Detroit Water and Sewerage Department

Wastewater Master Plan

DWSD Project No. CS-1314

Evaluation of Other WWTPs in DWSD Planning Area

Technical Memorandum
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Evaluation of Other WWTPs in DWSD Planning Area

1. Introduction

This technical memorandum discusses the wastewater treatment facilities located within the DWSD service area in Macomb, Oakland, St. Clair, Washtenaw, and Wayne Counties. The scope of work is to assess each of 22 wastewater treatment plants in the DWSD planning area and to delineate their service areas. Each facility is discussed in six major sections as follows:

a. Plant summary or description
b. Wastewater flow rates
c. Known problems (e.g., permit violations)
d. Condition of plant (e.g., equipment status, operational issues)
e. Plans for future rehabilitation or expansion
f. Wet weather flow management (e.g., SSO, CSO, capacity issues)

This memorandum is based on a draft report prepared for Task A.3.b by Sigma Associates and file information from the Michigan Department of Environmental Quality (MDEQ).

2. Wastewater Treatment Facilities

Twenty-two facilities are considered in this memorandum. Seven facilities are located in Macomb County, seven facilities in Oakland County, four facilities in St. Clair County, three facilities in Washtenaw County, and one facility in Wayne County.

Table 1 summarizes a list of wastewater treatment plants evaluated in this report along with their service areas.

Table 2 summarizes the following operating parameters for the facilities listed in Table 1.

- Name of the Facility
- Design Capacity (mgd)
- Annual Average Daily Influent Flow (Year 2000)(mgd)
- Annual Max. Daily Influent Flow (Year 2000)(mgd)
- Peak Hourly Influent Flows (Year 2000)(mgd)
- NPDES Violations if any
- Purchase Capacity**
- Type of System
- Plan for Future Expansion or Rehabilitation
- Sludge to DWSD Sewer

(** Service to adjoining communities)

Table 1. Summary of Other WWTPs in DWSD Planning Area

No.	Name of the Facility	Location	Areas Currently Served	Future Service Areas	Population Served
			MACOMB COUNTY		
1	Armada WWTP	Village of Armada	Village of Armada, Armada Township	None Known	1,548
2	Memphis WWSL	City of Memphis	City of Memphis	None Known	1,240
3	Mt. Clemens WWTP	City of Mt. Clemens	City of Mt. Clemens, Clinton Township	Macomb County Disposal Facility (part), New Haven, Chesterfield, Lenox Twp, Harrison Twp (part), WWF from S of Mt. Clemens	18,700
4	New Baltimore WWTP	City of New Baltimore	City of Baltimore	None Known	6,000
5	Richmond WWTP	City of Richmond	City of Richmond, Lenox Township (part)	None Known	4,300
6	Romeo WWTP	Village of Romeo	Village of Romeo, Part of Bruce Township	None Known	6,850
7	Warren WWTP	City of Warren	City of Warren	None Known	144,864
			OAKLAND COUNTY		
8	Commerce Township WWTP	Commerce Township	Commerce Township	White Lake Township, Village of Wolverine Lake, City of Novi	49,563
9	Holly Village WWTP	Village of Holly	Village of Holly	None Known	6,715
10	Milford Village WWTP	Village of Milford	Village of Milford	None Known	5,500
11	Pontiac City WWTP	City of Pontiac	City of Pontiac, Waterford Township, Sylvan Lake Township	None Known	76,000
12	South Lyon City WWTP	City of South Lyon	City of S. Lyon	Lyon Township	9,555
13	Walled Lake/Novi WWTP	City of Novi	City of Novi, City of Walled Lake, City of Commerce	None Known	9,500
14	Wixom City WWTP	City of Wixom	City of Wixom	None Known	9,500
			ST. CLAIR COUNTY		
15	Algonac WWTP	City of Algonac	City of Algonac, Ira Township, Clay Township	None Known	14,000
16	Americana Estates WWTP	Casco Township	Casco Township	None Known	1,500
17	Marine City WWTP	Marine City	Marine City	None Known	6,200
18	St. Clair Sanitary WWTP	East China	East China	None Known	3,447
			WASHTENAW COUNTY		
19 19	Ann Arbor WWTP	East Side of Ann Arbor City	City of Ann Arbor, Pittsfield Township, Scio Township, Ann Arbor Township	Not Known	128,000
20	Salem Township WWTP	Salem Township	Salem Hamlet	None Known	600
21	YCUA WWTP	Ypsilanti Township	Ypsilanti, Pittsfield, Pittsfield, Superior, Augusta, Sumpter, Northville, Canton, Plymouth, Van Buren Twps; Ypsilanti City	None Known	227,000

Table 1. Summary of Other WWTPs in DWSD Planning Area

No.	Name of the Facility	Location	Areas Currently Served	Future Service Areas	Population Served
WAYNE COUNTY					
22	Wyandotte WWTP	City of Wyandotte	Allen Park, Belleville, Ecorse, Lincoln Park, River Rouge, Romulus, Southgate, Taylor, Wyandotte; Brownstown, Van Buren Twps.	None Known	350,000

Table 2. Operating Data for Other WWTPs Within DWSD Planning Area

Name of the Facility	Design Capacity (MGD)	Annual Average Daily Influent Flow (Year 2000) (MGD)	Annual Max. Daily Influent Flow (Year 2000) (MGD)	Peak Hourly Influent Flows (Year 2000) (MGD)	NPDES Violations If Any	Purchase Capacity (MGD)	Wet Weather Flow Manage-ment	Expansion or Rehabilita-tion Plan?	Sludge to DWSD Sewer?
MACOMB COUNTY									
Armada WWTP	0.35	0.16	0.77	1.5	No	Armada Township	Separate	No	No
Memphis WWSL	0.15	---	---	N/A	No	No	N/A	Yes	No
Mt. Clemens WWTP**	6.0	3.83	6.85	N/A	No	Part Clinton Twp	30% CSO	Yes	No
New Baltimore WWTP	1.75	0.97	3.74	7.5	No	No	Separate	No	No
Richmond WWTP	0.9	0.60	1.80	4.4	No	Part of Lenox Twp	Separate	Yes	No
Romeo WWTP	1.6	0.87	1.77	4.7	No	Bruce Township	10% CSO	No	No
Warren WWTP	36.0	23.18	36.20	94	No	No	Separate	No	No
OAKLAND COUNTY									
Commerce Township WWTP	3.0	0.86	1.03	N/A	Yes	3.5[1]	Separate	Yes	No
Holly Village WWTP	1.2	0.92	3.45	N/A	No	Proposed	Separate	Yes	No
Milford Village WWTP	1.04	0.65	1.02	N/A	No	Possibility	Separate	No	No
Pontiac City WWTP	25.5	12.36	23.20	N/A	No	[2]	Separate	No	No
South Lyon City WWTP	1.5	1.00	1.63	N/A	No	No	N/A	No	No
Walled Lake/Novi WWTP	3.5	2.42	3.89	N/A	No	No	N/A	No	Yes
Wixom City WWTP	2.87	2.17	6.68	7.66	Yes	No	N/A	No	No
ST. CLAIR COUNTY									
Algonac WWTP	2.7	1.88	5.45	N/A	Yes	No	Separate	N/A	No
Americana Estates WWTP	0.12	0.12	0.12	N/A	No	NO	Separate	No	No
Marine City WWTP	1.0	1.0	4.10	N/A	No	No	Separate	N/A	No

Table 2. Operating Data for Other WWTPs Within DWSD Planning Area

Name of the Facility	Design Capacity (MGD)	Annual Average Daily Influent Flow (Year 2000) (MGD)	Annual Max. Daily Influent Flow (Year 2000) (MGD)	Peak Hourly Influent Flows (Year 2000) (MGD)	NPDES Violations If Any	Purchase Capacity (MGD)	Wet Weather Flow Manage-ment	Expansion or Rehabilita-tion Plan?	Sludge to DWSD Sewer?
WASHTENAW COUNTY									
Ann Arbor WWTP	29.5	18.70	33.70	39.5	Yes	No	Separate	No	No
Salem Township WWTP	0.05	0.013	0.037	N/A	No	No	N/A	No	No
YCUA WWTP	28.9	21.50	33.80	N/A	Yes	[3]	N/A	Yes	No
WAYNE COUNTY									
Wyandotte WWTP	125	50.40	116.70	N/A	Yes	[4]	N/A	Yes	No

