

## **2005 WATER POLLUTION CONTROL PLANT ANNUAL REPORT**

*Our Mission: As a team, efficiently serve the public and protect our natural resources through proper treatment and preservation of our water resources.*

### **EXECUTIVE SUMMARY**

The year 2005 was a year of active planning and intense preparation for construction Plant upgrades. Additionally, certain portions of the revised Permit became effective in November. In accordance with the changes associated with the re-issued Permit, the Plant is required to perform toxicity testing on three different points on the receiving stream. Previously, the City entered into a contract with ATS Engineering, Inc. (ATS) of West Chester, Ohio to develop final plans and specifications for a plant-wide upgrade. The last upgrade to this facility was completed in 1988. The final plans and specifications were completed, and Ohio EPA issued the Permission to Install (PTI). Equipment bids were awarded and a construction contract with Stanley Miller was awarded. Construction began in late September 2005. The Plant upgrade is estimated to cost approximately \$18M. Two of the largest single item costs will be for a stand-by power generator, approximately \$800,000.00, and methane-powered generator at approximately \$580,000.00.

The Water Pollution Control Plant continued to perform well in 2005. A total of 2,080,849,000 gallons of wastewater was treated during the year. This represents a decrease of 241,000,000 gallons compared to 2004. The decrease in flow to this facility is directly related to a decrease in total rainfall throughout 2005. The average flow to the plant was 5,703,000 gallons per day. In contrast to the wastewater treated at this facility the Water Treatment Plant produced on average 3,590,000 gallons per day. The reasons for this obvious disparity, approximately 2,113,000 gallons per day, between water produced and wastewater treated in 2005 is attributed to a combination of precipitation entering the Plant through the combined sewer system, collection system infiltration and un-metered sources. The infiltration component of this disparity continues to be actively addressed as this City continues to pursue the implementation of a sewer separation program. Un-metered sources are being identified and metered as part of the continuing meter upgrade program.

The NPDES Permit for this facility has established a minimum removal rate of 85% for removal of specific pollutants, primarily Suspended Solids (SS) and Carbonaceous Biochemical Oxygen Demand (CBOD). The removal rate for SS for this facility in 2005 was 92.51%. The removal rate for CBOD for this facility in calendar year 2005 was 97.37%. Clearly this Plant performed well in 2005.

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**TREATMENT SUMMARY**

The typical strength of wastewater is calculated in relationship to three basic constituents, Carbonaceous Biochemical Oxygen Demand (CBOD), Suspended Solids (SS) and Chemical Oxygen Demand (COD). The average daily strength of the wastewater treated at this facility in calendar year 2005 was 10,412 pounds of CBOD, 7,178 pounds of SS and 23,529 pounds of COD.

This represents no appreciable increase over 2004 for CBOD, COD or for SS. The decreased precipitation in 2005 had a negligible impact on the annualized average loading on the plant during calendar year 2005.

As noted above, the NPDES Permit for this facility requires that this facility reduce CBOD and SS by no less than 85%. There is no specific standard established for the reduction of COD. In calendar year 2005 the Water Pollution Control Plant reduced the CBOD by 97.37% and the SS by 92.51% prior to discharge to the receiving stream for a combined removal rate of 94.94%.

Given the significant impact of industrial discharges on this plant the COD is recognized as the primary indicator of industrial organic loading on this facility. A mathematical formula may be applied to the average daily COD loading on the plant to estimate a typical population equivalent relative to the COD loading. That formula produces a population equivalent of approximately 67,942. The estimated population of the City of Wooster is 26,166. The difference between the two figures of 41,766 represents the impact of industrial discharges on this plant during calendar year 2005.

The principle by-product of wastewater treatment is the production of sludge or biosolids. This facility produced 8,490,000 gallons of biosolids in 2005. This represents a decrease in biosolids generation for calendar year 2005 of approximately 5,328,000 gallons. The wastewater biosolids that were applied were mixed with the spent lime from the Water Treatment Plant. This process greatly enhances the quality and quantity (actual applied dry tons) of biosolids applied to farm fields. Ohio EPA recognizes the benefit of adding spent lime to wastewater biosolids and does not require this facility to report the lime component as applied to farm fields. This allows us to apply increased tons of biosolids to a particular field without losing the capacity of that field. A total of 3,319.73 dry metric tons of enhanced biosolids were applied to farm fields in 2005. This represents a significant decrease of 1,680.46 dry tons over calendar year 2004. Despite the decreased rainfall many application sites were seasonably wet and the result was less biosolids application in 2005.

