HISTORY

Sanitary sewer construction in Solon was initiated in 1929, and the first centralized treatment facility was commissioned in 1962. This conventional activated sludge facility had a design capacity of 1.4 million gallons per day (mgd). Solids handling consisted of anaerobic digestion and sludge drying beds. A second treatment facility, the Northeast Wastewater Treatment Plant (WWTP), was constructed in the mid-1960's to service the northeast area of Solon.

Rapid growth within city limits led to the first of three plant expansions at the Central WWTP. The first expansion, completed in 1970, increased the design average daily flow capacity to 2.4 mgd. Improvements included additional secondary treatment units and chlorinated (disinfection) facilities. A sludge thickener and centrifuge were added to improve solids handling and disposal capabilities.

Continued growth within Solon, including a substantial industri component and more stringent effluent discharge limits, necessitated a plant expansion. This expansion was completed in 1980. The growth component spurred the average daily design flow increase to 3.6 mgd. The contributing industrial wastewater flow and more stringent regulatory limits necessitated improvements of advanced secondary and tertiary treatment. Major wet stream improvements included automatic bar screens, a grit classifier, and grease separator, new primary and secondary clarifiers, high rate trickling filters, additional aeration tanks, rapid sand filtration, and expanded chlorination facilities. Vacuum filters, a dissolved air flotation thickener, and a purifax sludge stabilization system were added to the solids stream process.

Further, in the 1980's, the city retrofitted various processes to improve efficiencies. These improvements, considered minor, included adding two belt filter presses, retrofitting the aeration system with fine bubble diffusers, and adding odor control systems.

SOLON CENTRAL WATER RECLAMATION FACILITY PROCESS FLOW DIAGRAM

WET STREAM PROCESS

INFLUENT

Wastewater entering the plant from the collection system may be diverted to equalization basins utilized for storm flow, attenuation, daily peak shaving, and industrial shock load storage. The equalized flow is discharged into the wet stream process in a manner that affords optimal treatment.

PRELIMINARY TREATMENT

Preliminary treatment consists of automatic bar screens and grit tanks with classifiers. The materials removed are disposed of at a sanitary landfill

PRIMARY TREATMENT

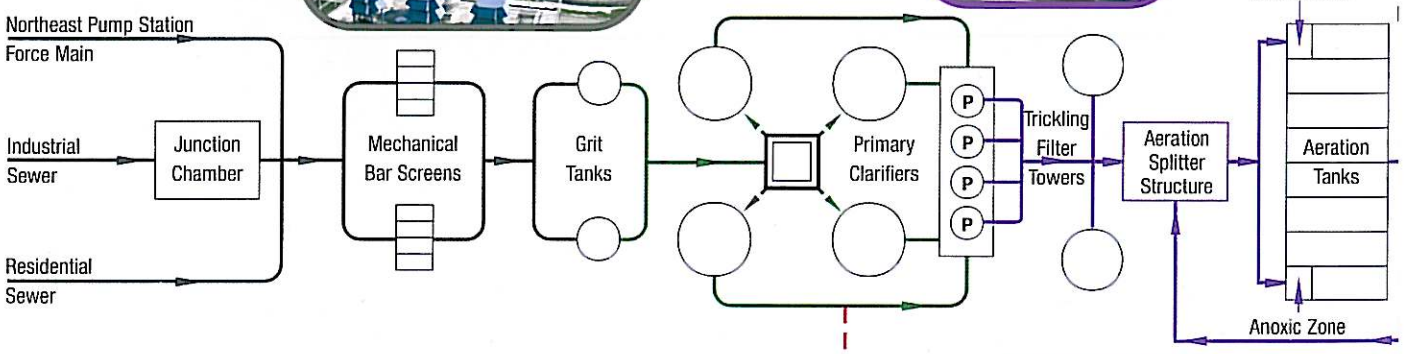
Primary settling is accomplished in four (4) primary clarifiers, and raw sludge removed is pumped to the anaerobic digesters. Floatable solids are removed and pumped to the Bar Screen Building and separated by a grease concentrator.

SECONDARY TREATMENT

Influent flow to the secondary treatment process is split between three (3) trickling filter towers. They can be operated as roughing or high rate towers. These are equipped with variable speed distributor arms to remove carbonaceous biochemical oxygen demand (BOD). Tower effluent can be recirculated to provide additional treatment and/or to ensure sufficient filter wetting rates.

Primary Clarifiers

Towers



SOLIDS STREAM PROCESS

Raw sludge removed from the primary clarifiers is pumped to the complete mix anaerobic digesters for volatile solids reduction prior to dewatering and stabilization. Digested primary sludge is blended with the waste activated sludge and thickened on the belt thickeners. Thickened sludge is then dewatered utilizing belt filter presses. Sludge cake can then be directed to the lime stabilization equipment capable of producing a Class A biosolid product, or directly loaded to a tractor-trailer and transported to the ultimate disposal site.

