City of Greensboro
Water Resources Department

Sewage Collection and Water Reclamation Plant Report for 1999

INTRODUCTION

The General Assembly of the State of North Carolina has passed a law (House Bill 1160) requiring that all entities that own or operate wastewater collection and treatment systems make an annual report available to their customers. This report must include information as to how well the system operated, what violations occurred, and other information. This report is produced in compliance with these requirements.

The City of Greensboro Water Resources Department operates two water reclamation plants and a sewage collection system that collects and transports the sewage to these two plants; some transfer of sewage occurs between the two plants. Following are the professionals designated by the state as the "Operators in Responsible Charge" (ORC) of the respective systems and permits for the systems:

North Buffalo Water Reclamation Facility
Permit No. NC0024325, ORC Barbara Hall, 336-373-5913

T. Z. Osborne Water Reclamation Facility
Permit No. NC0047384, ORC Terry Houk, 336-375-2240

Sewage Collection System
Permit process in development, ORC Rick Roberts, 336-373-2033

This report is being made available at all City Water Resources Facilities, Libraries, the Melvin Municipal Office Building, and on the City's web site. All customers will be notified of its availability by printing a notice on water and sewer bills that are generated after March 1, 2000. This report has been compiled by staff of the Water Resources Department and its approximate cost was $1,000.

The information contained herein is accurate to the degree possible:

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Allan E. Williams, Director of Water Resources

System Overview

The sewage collection and water reclamation system of the City of Greensboro begins with approximately 85,000 connections that serve homes, commercial establishments, and industries. Every day an average of 30.6 million gallons of sewage is generated in our homes and industries that must be collected, transported, and treated to very stringent standards before it is released back into our environment (in our streams). This service is provided by the city's Water Resources Department and is funded almost entirely from the user charges that are paid either monthly or quarterly by our customers. In 1999 the budgeted cost for these services totaled $28,500,000.

Nearly all of the sewage or wastewater that is generated by customers flows by gravity through sewers that range from 6 to 72 inches in diameter. Greensboro operates over 1,380 miles of these gravity sewer lines. As the lines leave neighborhoods they increase in size to accommodate the flows that are collected from the many areas that are served. These sewers generally follow terrain to take advantage of gravity flow but at certain points pumping stations are used to transfer the flow to different basins, such as keeping sewage from flowing into one of the city's drinking water reservoirs. The city currently operates 42 pumping stations that range in capacity from 30 to 2600 gallons per minute.

Rock Creek Pump Station

The real purpose of the collection system is to transport the mixture of Greensboro's liquid wastes to two large water reclamation facilities that process the mixture so that it can be returned to our streams with minimal environmental impact. The North Buffalo Facility and the T.Z. Osborne Facility are permitted to process up to 16 and 22 million gallons of wastewater per day, respectively.

North Buffalo Plant
(located off of White Street)

T. Z. Osborne Plant
(located off of Huffine Mill Road)

Both City water reclamation facilities are large, complex, plants that use physical, chemical, and biological processes to clean the wastewater. It is screened and settled to remove most suspended materials, but the heart of the plant is a biological process that uses bacterial cultures to remove the largest part of the suspended and dissolved wastes that are produced within the city. This biological process, called activated sludge, is sensitive to temperature, high flows produced by rainfall leaking into sewers, and toxic discharges that can be produced by industries or even homes. This sensitivity to factors largely beyond the control of the operators of the plants makes them susceptible to process upsets that can result in discharging constituents beyond the amount permitted by regulating authorities.