**OPERATIONS SUMMARY**  
**Jim Borton**

The WPCP is currently staffed 24 hours a day 7 days a week with at least two operations staff on duty at all times. Maintenance staff is on duty Monday through Friday.

The year 2005 proved to be a busy year in over-all plant operations. One major project was bid. The Plant up-grade project was awarded to Stanley Miller and construction is now underway.

WPCP Up-grade Project – In an effort to maximize operational efficiencies at this facility a design study was approved and has been completed by ATS Engineering (ATS) of West Chester Ohio. This study was conducted to determine if specific modifications to this facility would result in improved performance, reduced energy costs, reduced sludge production and increase over-all operational efficiencies. ATS presented the results of their Preliminary Design Study to the Utilities Committee of Council, the Director of Administration and WPCP facility staff during a meeting in March 2002. The results of the study with specific recommendations to proceed with engineering were presented to the whole Council during the second Council meeting in May 2002. Council approved the study with a recommendation to proceed. ATS has developed the final plans and specifications as detailed in the study and has completed all design aspects of the project. This project was bid and construction began September of 2005.

Every staff member participated in training activities during 2005. Specific courses attended included: Advanced Activated Sludge Short School; Design, Installation and Troubleshooting of Your SCADA System; Electrical System Maintenance Course; Boiler Operation and Maintenance Short School; Other training activities include the attendance at local meetings hosted by the Ohio Water Environment Association. Due to recent rule changes certified operators are required to obtain training contact hours in advance of license renewals. Additionally, the Plant's Operations Challenge team won the national title in Washington D.C. for "Best Operators in the World" in 2005. This was an international competition. The City's has good reason to proud of our team's accomplishment.

The performance of this plant in 2005 has not been without problems, but our well-trained staff has been able, for the most part, to keep the plant in compliance with the Permit. The employees of this plant deserve recognition for their efforts in meeting and exceeding expected standards of operation for this facility. The infrastructure is aging and many of the individual components are antiquated. Nevertheless, the plant continues to meet or exceed quality standards for effluent discharge. This seemingly anomalous situation is due, in large part, to the commitment of each employee of this facility to achieve the stated mission of the Water Pollution Control Plant.

**LABORATORY SUMMARY**  
**Michael Shultz and Greg Funk**

The EPA requires continuous monitoring of effluent quality. Lab personnel analyze for pH, suspended solids, ammonia, total Kjeldahl nitrogen, phosphorus, dissolved oxygen, carbonaceous biochemical oxygen demand, chemical oxygen demand, temperature, mercury, cadmium, chromium, copper, lead, nickel, zinc, silver, arsenic, molybdenum, selenium, fecal coliform, total residual chlorine, oil and grease and various sludge analyses as well as toxicity testing. They also analyze the discharges from the three (3) City VOC interceptor wells for iron and manganese. Contract laboratories analyze interceptor well discharges for cyanide, hexavalent chromium, nitrates and organics.

The City continued the effluent surcharge program in 2005. Industries known to produce an effluent high in Suspended Solids (SS) or Chemical Oxygen Demand (COD) are sampled on a regular basis for these two parameters. In order to compensate for the additional cost of treating their effluents, surcharges are levied against those industries that exceed 481.898 mg/L of COD or 286.413 mg/L of SS.

The laboratory is required to complete Quality Assurance samples each year. We are required to select a National Institute of Standards and Technology (NIST) approved laboratory, purchase samples, analyze them, and submit the results to that laboratory. Of the twenty-two test parameters, twenty-two were rated Acceptable for 2005.

The City of Wooster has many combined storm and sanitary sewers. Runoff water also infiltrates the sanitary sewers to some extent. Because of this situation the plant must bypass the excess flow into the creeks during storm events when the volume of flow exceeds the plant's treatment capacity of fifteen (15) million gallons per day (MGD).

Bypassing at the Plant's Apple Creek overflow is done manually, while bypassing is automatic at the Bever Street and Elm Street regulators. Whenever a bypass occurs the laboratory must analyze samples for each day of the bypass for suspended solids, dissolved oxygen and carbonaceous biochemical oxygen demand.

In 2005 there were thirty-four (34) Plant bypasses, twenty (20) Bever Street bypasses, and twenty-five (25) Elm Street bypasses for a total of seventy-nine (79) bypasses. This was a decrease of eighteen (18) bypasses over 2004. Again, the decrease in bypasses is a direct result of the decrease in precipitation in 2005 as compared with precipitation in 2004.

