CITY OF MIDLAND
WASTEWATER TREATMENT PLANT

2005 – 2006 ANNUAL REPORT

Submitted by: Kevin Babinski, Wastewater Superintendent

The City of Midland Wastewater Treatment Plant is a Michigan Class A Sewage Treatment Plant. We have been issued a National Pollution Discharge Elimination System (NPDES) Permit by the United States Environmental Protection Agency (US EPA) and Michigan Department of Environmental Quality (MDEQ). This permit authorizes Midland to discharge treated municipal effluents and sets pollutant reduction requirements. The Wastewater Plant is staffed with 22 full time employees and one part-time clerical employee. Wastewater operations are separated into the following areas, Plant Operations, Plant Maintenance, Pump Station Maintenance, Sanitary Sewer Maintenance and Storm Sewer Maintenance.

PLANT OPERATIONS

During fiscal year 2005-2006, 2,470,240,000 gallons of sewage was processed. The plant is staffed with six operators whose primary function is to ensure compliance with our NPDES Permit. Analytical is performed for carbonaceous biological oxygen demand (CBOD), Total Suspended Solids (TSS), Total Dissolved Solids (TDS), Ammonia Nitrogen (N), Total Phosphorus (P), Total Residual Chlorine, Total Mercury, Fecal Coliform, pH and Dissolved Oxygen.

Chemicals are added at various stages of treatment to reduce concentrations of CBOD, TSS, P and also for disinfection of our effluent. Chemical usage and costs are listed below:

MONTHLY CHEMICAL USAGE AND COST

2005 – 2006 Pounds

CHEM	July	Aug	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	TOTAL
Ferric Chloride	40,530	38,201	22,260	37,104	34,147	38,835	29,415	36,273	25,555	34,052	39,727	31,538	**407,637**
Anionic Polymer	165	220	220	55	0	0	615	330	495	440	385	0	**2925**
Cationic Polymer	400	300	400	500	300	450	450	715	820	990	825	825	**6975**
Chlorine	2,670	2,950	2,320	2,260	2,140	1,720	2,900	2,570	3,080	2,920	3,410	2,510	**31,450**
Sodium Bisulfite	5,553	3,836	3,185	4,328	3,058	3,410	4,643	6,125	7,553	6,769	6,495	4,762	**59,717**
TOTAL	**49,318**	**45,507**	**28,385**	**44,247**	**39,645**	**44,415**	**38,023**	**46,013**	**37,503**	**45,171**	**50,842**	**39,635**	**508,704**

2005 – 2006 $ Cost

CHEM	July	Aug	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	TOTAL
Ferric Chloride	4,860	4,298	2,872	4,786	4,405	5,010	3,795	4,679	3,297	4,393	4,763	4,068	**51,226**
Anionic Polymer	277	370	370	93	0	0	1,033	554	832	739	647	0	**4,915**
Cationic Polymer	584	438	584	730	438	657	657	1044	1,197	1,445	1,205	1,205	**10,184**
Chlorine	438	610	575	560	531	427	719	637	764	724	334	622	**6941**
Sodium Bisulfite	1,083	782	701	952	673	750	1,021	1,348	1,662	1,489	1,163	1,048	**12,672**
TOTAL	**7,242**	**6,498**	**5,102**	**7,121**	**6,047**	**6,844**	**7,225**	**8,262**	**7,752**	**8,790**	**8,112**	**6,943**	**85,938**

The wastewater plants largest utility usage is electricity. Annual costs for electricity at the plant and the remote pump stations are listed below:

Total Electrical Usage and Cost Per Month

2005 - 2006

MONTH	PLANT KWH	PLANT COST	PUMP KWH	PUMP COST	TOTAL KWH	TOTAL COST
July	252,000	11,935.07	94,476	6,720.65	346,476	18,655.72
August	255,200	11,963.95	81,863	4,854.69	337,063	16,818.64
September	272,000	12,296.47	69,169	5,042.75	341,169	17,339.22
October	244,000	12,366.62	82,371	5,978.60	326,371	18,345.22
November	308,000	15,231.74	111,914	8,408.38	419,914	23,640.12
December	288,800	13,199.58	116,351	8,513.50	405,151	21,713.08
January	277,600	14,855.61	146,754	10,937.78	424,354	25,793.39
February	314,400	16,138.22	143,639	10,971.60	458,039	27,109.82
March	280,000	16,215.39	152,367	12,045.61	432,367	28,261.00
April	280,000	16,188.76	138,676	11,466.00	418,676	27,654.76
May	287,200	16,184.29	132,879	10,629.88	420,079	26,814.17
June	265,600	15,256.38	106,582	8,578.04	372,182	23,834.42
TOTALS	**3,324,800**	**171,832.08**	**1,377,041**	**104,147.48**	**4,701,841**	**275,979.56**

The Wastewater plant uses natural gas for heating of the buildings and for heating the primary digesters. At some of the remote pump stations natural gas is used for fuel for the generators. The cost for natural gas is listed below:

Gas: Monthly Totals

2005 - 2006

MONTH	425 Smith Rd.	2000 Clay St.	2121 Austin St.	2125 Austin St.	3499 E. Ashman	4250 Moorland	TOTAL COST
July **2005**	25.94	8.42	0	2,350.00	39.57	13.03	2,436.96
August	22.26	9.34	0	6,326.25	16.72	9.34	6,383.91
Sept.	23.49	8.50	0	1,524.68	16.72	12.11	1,585.50
October	102.63	9.57	301.93	4,561.62	13.50	9.50	4,998.75
November	33.84	10.66	343.22	4,242.57	15.77	9.57	4,655.63
December	43.55	8.56	1,882.99	7,015.10	15.93	27.51	8,993.64
Jan. **2006**	29.08	9.46	2,700.73	1,375.74	15.98	9.62	4,140.61
February	30.37	158.68	3,024.50	8,932.63	27.12	77.16	12,250.46
March	28.72	12.81	1,798.21	6,415.93	31.38	12.48	8,299.53
April	27.80	9.63	395.74	3,146.45	165.59	11.74	3,756.95
May	36.43	82.41	0	2,999.91	47.16	18.21	3,184.12
June	43.82	9.58	0	2,087.80	34.32	18.23	2,193.75
TOTALS	**447.93**	**337.62**	**10,447.32**	**50,978.68**	**439.76**	**228.50**	**62,879.81**

RESIDUALS MANAGEMENT PLAN

Sludge is the waste by-product of wastewater treatment. Midland WWTP stabilizes sludge through anaerobic digestion and dewatering to create a product called bio-solids. Anaerobic digestion is a biological process that stabilizes sludge by reducing the volatile organic solids and by destroying pathogens and viruses. After processing sludge through this biological treatment these solids are classified as Class B bio-solids which are safe to use as a fertilizer supplement in the farming industry. The Midland WWTP has a permit issued by MDEQ to recycle this product to the farming community throughout the surrounding counties. Farmers throughout Midland County benefit from use of this product utilizing the nutrient contents as a fertilizer supplement. The City of Midland saves valuable landfill space by producing a recyclable product. The land application process is a subsurface injection procedure performed by a contracted land application company. Bio-solids are hauled from the WWTP via tanker truck and applied per guidelines based on agronomic rates for the crop to be grown. During the fiscal year 2005-06 the Midland WWTP land applied over 3 million gallons of bio-solids.

The Midland WWTP also conducts a winter pressing/composting process which allows for a more efficient residual management program and is producing an Exceptional Quality Class A bio-solid. This EQ bio-solid product is considered to be a higher quality product than Class B bio-solids and reduces the restriction requirements associated to a Class B bio-solid product and also reduces liability for the City of Midland based on EPA and MDEQ rules and regulations.

Over the past six years the Midland WWTP staff has negotiated changes in the Residual Management Permit for the City of Midland WWTP. The production of compost using leaves and wood chips mixed with bio-solids and the reduction in application management/record keeping requirements has made it feasible to try to establish a market for EQ bio-solids. Staff is now entering the marketing phase with this product which includes an agriculture field demonstration trial. Marketing bio-solids is a new concept in Michigan and until the market develops we will limit production of EQ composted bio-solids. At this time staff is exploring all avenues of marketing this product including the landscaping and horticultural markets.