[1] - Wolverine, Novi, White Lake Townships; [2] - Waterford Township and Sylvan Lake; ** Portion of wastewater from Macomb County Wastewater Disposal District is expected to be treated

[3] - Receives flows from Pittsfield Township, Superior Township, Augusta Township, Sumpter, Canton, Northville, Plymouth, Van Buren

[4] - Receives flows from the City of Allen Park, City of Belleville, Brownstown, Dearborn Heights, Ecorse, Lincoln Park, River Rouge City, Romulus, Southgate, Taylor, Van Buren

N/A = Not Available

2.1 Macomb County Wastewater Treatment Facilities

The following wastewater treatment facilities located in Macomb County are addressed in this section.

a. Armada WWTP
b. Memphis Wastewater Stabilization Lagoons (WWSL)
c. Mt. Clemens WWTP
d. New Baltimore WWTP
e. Richmond WWTP
f. Romeo WWTP
g. Warren WWTP

2.1.1 Armada WWTP

Plant Description

The Armada WWTP provides secondary treatment for the wastewater discharged from the Village of Armada and two parts of Armada Township adjacent to the village. The plant includes mechanical screening, grit removal, trickling filter for biological organic matter removal, final settling, UV disinfection, and anaerobic sludge digestion tanks. Following UV disinfection, the effluent passes through a Parshall Flume and over a cascading set of weirs and is discharged to the east branch of Coon Creek. Excess wastewater is diverted to a flow retention basin by opening a manual bypass valve installed at the influent manhole. The plant is operated by the Macomb County Public Works Department for the municipality.

The aerobically digested sludge is pumped to a sludge loading station, where it is hauled away in trucks and spread over agricultural land.

Wastewater Flow Rates

The annual average daily influent flow and the annual maximum daily inflow are 0.16 and 0.77 mgd, respectively. On several occasions, the incoming flow rate has exceeded the plant hydraulic capacity of 1.5 mgd.

Known Problems

The WWTP is apparently is in compliance with the discharge limits as identified in the National Pollutant Discharge Elimination System (NPDES) Permit. In 1981, the Michigan Department of Natural Resources (MDNR) recommended new effluent limits for the Armada WWTP. In response, the Village developed a Facilities Plan in 1982 and a Municipal Compliance Plan (MCP) in 1985 to modify the plant so that new NPDES limits could be met. The MCP recommended corrections to existing combined sewer overflow structures and phased sewer separation. The Village selected the Sequencing Batch Reactor (SBR) process as the main treatment process, which started operation in 1988.

Condition of Plant

On many occasions, the incoming flow exceeds the plant hydraulic capacity of 1.5 mgd. Excess wastewater is diverted to a flow retention basin by opening a manual bypass valve installed at the influent manhole. This diversion is designed to allow for manual screening, primary treatment, and chlorination prior to bypassing flow to the receiving stream.

Plans for Rehabilitation or Expansion

The WWTP was designed to treat wastewater from the Village of Armada and parts of Armada Township. There are no known existing plans to increase the plant capacity to accommodate other surrounding communities.

Wet Weather Flow Management

The wastewater collection system discharging into the Armada WWTP is a separate sanitary sewer system. Originally, the Village of Armada was served by a combined sewer system, which included nine CSO outfalls. In the early 1990's, a sewer separation project was implemented, which resulted in complete separation of the storm and sanitary sewer systems and elimination of the CSO structures. NPDES documents indicate that the maximum dry and wet weather flows are 0.251 mgd and 0.482 mgd, respectively. No other information pertaining to wet weather management is available.

2.1.2 Memphis WWTP

Plant Description and Location

The City of Memphis operates a stabilization lagoon wastewater treatment plant. The existing WWTP consists of two lagoons, providing primary and limited secondary treatment. Effluent from these lagoons is discharged to the Belle River.

The solids settled at the bottom of the lagoons are biologically stabilized and the sludge removed from the lagoons is used for land application.

Wastewater Flow Rates

The average influent flow to the lagoons is about 0.146 mgd and the average flow during seasonal discharge is 1.7 mgd. The City of Memphis estimates that the population will grow from the current 1,240 residents to 2,100 and 4,900 residents by the years 2004 and 2032, respectively. The anticipated average flow would be 0.28 mgd and 0.531 mgd for the years 2004 and 2032, respectively.

Known Problems

Available information indicates that one of the lagoons was cleaned (i.e. sludge removed) in 1993 without specifying which lagoon. The NPDES permit re-issued by MDEQ in March 1999 indicated that the City of Memphis would be required to perform a lagoon ex-filtration study to investigate the presence of leakage from the lagoons to the groundwater. The study was performed in June 1999 and identified some leakage sources from the lagoons. The City of Memphis is now required to add a liner to the lagoons to address the leakage problem.

Condition of Plant

Review of documents did not reveal any information pertaining to the present condition of this plant.

Plans for Rehabilitation or Expansion

The City of Memphis is in the process of studying options for expanding the stabilization lagoons. The potential expansion is based on the City's projections for additional growth in the next three decades. The treatment technologies that are being considered include aerating the lagoons and building a modular mechanical plant using sequential batch reactors, extended aeration, or similar biological technologies. Construction would be performed in phases, with the design capacity for the first phase being 0.323 mgd to accommodate growth (i.e., up to 2012). Phase 2 would increase the design capacity to 0.38 mgd, while capacity in phase 3 would allow up to 0.531 mgd of wastewater to be treated at the facility.

Wet Weather Flow Management

No information pertaining to wet weather management was found.

2.1.3 Mt. Clemens WWTP

Plant Description

The City of Mt. Clemens operates an advanced WWTP, which collects and treats wastewater from the City of Mt. Clemens and part of Clinton Township. The existing WWTP provides facilities for primary, secondary and tertiary treatment with sludge handling and disposal.

Biological treatment of the wastewater occurs in an oxidation ditch, followed by secondary treatment in two final clarifiers. Wastewater leaving the oxidation ditch is directed to one of two final clarifiers using a splitter box. Phosphorus and solids removal is accomplished by adding ferric chloride and an anionic polymer. The ferric chloride is fed into the wastewater in each channel of the oxidation ditch and in the return sludge pump well.

In the 1970s, treatment capacity was added to the plant to accommodate combined sewer overflows. This capacity consisted of a deep tunnel-retention sewer, with a 3.2 MG capacity. In 1989, the trickling filters were removed and an oxidation ditch was constructed.

The grit and material from the bar screens are collected and hauled to a landfill for disposal. The sludge collected in the clarifiers is either drawn off as waste activated sludge (WAS) or is returned by a screw pump to the oxidation ditch. The thickened WAS sludge is delivered to agricultural sites for subsurface injection.

Wastewater Flow Rates

The design capacity for the Mt. Clemens WWTP is 6.0 mgd for the average daily flow. The peak treatment capacity available at the plant is 12.5 mgd. The annual average daily influent and the annual maximum daily inflows are 3.83 and is 6.85 mgd, respectively.

Known Problems

Review of documents did not reveal any information pertaining to the present condition of this plant.

Condition of Plant

Review of documents did not reveal any current problems.

Plans for Rehabilitation or Expansion

There is an ongoing study to evaluate the possibility of treating a portion of the wastewater from Macomb County Wastewater Disposal District at the Mt. Clemens WWTP. The first phase would consist of conveying wastewater from Chesterfield and Lenox Townships and the Village of New Haven to the Mt. Clemens WWTP. Sewage from these communities would be intercepted north of Joy Boulevard and conveyed to the Mt. Clemens WWTP through a new pumping station and piping system. The second phase would consist of conveying wastewater from all of Harrison Township north of the Clinton River and pumping excess wet weather flows from communities south of the City of Mt. Clemens to the City's WWTP. The Mt. Clemens WWTP would be expanded from its current 6.0 mgd annual average capacity to 12.0 mgd.

Wet Weather Flow Management

A partial separation project for the sewers discharging to the Mt. Clemens WWTP was recently completed. The current collection system consists of about 30 percent combined sewers, with the rest being separate sanitary and storm sewers.

