

2011 Eighty-second Comprehensive Annual Report

For the year ended December 31, 2011



Madison Metropolitan Sewerage District
Madison, Wisconsin



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Welcome to the Eighty Second Annual Report of the Madison Metropolitan Sewerage District.

2011 was a transitional year that set the stage for years to come. As the newly hired Chief Engineer and Director, it was my priority to build on the successes of 2010 under the leadership of retired CED Jon Schellpfeffer, and work with employees to refine our direction and shape our course for the future. Thrown into this mix was the Governor's Budget Repair Bill that required the District to take urgent action to address mandated changes to collective bargaining and employee pay and benefits.

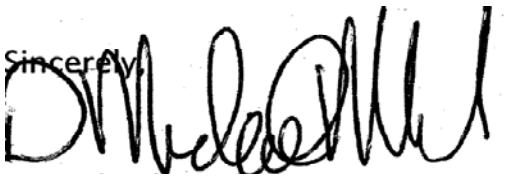
Despite the unanticipated issues resulting from Act 10 and getting a new Chief Engineer up to speed, the District's dedicated employees continued to meet its permit obligations and move ahead on critical projects. Of highest budgetary significance are the completed design, bidding and financing of the 11th Addition to the treatment plant. This $50 million expansion, for which ground was broken in February 2012, will provide necessary capacity out to 2030, minimize operational problems with foaming, and help us diversify our solids management program.

The District has taken a leadership role to find an innovative, low cost approach to deal with more stringent limits for phosphorus. The District brought together partners through a Memorandum of Understanding to create a three year pilot project to test a new concept called "adaptive management." Under this approach, the District will go upstream in the watershed to find ways to reduce sources of phosphorus from getting into surface water supplies instead of an expensive filtration system downstream at the plant. This approach, if successful, could save District customers tens of millions of dollars and potentially improve the water quality in the chain of lakes.

And finally, all District employees came together to take stock of where we are and define a vision for the future. Our vision centers on sustainability, taking a long-term view of the benefits we want to provide to our customers and assure we continue to provide value at an affordable cost.

I want to thank the District's fine staff for their tireless efforts.

Sincerely,



D. Michael Mucha
Chief Engineer and Director

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 ended June 30, 2011)
Edward V. Schten (term ending June 30, 2012)
Caryl E. Terrell (term ending June 30, 2013)
Ezra Meyer (term ending June 30, 2014)
Thomas D. Hovel (term ending June 30, 2015)

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:

D. Michael Mucha – Chief Engineer and Director
Michael Kressin – Building and Grounds Maintenance
Bart Nelson – Building and Grounds Maintenance
Chad Petersen – Building and Grounds Maintenance
Marc Wipperfurth – Building and Grounds Maintenance
Erik Rehr –Project Engineer I
Tim Stieve –Project Engineer I
Nathan Toth – Network Technician
Aaron Dose – Relief Operator

Retirements:

Terry Gent – Senior Custodian
Dennis Labelle – Building and Grounds Maintenance
Robert Hart – Metrogro Mechanic

Promotions:

Janelle Werner – Executive Coordinator
Ross Hollfelder – Assistant Metrogro Mechanic
Jeff Fuller – Apprentice Electrician II
Jeff Mike – Interim Mechanical Supervisor
Jon Martinson – Senior Journeyman Mechanic II
Richard Hockett – Senior Journeyman Lubrication Mechanic
Zenon Kochan – Journeyman Mechanic
Randy Conway – Relief Operator III
Jeffrey Kroning – Journeyman Electrician
Nathan Heiden – Operator II
Jeremy Olson – Apprentice Mechanic

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 of the District is 180.7 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 2011. 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 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 129 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

Owner	Number of Pumping Stations	Number of Grinder Stations
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 14,759,656,000 gallons of wastewater at the Nine Springs Wastewater Treatment Plant in 2011. This was a 5.9% decrease from 2010, due primarily to a lack of significant wet weather events in 2011. The average daily quantities of wastewater received from each municipality and through infiltration into the District's intercepting sewers in 2011 were as follows:

AVERAGE DAILY QUANTITIES OF WASTEWATER

Municipality	2011 (GPD)	% of Total
City of Fitchburg	1,951,000	4.83
City of Madison	26,412,000	65.32
City of Middleton	1,850,000	4.58
City of Monona	978,000	2.42

Municipality	2011 (GPD)	% of Total
City of Verona	900,000	2.23
Village of Cottage Grove	608,000	1.50
Village of Dane	53,000	0.13
Village of DeForest	701,000	1.73
Village of Maple Bluff	185,000	0.46
Village of McFarland	573,000	1.42
Village of Shorewood Hills	186,000	0.46
Village of Waunakee	1,591,000	3.93
Town of Blooming Grove	6,400	0.02
Town of Blooming Grove San. Dist. No. 2	161,000	0.40
Town of Blooming Grove San. Dist. No. 10	15,000	0.04
Town of Burke Util. Dist. No. 2	4,100	0.01
Town of Burke Util. Dist. No. 6	900	<0.01
Town of Dunn San. Dist. No. 1	159,000	0.39
Town of Dunn San. Dist. No. 3	63,000	0.16
Town of Dunn San. Dist. No. 4	15,000	0.04
Town of Dunn Kegonsa San. Dist.	142,000	0.35
Town of Madison	899,000	2.22
Town of Middleton San. Dist. No. 5	24,000	0.06
Town of Pleasant Springs San. Dist. No. 1	57,000	0.14
Town of Verona	700	<0.01
Town of Verona Util. Dist. No. 1	20,000	0.05
Town of Vienna Util. Dist. No. 1	81,000	0.20
Town of Vienna Util. Dist. No. 2	32,000	0.08
Town of Westport Util. Dist. No. 1	159,000	0.39
Town of Westport Util. Dist. No. 2	365,000	0,90
Town of Westport Util. Dist. No. 3	13,000	0.03
Town of Westport Util. Dist. No. 4	13,000	0.03
Town of Westport - Cherokee Golf & Tennis	7,400	0.02
Town of Windsor San. Dist. No. 1	327,000	0.81
Town of Windsor San. Dist. No. 3	500	<0.01
Town of Windsor - Illinois Foundation Seed	100	<0.01
Town of Windsor - Hidden Springs San. Dist.	4,300	0.01
Town of Windsor - Lake Windsor San. Dist.	29,000	0.07
Town of Windsor - Morrisonville San. Dist.	52,000	0.13
Town of Windsor - Oak Springs San. Dist.	27,000	0.07
Total Wastewater	38,665,000	95.62
Infiltration into District Interceptors	1,772,000	4.38
Total Received at the Treatment Plant	40,437,000	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 2011, the Nine Springs Wastewater Treatment Plant met all WDNR discharge limitations for the 5th consecutive year. In 2011, 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.

Improvements to the fine screening operation were under investigation in 2010 and 2011. A 30 psi spray bar with nozzles continually sprays the rotating 5 mm openings on the screens to push debris into a sluicing channel, and prevents the debris from continuing to the effluent side of the screen. It was found in 2010 that the nozzle spray was not covering the entire screen. This was leaving areas where rags and debris could push through to the effluent side of the screen. In 2011, all nozzles were replaced to provide an overlapping spray pattern.

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 treatment standards. Most of the solids, which contain the microbial culture, are pumped back to the aeration tanks. A certain percentage is 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 2011, 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 2011, approximately 38.32 million

gallons per day (mgd) on average were pumped to Badfish Creek and 3.55 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 4.9% in 2011. The waste-activated sludge (WAS), is thickened in two dissolved-air-flotation (DAF) units. The solids concentration from these units averaged 4.0% in 2011. One gravity belt thickener is also available to thicken waste-activated sludge. From January to July, 2011, and again in December, 2011, a portion of the WAS was thickened to approximately 5.9% on the gravity belt thickener to relieve the loadings to the DAF thickeners.

The anaerobic digestion process was operated as a mesophilic (moderate temperature) digestion system throughout 2011. 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 some 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. In spite of the modified feeding pattern, digester foaming problems plagued the east digesters throughout 2011, with the foaming worse in the cold weather months. A chemical defoamant was added to the east digesters from January to June, 2011, and beginning again in December, 2011. Operation in the current feeding pattern and the addition of chemical defoamants are expected to continue until 11th addition upgrades are made to the digestion system.

The digested biosolids concentration averaged 2.3% in 2011. The digested biosolids were thickened from 2.3% to an average concentration of 5.8% by the addition of polymer on gravity belt thickener # 2. An average of 22.2 tons/day of digested biosolids was thickened in 2011. A liquid emulsion polymer was used for thickening.

The thickened and digested biosolids are either pumped directly to 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”, becoming a source of revenue for the District.

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 705,000 cubic feet per day in 2011, and saved the District and its ratepayers approximately $1.1 million for the year. 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 14,400 kW-hrs of electricity was generated each day in 2011; and the engine blower saved the purchase of an additional 6,593 kW-hrs per day of electrical energy. In comparison, an average of 85,536 kW-hrs of electricity was purchased from MG&E each day, and approximately 15 cubic feet of utility natural gas was purchased each day for supplemental heating. The 15 cubic feet of utility gas is equivalent to 25 cubic feet of digester gas.

