	32.5%	$99,797	37.2 %	$94,687	35.2%	$92,614	35.3%	$116,655	43.1%

*Conversion of natural gas to heat is assumed to be 75% efficient
Note – due to rounding, numbers may not add exactly.

ANNEXATIONS TO THE DISTRICT

In 2012, annexations to the District added approximately 940.88 acres, increasing the area of the District to approximately 182.13 square miles. The annexations occurred in the Village of Waunakee, Village of DeForest, Town of Windsor, City of Madison and City of Middleton. Descriptions of the areas annexed are as follows:

Annexation Name	**Annexation Number**	**Municipality**	**Acres Added**
Kippley Annexation	2012-01	Village of Waunakee	318.5
Landfill Annexations	2012-02	City of Middleton	143.42
Bear Tree North	2012-03	Village of DeForest and Town of Windsor	364.19
Midtown Part “A” Attachment	2012-04	City of Madison	1.00
Midtown Road Part “B”, Area No. 8	2012-05	City of Madison	0.16
Sixmile Creek Golf Course Clubhouse	2012-06	Village of Waunakee	8.53
Bishops Bay-Jacobsen Estate	2012-07	Village of Waunakee	0.8540
URP-Vetter Attachment	2012-08	City of Madison	0.7120

SALARIES AND WAGES

On February 28, 2011, a two-year contract extension was executed between Madison Employees Local 60, American Federation of State, County and Municipal Employees, American Federation of Labor-Congress of Industrial Organizations (AFL-CIO) and the District. Provisions of the contract extension took effect on January 1, 2012 and the contract will expire on December 31, 2013. The Commission approved a new non-represented employee pay plan on June 28, 2012, to be effective January 1, 2013.

FINANCES

A general District property tax was not placed on the tax rolls in 2012.

All financial transactions of the District were audited by CliftonLarsonAllen, LLP. The audit report for the year ending December 31, 2012 is available at www.madsewer.org.

2012 Financial Summary

This statement is for informational purposes only and is not intended to represent full financial disclosures. Complete financial statements and related footnotes are available on our website at www.madsewer.org or available upon request.

	2012	2011
OPERATING REVENUES		
Charges for services:		
Transmission and treatment of sewage	$ 23,747,386	$ 22,395,826
Servicing pumping stations	265,183	307,675
Septage disposal	377,419	380,153
Pretreatment monitoring	18,496	20,833
Total operating revenues	24,408,484	23,104,487
OPERATING EXPENSES		
Administration	3,153,567	3,168,828
Treatment	9,511,099	9,951,518
Collection	2,148,550	2,156,231
Depreciation	5,395,217	5,424,384
Construction expenses	284,518	180,827
Total operating expenses	20,492,951	20,881,788
Operating income	3,915,533	2,222,699
NONOPERATING REVENUES (EXPENSES)		
Investment income	200,728	155,064
Capital grants	328,439	
Rent	65,848	84,694
Other	57,411	149,306
Capital assets contributed to other governments	(568,957)	
Disposal of property and equipment		28,266
Interest expense	(1,575,169)	{1,760,090)
Total nonoperating revenues (expenses)	(1,491,700)	(1,342,760)
Income before capital contributions	2,423,833	879,939
CAPITAL CONTRIBUTIONS	783,836	1,213,477
CHANGE IN NET POSITION	3,207,669	2,093,416
NET POSITION		
BEGINNING OF YEAR	107,003,500	104,910,084
END OF YEAR	$110,211,169	$ 107,003,500

MADISON METROPOLITAN SEWRAGE DISTRICT

Supplemental Detailed Information

The following information was prepared by the staff of Madison Metropolitan Sewerage District and is not a part of the Independent Auditor's Financial Report.

MADISON METROPOLITAN SEWERAGE DISTRICT
Madison, Wisconsin

GENERAL FUND
Year Ended December 31, 2012
(with comparative amounts for 2011)

Repair and Replacement Expenditures	**2012**	**2011**
Engineering & Administration	82,348	83,699
Nine Springs Treatment Plant	621,955	674,290
Nine Springs Treatment Plant Vehicles	92,160	108,752
Collection System	2,169	7,755
Collection System Vehicles	3,316	4,186
Interceptors		
Pumping Station #1	3,315	1,188
Pumping Station #2	13,722	26,273
Pumping Station #3	78	0
Pumping Station #4	14,196	2,441
Pumping Station #5	7,509	3,891
Pumping Station #6	1,207	694
Pumping Station #7	8,214	5,258
Pumping Station #8	2,190	725
Pumping Station #9	1,914	0
Pumping Station #10	9,972	3,676
Pumping Station #11	20,374	19,678
Pumping Station #12	4,799	14,467
Pumping Station #13	5,780	8,875
Pumping Station #14	3,377	1,540
Pumping Station #15	336	1,529
Pumping Station #16	18,017	2,640
Pumping Station #17	6,222	2,667
East Interceptor	14,846	236
Far East Interceptor	265	5,306
West Interceptor	7,285	20,361
Nine Springs Valley Interceptor	2,349	1,458
Northeast Interceptor	40,849	10,449
South Interceptor	6,505	0
Southeast Interceptor	265	265
Southwest Interceptor	0	4,000
City of Madison Pumping Stations	30,159	37,331
City of Verona Pumping Stations	0	2,183
Village of Maple Bluff Pumping Stations	0	6,938
Town of Dunn SD#1 Pumping Stations	632	1,947
Town of Dunn SD#3 Pumping Stations	329	135
Town of Madison Pumping Stations	257	2,421
Dane County Parks	440	4,096
Total Repair & Replacement	$1,027,352	$1,071,350

Capital Outlay Expenditures	2012	2011
Concrete Sewer	10,564	-
Electrical Equipment	87,918	26,005
Heavy Mechanical Equipment	-	10,375
Light Mechanical Equipment	-	23,900
General Equipment	-	14,719
Office Equipment	58,707	58,472
Lab Equipment	48,524	27,915
Fixed Improvements	3,564	76,715
Vehicles	90,309	68,722
Total Capital Outlay	$299,586	$306,823