Originally, there were 17 CSO regulators within the service area constructed in the 1940's, which discharged to the Clinton River. In the 1970's, a deep retention-tunnel sewer was constructed to collect combined sewer flows and transport them to the retention basin pumping station, from which they would be pumped to the retention basin. The plan consisted of a partial sewer separation project and upgrading the retention basin pumping station. When the full capacity of the retention basin, which is 37.0 MG, is reached, wastewater is discharged to the Clinton River.

2.1.4 New Baltimore WWTP

Plant Description

The City of New Baltimore operates a secondary treatment WWTP. In 1980, the plant was expanded and the trickling filters were replaced with rotating biological contactors (RBCs). In 1990, the sludge holding tank was converted to a high-rate digester and the existing chemical oxidation sludge treatment system was taken out of service. A 0.3 MG sludge storage tank was also added. In 1994, the plant was upgraded with the addition of a secondary clarifier. Biological treatment of the wastewater is achieved in the RBC reactors. Effluent from the RBC reactor flows to a set of two final clarifiers, where additional suspended solids are removed. Before discharging to the receiving water, the final effluent is dechlorinated. The effluent is discharged to Crapeau Creek, which discharges to Anchor Bay.

The digested sludge is transported to a storage tank before it is spread on drying beds. The supernatant and drainage water originating from the sludge lagoons and drying beds are recycled to the plant influent wet well for processing.

Wastewater Flow Rates

The annual average daily influent flow is about 0.94 mgd and the annual maximum daily inflow is 3.74 mgd. The facility is designed to operate with an annual average flow of 1.75 mgd. There are no known existing plans to increase the plant capacity to accommodate other surrounding communities.

Known Problems

Review of documents did not reveal any current problems. However, it should be noted that the annual daily maximum flow of 3.74 mgd is well above the design capacity of 1.75 mgd.

Condition of Plant

No information related to the present condition of the plant was found.

Plans for Rehabilitation or Expansion

The City of New Baltimore currently has no plans to upgrade or expand the existing wastewater treatment plant.

Wet Weather Flow Management

The City of New Baltimore has separate sanitary and storm sewer systems. No SSO problems have been reported. No other information related to wet weather flow management was available.

2.1.5 Richmond WWTP

Plant Description

The City of Richmond operates a secondary WWTP, which treats sanitary sewage from the City of Richmond and a small part of Lenox Township. Biological treatment of the wastewater occurs in oxidation ditches. The wastewater flows from the oxidation ditches to two final settling tanks before being conveyed to a mix tank followed by a chlorine contact tank. An upgrade in 1986 consisted of improvements to the grit removal equipment and replacement of the trickling filter secondary treatment with dual oxidation ditches. The 1986 upgrade also included a solids handling facility, additional storage for sludge, improvements to the chlorination equipment, and dechlorination equipment. The wastewater is disinfected in the chlorine contact tank before discharge to a drain, which in turn discharges into the Salt River

Sludge is disposed of through land application or through drying beds located on the plant property.

Wastewater Flow Rates

The plant has a design average flow capacity of 0.9 mgd with a maximum hydraulic design capacity of 1.5 mgd. The annual average daily influent flow is approximately 0.6 mgd and the annual maximum daily inflow is 1.8 mgd.

Known Problems

Review of documents did not reveal any current problems. The plant was designed to meet the anticipated growth needs of the city until the year 2000. As of 2001, wastewater flows are at 77 percent of the plant's design capacity. There are no known existing plans to increase the Richmond WWTP capacity to accommodate other surrounding communities.

Condition of Plant

The plant was upgraded in 1986 and no information is available as to the present condition of plant. The upgrade in 1986 consisted of improvements to the grit removal equipment and replacement of the trickling filter with dual oxidation ditches. The 1986 upgrade also included a solids handling facility, additional storage for sludge, improvements to the chlorination equipment, and dechlorination equipment.

Plans for Rehabilitation or Expansion

A master plan prepared in 1999 concluded that WWTP improvements would likely be necessary to accommodate future flows in the next 4 to 10 years. If inflow and infiltration reduction is accomplished, according to this report, these improvements could be potentially delayed. The plan indicated that future (i.e., 2010) average flows to the plant would be about 2.07 mgd. This is based on anticipated residential and industrial growth in the service area. The recommended WWTP improvements include the addition of a third oxidation ditch, a new 50 ft diameter secondary clarifier, a new sludge storage tank, and a new return activated sludge pump. The future growth would also require constructing additional sanitary sewers and upgrading some of the pumping stations.

Wet Weather Flow Management

The City of Richmond has separate sanitary and storm sewer systems. The flow discharged to the sanitary sewer system consists of about 80 percent domestic, 10 to 15 percent commercial and 5 to 10 percent industrial. No other information concerning wet weather flow management is available.

2.1.6 Romeo WWTP

Plant Description

The WWTP at the Village of Romeo is an advanced treatment facility. Alum is added at the Parshall Flume location for phosphorus removal. Polymer is added at the grit removal tank to improve the downstream flocculation step. Effluent from the primary settling tanks is conveyed to three parallel rows of RBCs. Effluent from the RBCs flows to three secondary clarifiers, where scum and settled sludge is returned to the grit removal tank. Flow from the secondary clarifiers is conveyed to three pressure sand filters for tertiary treatment. The effluent from the filters passes through the chlorine contact tanks before it is dechlorinated in an aeration tank where re-aeration occurs if needed. The final disinfected effluent from the plant is discharged to the East Pond Creek.

The liquid and dried digested sludge is transported to farm fields for land application.

Wastewater Flow Rates

The Romeo WWTP has an annual average design capacity of 1.6 mgd and a design peak flow rate of 3.3 mgd. The annual average daily influent flow is approximately 0.87 mgd and the annual maximum daily inflow is 1.77 mgd. Wastewater from the Village of Romeo and part of Bruce Township is treated at the plant.

Known Problems

Review of documents did not reveal any current problems. However, it should be noted that the annual average peak hourly influent flow of 4.7 mgd is greater than plant's design peak flow rate of 3.3 mgd.

Condition of Plant

No information related to the present condition of the plant was found. However, in October 1978, the plant was upgraded to improve the plant's effluent quality and to provide the plant with the capability of treating wastewater from part of Bruce Township. Dechlorination equipment was added in February 1990 to provide chlorine removal.

Plans for Rehabilitation or Expansion

There are no known existing plans to increase the Romeo WWTP capacity to accommodate other surrounding communities. There are no reported plans for further expansion or upgrade.

Wet Weather Flow Management

About 90 percent of the service area collection system consists of separate sanitary and storm sewers with the remaining 10 percent consisting of a combined sewer system. About 15 percent of the plant influent originates from industrial sources. Excess flows are controlled using a flow equalization tank system. No other information is available.

2.1.7 Warren WWTP

Plant Description

The City of Warren's WWTP consists of a single-stage activated sludge system, which provides removal of both the carbonaceous and nitrogenous oxygen demands. Two tanks operate as plug flow aeration reactors and two tanks as complete mix aeration basins. Ferric chloride is added for sulfide control and phosphorus removal at the plant influent pumping station. Effluent from these tanks is then conveyed to secondary clarifiers and on to the rapid sand filters for tertiary treatment. Final disinfected and dechlorinated effluent is discharged into the Red Run Drain.

Sludge is conditioned by the addition of a polymer coagulation agent and the resulting filter cake is discharged to a belt conveyor system for transport to the sludge incinerator.

Wastewater Flow Rates

The annual average daily influent flow is approximately 23.2 mgd and the annual maximum daily inflow is 36.2 mgd. The plant has a raw sewage pumping capacity of about 200 mgd, a design average flow capacity of 36 mgd and a maximum sustained flow capacity of 60 mgd. Flows greater than 60 mgd (due to infiltration and inflow during storm events) are diverted to a 50-MG retention (flow equalization) basin, where they are stored until WWTP capacity becomes available.