As noted in the 2010 annual report, the District was notified that it needed an air permit from the Department of Natural Resources for the operation of the engines and boilers. Since the District did not have a permit, all three engines had been removed from service in December of 2010. After that time the digester gas that was not used in the boilers was flared. An emission test of the exhaust of the blower engine was conducted on January 13. After results of the test were received it was decided that during the warmer times of the year the emissions from burning the gas in the flare would be greater than the emissions due to using the gas in the engines. Therefore, the engines were returned to service in mid-April. The results of the emissions test were used with modeling by RMT, Inc. to submit a request to DNR for an air permit. On October 31 the draft permit was printed for public notice. Since the comments provided by the District on the draft permit were substantial, it was mutually agreed between the District and the DNR to issue a construction permit for just the new facilities that would be included with the 11th Addition. This would allow construction to begin on that work. At the end of the year the District was gathering information to address DNR regarding a permit for the existing boilers and engines.

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.

The 2011 wastewater treatment data are reported in accordance with the District's 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
For 2011

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
1/4/11	41.07	q 0.19	q 0.13	4.50	< 1.6	77.2	q 6.20	3.36	< 0.7	110	1.13	3.46	q 1.36	152	52.3
2/8/11	40.17	0.32	q 0.10	q 2.59	< 0.8	67.2	q 5.95	2.95	< 0.7	89.2	0.984	q 2.14	q 1.00	127	57.4
3/8/11	44.71	q 0.21	< 0.07	3.91	q 0.84	71.3	22.7	q 1.58	< 0.7	61.4	0.761	4.24	q 2.04	124	53.7
4/5/11	46.23	q 0.10	q 0.15	q 2.33	< 1.2	65.1	q 7.33	q 2.42	< 0.8	55.0	3.54	4.58	2.20	110	52.8
5/10/11	45.32	q 0.10	< 0.08	q 3.26	< 1.2	68.1	q 7.52	q 1.69	< 0.8	106	1.45	3.87	q 1.76	122	46.5
6/7/11	44.84	< 0.08	< 0.08	q 3.82	< 1.2	65.1	8.86	3.71	< 0.8	115	1.29	q 3.58	< 1.2	134	47.7
7/13/11	41.91	< 0.08	< 0.08	q 3.69	< 1.2	72.8	q 4.11	q 2.60	< 0.8	80.1	0.858	q 2.93	< 1.2	133	43.3
8/10/11	39.38	q 0.16	< 0.08	q 3.14	< 1.2	81.5	q 6.64	5.50	q1.43	100	1.64	q 2.98	q 1.45	150	49.3
9/8/11	39.85	q 0.10	< 0.08	q 3.35	< 1.2	80.2	q 6.34	4.49	< 0.8	160	2.11	q 3.09	q 1.41	150	53.4
10/5/11	39.16	< 0.08	< 0.08	q 3.61	< 1.2	81.1	q 7.50	q 2.39	< 0.8	121	1.12	q 3.20	q 1.53	148	45.3
11/2/11	38.86	q 0.16	< 0.08	q 2.22	q 1.95	81.7	q 7.55	3.73	< 0.8	34.9	2.68	q 3.48	q 1.25	164	51.6
12/6/11	38.85	0.30	q 0.12	< 2.4	< 1.2	79.4	q 8.20	3.67	< 0.8	98.9	1.14	q 3.74	q 1.65	141	44.1

"<" 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
2011

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 - 11	39.37	36.97	3.57	243	4.8	221	5.4	41.4	0.16	5.8	0.29		7.09
Feb - 11	41.34	39.80	3.49	229	4.5	218	4.5	39.7	0.14	5.6	0.26		6.90
Mar - 11	45.13	43.45	3.54	214	4.0	206	4.2	37.3	0.09	5.3	0.18		6.97
Apr - 11	44.17	46.00	3.52	219	3.8	222	3.4	37.6	0.09	5.3	0.20	37	7.28
May - 11	42.87	41.91	3.50	200	3.7	212	3.9	37.8	0.08	5.2	0.20	47	7.58
Jun - 11	41.52	39.28	3.57	213	3.8	225	3.6	39.0	0.33	5.4	0.28	94	5.50
Jul - 11	40.38	37.51	3.58	211	3.4	214	3.8	38.0	0.11	5.2	0.35	190	5.17
Aug - 11	39.25	36.07	3.60	232	4.1	238	6.2	39.6	0.13	5.6	0.55	225	6.61
Sep - 11	38.60	35.87	3.59	220	3.6	226	5.5	41.7	0.10	5.7	0.36	215	5.49
Oct - 11	36.97	34.51	3.59	256	4.2	263	5.8	44.1	0.10	6.0	0.33	90	5.06
Nov - 11	38.21	34.79	3.58	236	5.0	229	5.8	42.6	0.11	5.8	0.33		6.62
Dec - 11	37.53	33.70	3.51	250	4.5	244	4.1	43.3	0.13	5.7	0.27		7.69
Average	40.45	38.32	3.55	227	4.1	226	4.7	40.2	0.13	5.6	0.30	128	6.50

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	2006	2007	2008	2009	2010	2011
Gallons Recycled (MG)	35.9	38.2	38.1	41.5	37.5	38.4
Dry Tons Recycled	7,185	7,380	7,720	8,219	7580	7,955
Acres Applied	4,431	4,758	4,566	5,129	4,646	4,863
Program Cost ($000)	$1,301	$1,335	$1,453	$1,511	$1,364	$1,605
$/1000 Gallons	$36.23	$35.13	$38.16	$36.41	$36.40	$41.77
$/Capita	$3.94	$4.05	$4.31	$4.45	$4.01	$4.72
$/Dry Ton	$181	$181	$188	$184	$180	$202

The District continues to produce a high quality biosolids product. Metal concentrations in 2011 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-2011 Average Values

Parameter	Concentration	EPA EQ Limit*	EPA Ceiling Limit	Units (Dry Weight)
Total Solids	4.96	NA	NA	%
TKN	7.8	NA	NA	%
NH3-N	3.3	NA	NA	%
Total-K	0.7	NA	NA	%
Total-P	3.9	NA	NA	%
Arsenic	5.6	41	75	mg/kg
Cadmium	1.2	39	85	mg/kg
Chromium	45.3	NA	NA	mg/kg
Copper	554	1,500	4,300	mg/kg
Lead	38.0	300	840	mg/kg
Mercury	.9	17	57	mg/kg
Molybdenum	21.1	NA	75	mg/kg
Nickel	21.7	420	420	mg/kg
Selenium	6.0	100	100	mg/kg
Zinc	778	2,800	7,500	mg/kg
PCB	<0.0193	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 2011. 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 wet weather during the spring application season, application was delayed. This resulted in a 90% increase in compensation costs over those required in 2010.

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 11th 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 4-year field research project being conducted jointly by the University of Wisconsin-Madison and 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. Specific research objectives include the following:

- Evaluating the agronomic benefits or drawbacks to using biosolids, composted biosolids, or de-watered biosolids for sod production compared to traditional production systems
- Quantifying soil loss or gain during traditional and biosolids-based sod production and harvesting
- Determining short and long term impacts of using biosolids for sod production on soil physical, chemical, and biological properties
- Quantifying changes in fertilizer and pesticide inputs along with disease and insect pest susceptibilities
- Calculating the economic advantages or disadvantages of using biosolids for sod production compared to traditional methods
- Identifying the potential social barriers to producer and consumer acceptance of sod grown using biosolids and identifying how potential barriers might be overcome

Should the economics and other issues associated with biosolids use for sod production prove to be favorable, a seventh objective of this project would be to develop a comprehensive outreach program to communicate the results of this project to stakeholders and to facilitate the adoption of more economically and environmentally sustainable sod production systems throughout the United States.

Biosolids were initially applied to the research plots in the fall of 2009, 2010 and 2011. Preliminary data are promising, showing that biosolids applied at high rates produced sod with color, density, and quality similar to or better than the fertilized controls.

INFORMATION SYSTEMS ACTIVITY

The District's Information Systems workgroup provides infrastructure and software support for the following existing applications:

Administration:

Budgeting, Document and Records Management, Email, Microsoft Office Desktop, Pretreatment, Pump Station Billing, Rate Setting, Security, User Change Billing, and Web Site Management.

Engineering:

Construction Administration, Construction Plan Holders, Geographical Information System (GIS), Annexations, and Hydrology Modeling.

Operations & Maintenance:

Metrogro Hauling and Land Application, Operations (Regulatory) Reporting, Laboratory Analysis, Process Control Data Transfer and Analysis, Oracle Work and Asset Management.

The Staff were also involved in the following activities during 2011:

- Server virtualization (consolidation) was started. Three servers were consolidated into one physical box.
- All IS staff took part in the planning for the Process Control System Upgrade project, including designs for infrastructure, database, and reporting.
- Hiring and training of the new Network Technician.
- Normal budgeted replacement of servers, PCs, and laptops.

RESEARCH

A long term objective of the District is to produce a biosolid that meets the USEPA and Wisconsin Department of Natural Resources definition of a Class A biosolid with respect to pathogens. Class A production requires the use of a treatment process that consistently reduces pathogens to below detectable levels. Current state and federal regulations require the production of a Class A biosolid for end uses anticipated in the MetroMix Program.

This research focused on identifying possible surrogates to traditional indicators and pathogens used by DNR and EPA to determine compliance with biosolids pathogen reduction requirements.