The marketing goal and purpose of the demonstration plots is to establish use of composted EQ bio-solids as a soil amendment in the agricultural industry, improving the organic content and cation exchange capability of soil. Two fields were selected and soil samples were analyzed prior to compost application both having organic content of less than 1.5% and classified as sandy soil. Application rates were varied between plots and t different crops were utilized for this demonstration. Farmers hauled the compost from the City of Midland Landfill and applied the product to the soil by manure spreaders. The farmers then tilled the soils working the EQ bio-solids into the soil to a recommended 4 to 6 inch depth. Initial crop growth and root inspection of the crops have demonstrated favorable results on improving the cation exchange capability of the soil. Follow up soil analysis will be performed after the crops are harvested. We anticipate one more year of demonstration plots in the agricultural area and future trials in the landscape and horticultural industries.

Bio-solids being loaded into manure spreader for application.

Soy bean on left before EQ bio-solids; right after EQ bio-solids.

This department has taken an active approach to producing a safe and valued recyclable product from what was once considered a waste product, and hold high expectations to marketing EQ bio-solids in the future.

PLANT MAINTENANCE

The treatment plant on Bay City Road was put into operation in 1963. A major portion of plant maintenance is spent on maintaining that infrastructure as Hydrogen Sulfide (H2S), generated by decaying sewage, deteriorates concrete. The grit building flow channel showed severe deterioration which was rehabilitated with a cementatious product and coated with a chemical resistant epoxy topcoat.

The primary settling tanks use flight boards and chains for sludge and grease removal. The maintenance staff replaced this mechanism in two of the six tanks. The remaining four tanks have been scheduled for replacement in future years.

The intermediate pump house has eight pumps used to convey sewage. The suction and discharge valves were 40+ years old and were difficult to operate as they did not always seal properly. Direct replacement valves were not available. Wastewater staff modified the piping and replaced the valves with new resilient wedge valves.

During the treatment process excess sludge is wasted to the digesters for pathogen reduction. The waste activated sludge pumps are run at a variable speed according to the amount of sludge we need to waste to the digester. These pumps were installed in 1991. At the minimum, one pump will run 24 hours a day, seven days a week. The pump's variable speed option consisted of a belt driven pulley system that is obsolete, and parts are expensive and very difficult to find. This type of variable speed drive system required high maintenance. Our staff redesigned the piping system and installed a new pump and gear box. We also added the use of an electrical variable

frequency drive with the option of adjusting speed via the programmable logic controller from the lab or locally at the pump.

PUMP STATION MAINTENANCE

Our collection system is made up of two types of pump stations, submersible and dry pit can stations. The dry pit can station is a metal structure that ranges in depth from 15 to 40 feet. Some of the earliest stations were built in the 50's. The can station uses cathodic protection as an anti corrosion system. A power supply emits an electrical current on a buried wire loop around the perimeter of the can to sacrificial anodes. Wastewater staff monitors and maintains this system. This year the anodes at the Elizabeth and Sugnet/Saginaw pump stations were replaced; Mears Engineering assisted our staff.

The pump stations use telemetry equipment to communicate to the treatment plant by sending signals on dedicated leased phone lines. The signal consists of both an analog and digital signal which gives us instantaneous and accurate information on the pump station status.
This system sends information back to the plant such as alarm status, pump status, pump speed, wet well level, and flow level. This telemetry system has been upgraded to some of the latest equipment available. The staff finished the upgrade of this equipment this year.

Staff is continually evaluating the efficiency and dependability of our pump station electrical systems. This year wastewater staff rebuilt the main electrical system along with the new control systems in our Washington and Midland Mall pump stations. We are using some of the latest technology along with tried and proven older technology to increase performance and to cut operating costs.