Known Problems

The WWTP is currently in compliance with the discharge limits as identified in the NPDES Permit. However, the plant has been plagued by an increasing series of equipment breakdowns and operational failures in recent years. While effluent limits have not been violated, treatment performance and hydraulic loading capability have been affected. This is largely due to the deteriorated condition of the tertiary treatment facilities. The effect of the aging equipment resulted in a drastic increase in the maintenance budget, especially in recent years.

Condition of Plant

A Project Plan prepared by Sigma Associates, Inc. in 1999 to qualify for the State Revolving Fund (SRF) identified improvements that consisted of the following:

- Grit channel effluent improvements to limit flow to the primary system.
- Flow splitting and scum skimming improvements to the primary and secondary settling tanks, and the addition of an underground gallery for the sludge piping system.
- Rapid sand filter and roof access improvements at the filter building, and waste wash water pump replacement.
- A back-up method for sludge disposal consisting of dewatering, chemical stabilization using lime followed by sludge cake disposal through a landfill or land application.

Plans for Rehabilitation or Expansion

There are no known plans for expansion or rehabilitation. The plant serves a heavily industrialized area with over 200 industries including General Motors. The City of Warren is considered to be fully developed. Therefore, the capacity requirement at the WWTP is not expected to change as minimal growth change is expected.

Wet Weather Flow Management

The City of Warren has separate sanitary and storm sewer systems. During wet weather, flows greater than the maximum treatment plant hydraulic capacity of 60 mgd are diverted to a 50 MG retention basin. On a few occasions, the basin overflows. Overflow from the basin is mixed with tertiary effluent, chlorinated and discharged to the Red Run Drain. When the storm subsides, retained flow in the basin is returned to the plant headworks for treatment. During dry periods, the basin can also be used to store sewage with high concentrations of harmful contaminants, which may result from industrial spills, accidents, or illegal dumping.

The City of Warren also experiences considerable infiltration and inflow into the sanitary sewers, which could increase the normal daily flow of about 30 mgd to over 150 mgd.

2.2 Oakland County Wastewater Treatment Facilities

The Wastewater Treatment Facilities located in Oakland County and addressed in this memorandum are listed below:

a. Commerce Township WWTP
b. Holly Village WWTP
c. Milford WWTP
d. Pontiac WWTP
e. South Lyon WWTP
f. Walled Lake / Novi WWTP
g. Wixom WWTP

2.2.1 Commerce Township WWTP

Plant Description

The Township of Commerce operates a WWTP to treat sanitary sewage from the municipality, Novi Township and from the Village of Wolverine Lake. Return sludge from the clarifiers is recirculated into the oxidation ditch. The settled solids are returned to the oxidation ditch as a source of biomass or are wasted to a sludge concentrator and sludge storage tanks. Ferric chloride and polymer are added to the waste stream in the clarifiers. The treated effluent is discharged to the Seeley Drain.

The sludge is disposed of by land application.

Wastewater Flow Rates

The annual average daily influent flow is approximately 0.86 mgd and the annual maximum daily inflow is 1.03 mgd. The plant has an average flow capacity of approximately 2.0 mgd through the new plant installed in 1998. An additional 1.0 mgd is available through the original plant. The plant is permitted to discharge up to 3.0

mgd. In its most recent NPDES permit, the community has applied for an increase in its discharge limit to 8.5 mgd, pending the completion of an upgrade at the plant. The Township of Commerce is an established community with a large potential for development inside and outside its current boundaries.

Known Problems

The WWTP is currently in compliance with the discharge limits as identified in the NPDES Permit. There was a hearing before a judge of the Office of Administrative Hearings of the MDEQ in April 1999, as the City of Farmington, the City of Farmington Hills and the Strathmore Subdivisions No. 1, 2 and 3 contested the renewal conditions for the Commerce Township NPDES permit in 1994. The case was settled by negotiation between the interested parties. The objections were withdrawn and the permit was renewed on April 13, 1999 by order of the judge.

The Township has an extensive and old sanitary sewer system. The system currently drains an area north of the WWTP along Welch Road from Maple Road to Oakley Park, around Lower Straits Lake and along Commerce Road from Union Lake Road to Wixom Road. The system also requires an extensive system of pumping stations to move the sewage to the WWTP.

Condition of Plant

No details of any problems with the operation of the treatment plant were available. However, the plant is expected to increase its capacity in the future as development continues in Commerce Township, White Lake Township, the Village of Wolverine Lake and the City of Novi.

Plans for Rehabilitation or Expansion

The plant is designed to treat the flow from the Township of Commerce. However, there are plans to provide additional capacity for adjoining communities. Commerce Township has an agreement with the City of Novi to treat up to 2000 households in exchange for Novi accepting an equal amount of households into the Novi/Walled Lake WWTP. Currently there are an estimated 550 residents in the designated area of Novi. The community has applied for an increase to the discharge limit to enable the WWTP to accept flow from White Lake Township, which lies to the north of Commerce Township. Commerce Township has requested that its discharge capacity increase to 8.5 mgd. Currently, no service is provided to White Lake Township.

Wet Weather Flow Management

There is a 0.2 MG equalization tank being used to hold the excess flows. Flow can be sent from the tank back to the inlet line to the current plant or to the activated sludge process. No other information concerning wet weather flow management is available.

2.2.2 Holly Village WWTP

Plant Description

The Village of Holly operates a tertiary wastewater treatment facility. In 1995, the plant completed an upgrade to the major components of the treatment system. The deteriorating RBC system was replaced with a new RBC system. The RBC system in place can be air scoured via air diffusers to help in the reduction of overloading. The treated effluent is discharged to the Shiawassee River.

Sludge removal consists of liquid sludge from the tank to land application sites.

Wastewater Flow Rates

The annual average daily influent flow is approximately 0.92 mgd and the annual maximum daily inflow is 3.45 mgd. The plant has a design flow of 1.2 mgd with a maximum flow capacity of 1.3 mgd.

Known Problems

The WWTP is currently in compliance with the discharge limits, as identified in the NPDES Permit. No other problems were identified.

Condition of Plant

The plant was upgraded in 1995. The WWTP provides facilities for tertiary treatment with sludge handling and disposal. No known operational and maintenance problems associated with the WWTP have been reported.

Plans for Rehabilitation or Expansion

The Village of Holly is looking into the feasibility of adding ultraviolet disinfection. There are plans for extending service outside the village boundaries to the nearby townships. The Village of Holly is considering other improvements that are required to meet the needs of the community in the future.

Wet Weather Flow Management

The wastewater collection system is separated from the storm water (done in 1996 improvements). Holly does not have any combined sewers at present. The documents did not reveal any information pertaining to wet weather flow management.

2.2.3 Milford Village WWTP

Plant Description

The Village of Milford WWTP utilizes an oxidation ditch consisting of an outer and an inner pass. In 1988, the WWTP underwent a major upgrade in accordance with an EPA Consent Decree. In addition, the existing interceptor sewer was replaced or re-lined to reduce infiltration. In the WWTP, grit removal was upgraded to a pump and hydroscreen process. The oxidation ditch replaced the conventional activated sludge process. Also, clarifiers and UV disinfection were added. The microscreen filters were added and a sieve drum concentrator was added. A sludge storage tank and sludge drying beds were added and the existing activated sludge and primary settling tanks were converted to aerobic sludge digestors. Ferrous Chloride is added to the waste stream in the oxidation ditch to assist in phosphorus removal. There are two clarifiers to separate the solids out of the liquid stream. Ferrous Chloride and Polymer are added to the waste stream in the clarifiers to assist in the settling process. The treated effluent is discharged to the Huron River.

The digested sludge is sent to the sludge drying beds. The dried sludge is subsequently disposed of by land application.

Wastewater Flow Rates

The annual average daily influent flow is approximately 0.65 mgd and the annual maximum daily inflow is 1.02 mgd. It is designed for an average flow of 1.042 mgd and a peak flow of 2.604 mgd. The Village of Milford is an established community with some limited potential for development inside and outside its current boundaries. There is mention in the 1993 application for the community's NPDES permit of increasing the plant capacity to 1.25 mgd. However, this expansion in capacity does not seem to have been implemented.

Known Problems

The WWTP is currently in compliance with the discharge limits as identified in the NPDES Permit. The annual average maximum daily inflow of 1.02 mgd is approaching the average design flow of 1.042 mgd.