Research results identified a possible surrogate organism for viruses. None of the tested surrogates correlated well with helminth (parasitic worms) ova inactivation. Rapid test methods for fecal coliforms and *Salmonella* were not statistically different from those using the EPA-

approved methods; however, the alternative methods were valid for a narrower density range of target organisms than the EPA-approved methods. The overall study results indicate that evaluation of surrogates and alternative methods needs to be conducted on a site-specific basis before they can reliably be applied for monitoring biosolids process performance.

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	2006	2007	2008	2009	2010	2011
Demonstration area (ft^2)	5,200	5,200	5,200	5,200	5,200	5,200
Irrigation period	16 June-26 Sept	7 May-6 Oct	16 May-27 Sept	26 June-24 Sept	11 Jun-12 Oct	09 May-08 Oct
Days irrigated	53	71	79	45	46	68
Total volume (gallons)	50,610	56,460	69,750	39,240	40,110	68,640
Total gallons/acre	424,000	473,000	584,000	327,000	336,000	574,990
Total gallons/acre/day*	8,000	6,662	7,400	7,267	7,305	8,456
Precipitation equivalent (in)	15.7	17.5	21.6	12.1	12.4	21.3
Commercial fertilizer additions						
Total Nitrogen (lbs/acre)	15.6	33	11	174	174	0
Total Phosphorus (lbs/acre)	0	0	0	0	0	0
Total Potassium (lbs/acre)	5.4	8	5	87	87	87
Effluent additions						
Total Nitrogen (lbs/acre)	60	66	77	48	48	91
Total Phosphorus (lbs/acre)	1.6	1.8	1.6	1.1	1.0	1.8
Total Potassium (lbs/acre)	48	54	67	38	35	62

There was no evidence of salt damage or nutrient deficiencies in the turf grass based on visual observations made throughout the growing season. District staff will explore opportunities to expand the irrigation project to a larger portion of the golf course in 2012.

Groundwater Recharge

The District, in partnership with the City of Fitchburg, supported a yearlong practicum (2010/2011 school year) conducted by the University of Wisconsin-Madison Water Resources Program that explored opportunities for groundwater recharge of treated effluent. Students participating in the practicum examined a wide range of engineering, water quality, regulatory, and social issues that need to be considered before a potential groundwater recharge project could move forward.

The investigation focused on identifying sites within Fitchburg that could accommodate an enhanced groundwater recharge project. The scope was expanded to include an evaluation of water reuse opportunities. The benefits of water reuse include preventing additional groundwater withdrawals and limiting the extent of watershed diversions.

Through a combination of research, fieldwork and computer modeling, the practicum students developed a better understanding of the suitability of the sites for enhanced groundwater recharge and water reuse. A means of delivering and distributing the treated wastewater across the landscape at the sites was also outlined, and applicable laws/regulations related to groundwater recharge were reviewed. Recommendations from the 2010/2011 practicum include:

1. Construct an enhanced groundwater recharge facility at the WDNR hunting grounds and deliver treated wastewater to the site to replenish the local aquifer.
2. Launch a wetland restoration project in the Nine Springs Wetlands and add treated wastewater to the site to raise the water table and improve conditions for native wetland plants.
3. Expand the effluent irrigation project at the Nine Springs Golf Course to limit groundwater use and promote water reuse.
4. Work with the WDNR to develop and improve the legal framework for enhanced groundwater recharge and water reuse in Wisconsin.
5. Reach out to the public to educate and engage them on watershed management and water reuse issues.
6. Promote water conservation on the individual and industrial levels.
7. Make upgrades to the Nine Springs Wastewater Treatment Plant to improve the quality of the effluent and, consequently, make water reuse projects more feasible and acceptable.
8. Renew a commitment to environmental leadership in Wisconsin by working extensive water reuse into future sustainable development strategies.

The District will consider these recommendations as it continues to evaluate opportunities for beneficial reuse of treated effluent. This is a recommendation of the District's 50-Year Master Plan.

UW Engineering Department/Digester Foaming

Dr. Sharon Long of the UW College of Agriculture and Life Sciences and graduate student Amanda Siebels continued their investigation of causes and potential cures for anaerobic digester foaming experienced at the Nine Springs Wastewater treatment plant. As has been previously noted, foaming in the digesters has been a serious operational problem for Nine Springs since the late 1990's, and in an extreme condition ultimately the foam has potential to cause extensive damage to the digester and gas handling equipment.

The final phase of investigation for this project examined the potential for heating WAS rapidly with steam to 70°C and then holding it at that temperature for 4 hours in order to attempt to break down some of the exocellular polymeric substances contained in the WAS and believed to contribute to the foaming. If this were successful in foam reduction it would have been strongly

considered for implementation into the Eleventh Addition. However, at the conclusion of the testing there was determined to be no observed reduction in foaming propensity using this method.

This project concluded with no definitive solutions for the issue of anaerobic digester foaming. Amanda Siebels presented the results of this work on several occasions, including at WEFTEC 2011.

UW Engineering Department/Poly-Aluminum Chloride Impact on Foaming

A new research project was initiated starting in September, primarily to evaluate the impact of poly-aluminum chloride (commonly referred to as PAX, or PAX-14) on foaming 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. A project team was assembled in conjunction with the University of Wisconsin-Madison, comprised of Dr. Dan Noguera (Principal Investigator, or PI) and his graduate student Klare Keadle, and Dr. Sharon Long and her student assistant Zachary Carroll. Dr. Long's group continued to operate 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—plus samples from the full-scale aeration basins and anaerobic digesters—were provided to Dr. Noguera's group for genomic DNA analysis to establish positively 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.

The study will involve the addition of PAX-14 into one of the four plants at Nine Springs WWTF, and is thus a ¼ scale trial on Nine Springs. Feed to the PAX bench digester will come from combining WAS from the PAX-dosed plant with primary sludge, whereas feed to the remaining three bench digesters will come from a non-PAX-dosed plant and similarly be combined with primary sludge. Preliminary work started at the end of 2011 with the study expected to be completed in the first half of 2012.

Phosphorus Release from Waste Activated Sludge (WAS)

In-house research work on this subject concluded in the first half of 2011, with the data continuing to fully support the previous observations that a small quantity of acid-phase digester sludge added to WAS and held for 4-6 hours would result in the highest phosphorus release potential of all methods evaluated over the preceding years of research. This finding has been directly implemented into the design for the Eleventh Addition to Nine Springs and will form the basis for the phosphorus harvesting process to be implemented. Additional work conducted to evaluate alternatives more fully and back-up methods for achieving phosphorus release found that a readily biodegradable carbon source such as acetic acid, propionic acid, or the Quality Liquid Feed (QLF) supplements tested could be effective in lieu of acid sludge if necessary.

The QLF supplement was also found to enhance the release obtained from acid sludge alone for the same period of time by about 20% to 25% and could approach the "theoretical value" of phosphorus available for release at this phase. However, the lack of a current clear pricing model for QLF (or similar substances that may be available) makes evaluation of the cost-benefits of using this additive with acid sludge to enhance phosphorus release difficult at this phase. The knowledge gained, however, has provided back-up options should acid sludge fail for any reason, and could be used in the future to further enhance the phosphorus-release and harvesting capabilities of the system planned for Nine Springs. The Nine Springs operations staff is sharing the findings of this research with the wastewater industry (and the environmental field at large).

INDUSTRIAL PRETREATMENT PROGRAM

In 2011, the Pretreatment Section continued to implement state and federal requirements regarding permitting activities directed towards industrial users. Additionally, pollution-prevention and source-control measures continued to serve as vital components of the working relationships with many non-permitted facilities.

Industrial permits for over half of the categorical industrial users were updated and reissued in 2011 (Madison Kipp, MGE Blount, Scientific Protein Labs, Trilary, Hydrite Chemical, Pfizer, Bock Water Heaters, MGE West Campus CoGen, SAFC-Madison, SAFC-Verona, Max Power Cylinders). 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 pretreatment program were conducted in 2011.

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 more than 30 hauling companies. Six discharge permits were reissued to entities such as landfill managers and industrial/institutional dischargers.

The Section's pollution prevention efforts for mercury settled into a maintenance mode in 2011; increased emphasis was applied toward chloride reduction measures. Where the mercury reduction program has successfully reduced the daily mass of mercury in wastewater influent to about one-half of an ounce, the chloride reduction program is tasked with reducing a daily loading that is measured in tens of thousands of pounds. The two programs share similarities and are also necessarily quite different.

Activities in the fifth year of the Mercury Pollutant Minimization Plan remained focused on the dental sector. In 2011, more than 30 dental clinics which operate amalgam separation equipment were inspected; this completed the five year goal of inspecting each of the 105 clinics where dental amalgam is placed or removed. The fourth annual report of the pollutant minimization program, for CY2010, featured the successes of the program; particularly noteworthy was that the average annual mercury concentrations for NSWWTP influent, effluent, and biosolids were the lowest on record.

The first chloride reduction program status report to DNR was submitted in 2011. Source identification efforts undertaken in 2011 included wastewater monitoring, performing industrial inspections and surveys, and evaluating road salting contributions to sewage. Considerable

sampling of wastewater was performed by the monitoring services crew, and all lab analysis were performed by the laboratory section. Informational and educational efforts included development of efficient water softening guidance, broadcast of public service announcements regarding softening, and presentations to road salting professionals.