Greensboro's Difficult Location

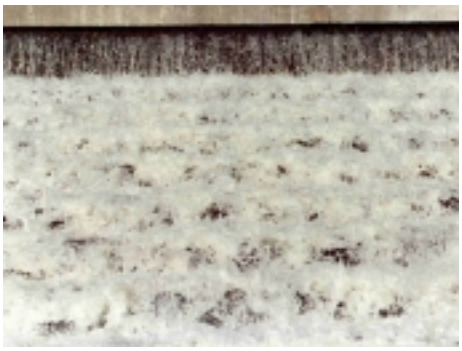
Many of Greensboro's residents recognize that our location is not ideal for water supply development; our streams are very small because we are at the "top" of the watershed where our streams drain limited amounts of land. What they do not recognize is that this makes wastewater reclamation very difficult also. The permitting of treated wastewater discharges makes the assumption that streamflow is at the lowest volume so as to offer the protection needed when streamflow is at its lowest. In North Carolina, this means the "7 Q 10" flow, or the lowest seven day flow expected every ten years. The permit limits for discharges takes this level of stream protection into account in calculating the limits; yet it applies 24 hours per day, 7 days per week, 365 days per year. Since Greensboro's limits are calculated for discharging to such small streams, our limits are very low. Not only does North Carolina have some of the most stringent stream standards in the country, Greensboro is a large city located on very small streams. Our discharge flow constitutes over 97% of the stream below our discharge points at the lowest stream-flows; therefore our permits are written so as to protect the streams at all times as though such minimal flow was present.

Treatment Plant Performance

The City of Greensboro's treatment plants operate under what are called NPDES permits, or National Pollutant Discharge Elimination System permits. These are highly complex permits that include monitoring requirements and discharge limits, some of which vary with seasons and have different maximums for daily values, weekly averages, monthly averages, and quarterly averages. Some limits protect streams from oxygen depletion, such as biochemical oxygen demand (BOD) and ammonia-nitrogen (which exerts oxygen demand over a delayed yet prolonged basis). Some limits are to protect aquatic life in the receiving stream, such as metals like cadmium or selenium or other constituents like fluoride or cyanide. These constituents are limited as low as 2.1 parts per ***b***illion and in many cases are lower than drinking water standards, because aquatic life is more sensitive than humans to these materials. One standard, fecal coliform, is designed to test for indicator bacteria to determine whether or not sufficient chemicals have been applied to disinfect the flow prior to discharge. The permits are complex and can be viewed at our treatment plants upon request.

Compliance with these permits requires that our laboratory must conduct over 12,556 tests per year. Any one of these tests may result in a value that causes us to violate the limits of the NPDES permit. When a sample is taken at its specified time, to even accidentally drop it or allow it to linger longer than permitted before refrigeration or analysis can result in a violation. There are some limits, such as cyanide, fluoride, selenium, and cadmium, over which the operators of the treatment plant have no control other than through regulating what industry can discharge to the sewers.

During 1999 the Water Resources Department treated over 11.18 ***b***illion gallons of wastewater and returned it to our streams.



Clean Water returned to our streams

We are proud of the outstanding performance of these facilities that was made possible by the dedicated efforts of the professionals who operate, maintain, and conduct tests for these facilities. However, despite these efforts we reported the following violations of the NPDES permit to the state. Each and every one of these was reported to the State of North Carolina in compliance with all reporting regulations and is included at the end of this report as **Table 1** (T. Z. Osborne) and **Table 2** (North Buffalo). There were no detected environmental impacts from any of these permit excursions.

Collection System Performance

The City of Greensboro operates a sewage collection system comprised of 1,380 miles of gravity line, 32,500 manholes, 42 pump stations, and 39 miles of pressurized sewage force main. The State of North Carolina is currently developing a permit system for such systems and no permit for our system has yet been issued. However, the system is subject to many rules and regulations that are now in effect. Most notably, if sewage escapes from the collection system for whatever reason and reaches a surface water body in an amount exceeding 1,000 gallons, it must be reported to all outlets of the news media. In addition, all spills of any volume reaching a water body must be reported to the State.

Sewage spills from a collection system can be caused by a number of reasons. Tree roots can find their way into sewer lines obstructing them, grease from residences or commercial establishments can collect in sewers and obstruct them, foreign objects can be dropped in sewers or manholes, rainwater can find its way into sewers overloading them, and pump stations can fail for mechanical or electrical reasons. Greensboro, like all cities, has experienced these problems in the last year of operation. A listing of these incidents that exceeded 1,000 gallons of discharge of wastewater from our collection system is included at the end of this report as **Table 3**. There were no detected environmental impacts from any of these incidents.