Condition of Plant

Documents reveal no known problems with the operation of wastewater plant.

Plans for Rehabilitation or Expansion

There are no known plans for plant upgrade or rehabilitation.

Wet Weather Flow Management

The documents did not reveal any information pertaining to wet weather flow management.

2.2.4 City of Pontiac WWTP

Plant Description

The City of Pontiac operates two plants (East Boulevard Plant and Auburn Road Plant). The design capacity of the plants is complicated by the fact that the arrangement is to operate the two plants in tandem. There are two primary settling tanks to remove suspended solids from the influent and four Imhoff tanks are used to supplement the primary settling tanks. A retention basin stores excess flows until they can be treated in the primary settling tanks. Aeration tanks and secondary clarifiers complete the process. The secondary effluent is routed to the Auburn Road plant. The treated effluent is discharged to the Clinton River.

The sludge from both plants is digested in aerobic digestors. The digested sludge is dewatered by vacuum filters and incinerated.

Wastewater Flow Rates

The combined wastewater plants have a total average design capacity of 25.5 mgd, with a peak design capacity of 30.0 mgd. The plant has an annual average daily influent flow of 12.4 mgd and a maximum flow of 23.2 mgd. It is permitted to discharge up to 25.5 mgd to the Clinton River. Pontiac treats some sewage flows from Waterford Township and Sylvan Lake.

Known Problems

The WWTP is apparently in compliance with the discharge limits, as identified in the NPDES Permit. No other problems were identified. The NPDES permit has established a special long-term effluent limit for mercury (0.0007 ppb).

Condition of Plant(s)

No information is available.

Plans for Rehabilitation or Expansion

There are no known plans for plant upgrade or rehabilitation.

Wet Weather Flow Management

The retention basin stores excess flows until they can be treated in the primary settling tanks when the peak inflow has receded. Discharges occur when the total flow to the plant exceeds 30 mgd. The retention basin is 235 feet in diameter and has a capacity of 3.5 MG.

The City of Pontiac's sewer system is a separated system. The NPDES permit application in 1990 indicates no combined sewer overflows. In addition it estimates that less than 5 percent of the city sewer system is combined.

2.2.5 South Lyon City WWTP

Plant Description

The City of South Lyon operates a secondary plant that treats the sewage from the municipality. Polymer and ferric chloride are added to the waste stream before the primary settling tanks to assist in phosphorus removal. There are two primary settling tanks (each of 168,300 gallons capacity), three RBC tanks (with 450,000 square feet of contact area in each tank for a total of 1,350,000 square feet), and two final settling tanks (of 143,000 gallons capacity each). There is a chlorine contact tank with two cells with a total capacity of 69,300 gallons. The treated effluent is discharged to an unnamed branch of the Yerkes Drain.

Sludge processing consists of primary and secondary sludge digestion. The digested sludge is disposed of to sludge drying beds or is taken by tanker truck for land application. The supernatant is returned to the raw sewage pump wet well.

Wastewater Flow Rates

The annual average daily influent flow is about 1.0 mgd and the annual maximum daily inflow is 1.63 mgd. The plant has a design flow capacity of about 1.5 mgd. The MDEQ has issued a permit to the City of South Lyon increasing the allowable discharge to 2.5 mgd.

The City of South Lyon is an established community with potential for development inside and outside its current boundaries. The city provided evidence in support of the recent increase in its NPDES discharge from 1.5 to 2.5 mgd. This evidence provided by the city projects that the population would grow from 9,555 in the year 2000 to 13,400 in 2020. In addition, potential annexation is projected to add up to 9,000 more in population.

Known Problems

The WWTP is apparently in compliance with the discharge limits as identified in the NPDES Permit. No other problems were identified.

Condition of Plant

In 1994, the community installed traveling bridge sand filters. Future plans are to modify or replace the rotating biological contactors and to move to a more efficient method of sludge disposal. No other problems were identified.

Plans for Rehabilitation or Expansion

There was originally a plan to provide capacity for areas of Lyon Township. However, the granting of a permit to Lyon Township for a WWTP has resulted in a reduction in the permitted discharge applied for by South Lyon.

Wet Weather Flow Management

A provision is apparently in place to screen excess wet weather and infiltration flows. The pump station has the capacity to pump excess flows for discharge to the Yerkes Drain. The documents reveal no other information pertaining to wet weather flow management.

2.2.6 Walled Lake/Novi WWTP

Plant Description

The City of Walled Lake and the City of Novi are jointly served by a WWTP, which treats the sanitary sewage from the City of Walled Lake and the northern part of the City of Novi. This new WWTP is designed as an advanced biological and chemical treatment system because of the increased industrial flows from the area. The biological system is intended to treat the sanitary portion of the flow while the chemical system is intended to precipitate the heavy metal constituents from the industrial portion of the flow. Alum is added in the grit chamber to facilitate phosphorus removal. The secondary treatment process uses activated sludge. The secondary clarifiers are incorporated in the activated sludge process units. The effluent is chlorinated after leaving the secondary clarifiers. Microfloc filters are used for tertiary filtration. The treated effluent is disinfected with UV irradiation and is discharged to the Fenley Drain.

The sludge is disposed of to a Detroit Water and Sewerage Department interceptor sewer**.
(** One report indicates sludge disposal by land application)

Wastewater Flow Rates

The annual average daily influent flow is about 2.42 mgd and the annual maximum daily inflow is 3.89 mgd. The plant has a design average flow capacity of 3.5 mgd and a maximum sustained flow capacity of 4.0 mgd. The WWTP is designed to treat the wastewater

from the City of Walled Lake, the City of Novi and Commerce Township. The agreement to provide service to Commerce Township allows for up to 2000 residential units. At present this agreement has not been activated.

Known Problems

The WWTP is apparently in compliance with the discharge limits, as identified in the NPDES Permit. A dispute between MDEQ and Oakland County Department of Public Works (DPW) about the conditions of the permit in 1995 was resolved by negotiation in early 1996.

Condition of Plant(s)

No information is available pertaining to the present condition of the treatment plant.

Plans for Rehabilitation or Expansion

The plant currently serves a population of 9,500 people (Estimated population April 1993). This number is projected to grow to 17,000 people in 2020. These numbers foresee an increase in demand for wastewater treatment.

Wet Weather Flow Management

Flows can be routed to an equalization / holding tank to capture excess flows due to infiltration / inflow problems. It has a capacity of 0.32 MG. No other information is available pertaining to wet weather flow management. There is no reference to any CSO facilities located within the City limits of Novi and Walled Lake and no information pertaining to SSOs is available.

2.2.7 Wixom City WWTP

Plant Description

The City of Wixom operates a WWTP, which treats the sanitary sewage from the City of Wixom. Two oxidation ditches are used to stabilize the organic matter in the wastewater. Three secondary clarifiers and two equalization tanks are employed. Tertiary treatment consists of flocculation with alum, four sand filters, and UV disinfection. The treated effluent is discharged to Norton Creek. This creek is ultimately a tributary of the Huron River. The Wixom WWTP is located on the south bank of Norton Creek at the western boundary of the city. There are two equalization / holding tanks to modulate and store excess weather flows.

The WWTP was designed as an advanced biological and chemical treatment system because of the increased industrial flows from the area. The biological system is intended to treat the sanitary portion of the flow while the chemical system is intended to precipitate the heavy metal constituents from the industrial portion of the flow.

The biological and chemical sludge are collected separately but combined prior to dewatering and aerobic digestion. Following the digestion, all sludge is pumped to 0.8 MG sludge tanks where it is stored until removed for land application.

Wastewater Flow Rates

Wixom is a fast developing residential and light commercial community with most industrial users located along Wixom Road. The annual average daily influent flow is about 2.17 mgd and the annual maximum daily inflow is 6.68 mgd. The plant has a design average flow capacity of 2.87 mgd and a maximum sustained flow capacity of 5.07 mgd. The City's permit is for a discharge of 2.8 mgd.

Known Problems

The City of Wixom has received a notice of non-compliance from MDEQ (NC-09-00-07-016D) for violation of BOD limitation.