ACCEPTANCE OF SEPTAGE AND ATYPICAL WASTES

Septage has been accepted at Nine Springs Wastewater Treatment Plant since 1986. In 2011, the District accepted wastewater from 22 permitted septage haulers and several non-typical haulers or sources. The septage receiving facility received over 9,400 loads in 2011. The septage haulers are charged a specific rate for each category of septage that reflects the District's cost of treating the wastes. In 2011, hauled-wastes revenue totaled nearly $334,000.

The following table lists the five domestic septage categories, the number of gallons of septage received during 2011, and the percent of increase or decrease in volume from 2010 to 2011.

Domestic Septage Received

Septic Tank	Holding Tank	Grease Trap	Settling Basin	Portable Toilet
7,027,000	14,900,000	491,000	234,000	233,000
2% decrease	3% increase	15% increase	5% increase	3% increase

The septage receiving facility is the discharge point for other wastewater not characterized by the five domestic categories. In 2011, other wastewater types and volumes included:

Other Wastewater Received	Volume (gal)
Village of Brooklyn Biosolids (39 loads)	195,000
Village of Belleville Biosolids (56 loads)	281,000
Refuse Hideaway Landfill Leachate	515,000
Verona Landfill Leachate	89,000
Middleton Landfill Leachate	16,500
Slaughterhouse Wastewater	831,000
Sanimax Gray Water	337,000
NFP Pet Food Wastewater	117,000
Other Industrial Wastewater	108,000
Remediation Projects Groundwater	53,000
WVDL Tissue Digester Residue	15,400
Danisco Annatto Oil Residue	4,200
HVAC Contractors Dilute Glycol	2,700
Total Other Wastewater Received	**2,565,000**

LAGOON SITE SUPERFUND PROJECT

Routine Operations & Maintenance activities continued in 2011. 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 & Maintenance activities will continue in 2012.

WATERSHED PROJECTS

Yahara River Watershed Monitoring Program

Monitoring to determine the impact of the District's treated discharge upon the main receiving stream, Badfish Creek, continued in 2011. During 2011, water-quality sampling of Badfish Creek, its tributaries and the Yahara and Rock Rivers continued semi-annually at established sampling points.

Aquatic macroinvertebrate samples were collected from three sites on Badfish Creek and one site on the Oregon Branch of Badfish Creek twice during 2011 (April and October). Three samples were taken at each site, producing a total of 24 samples. Biological indices continue to suggest that the District's effluent water quality is not inhibiting organisms from living in Badfish Creek. Preliminary data show fair to good water quality classification for all sites.

Fish were collected at three sites along Badfish Creek in July using the District's walk-along, stream-shocking boat. Each site sampled had four 100-yard sections shocked for data analysis. Results continue to show a diverse population of fish inhabiting Badfish Creek. A total of 45 different species of fish has been collected since fish shocking was started in 1983, with 20 species being collected in 2011.

The green sunfish and white sucker were again dominant. The information collected continues to suggest that water quality is not a limiting factor in the viability of fish living throughout Badfish Creek. The lack of fish habitat and the addition of non-point pollution sources along the 20 miles of Creek may continue to cause fewer game fish and other fish species to be collected during future surveys. The aquatic plant, Eurasian water milfoil, was seen for the seventh year at all fish shocking sites. There is a concern that this species of aquatic plant will form dense mats on the surface of the water, affecting dissolved oxygen values which are critical for the survival of fish and other aquatic life. Eurasian water milfoil is now quite prevalent at one site. This highly invasive exotic plant will be closely monitored during future surveys.

Sugar River and Badger Mill Creek Monitoring Program

The Sugar River and Badger Mill Creek, both within the Sugar River Watershed, were sampled chemically and biologically in 2011 to determine water quality.

During 2011, water samples were collected bimonthly at established sites within the watershed and chemically analyzed.

Aquatic macroinvertebrates were collected at two sites on the Sugar River and three sites on Badger Mill Creek in April and October. Aquatic macroinvertebrates were collected similarly to the ones in Badfish Creek with three kick samples taken at each site, producing 30 samples. Preliminary data for 2011 show a fair-to-good macroinvertebrate community at all of the sites, which is similar to 2010.

A fish survey completed in July used the District's walk-along stream-shocking boat on four 100-yard sections at two sites on Badger Mill Creek and two sites on the Sugar River. This survey produced 16 different species of fish. Since 1994, there have been 39 species of fish found in the Sugar River Watershed; 29 species in Badger Mill Creek and 36 species in the Sugar River. Water chemistry has not changed; however, stream habitat (substrate) appears to be changing from a more coarse gravel to a finer-grained mud. It is recommended for future studies to use the same shocking crews to aid in data analysis.

Upper Yahara River Watershed Monitoring Program

In July 2002, monthly water sampling was initiated in the Upper Yahara River Watershed on Token Creek, Six Mile Creek, Spring Creek and the Yahara River. For each water body, water samples were taken at sites near their headwaters and at sites closest to their entrance to Lake Mendota. Samples were taken to characterize water quality conditions in the Upper Yahara River Watershed. In July 2003, after a year of monthly testing, sampling was reduced to quarterly. The number of sample sites was also reduced, with remaining sampling taking place closest to each stream entry to Lake Mendota. During 2011, four samples were taken at these sites. Results continue to show similar values for the twenty-three chemical parameters monitored. Sites have also been chosen for fish and aquatic macroinvertebrate sampling, although no collections were made in 2011.

Phosphorus-Related Initiatives

Phosphorus-related initiatives impacting District operations include the implementation of numeric water quality criteria for phosphorus, and the Rock River Total Maximum Daily Load (TMDL), which was approved by EPA in September, 2011. The District has evaluated compliance strategies. These include adding advanced treatment at the Nine Springs Plant and pursuing an innovative approach called watershed adaptive management. In adaptive management, the District would work collaboratively with point and nonpoint sources of phosphorus to offset loads by identifying and funding cost-effective phosphorus control practices throughout the Yahara River watershed.

The District hired the consulting firm of CH2MHill to evaluate the cost of adding advanced treatment at the Nine Springs Wastewater Treatment Plant to meet lower nutrient levels. District staff also collaborated with the Dane County Land and Water Resources Department to estimate the cost of using adaptive management as a means of meeting phosphorus reductions required under the Rock River TMDL. Adaptive management appears to be a more cost-effective means of complying with phosphorus reduction requirements.

In late 2011, the District commission supported a staff recommendation to pursue a watershed adaptive management pilot project in collaboration with other point and nonpoint sources of phosphorus in the Yahara River Watershed. The pilot project will begin in 2012 and run through

2015. Efforts to date include working to identify other partners who will collaborate in the pilot project and developing a memorandum of understanding that identifies how the participants in the pilot project will work together, the goals of the pilot project, how success will be measured, and the financial responsibilities of each participant.

MONITORING STREAM FLOWS

An agreement signed in June, 1977, with the United States Geological Survey (USGS) for monitoring stream flows in Badfish Creek near Cooksville and in the Yahara River near Fulton, was renewed for another year. In September 1996, an agreement was also signed with the USGS to monitor stream flows, stage, specific conductance, dissolved oxygen and water temperatures in Badger Mill Creek near Bruce Street in Verona. This agreement was also renewed for another year. In April, 2009, a new monitoring site was added to the Sugar River at Highway 69 near Verona. This site monitors stream flows, stage, specific conductance, dissolved oxygen, water temperatures and pH.

LABORATORY ACTIVITIES

During 2011 the District Laboratory performed a total of 53,598 analyses on 12,279 samples. These analyses included:

PARAMETERS	QUANTITY
Nutrients (TKN, TP, NH3-N, NO2-N, PO4-P, WEP)	14,639
Solids (Suspended and Total)	15,670
Biochemical Oxygen Demand	5,232
Anions (C1, NO3-N, SO4)	5,446
Field Measurements (pH, TEMP, COND, DO)	4,200
Metals	5,336
Bacteria (FCOLI, TCOLI, ECOLI, Salmonella)	1,285
Volatile Fatty Acids (VFA)	713
Misc. Testing (Alkalinity,Density,Oil and Grease, CN, WET)	1,077

The District laboratory was also involved in the following activities:

- Continued its relationship with the UW by providing analytical support on four UW research projects.
- Analyzed numerous samples in support of in-house research to help determine the efficiency of phosphorus release using acid sludge and other additives.
- The City of Middleton continued sending the District samples for TKN, NH3-N and TSS analysis. During wet weather conditions, the city pumps water out of a retention pond and must have the discharged water analyzed for reporting to the DNR. During the year the District analyzed six samples of this type.
- Prior to making some modifications to a storm water detention pond, the city of Verona brought twelve samples to the laboratory for testing. This testing will continue in 2012 once the modifications have been completed.
- 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 148 samples for TKN, TP, CBOD5, TSS, and pH. This partnership will continue in 2012.

Other noteworthy activities in the laboratory during 2011 were the following:

- The lab must continue to show the capability to perform analyses in compliance with NR 149, the Wisconsin Administrative Code, to which laboratories must adhere in order to obtain certification in the State of Wisconsin. As part of this requirement, in May, 2011, the laboratory successfully underwent an on-site evaluation by the Wisconsin Department of Natural Resources. The results of this audit were overwhelmingly positive.
- The microbiology lab must continue to show the capability to perform analyses in compliance with the Safe Drinking Water Act. As part of this requirement, in December, 2011, the laboratory successfully underwent a biannual on-site evaluation by the Wisconsin Department of Agriculture, Trade and Consumer Protection. The results of this audit were overwhelmingly positive.
- Laboratory staff participated in a goal setting process to develop annual goals for 2011. The goals that were set and accomplished for 2011 were:
    - Develop guidelines for non-District staff working in the laboratory
    - Conduct a District wide "Clean Sweep" and arrange for proper disposal of items collected
    - Organize and inventory the laboratory storeroom
    - Develop and implement safety measures to ensure safety of tour participants when touring the laboratory
- All laboratory staff members met the criteria for successful participation in the District safety incentive program.