CITY OF MIDLAND
PUMP STATION INVENTORY

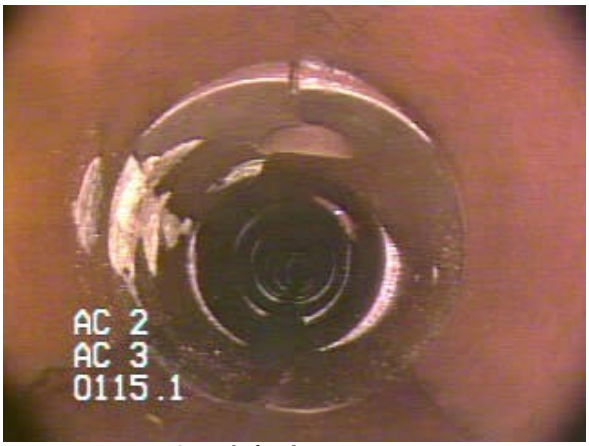
Pump Station	Address	# 0f Pumps	Type & Year	GPM	Size	HP	Generator
Walden Woods	3018 Abigail Ln.	2	1987 Submersible	220	4"	4	
Fairgrounds	2510 Airport Rd.	2	1982 Submersible	250		7.5	
Winterberry	4915 Airport	2	2001 Submersible	66	1-1/4"	2	
E. Ashman	3499 E. Ashman	2	2002 Submersible	1820	6"	60	Generac 150 kW Nat. Gas
Landfill	4323 E. Ashman	2	1960 Smith-Lovelace	315	4"	7.5	
Clay Street	2000 Clay	2	Smith-Lovelace	730	4"	30	Onan 85 kW Nat. Gas
Emerson	100 Currie Pkwy.	3	1959 Smith-Lovelace	1600	6"	20	Onan 80 kW Diesel
Currie	610 Currie Pkwy.	2	1961 Smith-Lovelace	600	6"	15	Share with Emerson
Dublin	3630 Dublin Ave.	2	1994 Submersible	300	4"	10	
Mall	6642 Eastman Ave	2	1991 Submersible	400	4"	14.8	
Elizabeth	1613 Elizabeth	3	1973 Usemco	2450	6"	75	
Jefferson Acres	4790 Jefferson Ave	3	1988 Submersible	350	6"	39	
Kent Street	235 Kent	4	1958 Custom	1100/2220 1740/2220	6/8/108"	25/40 50/40	Onan 230kW Diesel
State Street	824 E. Main	3	1994 Submersible	600	4"	20	Onan 50 kW Diesel
Moorland	4250 Moorland Dr	2	1978 Usemco	950	6"	10	Detroit 45kW Nat. Gas
Patrick	4200 E. Patrick	2	2002 Submersible	1780	6"	60	
Rockwell	101 Rockwell Dr	2	1976 Sandberg	400	6"	15	
Bay City Road	425 Rockwell Dr	2	1976 Usemco	400	4"	10	
Stratford Pines	1901 Rockwell St	2	1985 Submersible	120	4"	3	
Smith	425 Smith Rd.	2	1988 Submersible	900	6"	50	Detroit 200 kW Nat. Gas
Alpine	7321 N. Sturgeon	2	1976 Davco	245	4"	10	

Sugnet/Concord	709 E. Sugnet Rd	1	1979 Hydromatic	330	4”	5	
Sugnet/St. Andrews	1330 E. Sugnet Rd	1	1979 Hydromatic	330	4”	5	
Sugnet/Saginaw (new)	700 W. Sugnet Rd.	2	1973 Usemco	2100	6”	50	Onan 100 kW Nat. Gas --
Sugnet/Saginaw (old)	700 W. Sugnet Rd.	2	1948 Custom	845		5	share with Sugnet/Saginaw
Eastman Avenue	1800 W. Sugnet Rd	3	1988 Submersible	420	4”	25	
Valley	2900 W. Sugnet Rd	4	2002 Usemco	1800/5500	8/10”	75/215	Generac 500 kW Diesel
Sylvan	904 Sylvan Ln.	4	1988 Usemco	1050/1950 1400 x 2	5”	40/100	
Towsley	400 Towsley	2	1936 Custom	400/140	4”	5/5.5	
Stoneridge	5406 Trailridge	2	1994 Submersible	125	4”	5	
Vance Road	615 Vance Rd.	2	1991 Submersible	100	4”	1.75	
Wackerly/Sturgeon	3211 W. Wackerly	2	1989 Submersible	220	4”	1.75	
Washington	1098 Washington	2	1991 Submersible	50	1 ¼”	3.4	
Wyman	115 Wyman St.	4	1940 Custom	1400	6”	50	Onan 230 kW Diesel
Renee	4911 Isabella	2	1998 Submersible	84	4”	2.2	
Wheeler	3003 Wheeler	2	1996 Submersible	320	4”	9.4	
Chippewa	1969 Chippewa River	2	1998 Submersible	170	4”	3	
Perrine	7421 Perrine	2	2002 Submersible	500	6”		
Stratford Park		2	1976 Submersible	131	4”	5	
Nelson	80 Ashman Circle	5	2002 Submersible	700 x 2 5000 x 3	6”/12”	30/215	Generac 500kW Diesel
Countryside	6001 Countryside	2	2003 Submersible	320	4”	12.1	