Aeratio Tanks

Anaerobic Digesters

In 1988, the City's Northeast WWTP was converted to a pump station. The approximate 1.0 mgd of wastewater flow (from the northeast area of Solon) tributary to that pump station is conveyed via a force main to the Central WWTP.

Shortly thereafter, the city initiated a design for the expansion of the Central WWTP. This expansion to 5.8 mgd, completed in 1997, and intended to serve Solon through build-out, completed the city's consolidation of treatment facilities. Implemented improvements rehabilitated and updated much of the existing equipment and processes. They provided additional primary, secondary, and tertiary wet stream process units, and wet stream equalization units. The solids handling facility was converted to a lime stabilization process. The chlorination disinfection system was removed and an ultraviolet disinfection system was added. Odor control systems were expanded.

In 2007, the city completed the Trickling Filters/Aeration Project. This included the replacement of the trickling tower media and the addition of variable speed distributor arms for greater flexibility in the treatment of variable loads.

The aeration basin was modified with two anoxic zones, a fully automated D.O. control system and the capability to operate a conventional plug flow or step feed aeration system. These improvements allow the plant to maintain a higher solids retention time for the same basin volume to ensure adequate nitrification and reduce solids loading to the secondary clarifiers.

The City is confident that the present facility will meet Nation Pollution Discharge Elimination System (NPDES) limits well into the foreseeable future, based on current standards. The City of Solon Central WWTP is tributary to the Beaver Meadow Run, which is an upstream tributary to Tinkers Creek, the Cuyahoga River, and, ultimately, Lake Erie.

ADVANCED SECONDARY TREATMENT

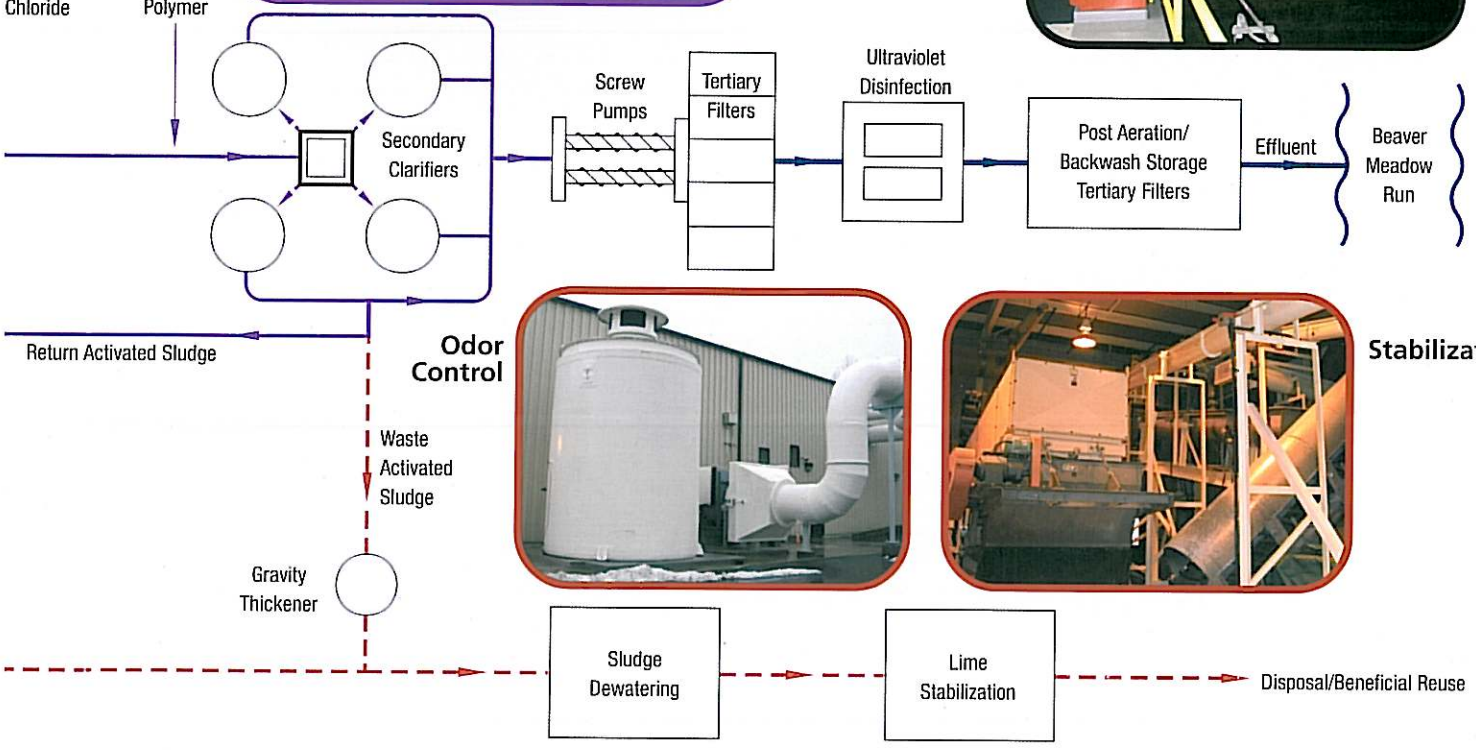
Trickling tower effluent is distributed to the aeration basin where the nitrification process occurs. The basin is equipped with automated air adjustment and fine bubble diffusers and can be operated in conventional plug flow or step feed flow. Anoxic zones at each basin influent facilitate denitrification in the aeration basin before reaching secondary clarification. Ferric chloride and polymer are used to enhance the treatment process. Activated sludge is returned to the aeration basin or wasted to the thickener before being sent to the solids handling building for sludge dewatering and stabilization.