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 2011. Maintenance Department personnel serve on the Joint Apprenticeship Training Committee (JATC) which oversees the activities of the apprenticeship programs for electricians and mechanics. Additional training courses attended by Maintenance Department supervisors and craftsmen included:

- Underground Storage Tank Operator training
- Boiler operation, maintenance, and safety
- Waukesha engine school
- Crane mechanical seal school
- Cooling tower chemistry
- Collection system seminar
- Variable frequency drive best practices

- Ethernet/tp seminar
- Electrical grounding and bonding
- Making the transition from staff to supervisor
- Management leadership skills for first time supervisors
- Transition to trainer seminar

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 and 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, painting and carpentry projects. This section also performs preventive maintenance work on the District's electrical manholes, process tanks, roofs, floors, and HVAC units.

In 2011, the Building and Grounds Crew assisted the Operations and Engineering staff with various projects. Major projects accomplished in 2011 were:

- Cleared trees off of the Grass Lake Dike.
- Continued working with the City of Madison on a non-intrusive well cleaning procedure. The procedure minimizes entry into confined spaces and allows the grease that is removed to be taken directly to the landfill.
- Performed preventive maintenance on Primary Tanks 6, 7, 8, 19, and 20.
- Performed preventive maintenance on Final Clarifiers 13, 14, 15, and 16.
- Painted and landscaped at the treatment plant.
- Changed the media in the sulfur removal vessel of the gas treatment system.
- Replaced first-pass diffuser stones and o-rings in Aeration Tanks 19-30.
- Performed minor painting at several pumping stations.
- Painted all of the air distribution lines on Plants 3 and 4.
- Painted the wet well walls at pumping stations 13 and 14 to seal out corrosive hydrogen sulfide vapors.
- Repaired and painted the masonry fascia on the Service Building.

The following services were contracted with support provided by the Building and Grounds Crew:

- Blasting and recoating of the metal components of Final Clarifiers 4 and 9 with Sherglass to extend the life of the equipment.
- Repairing of a leak in the concrete wall of Primary Tank 5.
- Fabrication of a stainless steel sluice gate for Final Clarifier 9. The gate was installed by the crew.
- Fabrication of gates for the plant flow split structure.

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 WPDES 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 2011 included:

- Rebuilt Pump 11B, two maci pumps, Metrogro transfer pump 4, pump 1 at the Lois Lowry Lane pump station, and Pump 2 at the Lost Pine pump station
- Replaced the unit heater in Pump Station 4
- Rebuilt the forcemain relief valve in Pump Station 11
- Replaced motors on GBT1 and Primary Tan 13
- Replace the stator, rotor, and gear joint on Cake Pump 1
- Replaced grit concentrator 1A
- Replaced the drive on Final Clarifier 14
- Replaced the gear box on Polymer Transfer Pump 1
- Replaced the sump pump in Aeration Gallery 2

Electrical Maintenance Section

The Electrical Maintenance Section devoted a majority of the year to providing the support 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, normal day-to-day support, staff training, and planned improvement and construction projects. Examples of preventive maintenance tasks developed by the section include: calibration of electrical and instrumentation equipment, thermographic testing of switches and motors, repair and testing of fixed and portable gas detectors, operational inspections and cleaning of electrical and electronic equipment. The section continued to make progress in identifying problems by tracking data with the use of the Computerized Maintenance Management System (CMMS). The CMMS has continued to aid with maintenance scheduling and daily 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 2011:

- Upgraded the control panel wiring and controls at the city of Madison Lois Lowry Lane lift station.
- Operated District portable generators to provide power to various pumping stations during planned and unplanned power outages.
- Continued with the replacement of Power Quality Monitors at the Nine Springs Facility and various District pump stations.

- Completed the installation and verified operation of cathodic protection system at the Epic lift station.
- Completed the installation of new radio antenna and upgrade of communication/control system at the Epic lift station.
- Completed the installation of new samplers for effluent sampling.
- Completed the flow meter replacement for mixed liquor from AT 16.
- Assisted with the thermographic inspection of electrical equipment at the Nine Springs facility and District pump stations.
- Completed the replacement of existing lighting in the vehicle loading building with new energy efficient lighting.
- Continued with the installation of new pump control system for effluent pumps.
- Upgraded Sodium Hypochlorite Metering Pump panel and controls to accommodate the installation of new pumps.
- Completed the replacement of existing lighting in the Headworks metering room with new energy efficient lighting.
- Started to upgrade and modify existing electrical equipment at District facilities to accommodate the requirements of NFPA 70E. (Arc Flash).
- Started the electrical/controls upgrade for City of Madison Atlas lift station.

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 and October based on usage. The July inventory count was delayed to allow modifications to the report to increase the effectiveness of the quarterly inventory count process. 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 2011 the Inventory Control/Purchasing section performed the following:

- Purchased and inventoried all safety equipment.
- Assisted with the development of a new inventory report for the April, July, and October inventories that will reduce the cost and increase the effectiveness of the partial inventory process.
- Assisted with the testing of new releases for the Computerized Maintenance Management System known as WAM.
- Assisted with the organization and attended the WAM user group conference which was held in Madison.
- Increased the number of parts being manufactured by local machine shops rather than purchasing them from the equipment supplier.
- Began working with a third machine shop to manufacture replacement parts.

- Transferred the cell phone contract from the Cingular WSCA contract to the AT&T State contract, including the rollout of a new handset.
- Obtained membership in the Madison Plant and Facilities Maintenance Association (PFMA), the International Facility Management Association (IFMA) and the Institute for Supply Management (ISM).

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. During 2011, the following activities were performed by the crew:

- Replaced Air Release Isolation Valves on the Badfish Creek Effluent Forcemain.
- Inspected and maintained the air relief valves on several of the pumping station forcemains. Worked with the Engineering Department and an equipment vendor to test a new relief valve. The valves worked very well and are expected to reduce the number of valve plugging incidents that can result in sanitary sewer overflows. Based on the test, two additional valves were purchased and installed.
- Made repairs to several manholes that had been damaged by snowplows or mowers.
- Inspected the following interceptors:
    - East interceptor upstream of Pump Station 7
    - Gaston Road Extension to the Far East Interceptor
    - Waubesa Extension of the Nine Springs Valley Interceptor
    - Highway 30 Extension, Lien Extension, Pflaum Road Replacement, Truax Extension, and Waunakee/DeForest Extension of the Northeast Interceptor
    - Rimrock Interceptor
    - Lakeside Extension of the South Interceptor
    - West Interceptor Extension, Esser Pond Extension, Fortune Drive Replacement, Gammon Extension, and Spring Street Relief of the West Interceptor
- Inspected stop log and flap gate structures.
- Exercised buried valves at several pumping stations.
- Worked with a contractor to clean the siphons.
- Raised three manholes along Goose Lake

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 2011 televising and cleaning was performed by the City of Madison and part was performed by Visu Sewer, Inc. The work performed by the City of Madison was in

areas within the city that were congested and required weekend and night work The following areas were cleaned and televised:

West Interceptor	13,500 ft
Northeast Interceptor	21,160 ft
Southeast Interceptor	1,606 ft
East Interceptor – Monona Extension	2,367 ft

USER-CHARGE MONITORING AND BILLING

User-charge billing of the District's thirty-seven 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 2011, the MS/SM crew collected data and samples at 95 field sampling points each quarter, thereby generating 2,749 samples throughout the year. The analysis of the user-charge field samples and Nine Springs influent samples by the District lab generated 10,996 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 2011 service charge rates, shown in the following table, were adopted on October 27, 2010.

Service Charge Rate Summary Information

Parameter	Rate	Units
Volume	$445.21	per million gallons
CBOD	$0.12697	per pound
Suspended Solids	$0.19779	per pound
TKN-Nitrogen	$0.34779	per pound
Total Phosphorus	$2.37767	per pound
Actual Customers	$18.70	per year
Equivalent Meters	$13.92	per year

The 2011 rates included a 0.86% 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 2011, the average annual residential service charge in the District was about $262. This amount includes $141 for services provided by the District and $121 for services provided by the municipality (e.g. the City of Madison). A survey of 167 of the nation's largest municipalities indicated that the typical residential service charges in the District in 2011 were 69% of the national average of $379.

Operating costs per million gallons of treated wastewater for the years 2007 through 2011 are shown in the table below. Several accounting policy changes in 2008 affect comparisons with prior years. First, benefit costs that had previously all been charged as an administration or treatment expense were charged to all cost centers. The effect of this change is to reduce administration costs and increase collection labor costs. Second, some planning costs are no longer charged to the collection and treatment cost centers, but are included under administration costs. The effect of this change is to increase administration costs and reduce collection and treatment costs. The combined effect of the accounting policy changes is to show an overall decrease in the 2007 operating costs of 0.7%. To enable a "same basis" comparison, column 2007(2) shows 2007 costs using the same accounting policies as were used for 2008 and succeeding years. These changes would increase the 2007 administration costs by 3%, and decrease the collection costs by 9% and treatment costs by 1%.