The City of Greensboro has an on-going cleaning and inspection program to monitor and maintain our sewer system, including rodding, high pressure washing, and closed circuit television inspection of lines. The City has an aggressive program to slip-line (refurbish) old leaking sewer lines to begin reducing the amount of rainwater entering our collection system. An excess of $1.0 million dollars per year is currently programmed for this.

Sewer Pipe Slip Lining (refurbishing old lines)

We are also enhancing our regulation of grease discharge in those areas where we are experiencing grease buildup in lines. While we maintain generators at many stations and can move mobile generators to the others, we are investigating the installation of automatic backup at stations that experience repeat loss of power that cannot be restored quickly (for example, the Brightwood Lift Station shown in the Table 3). It should be noted that of the 11.18 ***b***illion gallons of sewage produced in Greensboro in 1999, less than 200,000 gallons escaped our system, which is only 18 gallons per ***m***illion transported.

Summary

The Greensboro Water Resources Department is proud that given the capacity of our treatment plants and the age of our collection system, our permit departures have been minimal, especially when compared to similar cities. We recognize however, that in the changing climate of environmental concern, total compliance is demanded by the public. For this reason, the City of Greensboro has embarked on a major capital outlay program to expand and enhance our treatment processes, as well as to begin refurbishing our collection system. This is being paid for in higher sewer and water user fees, but we feel that the public must support this major effort to protect our surface water resources.

WATER Resources
City of Greensboro

WATER RESOURCES ADMINISTRATION
336-373-2055

T. Z. OSBORNE WATER RECLAMATION FACILITY
336-375-2240

NORTH BUFFALO WATER RECLAMATION FACILITY
336-373-5913

TABLE 1

T. Z. OSBORNE POTW-1999 ANNUAL REPORT VIOLATIONS LIST

	Number of Violations	Type of Violation(s)	Environmental Impact
January			
Loss of Influent flow [1/4 and 1/5]	1	Lost 1.176 million gallons of influent	None Noted
Loss of Influent Flow [1/24]	1	Lost 0.5 million gallons of influent	None Noted
February			
Lab Error - No Influent BOD Value 2/10	1	Monitoring	Not Applicable
March			
Cyanide [3/1-5]	1	Weekly Average	None Noted
Reporting Error for Cyanide Values	1	Reporting	Not Applicable
May			
Fluoride [5/5 and 5/12]	2	Daily Maximum	None Noted
June			
Fluoride [6/2]	1	Daily Maximum	None Noted
July			
Bioassay	1	Bioassay	None Noted
Sampler Malfunction [7/21]	1	Monitoring	Not Applicable
August			
Sampler Malfunction [8/5]	1	Monitoring	Not Applicable
October			
Lab Error- No Influent BOD Value 10/20	1	Monitoring	Not Applicable

January violations were a result of equipment failures associated with plant construction and upgrade.

TABLE 2

NORTH BUFFALO POTW-1999 ANNUAL REPORT VIOLATIONS LIST

	Number of Violations	Type of Violation(s)	Environmental Impact
February			
Ammonia Nitrogen	1	Monthly Average	None Noted
August			
Fecal Coliform [8/9-13]	1	Weekly Average	None Noted
Cyanide [8/30-9/3]	1	Weekly Average	None Noted
Carbonaceous Biochemical Oxygen Demand	5	Weekly Average	(note)
Carbonaceous Biochemical Oxygen Demand	1	Monthly Average	(note)
September			
Carbonaceous Biochemical Oxygen Demand	3	Weekly Average	None Noted
Carbonaceous Biochemical Oxygen Demand	1	Monthly Average	None Noted
Fecal Coliform [9/13-17]	1	Weekly Average	None Noted

(note): Oxygen level in North Buffalo Creek was below stream standard both above and below discharge during this period. Unable to attribute degree of impact from North Buffalo Plant discharge.