A new WWTP was constructed because of a requirement of a Consent Judgment entered into by Oakland County, the City of Wixom, the State of Michigan, and the U.S. EPA in 1988. In 1990, construction was completed and flows were diverted to the new WWTP in January 1991.

Condition of Plant

No current information is available.

Plans for Rehabilitation or Expansion

The WWTP is designed to treat the wastewater from the City of Wixom. There are no known existing plans to increase the plant capacity to accommodate other surrounding communities.

Wet Weather Management

Two equalization tanks are employed to dampen the excess flows due to infiltration/inflow problems. A search of the MDEQ files with regard to the Wixom WWTP did not reveal any other information regarding the collection system served by this plant.

2.3 St. Clair County Wastewater Treatment Facilities

The following wastewater treatment facilities located in St. Clair County are discussed below:

a. Algonac WWTP
b. Americana Estates of Casco WWTP
c. Marine City WWTP

d. St. Clair County Sanitary Authority WWTP

2.3.1 Algonac WWTP

Plant Description

St. Clair County owns and operates the Algonac WWTP. The original WWTP was commissioned in 1968 with primary treatment consisting of comminution, screening, grit removal, primary settlement and disinfection with chlorine. Secondary treatment is accomplished using rotating biological contactors and secondary clarifiers. The treated effluent is discharged to the North Channel of the St. Clair River. The existing treatment plant was renovated and expanded in 1980 and provides primary and secondary treatment, disinfection, and sludge handling processes. The wastewater treatment plant serves Algonac and parts of Ira and Clay townships; tributary population is approximately 18,822 people based on SEMCOG 2000 Census data.

Sludge treatment was added in the form of anaerobic digestion and vacuum filtration. The digested sludge is land applied by Synagro Technologies.

Wastewater Flow Rates

The average daily wastewater flow treated by the Algonac WWTP is 1.9 MGD with a design average capacity of 2.7 MGD. The current plant provides secondary treatment by use of 12 rotating biological contactor (RBC) units. Due to operational problems, the RBC units will be replaced with plastic-media trickling filter towers. By the end of 2003, when the trickling filter towers are constructed, the biological treatment system will have a design capacity of 4.0 MGD. The remainder of the plant will continue to be rated at 2.7 MGD. As flows increase, the county plans to increase the entire plant capacity to 4.0 MGD.

Known Problems

Due to operational problems, the RBC units will be replaced with plastic-media trickling filter towers. By the end of 2003, when the trickling filter towers are constructed, the biological treatment system will have a design capacity of 4.0 MGD.

There are twenty pumping stations reported in the system. One particular problem that is being experienced is damage due to the generation of hydrogen sulfide gas. Plans and contract bids for repairs and replacements at the pumping stations have been made.

There is also reported to be a solids deposition problem in the sewers, which is currently being addressed by the City of Algonac.

Condition of Plant

No known operational problems associated with the wastewater plant have been reported.

Plans for Rehabilitation or Expansion

There are no reported plans for rehabilitation or expansion, except for the replacement of the RBCs with plastic-media trickling filter towers

Wet Weather Flow Management

Algonac and the areas served in Ira and Clay townships have separated sewer systems. However, due to the age of the conveyance system, there is an appreciable amount of dry and wet weather inflow / infiltration (I / I).

2.3.2 Americana Estates of Casco WWTP

Plant Description

The facility collects and treats sanitary wastewater from the Americana Estates Mobile Home Park. The existing WWTP includes facilities for preliminary, primary, secondary and some advanced or tertiary treatment with sludge handling and disposal. The flow is discharged from the pumping station through a comminutor and grit chamber, then to an aeration tank. At this point, aluminum sulfate is added to the aeration tank for phosphorus removal. The next treatment step consists of final clarification followed by two holding ponds (approximately 5 acres each). The effluent is discharged to Marsac Creek located in St. Clair County.

Sludge settled in the final settling tanks is stored in sludge storage tanks and hauled out by a licensed septic hauler.

Wastewater flow rates

The plant sees an annual average daily influent flow of about 0.12 mgd. The annual maximum daily inflow is 0.12 mgd. The WWTP is designed to treat wastewater from the Americana Estates Mobile Home Park. There are no known existing plans to increase the plant capacity to accommodate other surrounding communities.

Known Problems

The WWTP is apparently in compliance with the discharge limits as identified in the NPDES Permit. No other problems were identified. It appears that phosphorus removal is not consistent, as there is a wide fluctuation in the concentration of

phosphorus in effluent wastewater. There are no pumping stations used for transporting wastewater from the service area to the treatment facility. A lift station located at the influent to the plant is used to lift the wastewater to the treatment units.

Condition of Plant

No information is available related to the present condition of the plant.

Plans for Rehabilitation or Expansion

There are no known existing plans for plant expansion or rehabilitation.

Wet Weather Flow Management

The available information pertaining to the collection system indicates that the collection system discharging to the plant is a separate sanitary system. The information also indicates that there are no industrial discharges to the plant. No problems associated with SSOs or wet weather capacity have been reported.

2.3.3 Marine City WWTP

Plant Description

Marine City operates a secondary WWTP that treats the sanitary sewage from the municipality. The Marine City WWTP was constructed in 1958 and was later upgraded several times with the latest upgrade being completed in 1990.

The facility consists of influent pumping, grit removal, a barminutor with manual screen bypass, two primary settling tanks, one high rate trickling filter, three final settling tanks, a chlorine contact tank, two anaerobic digesters, a sludge storage tank, a six-cell sludge drying bed, chemical feed equipment for feeding ferric chloride, polymer and chlorine, and an office/laboratory building. Phosphorus is removed in the secondary phase through biological processes. The addition of ferric chloride and polymer is accomplished if the biological process fails to remove enough phosphorus. The treated effluent is discharged to the St. Clair River.

Return sludge from the final clarifiers is diverted from the return sludge pump station to the waste sludge pumps for transfer to the sludge thickening tanks. The bio-solids are then transported to the farmland for sub-surface injection.

Wastewater Flow Rates

The present WWTP has a maximum capacity of 2.0 mgd with an average design flow of 1.0 mgd. The wastewater treatment plant serves a population of approximately 4,900 people based on SEMCOG 2000 Census data. There is no purchase capacity available in the Marine City WWTP.

Known Problems

The WWTP is currently in compliance with the discharge limits as identified in the NPDES Permit. No other problems were identified.

Condition of Plant

The Marine City WWTP has been significantly expanded or improved in 1971, 1982, 1988 and 1989/90. No information related to the current condition of plant was available.

Plans for Rehabilitation or Expansion

A search of the MDEQ files and available reports regarding the Marine City's WWTP did not reveal any information regarding rehabilitation or expansion.

Wet Weather Flow Management

A bypass channel with a manually cleaned bar screen with stop plates is available for standby screening to handle excess flows due to infiltration/wet weather. Marine City's sewer system is a separated system. No information regarding the collection system served by this plant was available.

2.3.4 St. Clair County Sanitary Authority East China WWTP

Plant Description

St. Clair Sanitary Authority operates a WWTP in the Township of East China, which treats the sanitary sewage from the municipality. The treated effluent is discharged to the St. Clair River. The raw wastewater is brought into the plant through nine lift stations. The treated wastewater is discharged into the St. Clair River.

Treatment at the East China Twp WWTP consists of screening, primary settling, rotating biological contactors (RBCs), secondary settling, and effluent disinfection. The secondary treatment consists of the RBCs followed by final settling. The process is designed to remove BOD and TSS. Ferric chloride is added after the RBCs and polymer is added in the final clarifiers to aid in phosphorus removal. The secondary wastewater is chlorinated with sodium hypochlorite and sent to a lagoon for dechlorination. The wastewater is then discharged to the St. Clair River.

The sludge produced in the treatment processes is sent to aerobic sludge digesters. The digested sludge is transferred to sludge drying beds. Approximately once per year, the dried sludge is land applied.

Wastewater Flow Rates

The design capacity of the plant is 2.2 mgd. The plant's annual average daily influent flow is about 0.6 mgd. The East China Twp WWTP serves a population of approximately 5,000 people based on SEMCOG 2000 Census data.

Known Problems

The East China Twp WWTP is currently in compliance with the discharge limits as identified in the NPDES Permit. No other problems were identified.