In comparison with the 2010 costs, 2011 overall operating costs increased 0.6% while administration costs decreased 1.9%, collection costs decreased 3.3%, treatment costs decreased 1.1%, and debt service costs increased 4.8%. The decrease in administration costs was due to reduced construction demolition and planning expenses. The decrease in collection costs was due to lower salaries, parts, and power costs. The decrease in treatment costs was due to lower repair service and chemical costs. The cost per million gallons increased by 6.8% compared to 2010 largely due to the significant volume decrease of 5.9%.

Costs per Million Gallons of Wastewater Treated

District Function	2007	2007(2)	2008	2009	2010	2011
Administration	$202	$209	$165	$203	$218	$227
Collection	115	105	118	129	122	125
Treatment	569	564	544	603	641	674
Debt Service	436	436	408	459	488	543
TOTAL	**$1,322**	$**1,314**	**$1,235**	**$1,394**	**$1,469**	**$1,569**

The costs per million gallons for 2010 have been restated in the table above. The values as published in the 2010 Annual Report used an incorrect volume of wastewater treated. The

result of the restatement is that the 2010 cost per million gallons is revised from $1532 to $1469.

TRAINING ACTIVITIES

During 2011, District employees completed over 6575 hours of training. As a whole District employees averaged over 78 hours of training per employee during the year.

Notable training during 2011 includes:

- Vendor training conducted for Pump Stations 6 & 8.
- District employees averaged over 14 hours of safety training each during 2011. Safety training is held monthly throughout the year.
- The District embarked on the new Leadership Mastery series conducted by Dr Eric Allenbaugh. The District executives, managers and supervisors attended the 3-day workshop. 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.

PUBLIC EDUCATION

MMSD 2011 Tour Summary

In 2011, 62 tours took place with a total of 1,948 total participants which is up from 2010 when there were 53 tours with a total of 1,741 total participants. Most tours included an area in the Effluent Building that displays the many species of fish found in streams receiving effluent. This was manned for nearly every tour by Jeff Steven. To highlight the quality of the effluent produced at the Nine Springs Wastewater Treatment Plant, the 50-gallon, flow-through aquarium was maintained in the Effluent Building public education room. In addition to the fish tank, this display area includes maps, drawings and pictures of all water, aquatic macroinvertebrate and fish surveys. The tank that houses fish contains species that are commonly collected along Badfish Creek, Badger Mill Creek and the Sugar River. 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 us a “canary in a 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. Tour participants also receive a pencil as a reminder that we need everyone’s

help in doing the right thing when using water. Tour groups are asked to keep inorganic wastes, chemicals, mercury, and unused medicines out of the wastewater stream to help protect the environment. Reinforcing the concept that "a toilet is not a waste basket". Time is spent during each tour encouraging people to consider higher education and apprenticeships working towards careers in environmental fields.

MMSD Radio Advertising Campaign for Public Education in 2011.

In 2011 MMSD conducted a spring radio advertising campaign, as part of a five-initiative action plan to help reduce inflow (clean water) getting into the MMSD collection system, The District, for the third year, produced and aired public education radio commercials. The commercials targeted homeowners encouraging them to check their gutter and downspout systems to make sure the systems would direct water away from their foundations, keeping the rainwater from getting into their basements plus information about proper basement sump pump connections. In 2011 there was a focus on reducing the amount of chlorides from salt used in water softeners targeting homeowners in the community. Complementing the advertising the District dedicated a webpage with inflow reduction resources to help prevent rainwater from getting into the sanitary sewer system. To view the webpage and listen to the commercials log on to:

http://madsewer.org/RainGuttersDownspoutsBasements.htm

LITIGATION

On December 3, 2010, Contract Dewatering Services, Inc. filed a suit in Dane County Circuit Court naming Morgan Contracting, Inc. and the District as co-defendants. Contract Dewatering Services alleged that Morgan Contracting failed to pay for dewatering services related to the District's Northeast Interceptor – Pumping Station 10 to Lien Road Project. Contract Dewatering Services also alleged that the District was withholding $232,289.98, the amount of the claim, from payment to Morgan Contracting. District counsel responded to the claim on December 17, 2010. At the beginning of 2011, the District still retained the $232,289.98, in addition to the normal contract retainage amount, from payment to Morgan Contracting awaiting direction from legal counsel. Upon payment of the claim amount to Melli Trust in February, 2011, the court dismissed the District from the case as a defendant and referred the case to mediation/arbitration to be settled between Morgan Contracting and Contract Dewatering Services.

STRATEGIC PLANNING INITIATIVES

In the spring of 2011, a process for developing the District's next strategic plan was established. The process would produce a new strategic business plan, including mission, vision, values and goals, by the end of 2011. Purpose statements and key result measures from all departments would follow by mid 2012.

As part of the planning process, the District formed a Strategic Guidance Making Team in May, 2011. The team members, consisting of a broad cross section of the District's workforce, met five times over a two-month period to fulfill its charter of designing, coordinating, and communicating an employee involvement plan for the first two phases of the strategic planning process, the *assessing* and *visioning* phases. To insure employee involvement, the guidance team had developed a round table process in which facilitators would ask for responses to six

different general questions. The team rolled out the process at a Plant meeting in August followed by round table discussions that took place in September and October.

Following the round table discussions, table findings were presented at a late October Plant meeting to insure that the findings were accurate. Themes from the round tables included keeping services affordable, maintaining a technical orientation, educating the public and employees, improving communication, reinforcing the District's role of *protecting public health and the environment*, and capturing knowledge before employees retire. Round table attendees felt that increasing regulation, unstable politics, public scrutiny, the economy, environmental changes, the changing workforce, and viewing waste as a resource were the external factors most likely to influence the District. Responses during the round table sessions also raised thoughts regarding levels of risk taking, new revenue sources, the District's "customers", level of communication with the public, and employee needs.

In early November, the Executive Team held an off-site two-day retreat. At the retreat, the directors shared 2011 successes, challenges and opportunities, and workforce capacity among other topics. The directors found the retreat very successful with the main result being a set of draft mission, vision, and values (MVV) developed with the input from employees.

Since the retreat, a draft form of the District's MVV was presented to employees and the Commission and subsequently adopted. Below is the adopted version of the District's MVV:

> **Mission Statement:** *Protecting Public Health and the Environment* (not surprisingly, the new mission statement looks a lot like previous mission statements)
>
> **Vision Statement:** *Enriching Life through Clean Water and Resource Recovery*
>
> **Values:** *Balance Integrity Creativity Teamwork*

The next phase in the process, *enacting*, will refine and define how departments and the District put the new mission, vision, and values into practice. One of the steps will be to identify what the MVV mean to each person and what they mean to different workgroups within the District. Additionally, each department will develop workgroup goals and plans that link to and address the MVV.

ENGINEERING AND CONSTRUCTION IN 2011

11th Addition to the Nine Springs Wastewater Treatment Plant

In 2008, the District embarked on a Solids Handling Facilities Plan for the Nine Springs Wastewater Treatment Plant. The primary objectives of the Solids Handling Facilities Plan were to provide additional solids handling treatment capacity capable of meeting 2030 loadings, minimize foaming in thermophilic digesters, resolve heat exchange problems, alleviate struvite formation by producing a marketable fertilizer, and to diversify the biosolids program by producing an alternative Class A product capable of being recycled to a larger market. The Plan recommended the facilities necessary to meet these objectives in a reliable and sustainable manner.

The team of Applied Technologies and Carollo Engineers was retained to complete the Solids Handling Facilities Planning work. The Solids Handling Facilities Plan was completed in late 2009 and was formally approved by the WDNR in early 2010.

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

- Two (2) acid digesters
- One (1) anaerobic digester
- A new Sludge Control Building (SCB#3)
- A Waste Activated Sludge (WAS) 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

During 2011, a second digester (Digester 9) and piping to allow the Stockholm treatment process were added to the project scope to provide treatment flexibility and provide adequate capacity to minimize digester foaming.

Detailed design was completed in October of 2011 and bids were opened on November 17, 2011. The contract was awarded to the low bidder, C.D. Smith Construction, on December 1, 2011, and a notice-to-proceed was issued on December 15, 2011. The low bid price was $39,447,000.00. Construction activities will begin early in 2012 and continue through 2014. The total estimated cost for the project, including all planning, design and construction expenses, is estimated at $51 million.

Collection System Facilities Plan

The 2002 Collection System Facilities Plan continued to guide MMSD's implementation of significant collection system capital improvements during 2011. The 2002 Collection System Facilities Plan provides an assessment of the condition and capacity of MMSD's collection system facilities, including 95 miles of gravity interceptors, 43.8 miles of wastewater and effluent forcemains, and 17 regional pumping stations.