Monthly field trips are conducted along the Killbuck Creek. Creek samples are collected at each bridge crossing the Killbuck from Wooster to Millersburg. Weather and creek conditions are recorded at each site.

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Samples are taken back to the laboratory and analyzed for pH, suspended solids, dissolved oxygen and carbonaceous biochemical oxygen demand. These tests show the effect of our effluent on the Killbuck Creek. There was a substantial improvement in water quality after the 1986-1988 plant expansion. We have records of field trip reports dating back to 1940.

**INDUSTRIAL PRETREATMENT PROGRAM SUMMARY**  
**Lee Troyer**

Approximately seventeen (17) years ago the United States Environmental Protection Agency required the City of Wooster to develop and implement an industrial pretreatment program. The regulation states in part that "Any POTW ... with a total design flow greater than 5 million gallons per day (mgd) and receiving from Industrial Users pollutants which Pass Through or Interfere with the operation of the POTW or are otherwise subject to Pretreatment Standards will be required to establish a POTW Pretreatment Program ..." Ref. 40 CFR 403.8 (a).

During 2005 all U.S. and Ohio EPA pretreatment program administrative, monitoring and inspection requirements were met. Seven (7) permit required industries and three (3) permit not required industries were sampled quarterly for heavy metals, chemical oxygen demand (COD), suspended solids (SS) and pH. Of those ten (10) industries, four (4) had analyses for Total Toxic Organics (TTO) completed.

Throughout the year additional samplings were completed at various locations to check on reports of unusual discharges into the sewer system or creeks or to verify suspected problem discharges from industrial or commercial users of the sewer system.

Pretreatment inspections were completed at the seven (7) permit required industries. The pretreatment coordinator performed these investigations with assistance from WPCP lab personnel. In accordance with State regulations the names of two (2) industries were published in the Daily Record for Significant Noncompliance (SNC) with pretreatment standards during calendar 2005, EnviroClean and Buckeye Container. EnviroClean violated the local limits for zinc and mercury; Buckeye Container violated the local limits for zinc and copper. Both industries addressed their respective problems and are now in compliance.

2005 saw no significant industrial slug discharges and there were no spills that caused difficulties at the treatment plant. However, increased loadings to the plant typically occur when Frito-Lay increases production during major holidays or when the company is preparing product to meet additional or promotional demands. Several other industries performed routine drain cleaning producing minor "slug" discharges. The City was notified prior to each event and none caused any problems for the Plant or Plant personnel. Other slugs occurred during times root treating in the sanitary sewer system was taking place and as plugged sanitary sewer lines were opened and flushed.

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An important although relatively unknown function of the pretreatment program is to keep heavy metals in the wastewater at levels low enough to allow sludge generated at the Water Pollution Control Plant to be safely applied to farmland as fertilizer. This is an integral part of the 503 Sludge Management Program for the Plant. It falls to the Pretreatment Coordinator to ensure compliance with these requirements. The City contracts for the hauling of biosolids, and the current contractor for the City is with Agri-Sludge of Shreve, Ohio. The cost of hauling sludge is based on hauling liquid sludge with specified solids content. The current cost as established by contract is 0.0286¢/gallon, which translates to approximately \$358,00.00 per year for sludge hauling.

**DISTRIBUTION AND COLLECTION DIVISION**  
**Tom Layland**

The City of Wooster began keeping track of the number of water main breaks per year in 1970. From 1970 through December 2005 there have been 883 water main breaks. This averages out to approximately 25 breaks per year.

1970 had the lowest number of breaks at 10. Some of the high totals were 37 breaks in 1983 and 36 breaks in 2000. However, the City experienced the greatest number of breaks in 2002 with 50 water main breaks, 12 breaks in December 2002 alone. 2003 started off somewhat ominously with 10 water main breaks in the first 21 days of the New Year. There was a total of forty-two (42) water main breaks in 2003 and thirty-nine (39) water main breaks in 2004. There were a total of twenty-two (22) water main breaks in 2005.

The majority of water main breaks occur in the Intermediate Zone; approximately 85% of all breaks citywide. The water pressure in this zone ranges from 125 psi near the pump stations to 40 psi near the water towers. Water hammer, the rapid oscillation or movement of water in the main, is a significant contributing factor to water main breaks.

The Intermediate Zone is the largest pressure zone in the City. It extends from Nold Ave. to the south to Oldman Road on the north. The western boundary is Oak Hill/ Normandy Dr., extending easterly to Akron Rd. The Intermediate Zone is delineated or maintained as a separate pressure zone by closed valves in the distribution system.