Condition of Plant

The plant is in good condition, with no reported problems.

Plant Expansion or Rehabilitation

The East China WWTP is sized to provide service to the existing community. The projected future flow from the service area is 1.7 mgd, which the existing plant is capable of treating. Currently, there are no plans for expansion.

Wet Weather flow Management

The East China Twp WWTP service area has a separated sewer system. However, there is an appreciable amount of dry and wet weather inflow / infiltration.

2.4 Washtenaw County Wastewater Treatment Facilities

Three wastewater treatment facilities located in Washtenaw County and discussed in this memorandum are listed below:

a. Ann Arbor WWTP
b. Salem WWTP
c. Ypsilanti WWTP

2.4.1 City of Ann Arbor WWTP

Plant Description

The City of Ann Arbor operates two essentially independent trains at the same site location. The two treatment trains, named the East and West plants, share a sludge handling facility and tertiary treatment. Overall, the plant provides primary, secondary, and tertiary treatment and sludge processing. Each primary tank discharges to one of four aeration tanks. In the event of high flows, the liquid stream

can be disinfected and discharged after exiting the secondary treatment process. The ertiary filters are mixed media sand filters. Disinfection is by chlorination. The treated effluent is discharged to the Huron River.

In 1978, a major renovation was initiated. This included the addition of a new plant, the East Plant. The average design flow was 29.5 mgd, 9.0 mgd through the existing (West) plant and 20.5 mgd through the new East plant. Overall, the raw sewage pumping station capacity was increased, a retention/equalization basin was added, and tertiary filtration was added. In addition, the capacity of each of the processes at the then existing plant (i.e. the West Plant), was increased.

The dried sludge is disposed of in an approved landfill or by land application (used as fertilizer). The dried sludge is also incinerated as necessary during the winter months to reduce the volume of dried sludge to be stored on the WWTP site.

Wastewater Flow Rates

The design capacity of the plant is 29.5 mgd (Annual Average Daily Flow). The plant has an annual average daily flow of about 18.7 mgd and a maximum daily flow of 33.7 mgd. This volume was established in the 1977 Basis of Design of the last major upgrade to the plant in 1978. This is also the volume allowed for discharge to the Huron River in the NPDES permit issued in 1999.

The Ann Arbor WWTP receives sewage from several areas located outside the City limits. These areas are located in Ann Arbor, Pittsfield and Scio Townships. No information regarding the areas or populations served in these townships was available in the documents obtained from MDEQ.

Known Problems

The MDEQ document search revealed two references to Consent Orders. One concerned phosphorus levels in the Huron River and the other related to SSOs.

With regard to phosphorus levels in the Huron River, the City of Ann Arbor has entered into a voluntary agreement with other communities to reduce phosphorus discharges to the Huron River in order to mitigate problems in Ford Lake and Belleville Lake. Region 5 of the USEPA has objected to the conditions set for renewal of the NPDES Permit on the basis that it is not satisfied with the provisions of this voluntary agreement.

With regard to SSOs, the MDEQ has given notice to the City of Ann Arbor of its intent to seek an Administrative Consent Order with the City to formalize a plan to reduce SSOs from the City's sewer system. Persistent problems with SSOs have resulted in the provision of an equalization and retention basin at the WWTP. The City has also conducted a study to determine the measures necessary to reduce or eliminate SSOs that are currently occurring in the form of basement flooding in several areas of the City.

Condition of Plant

No information regarding the collection system served by this plant was available. However, the plant, as constructed and put in service in 1983, is largely the plant that is in operation today.

Plans for Rehabilitation or Expansion

Between 1989 and 1992, a series of upgrades was completed. These included improvements to the grit removal process, the bar screen system, a new dechlorination system using sulfur dioxide, new aeration blowers, fine bubble diffusion for all aeration systems and biological nutrient removal activated sludge systems. Since 1992, the Lime Slaker Replacement Project has been completed.

Wet Weather Flow Management

An overflow chamber provides for the diversion of high flows from the Northside Interceptor Sewer into the Downriver Trunk Sewer System for routing to the Retention and Equalization Tank (18 MG).

Currently the City is undertaking an extensive SSO study to alleviate the long-standing problems with SSOs in a number of areas within the City limits. Two areas have been identified. One of these areas is north of the Huron River, comprising the Orchard Hills and Bromley districts. The other area is south of the Huron River and comprises the Dartmoor, Glen Leven and Morehead districts of the City. The study recommends a citywide footing drain disconnection program as the best means of eliminating SSOs.

2.4.2 Salem Township WWTP

Plant Description

The existing WWTP provides facilities for primary, secondary and tertiary treatment with sludge handling and disposal. The plant consists of an activated sludge process for biological treatment with alum added prior to the secondary clarifiers to improve phosphorus removal. The settled sludge is sent to a holding tank or is recirculated to the contact stabilization tank. Two filter cells are provided as part of the tertiary treatment. The filter is backwashed to a storage tank and the backwash water is recirculated back to the contact stabilization tank. UV irradiation is used for disinfection. The effluent wastewater is discharged to the Johnson Creek.

The thickened and dewatered sludge is disposed of in an approved landfill. The Township has an agreement with a landfill to accept the sludge. The plant has also a provision to dispose of sludge by land application.

Wastewater Flow Rates

The Salem Township WWTP is a small plant serving Salem Hamlet, the only urbanized area in Salem Township. Apart from the hamlet, the township is predominantly agricultural and rural. The design capacity of the Salem WWTP is 0.05 mgd. The plant has an NPDES permitted discharge capacity of 0.07 mgd. The plant's annual average daily influent flow is about 0.013 mgd and the annual maximum daily inflow is 0.037 mgd.

The township does not receive any non-sanitary wastewater from any industrial or commercial establishments.

Known Problems

The WWTP is currently in compliance with the discharge limits as identified in the NPDES Permit. No other problems were identified.

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Condition of Plant

Construction of the plant started in 1996 and the plant was commissioned in November 1997. There are no reported problems associated with this plant.

Plant Expansion or Rehabilitation

There are no plans for plant upgrade or rehabilitation. There is also no potential capacity to provide treatment to any other community or to other areas of Salem Township.

Wet Weather Flow Management

Salem Township has a separate sanitary sewer system. There are no CSO facilities in the service area of the Salem WWTP. The Township has also indicated that there have been no SSOs in the last five years. No other information related to wet weather flow management is available.

2.4.3 Ypsilanti Communities Utilities Authority WWTP

Plant Description

The Ypsilanti Communities Utilities Authority (YCUA) operates a tertiary treatment plant in Ypsilanti Township in southeast of Washtenaw County. There are six circular primary settling tanks followed by six rectangular aeration tanks. The effluent from the secondary clarifiers goes to the tertiary filters or, in the event of high flows, to the chlorine contactor for disinfection. The tertiary filters are mixed media sand filters. The effluent is normally discharged to the Rouge River and can be discharged to the Huron River via Willow Run Creek under emergency conditions.

Dewatered sludge is incinerated and the ash from the incinerator is settled in a lagoon. The settled ash is disposed off in an approved landfill. If the incinerator is not in service, the dried sludge is disposed off in a landfill.

In January 2001, the Authority opened the first sewage composting facility in the State of Michigan. This is a demonstration project to determine the feasibility of eliminating the need to transfer sewage sludge residue to a landfill.

Wastewater Flow Rates

The design capacity of the plant is 28.9 mgd. The current average flow is 21.5 mgd. The design peak flow rate is 42 mgd and the peak flow rate actually experienced is 44 mgd. The maximum flow allowed in the plant's NPDES permit is 58 mgd.

YCUA plant receives flow from Ypsilanti Township, Ypsilanti City, Pittsfield Township, Superior Township and Augusta Township in Washtenaw County and Sumpter, Canton, Northville, Plymouth and Van Buren Townships in Wayne County. The allocation of flow from each community is shown in the following figure (Figure 1).