The 2002 Facilities Plan provided a timetable for recommended collection system projects through 2020. The estimated total cost for the recommended projects through 2020 was approximately $84 million. As of year-end 2011, the following projects discussed in the Facilities Plan had been completed or were in progress during the previous three years:

- Pumping Stations 6 & 8 Rehabilitation – completed
- West Int. Campus Relief Phases V+ - postponed
- Far East Interceptor Gaston Road Extension – completed
- Northeast Interceptor - PS10 to Lien Road Relief/Replacement – completed
- South Interceptor Baird Street Extension Liner – completed
- Far East Interceptor Cottage Grove Extension Liner – completed
- West Interceptor – MH05-011 to MH05-021 Liner – completed

- West Interceptor Rehab in Old University Avenue - MH02-038 to MH02-513 Liner - completed
- East Interceptor MH06-204 to MH06-209 Liner - in progress

The original 10-year planning period detailed in the 2002 Collection System Facilities Plan will be reached in 2012 and an effort to update the Plan was started in 2008. The Capital Area Regional Planning Commission (CARPC) was retained to complete population and flow projections for 2030 and 2060. This work was completed in early 2009. Throughout 2009, 2010, and 2011, MMSD staff incorporated the CARPC capacity evaluation with collection system condition assessments, with a goal to update the Collection System Facilities Plan by 2012. This work was completed late in 2011, and a new 2012 Collection System Facility Plan is expected to guide the District's collection system capital improvement program beginning in 2012.

Pumping Stations 6 & 8 Rehabilitation

The Rehabilitation of Pumping Stations 6 and 8 included improvements to pumping equipment, electrical systems and structural components of the stations. These were intended to upgrade the reliability and pumping capacity of the stations. The project also included building additions, new HVAC equipment, and improvements to the exterior of both stations.

Design work was completed in 2008 and bids for construction were opened on June 27, 2008. Contracts were awarded on June 30, 2008, to the respective low bidders for the three prime contracts as follows:

General Construction	
Joe Daniels Construction Co., Inc.	$1,058,602.00
Mechanical Construction	
J.F. Ahern Company, Inc.	$2,661,000.00
Electrical Construction	
Forward Electric, Inc.	$1,956,241.00

Construction of the project started in the fall of 2008 and was completed in early 2011. Final contract amounts, including all change orders, were as follows:

General Construction	
Joe Daniels Construction Co., Inc.	$1,066,222.00
Mechanical Construction	
J.F. Ahern Company, Inc.	$2,676,475.00
Electrical Construction	
Forward Electric, Inc.	$1,806,386.00

Northeast Interceptor-PS10 to Lien Road Relief/Replacement

The 2002 Collection System Facilities Plan identified the existing 48" Northeast Interceptor from Pumping Station No. 10 to Lien Road as lacking adequate capacity for peak flows. The interceptor also had significant infiltration in several locations and had suffered concrete deterioration above the normal waterline.

To address these issues, the District began preparations to add capacity and/or replace the interceptor. Planning for this work began in 2008 and continued into 2009. Detailed design was completed in June of 2009, and included approximately 9,200 lineal feet of new interceptor pipe. Of this, approximately 5,200 feet was a relief sewer and 4,000 feet was a replacement sewer. Where replaced, the existing reinforced concrete interceptor was abandoned and a new 63-inch corrosion resistant fiberglass pipe was installed. Where relieved, the existing reinforced concrete interceptor remains in service and a parallel 54-inch pipe was installed.

Bids for construction of the NEI PS10 to Lien Road Relief/Replacement were opened on August 27, 2009. The Commissioners awarded the contract to Morgan Contracting, Inc., on August 31, 2009, at their respective low bid price of $7,493,000.00. Construction was completed in early 2011 and the contract with Morgan Contracting, Inc., was accepted by the Commissioners on March 14, 2011. The final contract amount, including all change orders, was $7,629,508.00.

West Interceptor- MH05-011 to MH05-21 Liner

This segment of the West Interceptor is located along the west shore of Lake Mendota, in the Marshall Park area. Routine televising of the cast iron interceptor, which was originally constructed in 1931, revealed corrosion and tuberculation above the normal water surface. Due to its close proximity to the shoreline and the risk of significant inflow of lake water if problems were encountered, it was decided to line the interceptor.

Planning and design were completed by MMSD staff in 2010 and the project was bid on October 19, 2010. The Commissioners awarded the contract to Terra Engineering & Construction Corp. on October 27, 2010, at their low bid price of $182,888.00.

Construction was completed during cold weather months in early 2011, which limited disruption to residents' landscaping and allowed the work to be completed during the non-recreational season. The contract with Terra Engineering & Construction Corp. was accepted by the Commissioners on May 12, 2011. The final contract amount, including all change orders, was $184,574.80.

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, replacement parts for the system are no longer available and the software that operates the system is no longer supported by the manufacturer.

In 2009, the District embarked on a long-range plan to evaluate the process control system and replace components as required. This included a facility planning phase, where overall needs were to be evaluated along with potential system vendors. Following completion of the facility plan, detailed design would be completed, followed by construction/implementation of the new control system.

CDM was retained to perform the facility planning for replacement of the process control system. This work was completed, in conjunction with MMSD staff, in 2011. Donohue & Associates was subsequently retained to perform detailed design for the PCS replacement.

Design work started in 2011 and will be completed in 2012, with construction anticipated in 2013 and beyond.

Operations Building HVAC Rehabilitation

Over the years, the heating, ventilating and air conditioning (HVAC) system in the Operations Building suffered numerous operational problems and failures. This led to improper temperature control within the building, causing poor working conditions and reduced morale. Portions of the existing HVAC system were also 30 years old and were at the end of their useful life. Because of this, it was decided to evaluate the system fully 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 subsequently embarked on planning and design associated with the HVAC system improvements. Detailed design was completed during the first half of 2011 and bids were opened on June 16, 2011. The contract was awarded to the low bidder, Mechanical Inc., on June 27, 2011, at their low bid price of $2,490,000.00. Construction activities began in the fall of 2011 and will continue through 2012. The total estimated cost for the project, including planning, design and construction expenses, is estimated at $3.3 million.

Crosstown Forcemain Relocation-High Speed Rail Station

During 2010, the Wisconsin Department of Transportation notified the District that the area north of the Monona Terrace Convention Center had been chosen as the preferred location for a high-speed rail station. Numerous utilities were located in this proposed footprint of the rail station, including the District's Crosstown Forcemain.

Planning to relocate approximately 1,500 lineal of the Crosstown Forcemain near the proposed rail station was completed in late 2010. A contingency of $500,000 was added to the 2011 budget for this work. Relocation work ended in early 2011, when the State formally discontinued the high-speed rail project.

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 needed 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 3,160 feet of 18-inch through 21-inch sewer, from MH02-038 to MH02-513, would be 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, with final contract closeout and acceptance of work anticipated in early 2012.

East Interceptor MH06-204 to MH06-209 Liner

Previous inspection of the East Interceptor-Fair Oaks Extension from MH06-204 to MH06-209 noted deterioration of the 85-year old pipe. Plans for lining approximately 1,320 feet of 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. The Commissioners awarded the contract to Insituform Technologies USA, on August 22, 2011, at their low bid price of $109,228.00. As of the end of 2011, construction had not started. Work is expected to be completed in early 2012, with contract closeout and acceptance of work anticipated in the spring of 2012.

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 2011, planning work was on-going, with completion anticipated in early 2012. This will be followed by detailed design for the remainder of 2012. Construction is anticipated to begin in the spring of 2013 and will take approximately two years to complete. The estimated construction cost of the pumping station is $11M.

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 pressurized forcemain will be 42-inch or 48-inch diameter, and will stretch approximately 15,500 lineal feet from the proposed Pump Station 18 site to the Nine Springs Treatment Plant.

Since the proposed Pumping Station #18 and forcemain are closely dependent on each other, AECOM was retained to perform forcemain design. Initial planning for the forcemain began during the same timeframe as the pumping station. As of the end of 2011, a draft of the preliminary design report for the forcemain was complete and the corridor for the forcemain had been chosen. Surveying of the corridor and detailed design, including traffic control and crossings of the Beltline and the Yahara River, will be completed during 2012. Forcemain construction will begin in 2013 or 2014, at an estimated cost of $10M.

Northeast Interceptor-Far East to Southeast

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 that extends approximately 5,500 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 and pumped via the new Pumping Station 18.

As with Pumping Station 18 and its forcemain, AECOM was retained to perform planning and design of this project. Planning commenced at the same time as Pumping Station 18. As of the end of 2011, a draft of the preliminary design report for the interceptor was complete and the corridor for the interceptor had been chosen. Surveying of the corridor was complete and initial geotechnical work had started. Detailed design, including traffic control and crossings of Highway 51 and Broadway Avenue, will be completed during 2012. Interceptor construction is expected to begin in late 2012 or early 2013, at an estimated cost of $8M.

Treatment Plant Asset Management Plan

During 2011, District staff began initial preparation of an Asset Management Plan for the Nine Springs Treatment Plant. The Plan would review the various assets in the treatment plant and identify items that require attention. These would include treatment systems that lack adequacy, are at the end of their useful life, have continual maintenance problems, and in general, may need replacement. These items would then be ranked in order of priority and be considered for inclusion in the capital improvement program.

As of the end of 2011, District staff had developed an initial list of projects that would improve plant operation by replacing aging or underperforming items. These projects will require additional study to determine the actual scope of work and when they should be completed. This work will be completed in 2012 and beyond.

Preliminary Nutrient Removal Cost Study

The Nine Springs Treatment Plant employs an activated sludge system for nitrification 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/adaptive management, 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.

At the end of 2011, CH2MHill had completed their cost study and final changes were being made to their report. The final report is expected to be approved and available for use in early 2012.

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 $114.1 million.