TERTIARY TREATMENT

Screw pumps lift the secondary effluent to five (5) air scoured rapid sand filters to achieve tertiary treatment. Flow from the filters is channeled through two ultraviolet disinfection banks before discharging to the receiving stream. A supervisory control and data acquisition system (SCADA) affords the staff reliable and continuous monitoring of all plant operations.

Secondary Clarifiers

Tertiary Filters



DESIGN DATA

GENERAL	
DESIGN YEAR	2010
DESIGN POPULATION	26,400
DESIGN FLOWS	
Average Daily Flow (mgd)	5.8
Peak Hourly Dry Weather Flow (mgd)	9.6
Peak Hourly Wet Weather Flow (mgd)	23.5 (15.0 w/EQ)
DESIGN CHARACTERISTICS	
BOD5 - Raw	405 mg/l
BOD5 - Effluent	9.0 mg/l
Suspended Solids - Raw	347 mg/l
Suspended Solids - Effluent	10.5 mg/l

WET STREAM FACILITIES

INFLUENT

FLOW EQUALIZATION BASIN	
Volume	
Northeast Pump Station Site, gal.	90,000
SCWWTP Site, gal.	880,000

PRELIMINARY TREATMENT

MECHANICAL BAR SCREENS	
Number	2
Capacity (each), mgd	12
GRIT TANKS	
Number	2
Type	Detritus
Capacity (each), mgd	7.8
Grit Pumps	
Number	3
Type	Vortex
Capacity (each), GPM	205

PRIMARY TREATMENT

CLARIFIERS	
Number	4
Diameter, ft.	50
SWD, ft.	10
Volume (each), gal.	147,000
Surface Overflow Rate @ ADF, gpd/sf	740
EFFLUENT PUMPS	
Number	4
Type	Submersible
Capacity (each), GPM	5,231

SECONDARY TREATMENT

TRICKLING FILTERS	
Number	3
Diameter, ft.	45
Media Depth, ft.	34
Surface Area (total), sf	4,770
Volume (total), cf	162,225
BOD5 Loading, lbs./1,000 cf	88
AERATION TANKS	
Number	8
Volume (total), cf	164,000
Detention Time @ ADF, hrs.	5
BLOWERS	
Number	3
Capacity (each), cfm	3 @ 5,000
CLARIFIERS	
Number	4
Diameter, ft.	55
SWD, ft.	12
Volume (each), gal.	213,750
Surface Overflow Rate @ ADF, gpd/sf	610
Solids Loading Rate, lbs/day/sf	35

TERTIARY TREATMENT

TERTIARY FILTERS	
Number	5
Area (each,) sf	378
Filtration Rate @ ADF, gpd/sf	2.67
Filtration Rate @ Peak, gpd/sf	5.0
DISINFECTION	
Ultraviolet Disinfection	
Number of Channels	2
Number of Banks/Channel	2
Number of Bulbs (total)	416

BIOSOLIDS FACILITIES

GRAVITY THICKENER	
Number	1
Diameter, ft.	30
SWD, ft.	10
Surface Overflow Rate, gpd/sf	600
ANAEROBIC DIGESTERS	
Number	2
Diameter, ft.	30
SWD, ft.	10
Volatile Suspended Solids Loading, lbs/1,000 cf	0.063
SLUDGE CONDITIONING/DEWATERING	
Gravity Belt Thickeners	
Number	2
Belt width, meters	2.2
Capacity (each), lbs. dry solids/hr.	1,700
Belt Filter Presses	
Number	2
1.5 Meter Press	
Capacity (each), lbs. dry solids/hr.	900
2.0 Meter Press	
Capacity, lbs. dry solids/hr.	1,200
Lime Stabilization Process	
Capacity, lbs. dry solids/hr.	850
Biosolids Cake Storage	
Area, sf	3,100
Cake depth, ft.	3
Volume, cy	350

ACKNOWLEDGEMENTS

The planning design, construction, and continued successful operation of Solon's Water Reclamation Facility is credited to the dedication of former and present plant operators, various offices of the City's administration, the Mayor, members of Council, consulting engineers, and general contractors.