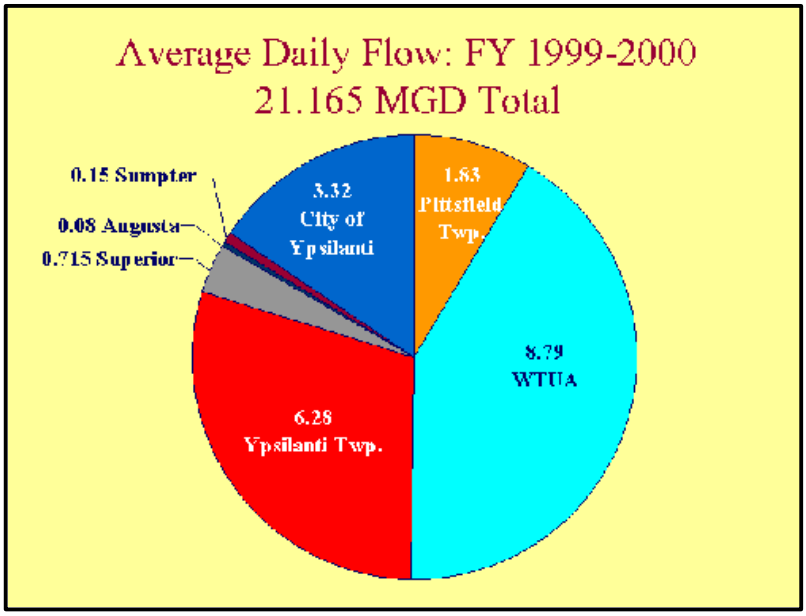

Figure 1. Flow Allocation for Various YCUA Communities

Known Problems

The MDEQ files revealed that a Consent Agreement was negotiated between the YCUA and Crown Vantage Paper Company, which operates a paper plant at Ypsilanti Mill and have been a persistent discharger of coloring dyes to the sewer collection system. On May 11, 2000, the Consent Agreement was described as being ready to be signed by the two parties. No further details were available in the documents obtained from MDEQ. There is a reported problem with hydrogen sulfide

generation and attack in parts of the collection system. This has resulted in several failures of gravity sewers and force mains.

Condition of Plant

The effluent is disinfected using chlorine. This process is not automated and must be adjusted manually, resulting in high doses of chlorine on a regular basis. There is a 15 MG retention basin to enable the storage of excess flows into the plant during a rainfall event.

The MDEQ noted during a Compliance Evaluation Inspection in January 2000 that the plant appears to be receiving influent solids concentrations beyond its solids loading design capacity. The plant operator was requested to respond to this observation. The YCUA replied that a Maximum Allowable Headworks Loading (MAHL) study was planned for the summer of 2000. No further details were available in the documents.

Plant Expansion or Rehabilitation

Improvements currently under design include an expansion of the liquid process capacity to 46-mgd employing A/O® for the entire facility, and replacement of the chlorine based disinfection process with UV. The new tertiary filters will employ air/water backwash technology. Additional site odor control will be provided by a combination of biofilters, chemical scrubbers and using foul air for combustion in the incinerator.

Solids processing will continue to employ incineration, but the process will be upgraded with a fluidized bed unit equipped with venturi scrubber, impingement trays, and wet electrostatic precipitator for emissions controls. Gravity Belt Thickeners will be used for thickening for waste activated sludge. Continuous Belt Filter Presses will dewater solids prior to incineration. Solids will be landfilled in the event the incinerator is off line for maintenance.

The proposed wastewater treatment plant (WWTP) improvements are based on an annual average design flow of 46 MGD for the entire plant. The following table (Table 3) shows the various design flows for the proposed plant.

Table 3. Design Flows for Proposed YCUA WWTP Expansion

Parameter (All flow values in mgd)	Original Design	Design Year 2025	Ultimate Design
Annual Average Daily Flow	28.9	46.0	58.0
Average Daily Flow of Maximum Month	31.5	49.9	61.8
Average Daily Flow for Maximum Week	34.4	53.6	67.6
Average Flow of Maximum Day	38.4	56.6	71.4
Sustained Peak Flow	42.0	63.0	77.0
Peak Instantaneous Flow (once in 25 years)	72.0	102.0	128.0

Also in the planning stage is a plant expansion on the MacGregor / State Street site that would provide 17 mgd capacity to the facility. The new plant will be dedicated to serving the Western Wayne Townships Utilities Authority. This will free capacity to allow growth in the Ypsilanti Community for new homes and industry.

Wet Weather Flow Management

There is a 15 MG retention basin to enable the storage of excess flows into the plant during a rainfall event. The collection system is 100% separate. The operators have reported to MDEQ that there is no significant inflow / infiltration problem and that the peaking factor is approximately 2. There was no information on CSO facilities available in the documents obtained from MDEQ.

2.5 Wayne County Wastewater Treatment Facilities

The wastewater treatment facility located in Wayne County and addressed in this memorandum is the Wyandotte WWTP

2.5.1 Wyandotte WWTP

Plant Description

The WWTP in Wyandotte is operated by the Wayne County Department of Public Works. There are seven rectangular primary settling tanks, of which one was added very recently. These tanks have primary sludge pumps to remove the settled sewage sludge from the bottom of the tanks. After primary settlement, a polymer solution is added to the waste stream to aid in the secondary settlement process. There are four rectangular aeration tanks. Primary effluent is mixed with return sludge from the secondary clarifiers to form mixed liquor. They are four circular (165-foot diameter) peripheral feed type-settling tanks. The detention time is 2.1 hours at 100 mgd. Disinfection is by ultraviolet irradiation. The treated effluent is discharged to the Detroit River.

The thickened sludge is mixed with a polymer and passed through conditioning tanks. The plant uses vacuum filters to produce sludge with a solids concentration of about 25%. The dewatered sludge is disposed of in an approved landfill.

Wastewater Flow Rates

The plant has an annual average daily flow of approximately 50.4 mgd and a maximum daily flow average of 116.7 mgd. The annual average design capacity of the plant is 125 mgd. The plant is currently undergoing an upgrade to increase the design capacity to 225 mgd. This upgrade process started in 1995 is expected to be completed in 2001. The current permitted discharge limit is 125 mgd. It is estimated that about 2.5 mgd is from industrial sources.

Wyandotte WWTP receives flow from the City of Allen Park, City of Belleville, Brownstown Township, City of Dearborn Heights, City of Ecorse, City of Lincoln

Park, City of River Rouge, City of Romulus, City of Southgate, City of Taylor, Van Buren Township and City of Wyandotte in Wayne County. The amount of flow from each community was not available in the documents obtained from MDEQ.

Known Problems

The MDEQ document search revealed a reference to Administrative Consent Order ACO-SW99-021. This ACO refers in part to a requirement that Elf Atochem located in the City of Riverview, eliminate all discharges to surface waters and redirect the discharge to the Downriver Collection System for treatment in the Wyandotte WWTP. The plant is also subject to a Consent Order 87-70092 (entered into in May 1994) requiring major modifications to the Downriver system.

Condition of Plant

No information related to the current condition of plant was available. However, a major expansion program is nearing completion.

Plant Rehabilitation or Expansion

A $70 million project to expand the plant from 125 to 225 mgd is nearing completion. The most recent portion of the project includes the installation of an UV disinfection system to replace the old chlorination / dechlorination system.

Wet Weather Flow Management

The treatment plant and interceptor system could not handle the peak wet weather inflow experienced during moderate to heavy rainstorms. This frequently resulted in basement backups and sewer overflows to surface water. The Wyandotte WWTP is part of the Wayne County Downriver System. The Wayne County DPW estimates that 20% of this sewer system is combined.

There is a protocol for bypassing the various steps in the liquid waste stream during wet weather. Between an influent flow of 125 mgd and 175 mgd, up to 25 mgd will bypass primary treatment to go directly to secondary treatment, 50 mgd of primary effluent will bypass secondary treatment, and all the influent will pass through the disinfection phase prior to discharge to the Detroit River.

There is a CSO storage tunnel constructed as part of a Consent Agreement applying to the Wayne County Downriver System. This project is called the Downriver Regional Storage and Transport System. It was commissioned in May 2001.

The Southgate/Wyandotte Retention Basin is also located within the service area. The following equalization basins are in the plant's service area: Allen Park Equalization Basin, Lincoln Park Equalization Basin. There are thirteen combined sewer outfalls from the system listed in the NPDES permit application.