TABLE 3

SEWAGE SPILLS FROM COLLECTION SYSTEM EXCEEDING 1,000 GALLONS

Permittee	Permit Number	Incident Started	Volume reaching Surface Waters	Surface Water Name	Location	Probable Cause
T. Z. Osborne	NC0047384	1/13/99	1,500	SOUTH BUFFALO	MERRITT DR @ I-40	8" MAIN STOPPED WITH GRAVEL
North Buffalo	NC0024325	1/24/99	5,000	NORTH BUFFALO	4455 OLD BATTLEGROUND RD	OVERFLOW FROM RAINWATER
T. Z. Osborne	NC0047384	2/ 3/99	20,000	PRIVATE POND	BURLINGTON RD @ MOUNT HOPE CHURCH RD	SWAG IN GRAVITY LINE
T. Z. Osborne	NC0024325	2/ 8/99	1,500	SOUTH BUFFALO	200 WARD RD	10" MAIN; GREASE & PAPER
North Buffalo	NC0024325	2/13/99	5,000	NORTH BUFFALO	BRIGHTWOOD LIFT STATION - 3306 GATESVILLE RD	POWER FAILURE ON DUKE POWER SIDE
North Buffalo	NC0024325	2/13/99	1,500	NORTH BUFFALO	BRIGHTWOOD LIFT STATION - 3306 GATESVILLE RD	POWER FAILURE ON DUKE POWER SIDE
T. Z. Osborne	NC0047384	3/30/99	5,000	SOUTH BUFFALO	S HOLDEN RD @ I-85 (BEHIND HOWARD JOHNSON HOTEL)	12" MAIN STOPPED WITH GREASE
T. Z. Osborne	NC0047384	4/18/99	1,500	SOUTH BUFFALO	1200 BLOCK OF EAST SIDE DR	10" MAIN STOPPED WITH ROOTS
North Buffalo	NC0024325	4/30/99	50,000	NORTH BUFFALO	CRIDLAND RD @ LATHAM RD	INFILTRATION FROM RAIN
North Buffalo	NC0024325	4/30/99	2,000	NORTH BUFFALO	CRIDLAND RD @ TENNIS COURTS	INFILTRATION FROM RAIN
North Buffalo	NC0024325	5/ 5/99	2,000	NORTH BUFFALO	2000 GLENSIDE DR	8" MAIN STOPPED WITH GREASE
North Buffalo	NC0024325	7/ 7/99	2,000	NORTH BUFFALO	ALPINE ST @ GORDON ST	8" MAIN STOPPED WITH GREASE
North Buffalo	NC0024325	7/22/99	2,500	NORTH BUFFALO	BRIGHTWOOD LIFT STATION (3306 GATES RD)	#2 PUMP LOST PRIME
T. Z. Osborne	NC0047384	8/19/99	3,000	SOUTH BUFFALO	CHATEAU DR @ AMBER LN	7.125" MAIN STOPPED WITH GREASE
North Buffalo	NC0024325	9/19/99	8,000	LAKE TOWNSEND	PEACH ORCHARD LIFT STATION (5148 N CHURCH ST)	SNAKE CRAWLED ACROSS POWER LINE CAUSING POWER FAILURE ON DUKE POWER SIDE
North Buffalo	NC0024325	10/26/99	1,500	NORTH BUFFALO	DENNY RD @ N CHURCH ST (ON OUTFALL)	8" MAIN STOPPED WITH GREASE & ROOTS
North Buffalo	NC0024325	10/29/99	2,000	NORTH BUFFALO	COLONIAL DR @ LIBERTY DR	8" MAIN STOPPED
North Buffalo	NC0024325	11/12/99	63,000	NORTH BUFFALO	BRIGHTWOOD LIFT STATION	OVERFLOW FROM REEDY FORK LIFT STATION BEING DOWN
North Buffalo	NC0024325	11/30/99	2,000	LAKE JEANETTE	KENNETH RD LIFT STATION	TWO PRIMARY WIRES GOING TO PUMP #1 BURNED CAUSING STATION TO FAIL TO OPERATE
North Buffalo	NC0024325	12/11/99	5,000	NORTH BUFFALO	1300 TILLERY DR (@ TEXTILE DR)	12" MAIN STOPPED WITH SAND & DIRT