SANITARY SEWER MAINTENANCE

The City of Midland uses high pressure jetter trucks to clean sanitary sewers. There are approximately 1,010,069 feet of sanitary sewer in the City of Midland ranging in size from 6 inches to 48 inches in diameter. Sewers are cleaned on a two year rotation. Some sewers located in the business district are cleaned on a seven week rotation.

During fiscal year 2005-2006 the City continued using trenchless technology to rehabilitate aging sewers. Three-thousand four-hundred feet of 30” diameter sewer located in Emerson Park was rehabilitated using cured in place pipe (CIPP) at a cost of $336,600. In addition, 385 feet of 18 inch and 592 feet of 10 inch sewer were also rehabilitated using this method. Some repairs have to be dug up and replaced. Twelve locations throughout the City required these repairs at a cost of $62,366.



Sewer before lining

Sewer after lining

The treatment plant is staffed 24 hours a day seven days a week and responds to customer calls and complaints. Plant staff responded to 125 sanitary sewer complaints of which 16 were found to be a problem in the City sewer.

STORM SEWER MAINTENANCE

During fiscal year 2005-2006 approximately 206,473 linear feet of storm sewer was cleaned. Catch basins associated with this sewer were also cleaned. The storm sewer maintenance program is on a four year rotation. A combination jetter/vactor truck is used for this purpose.

Wastewater staff also responded to 87 complaints of street flooding, the majority of which were due to grass & leaves covering basins.

Calendar Year	Feet Cleaned
2001	203,851
2002	194,895
2003	200,500
2004	208,315
2005	166,618
2006	250,326

Video equipment is used as an aid in inspection for defects and root intrusion as well as assisting in root removal.

GOALS

As part of last year's annual report I listed goals for the upcoming year. They were:

- 100% compliance of our NPDES Permit
  **No violations of permit

- Rehabilitate approximately 3000 feet of sanitary sewer using trenchless technology and 25 sanitary manholes
  **4377 feet of sanitary sewer was rehabilitated using this method along with 19 manholes

- Digitize storm and sanitary video library
  **Purchased software that allows us to digitize our records. Current records are recorded on DVD's.

- Negotiate a manageable mercury minimization program into our NPDES Permit
  **Program was submitted to the State for there approval in August of this year

- Oversee second stage clarifier design and construction project at the Wastewater Treatment Plant
  **Construction project has been awarded to contractor. Project to begin in early fall.

The logical results of these goals are to reduce or stabilize fund expenditures, maintaining authorized fund balances, stable sewer rates, providing a high level of customer service, protection of the local water environment and maintaining a professional, experienced, productive and safe Wastewater staff.

Goals for the coming fiscal year are as follows:

- 100% compliance of our NPDES Permit
- Evaluate sanitary manhole conditions and prioritize for rehabilitation.
- Gather data on sanitary and storm sewer system for GIS
- Implement mercury minimization program

I believe this report outlines some of the tasks my employees are challenged with. We want to continue to provide Midland with the structures, facilities and staff that will maintain and build on the environmentally sound policies developed and implemented.

Kevin Babinski - Wastewater Superintendent