The District had two Clean Water Funds loans in 2011 for which the final disbursement had not been received by the end of 2010. The status of those loans is as follows:

Pumping Stations No. 6 & 8 Rehabilitation

The District issued General Obligation Sewerage System Promissory Notes, Series 2008A, on November 12, 2008, to the State of Wisconsin Clean Water Fund (CWF Project 4010-26). These bonds are for an aggregate amount not to exceed $9,143,490 and are to be repaid at an annualized interest rate of 2.368%. The first interest payment on the loan was made on May 1, 2009. The first principal payment was made on May 2, 2011. The final bond payment will be made on May 1, 2028.

The final disbursement for this loan was made on October 21, 2011 bringing the total for this loan to $8,391,174.96.

Northeast Interceptor – PS 10 to Lien Road Relief/Replacement

The District issued General Obligation Sewerage System Promissory Notes, Series 2010A, on May 26, 2010, to the State of Wisconsin Clean Water Fund (CWF Project 4010-27). These bonds are for an aggregate amount not to exceed $8,964,767 and are to be repaid at an annualized interest rate of 2.369%. The first interest payment on the loan was made on November 1, 2010. The first principal payment was made on May 2, 2011. The final bond payment will be made on May 1, 2030.

The final disbursement for this loan was made on December 28, 2011, bringing the total for this loan to $8,876,033.84.

NINE SPRINGS ENERGY USE PROFILE

The following 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 2007 to 2011, renewable energy used at the Nine Springs Wastewater Treatment Plant provided roughly 35% of the Plant's energy needs and had an estimated value exceeding $5.7 million.

Notes:

1. 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.
2. The District made subsequent repairs and rebuilds to its gas engines during 2008 to 2010.
3. Power use was up in 2008 due to the higher flows that followed the June rainstorm events.
4. 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. At yearend 2011, the District was still in discussions with the DNR related to air quality permits.

Annual Energy Use Summary

Electric Energy	2007		2008		2009		2010		2011	
	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	77,083	85.9%	78,032	83.1%	70,804	77.6%	70,232	78.3%	67,856	79.2%
Wind Power Purchased from MG&E	15	0.0%	37	0.0%	39	0.0%	39	0.0%	16	0.0%
Generated from Digester Gas	3,260	3.6%	6,509	6.9%	10,468	11.5%	14,278	15.9%	14,469	16.9%
Avoided Purchase Due to Blower Gas Engine	9,378	10.5%	9,350	10.0%	9,892	10.8%	5,098	5.7%	3.357	3.9%
Total Used & Avoided	**89,736**		**93,929**		**91,202**		**89,648**		**85,697**	
Average cost of purchased power (dollars/kWhr)	$ 0.0674		$ 0.0735		$ 0.0739		$ 0.0779		$ 0.0804	
Estimated total monthly value of energy used	$183,879		$210,452		$205,123		$212,330		$209,684	
Estimated monthly value of renewable energy	$25,927	14.1%	$35,617	16.9%	$45,879	22.4%	$45,986	21.7%	$43,654	20.8%

Thermal Energy	2007		2008		2009		2010		2011	
	therms/ day	% of Total	therms/ day	% of Total	therms/ day	% of Total	therms/ day	% of Total	therms/ day	% of Total
Generated from Natural Gas	389	17.6%	637	28.8%	283	15.0%	273	14.2%	145	7.5%
Generated from Digester Gas	1,280	58.1%	813	36.8%	552	29.2%	544	28.2%	552	28.6%
Recovered from Gas Engines	534	24.2%	760	34.4%	1,055	55.8%	1,110	57.6%	1,236	63.9%
Total hot water energy used	**2,203**		**2,209**		**1,890**		**1,928**		**1,932**	
Average cost of purchased gas (dollars/therm)	$ 0.9344		$ 0.9432		$ 0.8273		$ 0.7258		$ 0.6753	
Estimated total monthly value of gas used*	$83,484		$84,505		$63,409		$56,746		$52,928	
Estimated monthly value of renewable energy	$68,750	82.4%	$60,151	71.2%	$53,918	85.0%	$48,701	85.8%	$48,960	92.5%
Total Energy Use	**2007**		**2008**		**2009**		**2010**		**2011**	
	$ 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	$267,363		$294,957		$268,533		$269,076		$262,612	
Estimated Value of Renewable Energy Used	$94,677	35.4%	$95,768	32.5%	$99,797	37.2%	$94,687	35.2%	$92,614	35.3%

* 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

During 2011, annexations to the District added 66.86 acres, increasing the area of the District to 180.66 square miles, or approximately 115,600 acres.

Annexation Name	Annexation Number	Municipality	Acres Added
EPIC LANDS	2011-01	Town of Verona	10
CLUB 51 PROPERTY	2011-02	Village of DeForest	1.63
LISA BARMAN PROPERTY	2011-03	Town of Westport (petitioned by the Village of Waunakee	75
COUNTRY VIEW ESTATES	2011-04	the Village of DeForest, Town of Windsor and the Town of Vienna (petitioned by the Village of Deforest)	314.35
BEAR TREE OFFICE PARK	2011-05	Village of DeForest	212.14
WAUNAKEE SCHOOL DISTRICT LANDS	2011-06	Village of Waunakee and the Town of Westport (petitioned by the Village of Waunakee)	25.2
BEAR TREE WEST	2011-07	Village of DeForest	169.9
LAUGHLIN ATTACHMENT	2011-08	City of Madison	0.38

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 adjusted 2011 base pay rates and established 2012 pay rate changes for non-represented employees on February 28, 2011.

FINANCES

A general District property tax was not placed on the tax rolls in 2011.

All financial transactions of the District were audited by CliftonLarsonAllen, LLP. The audit report for the year ended December 31, 2011 is available at www.madsewer.org.

2011 Financial Summary

This statement is presented in this report 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.

	2011	2010
OPERATING REVENUES		
Charges for services:		
Transmission and treatment of sewage	$ 22,395,826	$ 21,732,061
Servicing pumping stations	307,675	356,378
Septage disposal	380,153	429,035
Pretreatment monitoring	20,833	17,618
Total operating revenues	23,104,487	22,535,092
OPERATING EXPENSES		
Administration	3,168,828	2,924,286
Treatment	9,951,518	10,061,511
Collection	2,156,231	2,267,998
Depreciation	5,424,384	5,149,866
Construction Expenses	180,827	489,802
Total operating expenses	20,881,788	20,893,463
Operating income	2,222,699	1,641,629
NONOPERATING REVENUES (EXPENSES)		
Investment income	155,064	201,763
Rent	84,694	63,016
Other	149,306	179,475
Disposal of property and equipment	28,266	(116,875)
Interest expense	(1,760,090)	(1,679,972)
Total nonoperating revenues (expenses)	(1,342,760)	(1,352,593)
Income(loss) before capital contributions	879,939	289,036
CAPITAL CONTRIBUTIONS	1,213,477	496,324
CHANGE IN NET ASSETS	2,093,416	785,360
NET ASSETS		
BEGINNING OF YEAR	104,910,084	104,124,724
END OF YEAR	$ 107,003,500	$ 104,910,084

MADISON METROPOLITAN SEWERAGE DISTRICT

Supplemental 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, 2011
(with comparative amounts for 2010)

Repair and Replacement Expenditures	2011	2010
Engineering & Administration	83,699	83,385
Nine Springs Treatment Plant	674,290	908,931
Nine Springs Treatment Plant Vehicles	108,752	120,975
Collection System	7,755	5,488
Collection System Vehicles	4,186	4,019
Interceptors		
Pumping Station #1	1,188	3,876
Pumping Station #2	26,273	14,438
Pumping Station #3	0	422
Pumping Station #4	2,441	6,540
Pumping Station #5	3,891	541
Pumping Station #6	694	3,897
Pumping Station #7	5,258	16,624
Pumping Station #8	725	5,751
Pumping Station #9	0	950
Pumping Station #10	3,676	9,711
Pumping Station #11	19,678	9,552
Pumping Station #12	14,467	28,533
Pumping Station #13	8,875	12,308
Pumping Station #14	1,540	8,606
Pumping Station #15	1,529	3,345
Pumping Station #16	2,640	504
Pumping Station #17	2,667	21,075
East Interceptor	236	6,368
Far East Interceptor	5,306	0
West Interceptor	20,361	14,581
Nine Springs Valley Interceptor	1,458	12,257
Northeast Interceptor	10,449	3,823
Southeast Interceptor	265	306
Southwest Interceptor	4,000	0
City of Madison Pumping Stations	37,331	53,132
City of Verona Pumping Stations	2,183	2,190
Village of Maple Bluff Pumping Stations	6,938	2,658
Town of Dunn SD#1 Pumping Stations	1,947	658
Town of Dunn SD#3 Pumping Stations	135	1,776
Town of Madison Pumping Stations	2,421	16,034
Dane County Parks	4,096	72
Total Repair & Replacement	$1,071,350	$1,383,326

Capital Outlay Expenditures	2011	2010
Construction In Progress		
Electrical Equipment	26,005	
Heavy Mechanical Equipment	10,375	28,375
Light Mechanical Equipment	23,900	37,997
Instrumentation Equipment		
General Equipment	14,719	81,547
Engineering Equipment		
Office Equipment	58,472	96,589
Lab Equipment	27,915	
Fixed Improvements	76,715	
Force Main		
Vehicles	68,722	64,526
Total Capital Outlay	$306,823	$309,034

Madison Metropolitan
Sewerage District
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Protecting public health and
the environment

Service through stewardship,
integrity, and innovation.