The vast majority of the pipe material is unlined cast iron pipe. This pipe is corroding from the inside out. The friction of water movement is continually scouring the rusting inner lining of the pipe. Some areas inside the water main form nodules, which will pit the lining of the main causing structural weakness.

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It must be noted that this type of pipe, cast iron, was installed many years ago without the benefit of modern engineering techniques as well as the use of proper bedding or trenching material. In many installations the joints were leaded together, sometimes using mineral lead. This type of lead increases the rigidity of the pipe, robbing it of its flexibility. Invariably, with the excavation of a broken water main in the Intermediate Zone, the cast iron pipe is typically broken overtop a rock or a sewer trench. Typically, whatever material was originally excavated was placed back on top of the pipe.

The logical solution to the increasing frequency of water main breaks is to install slow-start or variable speed pumps to decrease the effect of water hammer on the pipe and initiate an aggressive pipe replacement program using cement lined ductile iron pipe. Many Public Utilities, with impetus from the GASB 34/35 Accounting Rule, have begun a pragmatic pipe replacement program with a targeted pipe replacement percentage in mind.

The wastewater collection system can be described as generally out-dated and in many areas subject to surcharging. Much of the collection system located in the historic part of town is of combined sewer system setup and receives by design both storm water and sanitary wastewater. This can and frequently does create a surcharging or flooding situation in the areas served by the combined sewer system during some storm events as the capacity of the sewers are exceeded.

The Utility Division has created a list of areas that require regular maintenance. These areas are failing to operate optimally due to bad joints, cracked pipes, minimum fall, or previously poor installation. Many manholes within the collection system are inspected regularly because of blockages due to poor or no channeling in the manhole.

Additionally, the existing collection system in the north end of town is being challenged to function due to undersized piping, grease buildup, and poor manhole channeling. This situation is a direct reflection of the continued growth and expansion in the north end of town.

Many of the collection system lines in the north end are 8"-12" vitrified tile lines that were originally installed for residential use. Today, with the upsurge in housing and restaurant construction in the north end these lines are handling more volume than the system was designed to handle.

Grease build-up from the many restaurants is a major concern for the Utility Division. Grease domes have built up in north end manholes and pose a constant threat to the ability of the collection system to function properly. Typically, many communities consider the monitoring of 150 grease traps or more as a full time job.

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There are now over 200 grease traps in the City of Wooster. The grease trap program is monitored by the Pretreatment Coordinator as a separate program.

The CCTV sewer main line camera was purchased in 2003 and has been of great benefit to the City of Wooster as a tool to determine causes of sewer backups, potential problems, and to help make best practice decisions for sewer main replacements. The CCTV camera has been used to facilitate decisions concerning paving and roadway projects because the Utility Division personnel were able perform system audits and establish the condition of the collection system lines prior to project planning. Long term, the entire collection system will be logged and identified. There were a total of 23,474 feet of sewer mains televised in 2005.

Staffing levels of the Distribution and Collection Division should be and will be reviewed by Management from time to time as conditions warrant. Adequate staffing levels must be maintained given the scope and scale of the two systems that are to be maintained by the Distribution and Collection Division personnel. As the infrastructure continues to age and fail it may be necessary to increase staffing levels in the future.

**CLOSING REMARKS**

2005 has been a challenging year on many levels for each division of Public Utilities. Nevertheless, it has been a highly productive year as well as this report will attest.

2006 is here and firmly established and we fully expect to substantial complete construction of the WPCP upgrade in this New Year.

**EMPLOYEE ROSTER**

<b>MANAGEMENT:</b>	Michael Hunter, Utilities Manager Jim Borton, Asst., WPCP Tom Layland. Asst., Distribution & Collection
<b>LABORATORY TECHNICIANS:</b>	Greg Funk Michael Shultz
<b>PRETREATMENT COORDINATOR:</b>	Lee Troyer
<b>MAINTENANCE STAFF:</b>	Dennis Ogden Charles Stryker
<b>OPERATORS:</b>	Steve Carathers Dave Mosher Gary Palmer Larry Rouhier Greg Underation
<b>ASST. OPERATORS:</b>	D.J. Reichert
<b>MASTER OPERATOR:</b>	Kevin Givins
<b>DISTRIBUTION &amp; COLLECTION</b>	Gary Hofstetter Tim Moretti Al Mowrer Tom Payne Milan Steiner Ray Windsor
<b>INSTRUMENTATION TECHNICIAN:</b>	Don Macko
<b>CLERK/TYPIST:</b>	Amy Hamilton

**END OF REPORT**

